URS

Draft Final
Technical Memorandum

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Subject: **Supplemental Remedial Investigation Work Plan**
Everett Shipyard
1016 14th Street
Everett, Washington

INTRODUCTION

In late 2008 and early 2009, URS conducted a field remedial investigation (RI) of the Everett Shipyard Site, 1016 14th Street in Everett, Washington ("Site"). The work was completed in accordance with Agreed Order No.: DE 5271 and the Final Remedial Investigation/Feasibility Study Work Plan (RI/FS Work Plan) dated October 31, 2008 (URS 2008). The results of the field RI were presented in the Preliminary RI Data Report (URS 2009), which was submitted to the Washington State Department of Ecology (Ecology) on May 26, 2009. The Preliminary RI Data Report provided recommendations to fill data gaps that were identified following review of the field RI data.

Ecology commented on the Preliminary RI Data Report on June 26, 2009. A series of conference calls were held to discuss these preliminary comments and build a consensus on the scope of work required to provide data needed for the feasibility study. Ecology summarized these discussions in an email dated July 13, 2009.

A draft Supplement RI Work Plan (Work Plan) was submitted to Ecology on July 24, 2009 and approved by Ecology in an email on July 30, 2009. A revised draft Work Plan, which included additional upland sampling designed to reduce uncertainties during the feasibility study, was submitted to Ecology on October 9, 2009. Ecology's comments on the revised draft Work Plan were provided during telephone conversations on October 15, 2009 and in a follow-up email dated October 16, 2009. This draft Final Work Plan has been revised to address the recent comments received from Ecology.

The purpose of this technical memorandum is to present the scope of work for the supplemental RI that will be used to fill data gaps identified during the review and discussion of the field RI results. The scope of work includes an upland investigation and a marine sediment investigation described below.

SCOPE OF WORK

Sampling and analysis plans (SAPs) for upland and marine sediment sampling and a site-specific Health and Safety Plan were prepared prior to the field RI. These plans were included as appendixes to the RI/FS Work Plan (see Appendixes A, E and F). The methods and procedures described in these plans will be utilized during these additional marine sediment and upland investigations unless otherwise indicated in the scope of work below.

MARINE SEDIMENT INVESTIGATION

Additional marine sediment sampling will be conducted to address data gaps identified in the vicinity of locations SG-23 and SG-13. The proposed sediment sampling locations are shown on Figure 1 and the location coordinates are shown in Table 1.

Vicinity of SG-23

Three new locations in the vicinity of location SG-23 will be sampled and analyzed for chemicals found to be in exceedance of the Sediment Management Standards (SMS) in the sample previously collected at SG-23. Grab samples will be collected from three new locations south, southwest, and west of location SG-23 (Figure 1) and analyzed for semi-volatile organic compounds (SVOCs) and bulk and porewater organotins to better define the extent of the SMS exceedances previously observed at SG-23. These samples, designated SG-28, SG-29, and SG-30, will also be analyzed for the conventional sediment variables. The proposed analytical work is summarized by location in Table 2.

A separate marine sediment investigation is currently ongoing on behalf of the Port of Everett (Port) in the North Marina west of location SG-23. The SMS exceedances associated with the eastern-most locations involved in this investigation, just west of location SG-23, were limited to SVOCs.

Vicinity of SG-13

Location SG-13 will be resampled to provide sediments to be used in bioassay testing. The new bioassay sample will be designated SG-31 to distinguish it from the prior sample collected from this location. Three new locations in the vicinity of location SG-31 will also be sampled and archived as a contingency in case of failure of the bioassays to be performed on sediment from SG-31. Sufficient sample volume will be collected at each of these locations so that these contingent analyses for all SMS constituents could be performed if needed.

Sample SG-31 will be collected from former location SG-13 for use in three bioassays. Two acute bioassays and one chronic bioassay will be performed with the SG-31 sediment in accordance with WAC 173-340-315 (Ecology 1995), the detailed guidance in the Sediment Sampling and Analysis Plan Appendix (Ecology 2008), and the detailed procedures outlined in the Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments (PSEP 1995). The proposed test species are summarized in Table 3.

Historical data from Ecology's EIM database were used to select a suitable reference location, i.e., one with fine-grained sediment and total organic carbon levels comparable to the SG-31 location. The selected reference location is in eastern Holmes Harbor on the east side of Whidbey Island. The reference sample will be designated SG-35.

The goal will be to achieve the recommended bioassay holding time of no more than two weeks. The sediments will be archived at 4°C in a nitrogen atmosphere. URS has contracted with Northwest Aquatic Sciences in Newport, Oregon to perform the bioassays.

Three samples, SG-32, SG-33, and SG-34, will be collected from locations north, west, and south of SG-31 for possible future analysis in case of failure of the SG-31 bioassays. Since access to location SG-34 is very limited due to the presence of floating docks, this location will be sampled using a Petit Ponar rather than the van Veen grab sampler used for the other samples. These samples will be promptly analyzed for conventional variables due to the short holding times for these analyses, and additional sediment will be frozen and archived. Further analysis of samples SG-32 through SG-34 would be contingent on the results of the bioassays from SG-31. In the event that the SG-31 bioassay(s) were to fail, the three archived samples would be analyzed for SVOCs based on SVOC exceedances of the SMS in prior sample SG-13. In the event that SVOC exceedances are found in any of the three additional locations, additional samples could be collected, during a subsequent phase of field work, from locations with exceedances in order to run bioassays.

