Pier 69 ● 2711 Alaskan Way
Seattle, WA 98121

Letter of Transmittal

To:	Ms. Piper Peterson Lee – EPA, Region 10 1200 Sixth Avenue, Suite 900, ECL-111 Seattle, Washington 98101 -3140	Date: August 28, 2008
From:	Joanna Florer – Windward Environmental Roy Kuroiwa – Port of Seattle	

Project reference: **Terminal 117 Early Action Area**

Hardcopy:	Electronic[a]:	Description:
1	**X**	**Cover letter for transmittal of the final QAPP dioxin addendum**
2	**X**	**Final T-117 QAPP Addendum – Upland Area Soil Sampling for Dioxin and Furans**

cc:

Hardcopy:	Electronic[a]:	Name:	Company:
1	**X**	Kym Takasaki	U.S. Army Corps of Engineers
	X	Kris Flint	EPA, Region 10
1	**X**	Rick Thomas	Dept of Ecology
	X	Brad Helland	Dept of Ecology
1	**X**	Marla Steinhoff	NOAA
1	**X**	Glen St. Amant	Muckleshoot Tribe
1	**X**	B.J. Cummings	Duwamish River Cleanup Coalition
	X	Heather Trim	People for Puget Sound
1	**X**	Tom Meyer	City of Seattle
	X	T-117 Technical Team	Windward, DOF, ENSR, Integral

[a] Electronic version is also available online at http://www.windwardenv.com/t117docs/default.htm

Signature

Pier 69 ● 2711 Alaskan Way
Seattle, WA 98121

August 28, 2008

Ms. Piper Peterson Lee
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Ms. Peterson Lee:

I am pleased to provide to you the *T-117 QAPP Addendum for Upland Area Soil Sampling for Dioxin and Furans*. This T-117 QAPP addendum addresses details of our proposed supplemental upland soil sampling investigation to determine the presence of dioxin on the T-117 Upland Area. The previous EPA approved *Terminal 117 Upland Investigation QAPP* (Windward and DOF 2006) is referenced, as appropriate, for details that remain unchanged from the initial T-117 Upland Area sampling investigation. We only received one comment, which pertained to sample location SB-56. We collaborated with Rick Thomas at Ecology and addressed this comment.

Hard copies of this QAPP will be distributed to the individuals indicated on the letter of transmittal, unless requested otherwise. In order to have dioxin and furan results available by September 29th (scheduled date to meet with EPA and the Stakeholders to review and evaluate tier 1 dioxin results from both T-117 Adjacent Streets/Yards and Upland Area) we intend to conduct field work from September 2nd to the 3rd. To this end, we respectfully request your approval of the attached document by close of business on Friday, August 29, 2008.

Please feel free to contact me at 206.728.3814 (Kuroiwa.R@portseattle.org) if you have any questions.

Sincerely,

Roy Kuroiwa
Project Coordinator

Lower Duwamish Waterway Superfund Site
Terminal 117 Early Action Area

T-117 QUALITY ASSURANCE PROJECT PLAN ADDENDUM –UPLAND AREA SOIL SAMPLING FOR DIOXIN AND FURANS

Prepared for:

The Port of Seattle
and
The City of Seattle

For submittal to:

US Environmental Protection Agency, Region 10
1200 Sixth Avenue
Seattle, WA 98101

August 28, 2008

Prepared by:

Wind Ward environmental LLC
200 West Mercer Street, Suite 401
Seattle, Washington • 98119

Table of Contents

List of Tables and Maps

Acronyms

Acronym	Definition
ARI	Analytical Resources, Inc.
AP	Analytical Perspectives
ASAOC	Agreement and Order on Consent
City	City of Seattle
cPAH	carcinogenic polycyclic aromatic hydrocarbons
COCs	contaminants of concern
DQI	data quality indicator
EAA	early action area
EE/CA	Engineering Evaluation/Cost Analysis
EPA	US Environmental Protection Agency
ERA	Ecological Risk Assessment
FS	Feasibility Study
HHRA	Human Health Risk Assessment
LDW	Lower Duwamish Waterway
NTCRA	Non-Time Critical Removal Action
PCBs	polychlorinated biphenyls
PAHs	polycyclic aromatic hydrocarbons
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan
RI	Remedial Investigation
T-117	Terminal 117
TPH	total petroleum hydrocarbons
TPH-Dx	total petroleum hydrocarbons – diesel and motor oil range
Windward	Windward Environmental LLC

