Swinomish Indian Tribal Community
U.S. EPA Brownfields Assessment Grant
Sampling Quality Assurance Plan

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ACROYMNS AND DEFINITIONS

1.0 INTRODUCTION

Environment International, Ltd. (EI) prepared this Sampling and Quality Assurance Plan (SQAP) following guidance from Swinomish Indian Tribal Community (SITC or the Tribe) to discuss all planned field and laboratory methods, requirements, and Quality Assurance/ Quality Control (QA/QC) procedures prior to conducting environmental sampling at various sites located throughout the Tribe's property with development potential.

The SQAP provides a mechanism to obtain regulatory agency approval of the proposed activities and to communicate to key stakeholders the sampling rationale and objectives, details of the sample locations and collection procedures, and details associated with analytical procedures and data reporting.

2.0 PURPOSE AND OBJECTIVES

The purpose of the SQAP is to describe the field sampling and data gathering methods to be used at the Site in detail, and will include an introduction, Site background, sampling objectives, sampling locations and frequency, sampling procedures and equipment, task management responsibilities and a schedule for completion of the field investigations and reporting activities. Specifically, the SQAP describes detailed sampling and analytical standard operating procedures (SOPs); QA/QC methods to ensure that the results of the work performed satisfy the data quality objectives (DQO) dictated by the intended use of the data; project instructions; laboratory method detection limits; reporting limits; compound-specific state regulatory standards tables; and data evaluation procedures.

The overall objectives of this assessment are to: 1) develop and execute plans to determine whether contamination exists based on past and present land use; 2) determine if existing contamination is below appropriate clean-up levels for future planned land uses; and 3) prepare a report and respond to comments of SITC, and, as appropriate, other stakeholders.

3.0 SITE BACKGROUND

The Swinomish Indian Reservation (Fig. 1) encompasses approximately 7,400 acres of uplands, almost 2,900 acres of tidelands, and 420 acres of freshwater wetlands. The reservation is a peninsula located on the southeast side of Fidalgo Island, Skagit County, Washington. It is 95% bounded by water - by the Swinomish channel to the east, Padilla Bay to the north, and Skagit, Kiket and Similk Bays to the south and west.

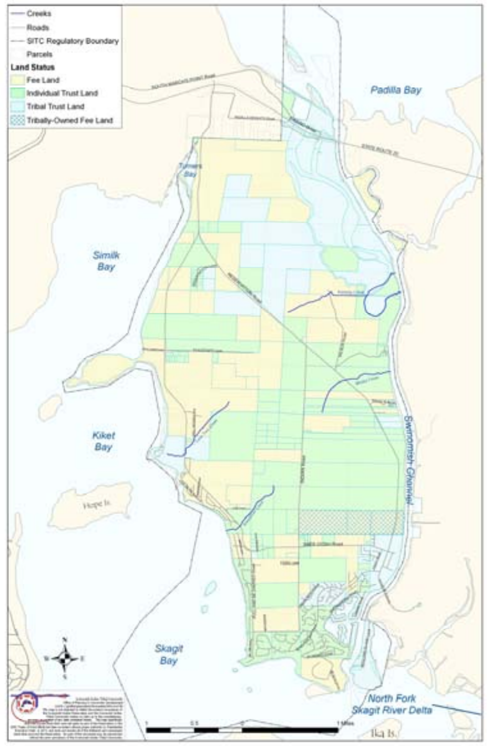

Figure 1. Swinomish Indian Reservation.

The Tribe or individual tribal members own about 58% of the non-tidal lands of the reservation, as well as 2900 acres of the intertidal lands surrounding it. The remaining 42% of the non-tidal lands have been passed out of Indian hands into non-Indian private ownership.

The reservation population is estimated at 4,800 (2006), of which approximately 800 are enrolled SITC members or other American Indians. Members of the SITC are descendents of the Swinomish, Kikiallus, Samish, and lower Skagit Tribes. The culture and economy of these peoples were centered on natural resources, including salmon, shellfish, and other marine resources, as well as resources from the uplands. Salmon and shellfish are still a principal resource base. Two hundred fishermen participate in the harvest of salmon and crab, and many others harvest shellfish for subsistence. Shellfish harvest consumption rates by tribal members are 20 to 40 times that of the general population, and fish consumption 10 times that of the general population. Because of these consumption rates, contamination of fish and shellfish stocks by hazardous materials is of a particular concern to the SITC.

The areas of concern include sites within four areas being investigated under the SITC's Brownfields Grant, these areas are designated as McGlinn Island, the Front Street Site, and Tribal Economic Zone (TEZ) Areas 1 and 2. A preliminary investigation was prepared for each area that describes the past usage, the locations and contaminants of concern, the potential future development, and the previous environmental assessments that were performed. This SQAP was prepared with the information gained from these preliminary investigations, interviews with the SITC, and a site visit conducted by EI and the SITC.

3.1 TEZ Area 1

TEZ Area 1 (Fig. 2) contains approximately 58 acres of uplands and 145 acres of intertidal area on Padilla Bay, west of the Swinomish Channel. The Swinomish Channel is a periodically dredged, navigable waterway that connects Padilla Bay in the north to Skagit Bay in the south. Uplands in Area 1 are classified as “made lands” by the National Resource Conservation Service (NRCS), as they were constructed by filling in former tidelands (primarily mudflat). The fill material consists almost completely of dredge spoils from the channel.

3.1.1 Geology/ Hydrogeologic Conditions

The surficial dredge spoils in Area 1 are fine to medium sands that are excessively drained, have moderately high saturated hydraulic conductivity, and are apparently quite infertile. The water table in this area is tidally influenced and high, given the low elevation of the filled areas, and is likely saline. There are reportedly no active or abandoned wells in Area 1; all drinking water is piped municipal water. Several current or abandoned septic systems exist, including a large mound system associated with the casino.

3.1.2 Locations of Concern

The two areas in TEZ Area 1 where sampling is to be conducted are the Lime Storage Area, and the Tidal Flats.

The Lime Storage Area was a former lime storage and staging area where lime material was transported from a barge to the storage area via a conveyor belt. The concrete slab floor of the former facility remains on the site, but the building and equipment have been removed. The site includes a deteriorating pier that was partially damaged by fire, and a creosoted bulkhead. The facility was thought to have handled material for the local farms to use as fertilizer; this would include lime and lime supplements. Yellow material exists in the soil beneath the previous location of the conveyor belt. The yellow material is a compressed powder that can be broken easily by hand, and can be found beneath the soil surface. The composition of this material has not been confirmed, but it appears to be sulfur based. Agricultural lime may require the addition of sulfuric acid for the effects to be released; therefore, it is feasible that sulfuric acid was stored at this facility. The Tribe has also noted that weeds do not grow well in this area, but the reason for this is not clear. The contaminants of concern at the Lime Storage Area include metals, and sulfate. The lime may have raised the pH of the soil to a damaging level, and possibly migrated to the ground and surface water. For this reason, the soil shall be monitored for pH, with an option to analyze the groundwater if the soil shows an elevated pH. The soil at the Lime Storage Area shall also be evaluated for Arsenic, Organic Chlorides, and Aroclors as these substances are used in concurrence with lime for agricultural purposes, and may have been handled at this facility.

The tidal flats in TEZ Area 1 on the northern boundary of the reservation are an important natural resource to the SITC, and are adjacent to the former Whitmarsh Landfill Site. The landfill has been covered with soil in the 1970’s, but a sulfuric smell and leachate has been noted at the landfill. An analysis of the collected soils in the Tidal Flats revealed concentrations of a number of PAHs, phenols and cresols above Toxics Cleanup Program (TCP) Model Toxic Cleanup Act (MTCA) Method A cleanup levels. A Burlington Northern rail spur runs through the area, and is known to release petroleum coke on the site. EI witnessed piles of released petroleum coke on the Tribe's property along the rail spurs during the site visit. The EPA has plans to further evaluate the sediments in the Tidal Flats, but it is unknown whether SITC property will be included in this evaluation. Contaminants of concern at the Tidal Flats include total petroleum hydrocarbons (TPH) from the petroleum coke, and Polyaromatic hydrocarbons (PAHs), phenols , and cresols from the Whitmarsh Landfill accumulating in the shellfish.

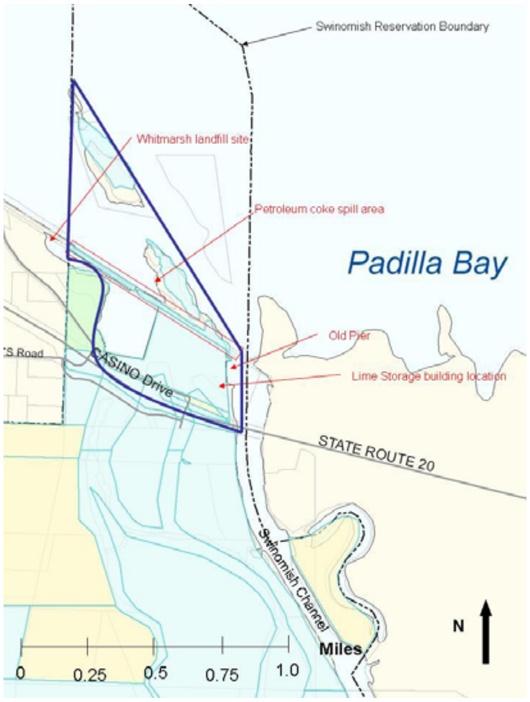

Figure 2. TEZ Area 1, Swinomish Indian Reservation Tribal Economic Zone

3.2 TEZ Area 2

TEZ Area 2 consists of approximately 280 acres of uplands and freshwater palustrine wetlands south of SR 20 and adjacent to the west side of the Swinomish Channel (Fig. 3). In the late 1800s dikes were constructed along the western edge of the Channel and Padilla Bay to the north to isolate the area from tidal flooding. Natural channels and man-made ditches, in conjunction with tide gates, drained this area sufficiently for much of it to be used for agriculture. In 1937 the Army Corps of Engineers completed the dredging of the Swinomish Channel from a series of sloughs to create a navigable channel between Skagit and Padilla Bays. The area is bounded by the Swinomish Channel to the east, SR 20 to the north, and additional diked and drained lands to the south. To the west, a 120-180 foot bluff separates Area 2 from the forested uplands of the reservation.

