Field Sampling Plan

For

Field Work Conducted in Summer 2000

for the

Peripheral Area
Everett Smelter Site
Everett, Washington

June 26, 2000

Conducted for:

Washington State Department of Ecology
Toxics Cleanup Program
Olympia, Washington

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ACRONYMS

CAP	Integrated Final Cleanup Action Plan and Final Environmental Impact Statement for the Upland Area
DU	Decision Unit
Ecology	Washington Department of Ecology
FSP	Field Sampling Plan
HSP	Health and Safety Plan
MANNO	Maintenance Area Not Normally Occupied
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAIC	Science Applications International Corporation
TCLP	Toxicity Characteristic Leaching Procedure

1.0 INTRODUCTION

A contractor, on behalf of the Washington State Department of Ecology (Ecology), will perform the work described in this Field Sampling Plan (FSP) as part of a homesite cleanup program at the former Everett Smelter site. The basis for this work is the Integrated Final Cleanup Action Plan and Final Environmental Impact Statement for the Upland Area (the CAP) (Ecology 1999). This FSP is to be used in conjunction with two other documents: The Quality Assurance Project Plan (QAPP) (SAIC 2000) and the Health and Safety Plan (HSP) (SAIC 2000); these three documents comprise the basic Project Plans for this work.

2.0 PROJECT OVERVIEW

The contractor will collect and analyze soil samples from a number of areas near the former Asarco Everett Smelter. This sampling is being conducted to obtain information necessary to plan the removal of arsenic-contaminated soil, to document contaminant levels of soil that will remain on site, and to help define the areal extent of contaminated soil.

This FSP addresses the collection and analysis of the following types of samples:

- Residential property samples, including:
  - Outside samples
  - Garden samples
  - Landscape samples
  - Samples from maintenance areas not normally occupied (MANNOs) (e.g., crawlspaces).

Residential sampling is addressed in Section 7.2.1.1.1 of the CAP. This sampling is being performed at homes within the area of suspected soil contamination in order to identify soils that may require removal or other remedial measures.

3.0 RESIDENTIAL SAMPLING—OUTSIDE SAMPLES

3.1 Number and Location of Samples

Each residential property will be divided into decision units (DUs). There will typically be two DUs per home. DUs will usually consist of a front yard and back yard, although property-specific factors will be considered, including ground slope and potential grading/cut and fill activities which may have occurred during construction. No DU may exceed 6,000 square feet; therefore, more than two DUs may have to be defined for large lots.

The sample density in each DU depends on the property's location relative to the former smelter. The study site has been divided into three zones, A, B, and C, based largely on proximity to the smelter (see Figure 7-1 in the CAP). Denser sampling is required in Zone A (closest to the former smelter) and progressively less dense sampling is called for in more distal Zones B and C (see Table 7-1 in the CAP). Per Table 7-1 in the CAP, the sample density for these homes will be as follows:

Homes in Zone B	
DU Size (ft)	**Number of Sampling Locations per DU**
< 1,125	5
1,125 – 1,800	Add 1 per 225 ft^2
1,800 – 4,000	8
4,000 – 6,000 (DU may not exceed 6,000)	Add 1 per 500 ft^2
Collect 6-inch depth intervals to 36 inches	

Like sample density, maximum sample depth is inversely related to distance from the former smelter. The sampling depth for homes in Zone A extends to 48 inches, in Zone B to 36 inches and in Zone C to 24 inches.

Properties will be identified and DUs will be defined in conjunction with Ecology prior to sampling. The contractor will then estimate the size of each DU and determine the number of sample locations required using the above table. Sample locations will be distributed evenly throughout the accessible portion of each DU to the extent practicable. Samples will not be collected from beneath permanent structures, including pavement. Given the relatively large area within most DUs that is taken up by obstructions (e.g., buried utilities, landscaping, etc.), locating samples using a strict grid system would not be workable.

3.2 Sample Collection

Access. Prior to sampling, Ecology will have arranged legal access to each of the properties. Probe locations will be chosen on relatively flat areas that are accessible to the geoprobe equipment (either a pickup truck-mounted rig or a smaller, limited-access rig). To access some locations, it will be necessary for the contractor and its subcontractors to remove a portion of fences, trim vegetation, or move small obstacles. If an identified probe boring cannot be accessed using these measures, then the contractor will relocate the boring to a nearby accessible location within the DU.