Title and Approval Page:
Terminal 117 Early Action Area
Quality Assurance Project Plan

Windward Project Manager	Joanna Florer	Date
Windward QA Manager	Marina Mitchell	Date
EPA Project Manager	Piper Peterson Lee	Date
EPA QA Manager	Ginna Grepo-Grove	Date

1 Introduction

This quality assurance project plan (QAPP) addendum provides guidance to field and laboratory personnel for the acquisition and analysis of soil samples to be obtained in the Terminal 117 (T-117) Upland Area portion of the T-117 Early Action Area (EAA). The purpose of this work is to evaluate the presence and concentrations of dioxin and furans in the T-117 Upland Area for the Non-Time Critical Removal Action (NTCRA). The results of this dioxin and furan evaluation may be incorporated into the revised EE/CA or during design to specifically address the presence of dioxin and furan in the EAA, if necessary. This proposed work is being coordinated with the City's effort to perform additional dioxin-related sampling in the Adjacent Streets Area of the T-117 EAA (Integral 2008a). The specific objectives of this work are to:

- Evaluate the presence and concentrations of dioxins and furans at select locations within the T-117 Upland (terminal) Area.
- Evaluate the potential for polychlorinated biphenyl (PCB) contaminated bank soil to have been a potential source of dioxins and furans to the sediment
- Examine the co-location of dioxin and furan concentrations with PCBs at select locations and depths with varying concentrations of PCBs (from non-detected to the highest found in the T-117 Upland Area).
- Provide an initial indication of whether the upland soil removal boundaries to address PCBs and other T-117 Upland COCs presented in the Draft Revised EE/CA (Windward et al. 2008) will be sufficient to also address dioxins and furans, should they be identified as an Upland Area issue at the T-117 EAA.
- Obtain information on dioxins and furans for purposes of future waste profiling as may be needed during design and implementation of the NTCRA.
- Find the bottom excavation depth based on the PCB action level of 1 mg/kg at two locations in the T-117 Upland Area where a vertical extent was not previously defined.

The purpose and objectives of the initial T-117 Upland Area investigation of the T-117 EAA and background information about the site can be found in the original QAPP (Windward and DOF 2006). This T-117 QAPP addendum addresses details that are specific to this supplemental upland soil sampling investigation. The Upland Investigation QAPP (Windward and DOF 2006) is referenced, as appropriate, for details that remain unchanged from the initial T-117 Upland Area sampling investigation.

2 Project Management

2.1 Project Organization and Team Member Responsibilities

Soil sampling will be performed by ENSR and Windward Environmental LLC (Windward) with assistance from Cascade Drilling Inc. (or equally qualified), which will provide the hollow-stem auger drill, rig and operator. Analytical Resources, Inc. (ARI) and Analytical Perspectives (AP) will perform chemical analyses of the samples. Additional details on project organization and team member responsibilities can be found in the Upland Investigation QAPP (Windward and DOF 2006).

2.2 Problem Definition and Background

As part of the City's source tracing program for the LDW (Herrera 2004), two samples from the Adjacent Streets portion of the T-117 EAA were analyzed for dioxin and furan congeners. The samples included one street dust sample collected at the intersection of Dallas Avenue S and 16th Avenue S (within the Adjacent Streets portion of the T-117 EAA) and a sample collected from an oil-water separator located on the Basin Oil property. Analytical results from this sampling program were recently compiled and reviewed by the City (Integral 2008b). The dioxin concentration for the street dust and the settling tank, expressed as the toxic equivalent (TEQ) concentration of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD), was 90.5 ng/kg and 15.2 ng/kg, respectively.