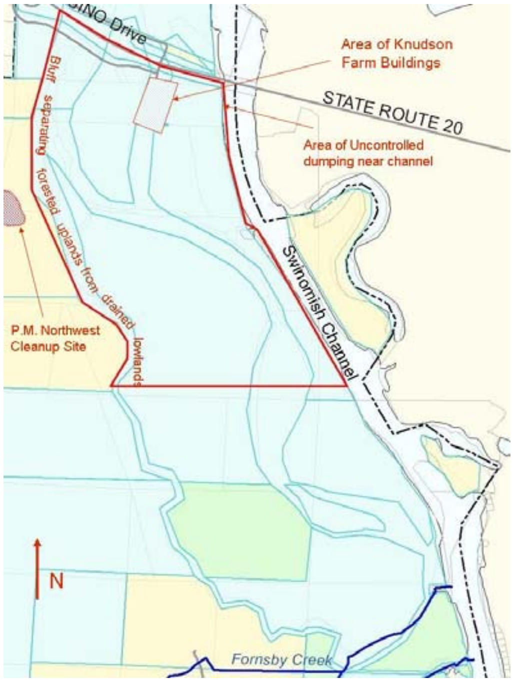

Figure 3. TEZ Area 2. Swinomish Tribal Economic Zone south of SR 20.

3.2.1 Geology/ Hydrogeologic Conditions

Unfilled areas in Area 2 are composed of drained and un-drained Tacoma silt loam (2007 Natural Resources Conservation Service (NRCS) soil map). These are classified as hydric soils, poorly to very poorly drained with moderately high saturated hydraulic conductivity. At least 80 inches of these alluvial soils overlays the area. The original dike probably consists of these same silt loam soils; however, sandy dredge spoils were piled along the channel atop the original dike until this practice ended around 1988. Bedsides the area along the channel, dredge spoils have been deposited in various other locations, mostly in the north and northeast section of the area. All of the current uplands in Area 2 have been classified as previously converted wetlands.

3.2.2 Locations of Concern

The only location in TEZ Area 2 where sampling will be conducted is a pile of wood of unknown origin that is believed to have been treated with creosote. Sampling will be conducted to determine whether the creosote could have contaminated the soil surrounding the pile.

3.3 Front Street Site

The Front St. Store Site a one acre plot of land located on the east side of Front St., in the Swinomish Tribal Village, adjacent to the seafood processing plant (Figures 4 and 5).

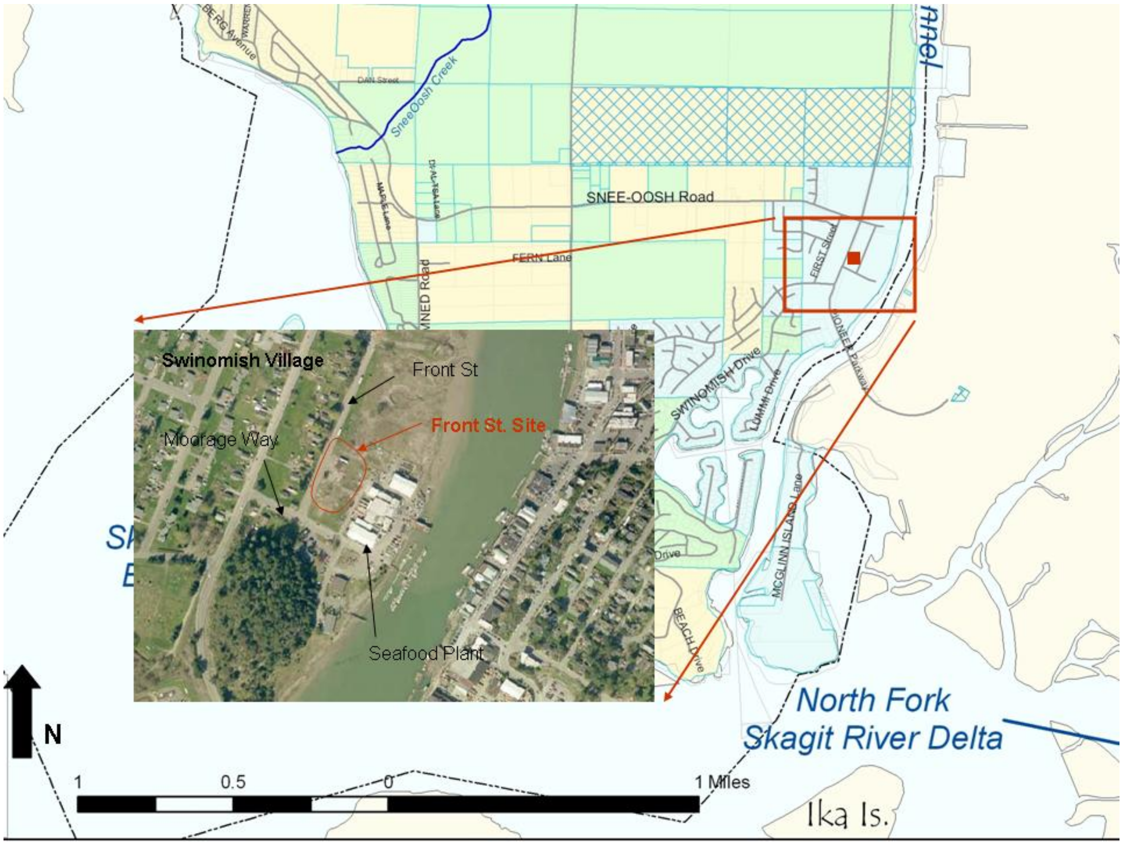

Figure 4. Front St. Site.

On the site there is an abandoned and badly deteriorated structure that used to be a liquor and convenience store. A refrigerated trailer is adjacent to the rear of the store. At the east side of the site, adjacent to the seafood plant, is a collapsed wooden building. The Front St. site has become a magnet for illegal dumping and much debris has accumulated, including fuel tanks, household appliances, and vehicles. The building predates the municipal sewage system so it's likely there is a septic system on site. No above-ground tanks are present, and there are no obvious indications of any belowground tanks. There is no evidence there were ever gas pumps here.

Figure 5. Detail of Front St. Site

3.3.1 Geology/ Hydrogeologic Conditions

This site is built on dredge spoils created when the US Army Corp of Engineers dredged the Swinomish Channel in the first part of the 20th century. The surficial soils are sandy and excessively drained. Given its proximity to the channel the water table is likely to be high, saline and tidally influenced.

3.3.2 Locations of Concern

The environmental concern at the Front Street Site is the former store, the collapsed building, and the large debris that has been abandoned at the site. Of specific concern is whether asbestos or lead has migrated from the buildings and abandoned debris to the surrounding soil, if hazardous substances have been dumped into the septic system and have migrated to the surrounding soil, and the possibility that the refrigerator trailer released Freon to the environment. The presence of lead based paint will be analyzed using x-ray fluorescence, and material from inside the building will be analyzed for asbestos.

3.4 McGlinn Island

McGlinn Island is approximately a 50 acre natural island on the east side of the Swinomish Channel, connected by a man-made causeway to the mainland south of the town of La Conner (Fig. 6). The causeway consists of approximately 58 acres of dredge spoils from the Swinomish Channel.

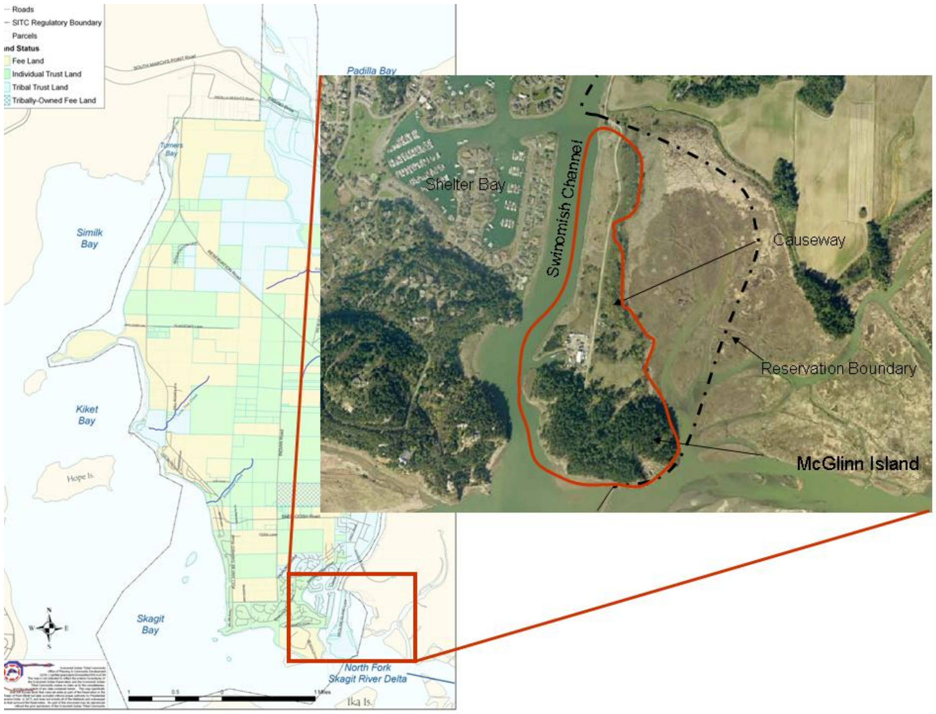

Figure 6. McGlinn Island Vicinity.

3.4.1 Geologic/ Hydrogeologic Conditions

McGlinn Island itself is a rock outcrop with a sandy bald located on its north side. Geologically, the island is a seastack almost entirely buried by alluvial material. Fig. 3 is a historical map showing the extent of the original island prior to Swinomish Channel dredging operations in the early 20^{th} century. The causeway consists entirely of sandy excessively drained dredge spoil material deposited into previously intertidal lands. McGlinn Island Lane is a gravel road that provides access to the island from La Conner.

The water table on the causeway is likely high, saline, and certainly tidally influenced. There are most likely abandoned wells on McGlinn Island along with the current SITC deep well. Septic systems may exist associated with Latitude Marine and the previous and current structures on the Island, including the Skagit Plastics factory at the north end of the causeway. The existence of any underground storage tanks is unknown.