Utilities. Prior to sampling, The contractor will locate major underground utilities (gas, phone, cable TV, electric, water, and sanitary sewer) by using the free "one-call" system, consulting city as-built drawings, or using private locating services. Other underground structures that may be on the properties, such as roof or foundation drains, sprinkler lines, and old septic systems, will be avoided to the extent that their positions are known or apparent.

Drilling Regulations. Per state regulations, soil probing will be conducted or directly supervised by a Washington State-licensed driller. In addition, drilling permits ("start cards") must be obtained per Washington State regulation prior to initiating soil probing unless this requirement is waived by Ecology.

Sample Collection. Soil sampling will be performed using a geoprobe-type rig. Soil cores will be collected in new, clear, plastic sample liners. At each sampling location, a probe will be

advanced to 36 inches (3 feet) or to refusal upon three attempts at the same location. The soil will be logged and the tube marked at lengths representing 6-inch depth increments from the surface to the bottom of the core. The tube will be capped and labeled with the date and sample number (see Appendix A) prior to being transported to the sample processing facility.

The field geologist is responsible for monitoring of geoprobe sampling operations and recording pertinent information regarding the geologic materials penetrated during probing operations. The following information will be recorded in the field notebook for each probe:

- Probe number (assigned sequentially in the field starting at "1" within each DU)
- Property number and address (see Table 2)
- Decision Unit (A, B, etc.)
- Probe location (note on property map)
- Date
- Geologist
- Geoprobe rig used (truck or limited access)
- Geological log of soil grain size, color, and consistency
- Total penetration depth and recovery
- List of the samples/depths collected from this probe location
- Other notes (e.g., core refusal, presence of till, difficult probing conditions, debris encountered)

Upon completion of each probe, the boring will be abandoned by filling with bentonite pellets or chips. The actual location of each completed boring will be marked with a wire flag or spray paint and plotted on a map prior to leaving the site.

Decontamination. To prevent the potential distribution of contaminated soil, the probe rig and downhole probe tools will be cleaned of adhering soil before moving between properties. To prevent sample cross-contamination, the probe drive shoe will be decontaminated between each boring using non-phosphate detergent wash and a distilled water rinse. A new plastic sample liner will be used for each boring.

3.3 Sample Processing and Analysis

Rationale. For every depth interval within a DU, a composite sample will be prepared from a portion of each discrete sample from that depth interval. The composite sample will be analyzed and the discrete samples will be archived. The composite sample result will be compared to the average arsenic concentration remediation level listed in the CAP for that depth interval. If the composite result exceeds the average remediation level, the depth interval for the entire DU represented by the composite will be slated for removal. However, if the composite result does not exceed the average remediation level, then all discrete samples from that depth interval in that DU will be analyzed to determine if any discrete sample exceeds the maximum remediation level listed in the CAP[1]. If any discrete result exceeds the maximum remediation level, the depth

[1] The situation may occur in which a composite sample result is so low that it can be shown mathematically that none of the discrete samples could exceed the maximum arsenic concentration remediation level. In this case, the discrete samples will not be analyzed and the depth interval would not require removal.

interval for the entire DU will also be slated for removal; otherwise the depth interval will not require removal (unless underlying depth intervals require removal).

Methods. Samples will be processed and composited using the procedure shown in Appendix B. This procedure shows how a composite will be prepared so that it represents an equal volume of the discrete samples.

Samples will be analyzed for arsenic. The analytical laboratory, analytical methods, reporting limits, sample containers, sample preservation, and holding times are addressed in the QAPP.

For each DU, composites will initially be analyzed *only* for the depth intervals below 12 inches. Composites from the upper layers (i.e., the 0 – 6-inch and the 6 – 12-inch layers) will be retained pending results of the deeper samples. Only if results from the deeper layers require it will samples from upper layers be analyzed.

Decontamination. Sample processing and compositing will utilize a combination of pre-cleaned disposable equipment and reusable plastic and stainless steel equipment. Reusable equipment (e.g., mixing bowls and spoons) will be decontaminated with non-phosphate detergent, rinsed with tap water, and receive a final rinse with distilled water. Pre-cleaned, disposable equipment will be used once then discarded.

Sample Shipping. All samples for analytical testing will be shipped overnight (e.g., Federal Express) to an analytical laboratory. Samples will be shipped in a cooler kept cold with "blue ice" packs or double-bagged ice. A sample Chain-of-Custody form will be included in each sample shipment.