The City is conducting a follow-up dioxin sampling program for the EAA streets and adjacent yards. The Port and the City, in coordination with EPA, are conducting this supplemental dioxin sampling program for the T-117 Upland Area to supplement the City's dioxin sampling program, to address the specific objectives provided above in Section 1 (Introduction).

2.3 Project/Task Description and Schedule

Soil chemistry data will be generated to evaluate the presence of dioxin and furans in the T-117 Upland Area. Field sampling will be initiated immediately following EPA's approval of this QAPP addendum. The laboratories will provide the chemical analysis results within three weeks following the delivery of the samples. Preliminary (i.e., un-validated) data will be immediately reviewed with EPA, and validated within three weeks of receiving data packages from the laboratories. Results will be presented to EPA in a data report two weeks after Windward's receipt of validated data.

2.4 SPECIAL TRAINING REQUIREMENTS/CERTIFICATION

Training requirements for personnel participating in sample collection can be found in the Upland Investigation QAPP (Windward and DOF 2006). The site health and safety plan remains in effect for this sampling effort.

2.5 DOCUMENTATION AND RECORDS

The results of this field effort, including the data validation report, will be presented in a data report, and these results will also be included in the revised EE/CA. Procedures for documenting field observations, laboratory records, and data reduction can be found in the Upland Investigation QAPP (Windward and DOF 2006).

3 Data Generation and Acquisition

This section presents sampling design and sampling methods. Details regarding decontamination procedures, field-generated waste disposal, sample handling and custody, analytical methods requirements, quality assurance/quality control, instrument/equipment testing, inspection and maintenance requirements, instrument calibration and frequency, inspection/acceptance requirements for supplies and consumables, and data management can be found in the Upland Investigation QAPP (Windward and DOF 2006).

3.1 SAMPLING DESIGN

The objectives of this supplemental T-117 Upland Area soil investigation are listed in Section 1 (Introduction). The primary focus is to determine the presence of dioxin and furan within the T-117 Upland Area.

To meet these objectives, twenty-three soil samples will be collected from eight locations shown on Map 3-1. Table 3-1 describes how each sample location will be used to meet one or more of the sampling program objectives. All soil samples will be analyzed for dioxin and furans, PCBs, polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH) in the diesel and motor oil ranges, and total solids. Samples will be collected at continuous 1.5ft intervals in the shallow (i.e.,< 5ft) intervals at each location to evaluate the presence of dioxin an furans as well as the co-location with various PCB concentration and other T-117 COCs. At two locations, SB-59 and SB-60, samples will be collected from 1.5 ft intervals collected on 2.5 ft centers at depth (i.e., >10ft) in order to re-evaluate PCB concentrations at depth and find a bottom depth with PCB concentrations less than 1 mg/kg. At all locations a sample will be collected from the anticipated excavation depth and archived for potential dioxin and furan analyses depending on the results of the shallow intervals. No samples will be collected from intervals between shallow intervals and the intervals collected at depth since soil in at that depth has already been characterized

and will be removed requiring no further evaluation at this time. If this investigation indicates that dioxin and furans are T-117 Upland Area COCs, additional investigation may be required. After the conclusion of this field study and analyses, a data report will be provided to EPA. Any updates or revisions to the current draft Revised EE/CA and proposed removal boundaries will be evaluated and decided subsequent to this study.