3.4.2 Locations of Concern

Latitude Marine, a non-Tribal commercial boat yard that operates on land leased from the SITC, is located on the southern end of the causeway. Adjacent to the northern end of the tribal trust land on the causeway there are several large concrete slabs. The slabs are remnants from a fiberglass boat building facility in operation from the mid-1950's to no later than the mid-1970s (Fig. 7). The building was destroyed by fire in the early 1980's, and most of the debris has been removed from the site. Just south of the location of the former fiberglass boat facility is a partially buried pile of burned wood and rusted paint cans. It is speculated that this debris originated from the former fiberglass boat facility, but this has not been confirmed.

Figure 7. Fiberglass boat factory foundation

Besides buildings associated with Latitude Marine, an unoccupied residence (previously used by a caretaker) is located south of Latitude Marine, as well as a deteriorating older building and a mobile home. At the south end of McGlinn Island Lane a pump house for a deep well is maintained by SITC Public Works. No other buildings are located on the island or causeway.

Near Latitude Marine a considerable amount of uncontrolled dumping has occurred, including vehicles, scrap metal and boats. Along the causeway, most debris consists of weathered creosote pilings and timbers, both in the water and ashore along the causeway.

Due to the fire that destroyed the former fiberglass boat facility, this site has a potential for dioxin contamination at the former location of the building and at the site of the pile of burned debris. The former use of the site indicates that there is a concern for metals, asbestos, and semivolatile organic compounds (SVOC). Also, the large abandoned debris may have released oil and gas into the environment.

4.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

SITC will manage the sampling event with assistance from EI. The table in Section 4.1 depicts the personnel that will participate on this project.

4.1 Personnel Assignments

Project Role	Personnel Assignment	Responsibility
Principal Manger - SITC	**Scott Andrews** 360-466-7280 sandrews@swinomish.nsn.us	Overall contract management, resource assignments, and technical and project management
Project Scientist - SITC	**Jon Boe** 360-466-7280 jboe@swinomish.nsn.us	Ensure that samples are collected, transferred, and documented in accordance with this SQAP. Coordinate on issues concerning quality control Coordinate with the Analytical Laboratory to ensure that chemical analyses are performed in accordance with the project specifications.
Consultant Manger - EI	**Valerie Lee** 206-525-3362 W 207-409-6060 M Email: valerie.lee@eiltd.net	Overall contract and client management, resource assignments, and technical and project management for EI.
Field Coordinator - EI	**Peter Graziani** 206-525-3362	
Project Chemist	**Jennifer Arthur** 206-525-3362	Oversee Data Validation and Analysis
QA Manager	**Aron Borok** 503-484-5711	Oversee project QA
Analytical Laboratory Project Manager	**To Be Determined**	Receive samples from EI Personnel for analysis of analytes

4.2 Schedule

The project began with a kickoff meeting on April 9, 2008, and a site visit was conducted by EI on May 15, 2008. SITC proposes to develop and obtain approval of this SQAP and a Site Health and Safety Plan in time to perform the sampling by mid-August with an estimated 21-day turn-around time with preliminary results expected within 48 hours for all of the sample results. Laboratory results will be sent to Jon Boe by email (jboe@swinomish.nsn.us). The exact schedule for the sampling will be coordinated at a later date with the SITC.

Following the initial round of soil sampling, the goal is to complete validation and analysis of data by mid-October. During the remainder of October and early November, if requested by the SITC -- EI will develop the risk assessment, identify possible cleanup options, and calculate cost estimates for site remediation in cooperation with SITC. This would allow producing a draft Site Assessment report by early-mid November for SITC review and final report by early to mid-

December. This schedule allows some leeway to manage unforeseen delays such as additional deliberations with stakeholders or discovery of additional contaminants.

5.0 PROJECT DESCRIPTION

5.1 Sample Method

SITC will collect grab samples from the soil at the locations of concern in each area. The exact location of the samples will be determined in the field and based on visual inspection of the sites. The sampler will select locations where visual presence of the contaminants of concern in the soil is observed. Each contaminant of concern is detailed in Section 3 of this SQAP, and differ at each site.

The sample locations will be recorded with a GPS. Tables 1 through 3- depicts Data Quality Objectives (DQOs), and locations of the soil samples.

5.2 Native Soil Sampling

The native soil will be sampled for PCBs, SVOCs, TAL Metals, TPH, Arochlors, Organic Chlorides, Asbestos, Lead, and Dioxins. A clean, stainless-steel spade shovel will be used to collect soil to a depth of approximately 1 foot deep at each grab sample location. An eight (8)-ounce jar will be filled with the soil from each sampling location using a clean stainless steel spoon, and stored by EI at a temperature of 4º C until delivered to the laboratory.
The analysis of the soil depends on the location of the sample. Tables 1-3 depict the correlation between the sample locations and the analyses required.

5.3 Water Sampling

EI does not plan to collect water samples at this time.

5.4 PID

EI will screen soil samples by removing the top surface cover (3-6 inches) with a clean stainless-steel scoop and measure organic compounds with a Photoionization Detector (PID). The PID will be placed in the hole to get an initial reading. If there is a reading close to 10 ppm, the soil will be placed and sealed in a zip-loc bag, be allowed to warm if possible, and be shaken and kneaded through the bag to release inter-granular gases. A small opening will be made in the seal, and the end of the PID sampling tube will be inserted into the bag. Any detection of volatile gas will be recorded on field collection forms with a GPS location noted.

The purpose of the PID is to determine the possibility of SVOC or TPH contamination at a specific point. The PID will be used in locations where contamination is possible, but not visible such as locations beneath outboard motors or abandoned machinery that do not have a visible spill or leakage. The PID will also be utilized at locations where a soil sample is taken to help determine the extent of the contamination.

5.5 Sample Collection Procedures

To collect the surface grab soil samples, a pre-cleaned, stainless steel scoop will be used to obtain soil samples by transferring soil from a pre-cleaned spade shovel to the sample container. Samples will be collected in glass jars with caps tightly secured and placed in the cooler with ice to 4ºC. Between each compositing set of samples, tools will be thoroughly cleaned with Alconox soap and rinse with deionized (DI) water to prevent cross contamination.

5.6 Investigation Derived Wastes

Investigation Derived Wastes (IDWs) are routinely generated for site investigation activities, including excess soil samples, personal protective equipment (PPE), sampling equipment, and other wastes. Used PPE and non-soil solid waste generated during field activities will be collected in plastic trash bags. Excess soil will be left onsite pending the results for final disposition of the site.

5.7 Preparation of the Investigation Report

Results of the investigation will be presented in a final report. The report will include the following items, as appropriate:

- Summary of field and analytical activities and findings
- Summary of data usability and any impact on data quality
- Recommendation of further action
- Tabulated analytical data tables
- Figures depicting sample locations, contaminant distribution, and groundwater contours
- Exploration logs and any sample alteration forms

Sampling forms (including chain-of-custody), field notes and corrective action forms will be included in the site file that is submitted to EPA after the project.

6.0 DQOS AND CRITERIA FOR MEASUREMENT DATA

DQOs are the quantitative and qualitative terms used by EPA to describe how good the data needs to be in order to meet the objectives of the project. DQOs for measurement data (referred to here as data quality indicators) are precision, accuracy, representativeness, completeness, comparability, and measurement range. The overall QA objective for analytical data is to ensure that data of known, acceptable and legally defensible quality are generated. To achieve this goal, data must be reviewed for 1) precision, 2) accuracy or bias, 3) representativeness, 4) comparability, and 5) completeness. Tables 1 through 4 depict the DQOs for soil at the SITC property.

6.1 Precision

Precision measures the scatter in the data due to random error. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average values. Analytical precision is measured through matrix spike/matrix spike duplicate (MS/MSD) samples for organic analysis and through laboratory duplicate samples for inorganic analyses. Analytical precision is quantitatively expressed as the relative percent difference (RPD) between the MS/MSD or duplicates.

Field and analytical precision will be evaluated by the relative percent difference (RPD) between field duplicate samples and laboratory duplicate samples; laboratory accuracy and precision will be determined by the spike recoveries and the RPDs of the MS/MSD samples, respectively.

$$RPD = \frac{(R1 - R2)}{((R1 + R2)/2)} \times 100$$

R1 = Recovery for MS or initial analyte concentration
R2 = Recovery for MSD or duplicate sample concentration

The precision goals for this study are 35% for soil, sediment, and water samples.

6.2 Accuracy

Accuracy measures the closeness of the measured value to the true value. Analytical accuracy is assessed by "spiking" samples with known standards (surrogates or matrix spikes) and establishing the percent recovery. When a known amount of surrogate is added to a sample and its percent recovery is within laboratory established control limits, then the analyte values in the sample are considered accurate.

Accuracy will be evaluated by the use of percent recovery (%R) of the target analyte in spiked samples and surrogates in all samples and QC samples.

$$\%\ Recovery = \frac{SQ - NQ}{S} \times 100$$

SQ = quantity of spike or surrogate found in sample
NQ = quantity found in native (unspiked) sample
S = quantity of spike or surrogate added to native sample

6.3 Representativeness

Representativeness is the degree to which data from the project accurately represent a particular characteristic of the environmental matrix, which is being tested. Representativeness of samples is ensured by adherence to standard field sampling protocols and standard laboratory protocols.

The design of the sampling scheme and number of samples should provide a representativeness of each matrix or product of the chemical processes being sampled.

6.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of standard techniques for both sample collection and laboratory analysis should make data collected comparable to both internal and other data generated. Sample collection methods and other field methods are described in Section 5.0.

Comparability is the measurement of the confidence in comparing the results of this study/project with the results of a different study/project using the same matrix, sample location, sampling techniques and analytical methodologies.

6.5 Completeness

Completeness is defined as the ratio of acceptable (non-rejected) measurements obtained to the total number of measurements for an activity. The completeness objective for this project is 100 percent.

Completeness is the percentage of valid results obtained compared to the total number of samples taken for a parameter. Since sampling is by grabs and limited in number of samples, the number of valid results obtained from the analyses are expected to be equal or better than 90%. Percent completeness may be calculated using the following formula:

$$\% \text{ Completeness} = \frac{\text{\# of valid results}}{\text{\# of samples taken}} \times 100$$

The QA objectives outlined, above, will be evaluated in conjunction with the data validation process.