4.0 RESIDENTIAL SAMPLING—GARDEN SAMPLES

4.1 Number and Location of Samples

Each garden will be sampled in two locations. Additional sample locations may be added to unusually large gardens on a case-by-case basis in consultation with Ecology. Sampling depth for all gardens in all zones is 18 inches.

4.2 Sample Collection

Samples will be collected using the methodology described above in Section 3.2 with the exception that, if conditions permit (or require), sample tubes may be driven manually instead of with a geoprobe rig.

4.3 Sample Processing and Analysis

Samples will be processed and analyzed as described above in Section 3.3 with the exception that composites for all three layers will be prepared and analyzed. For purposes of sample processing, compositing, and analysis, each garden is treated as if it were a separate DU.

5.0 RESIDENTIAL SAMPLING—LANDSCAPE SAMPLES

5.1 Number and Location of Samples

A landscape area is an area within a DU that contains prized plants or other landscape features that the homeowner does not wish to be excavated in the event that results from the surrounding DU indicate that soil removal is called for. Landscape areas will be identified to Ecology by the homeowner prior to sampling.

Each landscape area will be sampled in at least two locations. Additional sample locations may be added to unusually large landscape areas on a case-by-case basis in consultation with Ecology. Sampling depth for all landscape areas in all zones is 24 inches.

5.2 Sample Collection

Samples will be collected using the methodology described above in Section 3.2 with the exception that, if conditions permit (or require), sample tubes may be driven manually instead of with a geoprobe rig.

5.3 Sample Processing and Analysis

No composite samples will be prepared or analyzed for landscape area samples. Instead, all discrete samples from each 6-inch layer from each probe will be analyzed. Sample tubes will be simply cut into "sticks" that represent the 6-inch layers. The sticks will then be capped, labeled, and analyzed[2].

6.0 RESIDENTIAL SAMPLING — MANNOs

6.1 Number and Location of Samples

Four shallow soil samples, representing the 0 – 2-inch layer, will be collected in each MANNO. The samples will be distributed evenly throughout the area to the extent practicable.

MANNOs associated with the homes included in the summer 2000 residential sampling effort will be sampled. In addition, the MANNOs associated with the 10 homes included in the 1998 residential sampling will also be sampled.

6.2 Sample Collection

At each sample location, soil will be removed from a 2-inch cubic volume and placed in a labeled sample jar. Samples will be collected manually using a decontaminated stainless steel tool (trowel, spade, spoon, or other appropriate instrument).

[2] Preparation of a field duplicate will require that soil be removed from a stick, split, and placed in placed in labeled sample jars before being sent for analysis.

6.3 Sample Processing and Analysis

Samples will be processed and analyzed as described above in Section 3.3 with the exception that only a single composite representing the 0 – 2-inch layer will be prepared and analyzed. Only a portion of soil from each discrete sample jar will be used to prepare the composite; the remaining discrete samples will be retained pending receipt of composite results. For purposes of sample processing, compositing, and analysis, each crawlspace area is treated as if it were a separate DU.

8.0 FIELD QUALITY CONTROL SAMPLES

Two types of field quality-control (QC) samples will be prepared for this project: equipment rinses and split samples.

8.1 Equipment Rinses

One type of equipment rinse will test for contamination of the plastic geoprobe liners (sample tubes). These equipment rinses will be prepared by pouring high-purity water through new probe liners into pre-preserved sample bottles. In order to be representative, liners for equipment rinses will be selected from several different cartons. One equipment rinse of this type will be prepared for every 20 sample tubes used during the sampling event (i.e., 5 percent).

The other type of equipment rinse will test for contamination of equipment used in sample processing and composite preparation due to incomplete decontamination between samples. These equipment rinses will be prepared by pouring high-purity water over and through decontaminated processing equipment used in sample preparation (e.g., bowls and spatulas) into pre-preserved sample bottles. One equipment rinse of this type will be carried out approximately every other day that samples are processed.

Equipment rinse sample bottles will be labeled with date and sample number using the sample numbering scheme described in Appendix A and shipped to the laboratory under chain-of-custody for analysis. The sample number and type of equipment rinsed will be noted in the field notebook. The water used to prepare the blanks will be certified by the supplier to contain non-detectable concentrations of arsenic.