Table 3-1. Supplemental soil sampling location and rationale

Map ID[a]	Easting	Northing	Excavation Depth (ft)	Sample Intervals[b] (ft)	Analyses	Rationale
SB53	1275125	195679	none	0.5 – 2.0	PCBs, PAH, TPH, and D/F	Area likely used for storage over the years with low PCB concentration (< 1 mg/kg), not designated for excavation Evaluate dioxin/furan concentration in the vicinity of a previous location determined to have low PCB concentration
SB54	1275228	195737	8	0 – 1.5 1.5 – 3.0	PCBs, PAH, TPH, and D/F	Evaluate dioxins and furans concentrations along the bank at an area with high PCB concentrations (730 mg/kg) If necessary, evaluate if the vertical removal boundary is sufficient to address dioxin and furans
				Z: 7.5 – 9.0*	Archive D/F	
SB55	1275334	195685	12	0 –1.5 1.5 – 3.0	PCBs, PAH, TPH, and D/F	Evaluate dioxins and furans concentrations along the bank at a location with high PCB concentrations (530 mg/kg) If necessary, evaluate if the vertical removal boundary is sufficient to address dioxin and furans
				Z: 11.5 – 13.0*	Archive D/F	
SB56	1275335	195443	none	0.5 – 2.0	PCBs, PAH, TPH, and D/F	Area within vicinity of former manufacturing plant with low PCB concentration (< 1 mg/kg), not designated for excavation Evaluate dioxins and furans concentrations in the vicinity of a previous location determined to have low PCB concentrations
				2.0 - 3.5** 3.5 - 5.0**	PCBs Archive D/F	Fill a spatial data gap and evaluate PCB concentrations at depth. If necessary, evaluate if the vertical removal boundary is sufficient to address dioxin and furans after appropriate Z depth has been determined
SB57	1275463	195508	9	0 –1.5 1.5 –3.0	PCBs, PAH, TPH, and D/F	Evaluate dioxins and furans concentrations along the bank at a location with high PCB concentrations (400 mg/kg) If necessary, evaluate if the vertical removal boundary is sufficient to address dioxin and furans
				Z: 8.5 –10.0*	Archive D/F	

Map ID[a]	Easting	Northing	Excavation Depth (ft)	Sample Intervals[b] (ft)	Analyses	Rationale
SB58	1275310	195388	4	0.5 – 2.0 2.0 – 3.5	PCBs, PAH, TPH, and D/F	Area near perimeter of T-117 Upland and within vicinity of former manufacturing plant with elevated PCB concentration (62 mg/kg) at the surface Evaluate dioxins and furans concentrations at continuous depth intervals at a location with high PCB concentrations near the surface and decreasing with depth If necessary, evaluate if the vertical removal boundary is sufficient to address dioxin and furans
				3.5 – 5.0*	Archive D/F	
SB59	1275381	195336	16	0.5 – 2.0 2.0 – 3.5	PCBs, PAH, TPH, and D/F	Evaluate dioxins and furans concentrations at a location with the highest PCB concentration (4,200 mg/kg) Re-evaluate PCB concentrations at depth and find a bottom depth with PCB concentrations < 1 mg/kg. If necessary, evaluate if the vertical removal boundary is sufficient to address dioxin and furans after appropriate Z depth has been determined
				15.0 – 16.5** 17.5 – 19.0**	PCBs Archive D/F	
SB60	1275502	195340	14	0.5 – 2.0 2.0 – 3.5 3.5 – 5.0	PCBs, PAH, TPH, and D/F	Evaluate dioxins and furans concentrations at a location with the high PCB concentration (1,100 mg/kg) Re-evaluate PCB concentrations at depth and find a bottom depth with PCB concentrations < 1 mg/kg. If necessary, evaluate if the vertical removal boundary is sufficient to address dioxin and furans after appropriate Z depth has been determined
				12.5 – 14** 15.0 – 16.5** 17.5 – 19.0**	PCBs Archive D/F	

Horizontal datum = Washington State Plane North, NAD83, US survey ft

* Sample will be archive depending on the dioxin and furan results of the shallow intervals.

** Sample will be analyzed for PCBs only and archived for dioxin and analyzed if necessary

[a] Location IDs in the project database will begin with "T117-" to identify the T117 sampling site.

[b] At locations covered by asphalt, the first sample interval is collected from below the asphalt, about 6 inches below ground surface