6.6 Corrective Action

If procedures in the field or the lab are not performed to the project specifications and data quality objectives are not met, specific corrective actions will be determined that may include but are not limited to the following:

- Identifying the source of the violation
- Re-analyzing samples if holding time criteria permit
- Re-sampling and analyzing
- Evaluating and amending sampling and analytical procedures
- Accepting data and flagging it to indicate the level of uncertainty.

6.7 Documentation and Records

The sample collection team will maintain field notes in a bound waterproof notebook, photographs of the area and sampling points, and chain-of-custody documents. The locations of the sampling points will be documented using GPS technology. All sample collection related documents, records, and summaries of data generated will be kept by the Project Engineer in a project file.

The following documents will be archived at the lab(s): (1) signed hard copies of sampling and chain-of-custody records; and (2) electronic and hard copies of analytical data including extraction and sample preparation bench sheets, raw data and reduced analytical data. The laboratory will also store all sample receipt, sample login, extraction documentation, and laboratory instrument documentation per the lab's SOP.

7.0 ON-SITE HEALTH AND SAFETY

All staff conducting site investigation will have up-to-date HAZWOPER certifications consistent with OSHA requirements and will comply with the site-specific Heath and Safety Plan.

8.0 SAMPLING METHODS REQUIREMENTS

All sampling, decontamination, and recording procedures will be conducted in accordance with the EPA Standard Operating Procedures. SITC will utilize the 'Forms II light' program for all documentation including, but not limited to, the chain-of-custody, procedure deficiency reports, and sample labels. Information regarding the 'Forms II Light' Program can be found at: http://www.epa.gov/superfund/programs/clp/f2lite.htm

SOPs for Decontamination, Sample Labels, Sample Package, Sample Preservation, and Investigative Derived Waste can be found in Appendices A through F.

8.1 Sample Requirements

Soil samples will be collected using only certified clean sample containers provided by the laboratory will be used in the field. Container type, number, volume, preservatives, and maximum sample holding times to extraction and/or analysis will be completed as specified by the respective analytical methods. Table 2 includes a summary of the sample container sizes, preservatives, and holding times for the project.

8.2 Equipment Decontamination

For non-dedicated sampling equipment and tools, the following decontamination procedure will be followed: (1) the tools will be brushed cleaned prior to use with laboratory grade soap (Alconox) and rinsed with water, (2) methanol or acetone will be used to clean the equipment of any oily residue and (3) equipment will be rinsed with deionized water as a final rinse. Any equipment which can be used only once will not be reused for field sampling. See appendices A and F for the standard operating procedures for decontamination.

8.3 Sample Handling and Custody Requirements

Samples will be stored in coolers and kept under custody at all times. An EPA Region 10 FORMS II Lite^{TM} Chain of Custody form will be completed in indelible ink for each shipping container (e.g., ice chest) used. Each sample will be included in the field data sheets and given individual numbers to match the bottles and the field data sheets. Prior to sealing the ice chest, one copy of the COC form and a copy of the field record sheet will be sealed in a re-sealable waterproof plastic bag. This plastic bag will be taped to the inside cover of the ice chest so that it is maintained with the samples being tracked. Ice chests will be sealed with reinforced tape for shipment. Until the field samples are relinquished to the laboratory, the samples will be kept in coolers with ice and cooled to approximately 4º C. Each cooler will have an accompanying temperature blank.

9.0 ANALYTICAL METHOD REQUIREMENTS

The procedures used for sample analysis are depicted in Table 1. The laboratory shall follow the standard methods throughout this sampling event.

9.1 Quality Control Requirements

Quality control samples will be collected as required by the EPA laboratory. Matrix spikes, matrix duplicates spikes, blind samples, reference materials laboratory blanks and participation in performance evaluation studies are all used to ensure that the data are of known documented quality. Soil duplicate samples, collected as composites or grab samples, will be collected in 10% of the total, or approximately 4 samples. To test for proper decontamination of equipment between collecting samples, approximately 5% of the total, or 2 samples, will be collected by rinsing sampling equipment with water provided by the laboratory.

All of the field instruments will be calibrated and used in accordance with the specified EPA methods and the manufacturer’s instruction manual.

9.2 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

The Field Coordinator is responsible for testing, inspection and maintenance of the field instruments used for sample collection. The laboratories will follow their standard operating procedures for any preventive maintenance required on laboratory instruments or systems used for this project.

9.3 Calibration Procedures and Frequency

Field maintenance and calibration will be performed prior to use of the instruments according to manufacturer’s specifications when appropriate. The laboratory will follow the calibration procedures found in the specified EPA method or in the laboratory's SOPs. Table 5 depicts the calibration frequency for each piece of equipment. Table 6 depicts procedures that EI will follow to prevent false readings from the field sampling equipment.

9.4 Inspection/Acceptance Requirements for Supplies and Consumables

All sample containers used for this project will be new and certified clean by MEL. Sample collection team will make note of the information on the certificate of analysis that accompanies sample containers to ensure that they meet the specifications and guidance for contaminant free sample containers.

10.0 DATA MANAGEMENT

A field sampler's notebook, photos, GPS location data and the FORMS II Lite™ Chain of Custody will be used to document the sampling and inspection activities providing the following information: site name, sample number, date, time of each sample collection, sampler's name or initials and sampling location. If applicable, a suffix l-FD will be appended to the sample identified as the field duplicate. For fixed laboratory analyses, field duplicates will be assigned a unique sample identifier and will be submitted 'blind' to the analytical laboratory. Analytical duplicate results will be reported with a trailing –AD (analytical duplicate) or D. Validated laboratory results and necessary interpretation will be appended to the reports. All data generated during this project will be processed, stored, and distributed according to the QASP's specifications and laboratory's SOPs.

10.1 Reports to Management

A draft report will be prepared to document the results of this investigation. A final report containing the sampling locations, data, calculations, and conclusions will be prepared, including a map documenting the sampling locations.

11.0 ASSESSMENT/OVERSIGHT

11.1 Assessments and Response Actions

An internal assessment of the data and results will be conducted by SITC, EI and the Laboratory QA Coordinator which routinely participates in EPA's WP Studies.

Corrective action procedures that might be implemented from QA results or detection of unacceptable data will be developed if required (See Table 7- Corrective Action Form).

Problems encountered during any assignment require appropriate action be taken.

11.2 Field Tasks

The Field Team Leader (FTL) will oversee personnel and subcontractors in the field during the assignment. The FTL will notify the project QA Officer immediately if any problems are encountered. The FTL may proceed in making minor adjustments to field procedures or sample design after notifying the QA Officer. Major corrective actions (i.e. encountering buried drums) require immediate notification of the EPA Project Manager prior to proceeding with the field investigation. All problems encountered and any deviations from or changes made to field procedures or sample design will be documented by the FTL in the field book.

11.3 Laboratory Tasks

The analytical laboratory is responsible for ensuring that all lab tasks are completed in accordance with all methods and SOPs. The laboratory will notify the project QA Officer immediately if problems are encountered with any analysis. The laboratory must maintain its certification with the EPA and the state throughout the assignment.

11.4 Corrective Actions

The QA Officer is responsible for reporting any problems. Any problems reported to the QA Officer will be documented by the QA Officer and a corrective action initiated using a Corrective Action Form. The form includes a summary of the issue, the prescribed corrective action, and the planned verification steps. The QA Officer is responsible for assuring that initial action has been taken and appears effective, and, at an appropriate later day, checks again to see if the problem has been fully solved. All Corrective Action Forms will become part of the permanent site file.

12.0 DATA VALIDATION AND USABILITY

12.1 Data Review, Validation, and Verification Requirements

The summary of all analytical results will be reported to the project managers. The raw data for this project shall be maintained by the laboratory. Data verification will be performed by LAB or the CLP designated laboratory for all the analyses prior to the release of data. The laboratory will archive the analytical data into their laboratory data management system.

12.2 Validation and Verification Methods

All data generated shall be validated in accordance with the methods specified in the QASP and the Functional Guidelines for Organic and Inorganic Data Review. All data generated by the laboratory will be reported to the project managers. Data generated through the CLP will require a "limited" validation as part of EPA Region 10's own internal oversight process. All data should be transmitted to the SITC Brownfields Coordinator, Jon Boe by email (jboe@swinomish.nsn.us).

12.3 Data Usability

A determination of data usability will be made based on the data verification and reviews processes described on forms Q-1 and Q-2. If items are identified which may cause data to be unusable, additional samples may be collected and reanalyzed to provide usable data.

A summary of data usability will be included in the final report. Any deviations or specific data qualifications identified by the Project Chemist will be addressed in terms of the affect it has on the decision making process at the site.

Table 1 – Sample Locations and DQO for Soil Sample

Analyte	Analysis Method	QA/QC Samples	Detection Limits	Accuracy	Precision (RPD)	Completeness	Sample Type	Sample Location	# of Samples
Asbestos	EPA 600/R93-116	Duplicate samples at 10% of total sample	per MEL RL	per MEL	per MEL	100%	Solid	Boat plant, boat dump, McGlinn Island buildings, Front St. site.	Max. 20
SVOC	EPA 8270	Duplicate samples at 10% of total sample, and rinsate blanks at 5% of total samples	per MEL RL	per MEL	per MEL	100%	Surface	5 from boat plant, 20 from boat dump, 7 from McGlinn Island buildings	32
TAL Metals	EPA 6020	Duplicate samples at 10% of total sample, and rinsate blanks at 5% of total samples	per MEL RL	per MEL	per MEL	100%	Surface	5 from boat plant, 20 from boat dump, 7 from McGlinn Island buildings, 2 from creosote area	34
TPH	NWTPH-Dx Extended	Duplicate samples at 10% of total sample, and rinsate blanks at 5% of total samples	per MEL RL	per MEL	per MEL	100%	Surface	20 from boat dump, 5 from lime storage area	25
Dioxins	EPA 8290	Duplicate samples at 10% of total sample, and rinsate blanks at 5% of total samples	per MEL RL	per MEL	per MEL	100%	Surface	5 from fiberglass boat plant; 3 from lime storage area	8
DDT	EPA 8081	Duplicate samples at 10% of total sample, and rinsate blanks at 5% of total samples	per MEL RL	per MEL	per MEL	100%	Surface	5 from lime storage area	5
pH	EPA 9045	Duplicate samples at 10% of total sample, and rinsate blanks at 5% of total samples	per MEL RL	per MEL	per MEL	100%	Surface	5 from lime storage area	5
Total Aroclors	EPA 8082	Duplicate samples at 10% of total sample, and rinsate blanks at 5% of total samples	per MEL RL	per MEL	per MEL	100%	Surface	5 from lime storage area	5
Lead-based paint	EPA 6200	Instrument blank and method blank	Per MEL RL	per MEL	per MEL	n/a	Solid (Paint)	Front St. building and other buildings, as needed	n/a