8.2 Split Samples

Split samples will be made up by removing a representative portion of soil from a prepared sample and placing it in a second sample container. Splits of composite samples will be made up as the composites are prepared. Splits of discrete samples will not be made up at the time of sample processing because it will not be known at that time which discrete samples will be analyzed. Instead, splits of discrete samples will be made after it is determined which discrete samples will be analyzed. If discrete samples are archived by the analytical laboratory (e.g., because of refrigerated storage space limitations at contractor facilities), then splits of discretes will be prepared by the analytical laboratory, as directed by the contractor, prior to analysis.

Split samples will be prepared for approximately 5 percent of all samples that are analyzed; this applies to both composite and discrete samples. Split samples will be labeled using the numbering system shown in Appendix A and will be analyzed along with the original sample.

9.0 WASTE SOIL CHARACTERIZATION SAMPLES

It is necessary to perform additional characterization of any soils that are slated for excavation in order to determine the appropriate method and location of their disposal. This characterization will involve preparing a single "super composite" sample for each *property* where soil removal is necessary. The super composite will be prepared by combining equal volumes of soil from each layer in each DU at a property that will be removed using the general procedure described above in Section 3.3. If the composite samples are archived by the analytical laboratory (e.g., because of refrigerated storage space limitations at contractor facilities), then the super composites will be prepared by the analytical laboratory, as directed by the contractor, prior to analysis. Waste soil characterization samples will be analyzed for waste characterization parameters (e.g., TCLP) as described in the QAPP.

APPENDIX A – SAMPLE NUMBERING SYSTEM

SAMPLE NUMBERING SYSTEM

For Discrete Samples:

Example sample numbers: ***005-A-02-H-1***
001-B-10-A-1
001-B-10-A-2

Where fields are:

Property # – DU – Boring # – Depth Interval – "1" (if a primary sample) or "2"(if a split)

- Property #: Preassigned. Example: 1, 2, . . . (Each property in the Peripheral Area is to be assigned a unique number, starting sequentially from the last property number from the last season's work.)
- Decision Unit (letter): Preassigned. Example: A, B, . . .
- Boring #: Sequential within each Decision Unit. Assign in field. All re-tries get same number as original try. Example: 1, 2, . . .
- Depth Interval (letter):

A = 0.0 – 0.5 ft
B = 0.5 – 1.0 ft
C = 1.0 – 1.5 ft
D = 1.5 – 2.0 ft
E = 2.0 – 2.5 ft
F = 2.5 – 3.0 ft
G = 3.0 – 3.5 ft
H = 3.5 – 4.0 ft

- "***1***" if a primary sample, "***2***" if a split. Splits of discrete samples will be prepared at a rate of 10% *only* for those discrete samples being analyzed.

For Composite Samples:

Example sample numbers: ***Comp-005-A-H-1***
Comp-001-B-A-1
Comp-001-B-A-2

Where field numbers are:

"Comp" – Property # – DU – Depth Interval – "1" (if a primary sample) or, "2"(if a split)

- Property #, Decision Unit, and Depth Unit are same as for discrete samples. (Boring # is not applicable to composite samples).
- "***1***" If a primary sample, "**2**" if a split.

For Equipment Rinses:

Example sample numbers: ***ER-1, ER-2, etc.***

APPENDIX B – SAMPLE PROCESSING & COMPOSITING PROCEDURES

SAMPLE PROCESSING & COMPOSITING PROCEDURES

Prepare "sticks":

- Receive samples from field. Sample tubes will be labeled and marked to represent 6-inch depth layers. (Samples from crawlspaces will be received in labeled sample jars.) Cut tubes where marked into "sticks." Cap and label each stick pending further processing or analysis. Depending on the sample type (outside, crawlspace, garden, landscape, or boundary), sticks may retained pending laboratory results, sent as-is to the laboratory, or processed into composites and discretes as described below.

Prepare composites and discretes:

The steps that follow apply to preparation of composite samples from a single DU or DU-like area (e.g., a garden or crawlspace).

- Remove soil from each stick (or jar, in the case of crawlspace samples) from the same depth layer onto a sheet of aluminum foil. Split the soil into two representative halves. If the soil is cohesive, this may be done by splitting the stick lengthwise. If the soil is non-cohesive, the soil should be homogenized, formed into a pile, and the pile split.

- Place one half of the soil into a labeled discreet sample jar. Depending on the sample type, discretes may be analyzed or retained pending laboratory results.

- Place the other half of the soil into a decontaminated stainless steel bowl along with the soil from the other samples from the same layer. Mix to homogenize. Remove a representative portion to a labeled composite sample jar and ship to laboratory for analysis. Place excess soil in plastic waste bucket for later disposal.