D/F – dioxin and furans

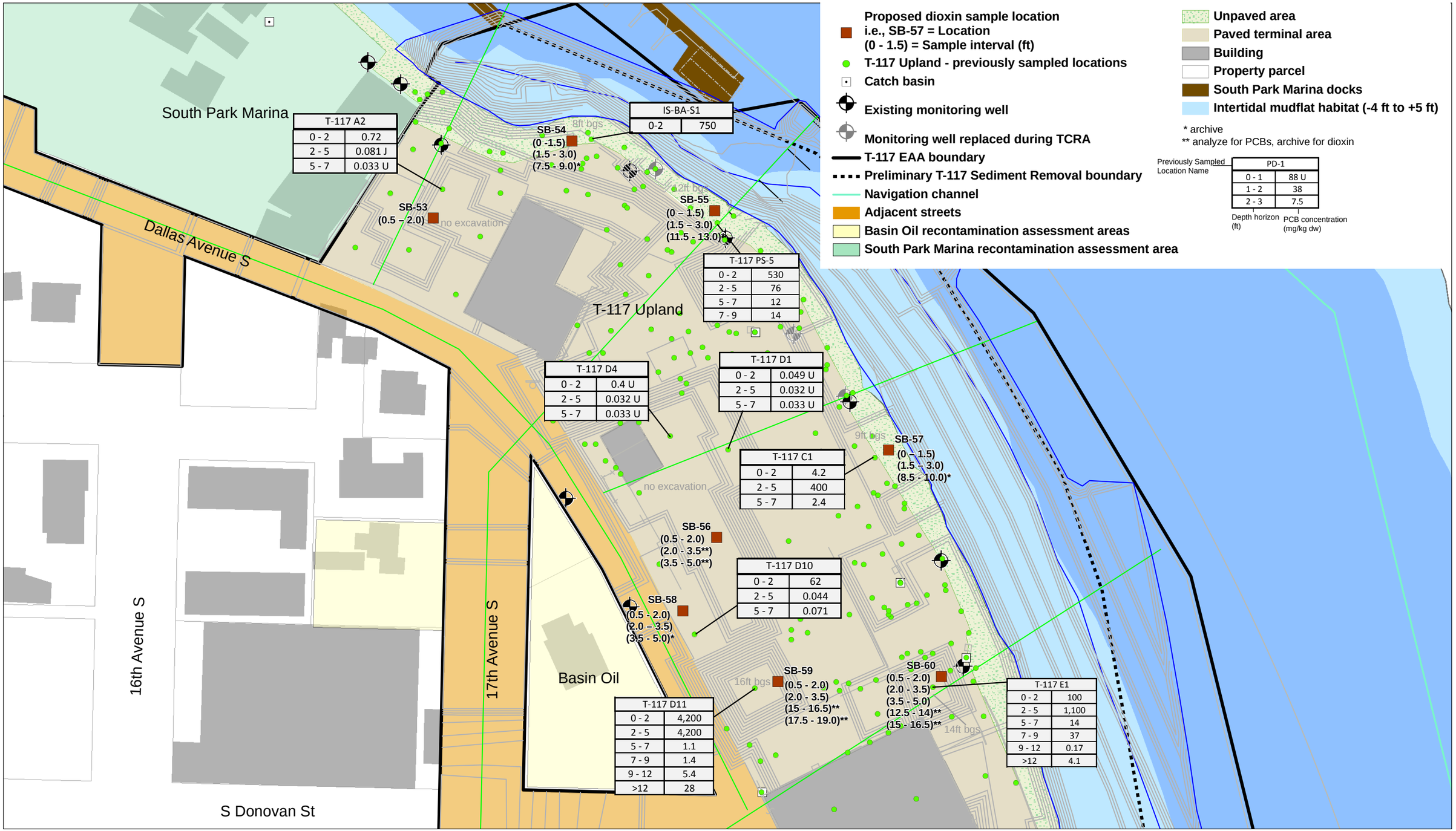
PAHs – polycyclic aromatic hydrocarbons

PCBs – polychlorinated biphenyls

SB – soil boring

TPH – total petroleum hydrocarbon

Z – Z sample, which is collected from the anticipated excavation depth



Map 3-1. Proposed supplemental upland soil sampling locations

Prepared by KH 08/08/08; Map 3396, W:\Projects\03-08-12 T-117 (Malarkey)\Data\GIS\QAPP_2008

3.2 SAMPLING METHODS

3.2.1 Field collection methods

All field activities will be performed under the direction of the field coordinator, Joanna Florer of Windward, or other oversight personnel and EPA oversight as appropriate. Soil sampling will be accomplished by advancing a hollow-stem auger drill deployed from a drill rig operated by Cascade Drilling, Inc. under the direction of Windward. Refer to the Upland Investigation QAPP (Windward and DOF 2006) for field operations, collection equipment and sample handling procedures. Soil will be homogenized by Windward personnel in the field using stainless steel bowls and spoons and transferred into containers as specified in Table 3-3.