Table 2 – DQO for Soil Samples

Analyte	Analysis Method	Matrix	Container Size/ Type	Preservative	Maximum Holding Time (Not Frozen)	Maximum Holding Time (Frozen)	MCTA Method A Screening Levels
Asbestos	EPA 600/R93-116	Solid	2 oz. glass jar or suitable plastic bag	n/a	n/a	n/a	n/a
SVOC	EPA 8270	Soil	4 ounce jar	Cool, 4 degrees Centigrade	14 Days (Extraction), 40 Day (Analyze)	1 year	2000
TAL Metals	EPA 6020	Soil	4 ounce jar	Cool, 4 degrees Centigrade	180 Days	1 year	See Table 3
TPH	NWTPH-Dx Extended	Soil	4 ounce jar	Cool, 4 degrees Centigrade	14 Days (Extraction), 40 Day (Analyze)	1 year	2000
Dioxins	EPA 8290	Soil	4 ounce jar	Cool, 4 degrees Centigrade	14 Days (Extraction), 40 Day (Analyze)	1 year	6.7-30
DDT	EPA 8081	Soil	4 ounce jar	Cool, 4 degrees Centigrade	15 Days (Extraction), 40 Day (Analyze)	1 year	3
pH	EPA 9045	Soil	2 ounce jar	Cool, 4 degrees Centigrade	Analyze immediately	Analyze immediately	n/a
Total Aroclors	EPA 8082	Soil	4 ounce jar	Cool, 4 degrees Centigrade	15 Days (Extraction), 40 Day (Analyze)	1 year	1

Table 3 – MTCA Level A Screening Level for TAL Metals

Metal	Screening Level (ppm)[a]
Arsenic	7.3[b]
Barium	923
Cadmium	80
Chromium	120000[c]
Copper	263
Lead	250
Selenium	5.2
Silver	13.6
Mercury	2.1
Zinc	5,971

a) Screening levels based on MCTA Method A for unrestricted land uses for petroleum hydrocarbons, PCBs, and Lead. Remaining screening levels are most conservative of MTA Method B standard formula value for direct contact and protection of groundwater using the MCTA equation 747-1.
b) Screening level adjusted upward for Puget Sound Basin background.
c) Screening level applies to Chromium (III)

Table 4 – Calibration and Corrective Action: Field Equipment

Instrument/ Component	Activity	Frequency	Acceptance Criteria	Corrective Action	SOP Ref.
Photoionization Detector	Zero Calibration/Zero Air Single-point calibration 100ppm isobutylene	Calibrate daily and perform check daily before use	Zero Air ± 5ppm Isobutylene ± 10%	Clean or replace PID bulb. Re-calibrate, or replace meter and recalibrate.	According to the manufacturer

Table 5 – Preventive Maintenance: Field Equipment

Instrument	Component	Activity	Frequency	SOP Ref.
GPS	pH probe	Two point calibration: 4 and 10 pH buffers	Calibrate daily according to the manufacturer's directions	According to manufacturer
Photoionization Detector	NA	Zero Calibration/Zero Air Single-point calibration 100ppm isobutylene	Calibrate daily and perform check daily before use	According to manufacturer

Table 6 – Corrective Action Summary Report

Corrective Action Summary Report	
Site:	Location:
Initiator:	Date:
Project Manager:	Issue Type:
Data Impact : ☐ Serious impact ☐ Potential impact ☐ No impact ☐ Unknown	Status: ☐ Initial Reporting ☐ Clarification ☐ CA Verification ☐ Follow on
Summary of Issue:	
Cause of Issue:	
Planned Corrective Action:	
Planned Verification:	
Completed by: ______________________________ Approved by: ______________________________ Verified by: ______________________________	Date: _________________ Date: _________________ Date: _________________

REFERENCES

- EPA Frequently Asked Questions on Quality Assurance Project Plans

- *EPA Manual 5360: EPA Quality Manual for Environmental Programs* (PDF 62pp, 169K). Chapter 5 contains Quality Assurance Project Plan specifications for EPA organizations.

- *EPA Requirements for Quality Assurance Project Plans (QA/R-5)* (PDF 40pp, 120K) - March 2001(**Reissued May 2006**), EPA/240/B-01/003. Reissue Notice (PDF 2pp, 91K) Defines specifications for Quality Assurance Project Plans prepared for activities conducted by or funded by EPA. These specifications are equivalent to Chapter 5 of EPA Manual 5360.

- *Guidance for Quality Assurance Project Plans (G-5)* (PDF 111pp, 401K) - December 2002, EPA/240/R-02/009. Guidance on developing Quality Assurance Project Plans that meet EPA specifications. Note: This document replaces EPA/600/R-98/018 issued in February, 1998.

- *Guidance for Geospatial Data Quality Assurance Project Plans (G-5G)* (PDF 106pp, 1.5MB) - March 2003, EPA/240/R-03/003. Guidance on developing Quality Assurance Project Plans for geospatial data projects.

- *Guidance for Quality Assurance Project Plans for Modeling (G-5M)* (PDF 121pp, 616K) - December 2002, EPA/240/R-02/007. Guidance on developing Quality Assurance Project Plans for modeling projects.
  & NBSP
- *Guidance on Choosing a Sampling Design for Environmental Data Collection (G-5S)* (PDF 178pp, 1.0MB) - December 2002, EPA/240/R-02/005. Guidance on applying standard statistical sampling designs (such as simple random sampling) and more advanced sampling designs (such as ranked set sampling, adaptive cluster sampling) to environmental applications.

- *Guidance on Quality Assurance Project Plans for Secondary Research Data* (PDF 2pp, 7K). Example Quality Assurance Project Plan specifications for secondary research data developed by the QA Managers in EPA's National Risk Management Research Laboratory.

- Example Checklist for a Developing or Reviewing a QA Project Plan (Microsoft Word version 11pp, 150K). From Appendix C of the *Guidance on Quality Assurance Project Plans (G-5)*.

- EPA Region 10 Quality Management Plan; This document defines and describes the Quality Management (QM), Quality Assurance (QA), and Quality Control (QC) policies and responsibilities required by Region 10, in concurrence with the Agency's mandated QM program.
http://yosemite.epa.gov/R10/OEA.NSF/webpage/QA+Reference+Documents!OpenDocument&ExpandSection=32#_Section32

- EPA: You and QA In Region 10 http://www.epa.gov/region10/offices/oea/youqa.pdf

- EPA Region 5 QA/R-5, EPA Requirements for Quality Assurance Project Plans
http://www.epa.gov/quality/qs-docs/r5-final.pdf

- Washington Dept. of Ecology website http://www.ecy.wa.gov/biblio/0403030.html

APPENDIX A

Summary of Decontamination Procedures

1. DECONTAMINATION AREA

The existing decontamination facility will be repaired and used for decontamination activities at the site. Repairs that may be necessary to return the facility to operating condition include clearing grass weeds and shrubs from the area, importing gravel for surfacing and repairing or replacing existing equipment. New equipment and materials used to refurbish the existing facility should be similar to and compatible with existing equipment and materials. An aboveground storage tank of sufficient volume to store water for use in the decontamination facility will be installed at the facility. A submersible pump will be installed in the collection structure. Equipment and materials associated with the use of the decontamination facility such as scrub brushes and high pressure low volume pressure washers also must be provided and restocked as necessary. The decontamination facility will be completed prior to the start of work.

2. SOURCE WATER

The water used for decontamination of large equipment and gross wash and rinse of sampling equipment may be treated water from the groundwater treatment plant. It will be stored at the facility in an aboveground storage tank in quantities sufficient for daily operations. This water will be sampled at the commencement of decontamination activities for all chemicals of concern for the project including VOC’s , SVOC’s, PAH’s, PCP’s and Dioxins/Furans. If water from a different source is used at any time during the project, a sample of the new water will be sent for analysis. The source water sample is collected for QA/QC reasons to ensure that the decontamination procedure is not re-introducing contamination to the equipment.

De-ionized ultra filtered (DIUF) water must be used in the final rinse of sampling equipment (SOP 60.1) DIUF water will be purchased from a field supplier.

3. HEAVY EQUIPMENT AND VEHICLES

Equipment and vehicles leaving the Exclusion Zone will pass through the decontamination facility for the removal of soil or other materials that may be contaminated. The equipment and material will be washed down on the designated was pad at the existing facility using high pressure, low volume pressure washers. Decontamination of large pieces will take place on metal sawhorses to prevent contact with the decontamination pad. Materials washed off of the equipment and vehicles will be collected in the existing solid and liquid collection structure for temporary storage.

All earth moving equipment in the Exclusion Zone will be classified as contaminated or uncontaminated and will handle only materials with the same classification. Potentially contaminated materials will be treated as contaminated until determination is obtained. Hauling routes within the Exclusion Zone classified as contaminated will be observed by vehicles at all times during the project.

4. SAMPLING EQUIPMENT

Sampling equipment will be decontaminated prior to use to prevent cross contamination between sampling locations and to obtain accurate analytical results. This decontamination may take place at the site of sampling using a mobile decontamination station consisting of polyethylene tubs. All equipment brushes and polyethylene tubs needed for decontamination procedures will be underlain by polyethylene sheeting. All water used during the decontamination process will be transferred to the decontamination pad. Sampling equipment that will be decontaminated includes, but may not be limited to the following submersible pumps and horses, water level indicators, bailers, various groundwater measurement probes, hand augers and extensions, and bowls and towels. Decontamination is a wash and double rinse procedure but the specific decontamination procedures depend on the composition of the sampling device.

5. PERSONNEL

Decontamination of personnel may include wash down of outer clothing and boots with a high pressure water source or disposal of throw away type coveralls, gloves, and boot covers. Disposable materials will be stored at the decontamination facility in plastic bags in sealed drums awaiting offsite disposal. Drums will be clearly dated and labeled as containing Personal Protective Equipment (PPE).