Table 3-2. Sample containers for chemical analyses

PARAMETER	CONTAINER
Dioxins and furans[a]	(1) 8-oz glass jar
PCBs as Aroclors[a]	(1) 16-oz glass jar
PAHs[a,b]	
TPH-Dx – diesel and motor oil ranges[a]	
Total solids	(1) 4-oz glass jar
Rinsate blank for PCBs, PAHs, and TPH-Dx	(5) 500-mL glass amber bottles

[a] One sample must be collected in duplicate for laboratory quality assurance/quality control (QA/QC) samples

[b] Target PAHs include anthracene, pyrene, dibenzofuran, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, benzo(b)fluoranthene, fluoranthene, benzo(k)fluoranthene, acenaphthylene, chrysene, benzo(a)pyrene, dibenz(a,h)anthracene, benzo(a)anthracene, acenaphthene, phenanthrene, fluorene, 1-methylnaphthalene, naphthalene, and 2-methylnaphthalene.

PAHs – polycyclic aromatic hydrocarbons

PCBs- polychlorinated biphenyls

TPH-Dx – total petroleum hydrocarbons in the diesel and motor oil ranges

3.2.2 Location and sample IDs

Each location will be assigned a unique identification (ID) number. The first four characters of the location ID will be "T117-" to identify the T117 site, followed by "SB" and two numbers to designate the soil boring location. The location IDs presented on maps will be simplified to just the soil boring number, without the "T117-." For example, location "T117-SB53" is presented on Map 3-1 as "SB53."

Sample IDs will begin with the associated location ID followed by the upper and lower limits of the sampled depth interval. For example, the first 1.5-ft interval collected from SB53 would be designated T117-SB53-0-1.5, and the next continuous interval from the same location would be designated as T117-SB53-1.5-3.0, and so on. If the actual sampling depths differ from the target sampling depths presented in Table 3-1, the sample ID will be adjusted to reflect the actual sampling depth interval.

3.2.3 Field quality assurance/quality control

Field quality assurance/quality control (QA/QC) will include one field duplicate soil sample and one rinsate blank sample. The field duplicate sample will be analyzed for all parameters, and the rinsate blank sample will be analyzed for PCBs, PAHs, and TPH-Dx only. Field QA/QC samples will be assigned modified sample IDs as described below:

- The field duplicate sample will be assigned the next available location number at the end of the sequence (as identified in Table 3-1). For example, the field duplicate sample of T117-SB53-0-1.5 would be identified as T117-SB57-0-1.5.
- The rinsate blank sample will be assigned the same characters as the sample ID collected immediately prior to the collection of the rinsate blank sample, followed by the identifier "-RB." For example, the rinsate blank collected from T117-SB53-0-1.5 would be T117-SB53-0-1.5-RB.

3.3 ANALYTICAL METHODS

Analytical methods and data quality indicators (DQIs) for this sampling effort are summarized in Table 3-3 and are discussed in greater detail in the Upland Investigation QAPP (Windward and DOF 2006).

Sample coolers containing soil and rinsate blank samples for PCBs, PAHs, TPH-Dx, and total solids analyses will be transported directly to ARI by Windward personnel. Soil samples for dioxins and furans analysis will be shipped via overnight delivery to AP, and may be stored frozen at the Windward or ARI until shipment. All samples will be transported in sturdy coolers with wet ice or frozen gel packs using the chain-of-custody procedures described in the project QAPP (Windward and DOF 2006).