6. DISPOSAL OF DECONTAMINATION WASTE

The decontamination pad will be washed down at the completion of each day of work. Decontamination activities will be conducted such that all water used and all soil removed falls onto the pad and is captured by the trench drain. Soil clumps captured by the trench drain will be removed daily and transported as contaminated material to the thermal desorption unit for treatment.

The liquid waste collected in the existing collection structure will be pumped out regularly and inspected for gross contamination. The collection structure will be inspected daily to monitor solid and liquid content and ensure pump operation. At the beginning of each work day, the decontamination technician will gage the depth of solids in the collection structure. If the depth of solids in the structure reaches 1.5 feet, the solids will be removed in a manner so as to minimize the moisture content of the solids removed. The solid waste will be inspected for gross contamination. If gross contamination is sampled for waste characteristics (Table 4.1) and stored for disposal off site as hazardous material (Section 5.0). If gross contamination is not present, the solid materials will be transported to the on site thermal desorption unit for treatment and the liquid waste will be transported to the on site groundwater treatment facility for treatment. Other solid waste such as disposable coveralls or worn out brushes which cannot be treated by thermal desorption should be disposed of off site as appropriate (Section 5.0).

APPENDIX B

SAMPLE LABELS

B.1 SCOPE AND APPLICATION

Every sample will have a sample label uniquely identifying the sampling point and analysis parameters. The purpose of this standard operating procedure (SOP) is to delineate protocols for the use of sample labels. An example label is included as Figure 50.1.A. Other formats with similar levels of details are acceptable.

B.2 MATERIALS

- Sample Label
- Indelible Marker

B.3 PROCEDURE

The use of preprinted sample labels is encouraged and should be requested from the analytical support laboratory during planning activities.

As each sample is collected, fill out a sample label ensuring the following information has been collected.

- Project Name
- Project Number
- Location/Site I.D. enter the well number of surface water sampling number and other pertinent information concerning where the sample was taken.
- Date of Sample Collection
- Time of Sample Collection
- Analyses to be Performed (Note due to number of analytes details of analysis should be arranged with lab.
- Whether Filtered of Unfiltered (water samples only)
- Preservatives (water samples only)

Double check the label information to make sure it is correct. Detach the label, remove the backing and apply the label to the sample container. Cover the label with clear tape ensuring that the tape completely encircles the container. Record the Sample Number and designated sampling point in the field logbook, along with the following sample information.

- Time of sample collection (each logbook page should be dated) .
- The location of the sample
- Organic vapor meter or photoionization meter readings for the sample (when appropriate).

- Any unusual or pertinent observations (oil sheen on groundwater sample, incidental odors, soil color, grain size, plasticity, etc.)
- Number of containers required for each sample
- Whether the sample is a QA sample (split, duplicate, or blank)
- A typical logbook entry might look like this
- 7:35 AM, Sample No. MW.3, PID=35 PPM, Petroleum odor present. Sample designated MW.3 001

B.4 MAINTENANCE

Not Applicable

B.5 PRECAUTIONS

Note that although incidental odors should be noted in the logbook, it is unwise from a health and safety standpoint to routinely sniff test samples for contaminants.

B.6 REFERENCES

USEPA 1980 Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans QAMS 005/80

Project Name __________ Project
Number___________
Sample Location/Site ID
____
Date __/__/__ Time_________
Other________________
Analytes VOC SVOC P/P Metals CN
PAH D/F HERBS DIOXINS
TPH
Filtered [No] [Yes] ALK TSS
Preservative [HCl] [HNO3] [NaOH] [H2SO4]
Sampler_____________________________________
____

APPENDIX C

STANDARD OPERATING PROCEDURE

SAMPLE PACKAGING

C.1 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SAP is to delineate protocols for the packing and shipping of samples to the laboratory for analysis

C.2 MATERIALS

- Waterproof coolers (hard plastic or metal)
- Metal cans with friction seal lids (e.g. paint cans)
- Chain of custody forms
- Chain of custody seals (optional)
- Packing material
- Sample documentation
- Ice
- Plastic garbage bags
- Clear tape
- Zip seal plastic bags

C.3 Procedure

1.) Place samples directly on ice to bring temperature down
2.) Check cap tightness and verify that clear tape covers label and encircles container
3.) Wrap sample container in bubble wrap or closed cell foam sheets. Samples may be enclosed in a secondary container consisting of a clear zip seal plastic bag.
4.) Place several layers of bubble wrap or at least 1 of vermiculite on the bottom of the cooler. Line cooler with open garbage bag, place all the samples upright inside the garbage bag and tie.
5.) Double bag and seal loose ice to prevent melting ice from soaking the packing material. Place the ice outside the garbage bags containing the samples.
6.) Pack shipping containers with packing material, closed cell foam, vermiculite, or bubble wrap. Place this packing material around the sample bottles or metal cans to avoid breakage during shipment
7.) Enclose all sample documentation (ie field parameter forms, chair of custody forms, in a water proof plastic bag, and tape the bag to the underside of the cooler lid. If more than one cooler is being used, each cooler will have its own documentation. Add the total number of shipping containers included in each shipment on the chain of custody form.

8.) If required, seal the coolers with signed and dated custody seals so that if the cooler were opened, the custody seal would be broken. Place clear tape over the custody seal to prevent damage to the seal.
9.) Tape the cooler, shut with packing tape over the hinges and place tape over the cooler drain
10.) Ship all samples via overnight delivery on day they are collected if possible.

C.4 MAINTENANCE

Not Applicable

C.5 PRECAUTIONS

C.5.1 PERMISSIBLE PACKAGING MATERIALS

- Non absorbent
    - Bubble wrap
    - Closed cell foam packing sheets
- Absorbent
    - Vermiculite

C.5.2 NON PERMISSIBLE PACKAGING MATERIALS

- Paper
- Wood Shavings (excelsior)
- Cornstarch peanuts

APPENDIX D

STANDARD OPERATING PROCEDURE

SAMPLE PRESERVATION

1. SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to define the preservatives and techniques to be employed in preserving environmental samples between collection and analysis.

2. SAMPLE PRESERVATIVES

- HNO_3
- Ice
- HCl
- NaOH

3. PROCEDURE

Containers must be certified clean with copies of laboratory certification furnished to the contracting officer's representative (COR)

Water samples will be collected according to procedures detailed in SOPs 30.2 and 30.3 and placed in containers appropriate to the intended analyte as given in Table 50.3 A

- Samples collected for semi-volatile organic compound (SVOC) analysis will generally be collected in pre-preserved VOC vials. Sufficient HCl should have been added to the vial prior to the addition of the sample such that the pH<2.
- Samples collected for metals analysis will be acidified in the field to a pH < 2 by the addition of HNO3. Filtered samples will be acidified after filtration. After acidifying the sample, the container should be lightly capped, then swirled to thoroughly mix the sample. The cap will then be loosened to release any excess pressure this operation may have generated.
- Samples collected for cyanide will be alkalized to a pH > 12 by the addition of NaOH.
- Samples not requiring chemical preservation will be placed on ice and cooled to 4 degrees C (e.g. semivolatile organic compounds, explosives)
- Soil and sediment samples will be collected according to procedures detailed in SOPs 30.1 and 30.4 in containers appropriate to the intended analyte as given in Table 50.3 B.
- No chemical preservatives will be added to soil or sediment samples. These samples will be immediately placed on ice and cooled to 4 degrees C.
- Soil samples will be collected according to procedures detailed in Section 5.0 of this SQAP.

- No chemical preservatives will be added to soil or sediment samples. These samples will be immediately placed on ice and cooled to 4 degrees C.

4. MAINTENANCE

Not applicable

5. PRECAUTIONS

- Note that acidifying a sample containing cyanide may liberate HCN gas.
- Avoid breathing any fumes emanating from acidified samples.
- Acidify samples only in the open rather than in closed spaces such as a vehicle.
- See the HSP for other safety measures.

APPENDIX E

STANDARD OPERATING PROCEDURE 70.1

INVESTIGATION DERIVED WASTE

E.1 SCOPE AND APPLICATION

Management of investigation derived waste minimizes the potential for the spread of hazardous waste on site or off site through investigation activities. The purpose of this standard operating procedure (SOP) is to provide instructions for the proper management of contaminated materials derived from the field investigations.

E.2 INTRODUCTION

Materials that are known or suspected to be contaminated with hazardous substances through the actions of sample collection or personnel and equipment decontamination are said to be investigation derived wastes. These wastes include decontamination solutions, disposable equipment, drill cuttings and fluids, and groundwater monitoring, well development and purge waters. To the extent possible the site manager will attempt to minimize the generation of these wastes through careful design of decontamination schemes and groundwater sampling programs. Testing conducted on soil and water investigation derived wastes will show if they are also hazardous wastes as defined by RCRA. This will determine the proper handling and ultimate disposal requirements.

The criteria for designating a substance as hazardous waste according to RCRA is provided in 40 CFR 261.3. If investigation derived wastes meet these criteria, RCRA requirements must be followed for packaging, labeling, transporting, storing and record keeping as described in 40 CFR 262.34. Those wastes judged to potentially meet the criteria for hazardous wastes will be stored in DOT approved 55 gallon steel drums.

Investigation derived waste is assumed to be RCRA hazardous waste unless analytical evidence indicates otherwise. Nonhazardous waste will be disposed of in accordance with installation approved procedures.

E.3 INVESTIGATION DERIVED WASTE MANAGEMENT

Procedures that minimize potential for the spread of hazardous waste include minimizing the volume of waste generated waste segregation appropriate storage and disposal according to RCRA requirements.

E.4 WASTE MINIMIZATION

All efforts should be made to minimize the amount of waste without cross contamination.

E.5 WASTE SEGREGATION

Waste storage and handling procedures to be used depend upon the type of generated waste. For this reason, investigation derived hazardous wastes described below are segregated into separate 55 gallon storage drums. Waste materials that are known to be free of hazardous waste contamination (such as broken sample bottles or equipment containers and wrappings) must be collected separately for disposal to municipal systems. Large plastic garbage or lawn and leaf bags are useful for collecting this trash. Even clean sample bottles or Tyvek should be disposed with care. Even though they are not legally a problem, if they are discovered by the public, they may cause tremendous panic. Therefore, items that are known to be free from toxic waste to the public must not be disposed into any public dumpster such as found at your hotel or park. Items free from contamination may be freely transported in your vehicle until an appropriate disposal site is found.

E.5.1 Decontamination Solutions

Solutions considered investigation derived wastes range from detergents, organic solvents and acids used to decontaminate small hand samplers to steam cleaning rinsate used to wash drill rigs and other large equipment. These solutions are to be stored in 55 gallon drums with bolt sealed lids.

E.5.2 Soil Cuttings and Drilling Muds

Soil cutting are solid to semisolid soils generated during trenching activities or drilling for the collection of subsurface soil samples or the installation of monitoring wells. Depending on the type of drilling, drilling fluids known as muds may be used to remove soil cuttings. Drilling fluids flushed from the borehole must be directed into a settling section of a mud pit. This allows reuse of the decanted fluids after removal of the settled sediments. Drill cuttings whether generated with or without drilling fluids are to be removed with a flat bottomed shovel and stored in 55 gallon drums with bolt sealed lids.

E.5.3 Well Development and Purge Waters

Well development and purge waters are grounwaters removed from monitoring wells to repair damage to the aquifer following well installation, obtain characteristic aquifer groundwater samples or measure aquifer hydraulic properties. The volume of groundwater to be generated will determine the appropriate storage procedure. Well purging and well development will generate approximately two to ten well casing volumes of groundwater. This volume can stored in 55 gallon drums.

E.5.4 Disposable Equipment

Disposable equipment includes used personal protective gear such as tyvek coveralls, gloves, booties, and APR cartridges and some inexpensive sampling equipment such as trowels or disposable bailers. This equipment is assumed to be contaminated if it is used at a hazardous waste site because it is impractical to submit these items for analysis. These materials are to be stored on site in 55 gallon drums pending final disposal.

E.6 WASTE STORAGE

The wastes that are accumulated through investigations must be stored on site prior to disposal. An on site waste staging area should be designated to provide a secure and controlled storage for the drums. Per RCRA requirements storage cannot exceed 90 days for materials presumed or shown to be RCRA-designated hazardous wastes, waste which is known not to be RCRA-designated wastes should be promptly disposed to municipal waste systems.

E.6.1 Storage Containers

Containers will be DOT approved (DOT 17H 18/16GA OH unlined) open head steel drums. The lids should lift completely off the drum, and be secured by a bolt ring. Order enough drums to store all anticipated purge water (at least five times the well casing volume) plus extra drums for solid waste and decontamination water. Solid and liquid wastes are not to be mixed in the drums. A typical decontamination line uses approximately 30 gallons of water.

Pallets are often required to allow transport of filled drums to the staging area with a forklift. Normal pallets are 3 x 4 and will hold two to three 55 gallon drums depending on the filled weight. If pallets are required for drum transport or storage field personnel are responsible for ensuring that the empty drums are placed on pallets before they are filled and that the lids are sealed on with the bolt tighten ring after the drums are filled. Because the weight of one drum can exceed 500 pounds, under no circumstances should personnel attempt to move the drums by hand. Removal of drums to the staging area is normally the responsibility of the client, unless other arrangements have been made.

E.6.2 Drum Labeling

Each drum that is used will be assigned a unique number which will remain with that drum for the life of the drum. This number will be written in permanent marker on the drum itself, do not label drum lids. Drum labels will contain the following information:

- Waste accumulation start date
- Well number or boring number if applicable
- Drum number
- Contents matrix (soil, water, slurry, etc.)
- Project name

E.7 WASTE DISPOSAL

Responsibility for the final disposal of investigation derived waste will be determined before field activities are begun and will be described in the investigation work plan. Disposal or long term storage (over 90 days) of the RCRA-designated hazardous wastes requires procedures which are beyond the scope of the SOP

E.8 PRECAUTIONS

Only qualified personnel are authorized to handle equipment Adhere to health and safety procedures.

APPENDIX F

STANDARD OPERATING PROCEDURE 80.1

DECONTAMINATION

F.1 SCOPE AND APPLICATION

All personnel or equipment involved in intrusive sampling, or enter a hazardous waste site during intrusive sampling must be thoroughly decontaminated prior to leaving the site to minimize the spread of contamination and prevent adverse health effects. Equipment must be decontaminated between sites to preclude cross-contamination. This standard operating procedure (SOP describes the decontamination requirements for sampling equipment and site personnel.

F.2 MATERIALS

- Plastic sheeting buckets
- Installation-approved decontamination water source
- Deionized ultrafilter water (DIUF)
- Non phosphate laboratory detergent
- Aluminum foil or clean plastic sheeting
- Pressure sprayer rinse bottles brushes
- Plastic garbage bags

F.3 PROCEDURE

F.3.1 SAMPLE BOTTLES

At the completion of each sampling activity the exterior surfaces of the sample bottles must be decontaminated as follows:

- Be sure that the bottle lids are on tight
- Wipe the outside of the bottle with a paper towel to remove gross contamination.

F.3.2 PERAONNEL DECONTAMINATION

Review the project Health and Safety Plan (HSP) for the appropriate decontamination procedures.

F.3.3 EQUIPMENT DECONTAMINATION

F.3.3.1 Water Samplers

F.3.3.1.1 Bailers

Afer each use Polytetrafluoroethelyne (PTFE) double check valve bailers used for groundwaster sampling will be decontaminated as follows:

1. Discard all lanvards in properly marked sealable container or as directed by the HSP. Note no tubing is to be used in conjunction with a bailer in collecting samples.
2. Scrub the bailer to remove gross (visible) contamination, using appropriate brush(es) approved water and non phosphate detergent.
3. Rinse off detergent with approved water
4. Rinse bailer with approved decontamination water
5. Rinse bailer with 0.10N Nitric Acid solution
6. Rinse bailer with DIUF grade water
7. Rinse bailers used to collect organic samples with pesticide grade methanol
8. Wrap bailer in aluminum foil or clean plastic sheeting, or store in a clean, dedicated PVC or PTFE storage container
9. Dispose of used decontamination solutions with drummed purge water

F.3.3.1.2 Submersible Pumps

1. Scrub the exterior of the pump to remove gross (visible) contamination, using appropriate brushes, approved water and non phosphate detergent (Steam cleaning may be substituted for detergent scrub)
2. Calculate the volume of pump plus any tubing which is not disposable and not dedicated to a single well. Pump 10 gallons of non phosphate laboratory detergent solution to purge and clean the interior of the pump
3. Rinse by pumping no less than 10 gallons of approved water to rinse
4. Rinse pump exterior with approved decontamination water
5. Rinse pump exterior with DIUF water
6. Rinse pumps used to collect organic samples with pesticide grade methanol
7. Wrap pump in aluminum foil or clean plastic sheeting, or store in a clean, dedicated PVC or PTFE storage container.

F.3.3.1.3 Dip Samplers

All dip samplers whether bucket, long-handled, or short handled (see SOP 30.3 Surface Water Sampling) will be decontaminated in the same manner as bailers.

F.3.3.1.4 Field Glassware

Electric water level indicators weighted measuring tapes or piezometers used in the determination of water levels, well depths and/or non-aqueous phase liquid (NAPL) levels will be decontaminated in the same manner as bailers. Clean laboratory wipes may be substituted for brushes. Tapes, probes, and piezometers should be wiped dry with clean laboratory wipes and coiled on spools or clean plastic sheeting.

F.3.3.2 Solid Materials Samplers

Solid materials samplers include soil sampling probes, augers, trowels, shovels, sludge samplers, and sediment samplers. Equipment will be decontaminated as follows:

1. Scrub the sampler to remove gross (visible contamination, using appropriate brush(es) approved water and non phosphate laboratory detergent.
2. Rinse off detergent with approved decontamination water
3. Rinse sampler with DIUF water
4. Rinse samplers used to collect organic samples with pesticide grade methanol
5. Wrap sampler in aluminum foil, clean plastic sheeting, or store in a new zip-seal bag (size permitting) or clean, dedicated PVC or PTFE storage container
6. Dispose used decontamination solutions properly according to the site HSP

F.3.3.3 Other sampling and measurement probes

Temperature, pH, conductivity, Redox, and dissolved oxygen probes will be decontaminated according to manufacturer's specifications. If no such specifications exist, remove gross contaminant and triple rinse probe with DIUF water. Rinse probes used to collect organic samples with pesticide grade methanol.

F.3.3.4 Drilling Rigs and Excavators

Drilling rigs excavators and associated equipment such as augers, drill casing, rods, samplers, tools, recirculation tank, and water tank (inside and out) will be decontaminated prior to site entry after over-the-road mobilization and immediately upon departure from a site after drilling a hole. Supplementary cleaning will be performed prior to site entry. There is a likelihood that contamination has accumulated on tires and as spatter or dust enroute from one site to the next.

1. Place contaminated equipment in an enclosure designed to contain all decontamination residues (water, sludge, etc.).
2. Steam clean equipment until all dirt, mud, grease, asphaltic, bituminous, or other encrusting coating materials (with the exception of manufacturer-applied paint) have been removed.
3. Water used will be taken from an approved source
4. Containerize sample characterize and dispose of all decontamination residues properly.

F.4 PRECAUTIONS

- Dispose of all wash water, rinse water, rinsates, and other sampling wastes (tubing, plastic sheeting, etc.) in properly marked, sealable containers or as directed by the HSP
- Do not eat, smoke, or drink on site.

APPENDIX G

EPA Environmental Response Team – SOP

U. S. EPA ENVIRONMENTAL RESPONSE TEAM

STANDARD OPERATING PROCEDURES

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SOIL SAMPLING

CONTENTS

SUPERCEDES: SOP #2012; Revision 0.0; 11/16/94; U.S. EPA Contract 68-C4-0022.