Table 3-3. Data quality indicators for sediment analyses

Parameter	Units	Method	Reference	Sensitivity		Precision	Accuracy	Completeness	Maximum Sample Holding Time	Preservative	Laboratory
				RL	MDL						
Dioxins and furans	ng/kg dw	HRGC/HRMS	EPA 1613B	0.5 – 5.0	0.074 – 0.62	±50%	50 – 150%	95%	1 year to extract, 40 days to analyze	freeze/-20℃	AP
PCBs as Aroclors	µg/kg dw	GC/ECD	EPA 8082	20	4.1	±50%	50 – 150%	95%	14 days to extract, 40 days to analyze[a]	cool/0 – 6℃	ARI
PAHs[b]	µg/kg dw	GC/MS	EPA 8270D	67	6 – 27	±50%	30 – 160%	95%	14 days to extract,[a] 40 days to analyze	cool/4 ±2℃	ARI
TPH-Dx – diesel and motor oil	mg/kg	GC/FID	NWTPH-D	5.0 – 10	0.50 – 1.9	±50%	30 – 130%	95%	14 days to extract,[a] 40 days to analyze	cool/4 ±2℃	ARI
Total solids	% ww	oven-dried	EPA 160.3	0.1	na	±20%	na	95%	7 days	cool/0 – 6℃	ARI

[a] Aqueous rinsate blanks have a maximum holding time of 7 days to extract and 40 days to analyze, and will be stored at 0 – 6 ℃.

[b] Target PAHs include anthracene, pyrene, dibenzofuran, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene, benzo(b)fluoranthene, fluoranthene, benzo(k)fluoranthene, acenaphthylene, chrysene, benzo(a)pyrene, dibenz(a,h)anthracene, benzo(a)anthracene, acenaphthene, phenanthrene, fluorene, 1-methylnaphthalene, naphthalene, and 2-methylnaphthalene.

AP – Analytical Perspectives

ARI – Analytical Resources, Inc.

dw – dry weight

EPA – US Environmental Protection Agency

GC/ECD – gas chromatography/electron capture detection

GC/MS – gas chromatography/ mass spectrometry

HRGC/HRMS – high resolution gas chromatography/high resolution mass spectrometry

MDL – method detection limit

na – not applicable

PAHs – polycyclic aromatic hydrocarbons

PCBs- polychlorinated biphenyls

RL – reporting limit

TPH – total petroleum hydrocarbon

4 Assessment and Oversight

Details of project assessment and oversight are presented in the original QAPP (Windward et al. 2003).

5 Data validation and Usability

All results will undergo a summary-level data validation as described in the original QAPP (Windward and DOF 2006) by EcoChem, Inc., with one exception. The dioxins and furans results will undergo a full-level data validation.

6 References

Herrera. 2004. Sampling and analysis plan, Diagonal Avenue South drainage basin pollutant source investigation. Prepared for Seattle Public Utilities Herrera Environmental Consultants, Inc., Seattle, WA.

Integral. 2008a. Draft quality assurance project plan. Investigation of potential PCDD/PCDF contamination in soil: City of Seattle streets and yards adjacent to the T-117 Early Action Aria, Seattle, Washington. Integral Consulting, Inc., Mercer Island, WA.

Integral. 2008b. Toxic equivalent concentrations of TCDD in source sediments and street dirt. Prepared for Seattle Public Utilities. Integral Consulting, Inc., Mercer Island, WA.

Windward, DOF. 2006. Terminal 117 upland investigation quality assurance project plan. Prepared for the Port of Seattle. Windward Environmental LLC and Dalton, Olmsted & Fuglevand, Inc., Seattle, WA.

Windward, DOF, Onsite. 2003. Lower Duwamish Waterway Superfund site, Terminal 117 early action area. Quality assurance project plan. Prepared for the Port of Seattle. Windward Environmental LLC, Dalton, Olmsted & Fuglevand, Inc., and Onsite Enterprises, Inc., Seattle, WA.

Windward, ENSR, Integral, DOF. 2008. Terminal 117 Early Action Area. Revised engineering evaluation/cost analysis. Draft. Prepared for the Port of Seattle and the City of Seattle. Windward Environmental LLC, Seattle, WA; ENSR Corporation, Seattle, WA; Integral Consulting, Inc., Mercer Island, WA; and Dalton, Olmsted & Fuglevand, Inc., Seattle, WA.