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative soil samples. Sampling depths are assumed to be those that can be reached without the use of a drill rig, direct-push, or other mechanized equipment (except for a back-hoe). Analysis of soil samples may determine whether concentrations of specific pollutants exceed established action levels, or if the concentrations of pollutants present a risk to public health, welfare, or the environment.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the actual procedures used should be documented and described in an appropriate site report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment depending on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, continuous flight auger, a trier, a split-spoon, or, if required, a backhoe.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Samples should, however, be cooled and protected from sunlight to minimize any potential reaction. The amount of sample to be collected and proper sample container type are discussed in ERT/REAC SOP #2003 Rev. 0.0 08/11/94, *Sample Storage, Preservation and Handling*.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary potential problems associated with soil sampling - cross contamination of samples and improper sample collection. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample, or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

5.0 EQUIPMENT

Soil sampling equipment includes the following:

- Maps/plot plan
- Safety equipment, as specified in the site-specific Health and Safety Plan
- Survey equipment or global positioning system (GPS) to locate sampling points
- Tape measure
- Survey stakes or flags
- Camera and film
- Stainless steel, plastic, or other appropriate homogenization bucket, bowl or pan
- Appropriate size sample containers
- Ziplock plastic bags
- Logbook
- Labels
- Chain of Custody records and custody seals
- Field data sheets and sample labels
- Cooler(s)
- Ice
- Vermiculite
- Decontamination supplies/equipment
- Canvas or plastic sheet
- Spade or shovel
- Spatula
- Scoop
- Plastic or stainless steel spoons
- Trowel(s)
- Continuous flight (screw) auger
- Bucket auger
- Post hole auger
- Extension rods
- T-handle
- Sampling trier
- Thin wall tube sampler
- Split spoons
- Vehimeyer soil sampler outfit
  - Tubes
  - Points
  - Drive head
  - Drop hammer
  - Puller jack and grip
- Backhoe

6.0 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in ERT/REAC SOP #2006 Rev. 0.0 08/11/94, *Sampling Equipment Decontamination*, and the site specific work plan.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or pre-clean equipment, and ensure that it is in working order.

4. Prepare schedules and coordinate with staff, client, and regulatory agencies, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.

6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminant, should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations should be utility-cleared by the property owner or the On-Scene-Coordinator (OSC) prior to soil sampling; and utility clearance should always be confirmed before beginning work.

7.2 Sample Collection

7.2.1 Surface Soil Samples

Collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material is removed to the required depth and a stainless steel or plastic scoop is then used to collect the sample.

This method can be used in most soil types but is limited to sampling at or near the ground surface. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A flat, pointed mason trowel to cut a block of the desired soil is helpful when undisturbed profiles are required. Tools plated with chrome or other materials should not be used. Plating is particularly common with garden implements such as potting trowels.

The following procedure is used to collect surface soil samples:

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.

2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.

3. If volatile organic analysis is to be performed, transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval or location into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.2 Sampling at Depth with Augers and Thin Wall Tube Samplers

This system consists of an auger, or a thin-wall tube sampler, a series of extensions, and a "T" handle (Figure 1, Appendix A). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin wall tube sampler. The system is then lowered down the borehole, and driven into the soil to the completion depth. The system is withdrawn and the core is collected from the thin wall tube sampler.

Several types of augers are available; these include: bucket type, continuous flight (screw), and post-hole augers. Bucket type augers are better for direct sample recovery because they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights. The continuous flight augers are satisfactory when a composite of the complete soil column is desired. Post-hole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil and cannot be used below a depth of approximately three feet.

The following procedure is used for collecting soil samples with the auger:

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.

2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first three to six inches of surface soil for an area approximately six inches in radius around the drilling location.

3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.

4. After reaching the desired depth, slowly and carefully remove the auger from the hole. When sampling directly from the auger, collect the sample after the auger is removed from the hole and proceed to Step 10.

5. Remove auger tip from the extension rods and replace with a pre-cleaned thin wall tube sampler. Install the proper cutting tip.

6. Carefully lower the tube sampler down the borehole. Gradually force the tube sampler into the soil. Do not scrape the borehole sides. Avoid hammering the rods as the vibrations may cause the boring walls to collapse.

7. Remove the tube sampler, and unscrew the drill rods.

8. Remove the cutting tip and the core from the device.

9. Discard the top of the core (approximately 1 inch), as this possibly represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container. Sample homogenization is not required.

10. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly.

    When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.

12. Abandon the hole according to applicable state regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

7.2.3 Sampling with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

The following procedure is used to collect soil samples with a sampling trier:

1. Insert the trier (Figure 2, Appendix A) into the material to be sampled at a 0° to 45° angle from horizontal. This orientation minimizes the spillage of sample.

2. Rotate the trier once or twice to cut a core of material.

3. Slowly withdraw the trier, making sure that the slot is facing upward.

4. If volatile organic analyses are required, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.4 Sampling at Depth with a Split Spoon (Barrel) Sampler

Split spoon sampling is generally used to collect undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted with a split spoon sampler to give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to its sampling depth through the bottom of the augured hole and the core extracted.

When split spoon sampling is performed to gain geologic information, all work should be performed in accordance with ASTM D1586-98, "Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils".

The following procedures are used for collecting soil samples with a split spoon:

1. Assemble the sampler by aligning both sides of barrel and then screwing the drive shoe on the bottom and the head piece on top.

2. Place the sampler in a perpendicular position on the sample material.

3. Using a well ring, drive the tube. Do not drive past the bottom of the head piece or compression of the sample will result.

4. Record in the site logbook or on field data sheets the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth.

5. Withdraw the sampler, and open by unscrewing the bit and head and splitting the barrel. The amount of recovery and soil type should be recorded on the boring log. If a split sample is desired, a cleaned, stainless steel knife should be used to divide the tube contents in half, longitudinally. This sampler is typically available in 2 and 3 1/2 inch diameters. A larger barrel may be necessary to obtain the required sample volume.

6. Without disturbing the core, transfer it to appropriate labeled sample container(s) and seal tightly.

7.2.5 Test Pit/Trench Excavation

A backhoe can be used to remove sections of soil, when detailed examination of soil characteristics are required. This is probably the most expensive sampling method because of the relatively high cost of backhoe operation.

The following procedures are used for collecting soil samples from test pits or trenches:

1. Prior to any excavation with a backhoe, it is important to ensure that all sampling locations are clear of overhead and buried utilities.

2. Review the site specific Health & Safety plan and ensure that all safety precautions including appropriate monitoring equipment are installed as required.

3. Using the backhoe, excavate a trench approximately three feet wide and approximately one foot deep below the cleared sampling location. Place excavated soils on plastic sheets. Trenches greater than five feet deep must be sloped or protected by a shoring system, as required by OSHA regulations.

4. A shovel is used to remove a one to two inch layer of soil from the vertical face of the pit where sampling is to be done.

5. Samples are taken using a trowel, scoop, or coring device at the desired intervals. Be sure to scrape the vertical face at the point of sampling to remove any soil that may have fallen from above, and to expose fresh soil for sampling. In many instances, samples can be collected directly from the backhoe bucket.

6. If volatile organic analyses are required, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7. Abandon the pit or excavation according to applicable state regulations. Generally, shallow excavations can simply be backfilled with the removed soil material.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration

activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OHSA and corporate health and safety procedures, in addition to the procedures specified in the site specific Health & Safety Plan..

12.0 REFERENCES

Mason, B.J. 1983. Preparation of Soil Sampling Protocol: Technique and Strategies. EPA-600/4-83-020.

Barth, D.S. and B.J. Mason. 1984. Soil Sampling Quality Assurance User's Guide. EPA-600/4-84-043.

U.S. Environmental Protection Agency. 1984 Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition. EPA-600/4-84-076.

de Vera, E.R., B.P. Simmons, R.D. Stephen, and D.L. Storm. 1980. Samplers and Sampling Procedures for Hazardous Waste Streams. EPA-600/2-80-018.

ASTM D 1586-98, ASTM Committee on Standards, Philadelphia, PA.

APPENDIX A
Figures
SOP #2012
February 2000

FIGURE 1. Sampling Augers

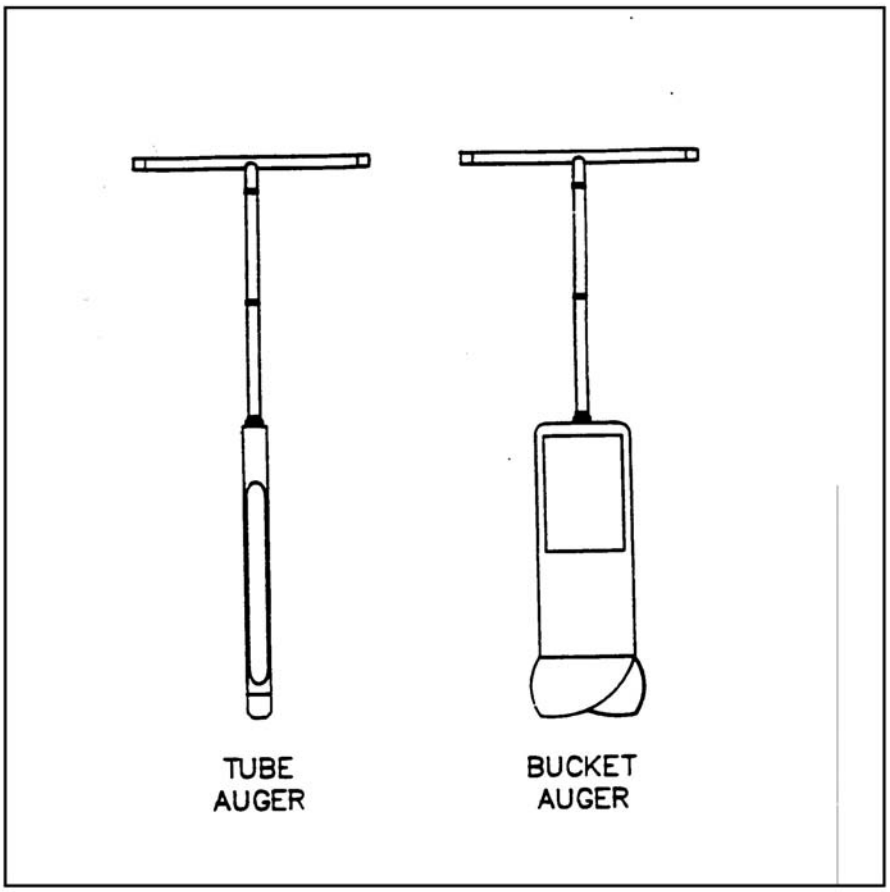

FIGURE 2. Sampling Trier