Table 3 summarizes the proposed sediment chemical analyses, including both environmental samples and quality control samples.

UPLAND INVESTIGATION

Forty-three additional soil borings will be sampled to further assess the extent of impacted soils beneath site buildings and around the leasehold perimeter (Figure 2). The data collected from these locations will be used to refine the extent of the required cleanup and identify any structures which may need to be demolished prior to cleanup. The rationale for the borings, sample depths and the analytical program is summarized in Table 5. The analytical program focuses on metals, cPAHs and petroleum hydrocarbons because one or more of these compounds were detected at each location where constituents exceeded preliminary soil cleanup levels. Other compounds, including organotins, polychlorinated biphenyls and semi-volatile organic compounds, were either not detected above the preliminary cleanup levels or were co-located with the primary compounds of concern identified above.

The RI/FS Work Plan included a task to locate and sample monitoring well MW-3 which was installed by Landau Associates in 2003. During the field RI, the well could not be located. To obtain soil and groundwater data from this location, one direct push boring (SB-43) will be drilled in the upland area near the former monitoring well MW-3 (Figure 2). Surface soils in the area of SB-43 visually appear to be impacted by abrasive grit to a depth of less than 0.5 feet below ground surface (bgs) and these near-surface soils are expected to be removed during site cleanup. Therefore, as shown in Table 5, a shallow soil sample (0.0 to 0.5 foot bgs) will not be collected at this location. A shallow groundwater sample (approximately 5 to 9 feet bgs) will be

collected from the boring SB-43 and analyzed for dissolved metals (arsenic, copper, nickel and zinc) by EPA 6010B/7000A Series Methods, total petroleum hydrocarbons (diesel range) by Ecology NWTPH-Dx, and SVOCs by EPA Method 8270D.

One additional groundwater sampling event will be completed in October 2009 at monitoring wells MW-2, MW-4, MW-6 and MW-7 due to the inconsistency between the three initial results to confirm indicator hazardous substances for groundwater. The groundwater samples will be analyzed for total and dissolved arsenic, copper, nickel and zinc by EPA 6010B/7000A Series Methods, and SVOCs by EPA Method 8270D. The laboratory analyses will be completed as outlined in the QAPP (see Appendix G of the RI/FS Work Plan). The samples for dissolved metal will be filtered in the field.

SCHEDULE

Wells MW-2, MW-4 and MW-7 were sampled on July 9, 2009 following receipt of approval from Ecology to proceed with this task. MW-6 could not be sampled at that time due to the presence of a barge located over the well. The barge has since been moved and wells MW-2, MW-4, MW-6 and MW-7 were sampled October 13, 2009.

The sediment sampling was initiated on October 7, 2009 and was completed on October 13, 2009. The upland investigation is scheduled to start in late October and should be completed by early November 2009. This overall schedule is generally consistent with the schedule submitted to Ecology on March 11, 2009; however the field work could extend a few days past November 2, 2009.

REFERENCES

Washington State Department of Ecology (Ecology). 2008. *Sediment Sampling and Analysis Plan Appendix*. Publication No. 03-09-043. February 2008.

_____. 1995. Sediment Management Standards. *Chapter 173-204, Washington Administrative Code*. Publication No. 96-252. December 1995.

Puget Sound Estuary Program (PSEP). 1995. *Recommended Guidelines for Conducting Laboratory Bioassays on Puget Sound Sediments*. Interim Final Report, Puget Sound Estuary Program, US Environmental Protection Agency, Region 10, Seattle, Washington. July 1995.

URS Corporation (URS). 2009. *Preliminary Remedial Investigation Data Report, Everett Shipyard.* Everett, Washington. May 26, 2009.

_____. 2008. *Final Remedial Investigation Feasibility Study Work Plan, Everett Shipyard.* Everett, Washington. October 31, 2008.

Attachments:

Figure 1 – Proposed Supplement Sediment Sample Locations
Figure 2 – Proposed Supplemental Soil Sample Locations

Table 1 – Sediment Station Coordinates
Table 2 – Summary of Proposed Sediment Analyses
Table 3 – Bioassay Organisms
Table 4 – Environmental and Quality Control Sample Quantities for Marine Sediment Analyses
Table 5 – Summary of Proposed Soil Sample Analyses

Table 1
Sediment Station Coordinates

Station Number	Latitude (Decimal Degrees//Degrees, Minutes, Seconds)	Longitude (Decimal Degrees//Degrees, Minutes, Seconds)	Estimated Water Depth (feet)	Proposed Sample Depth Below Sediment Surface
SG-28	47.99908889//47°59'56.72"	-122.21663611//-122°12'59.89"	10	0 to 10 cm
SG-29	47.99900556// 47°59'56.42"	-122.21649444//-122°12'59.38"	10	0 to 10 cm
SG-30	47.99900278// 47°59'56.41"	-122.21628056//-122°12'58.61"	10	0 to 10 cm
SG-31	47.99759444// 47°59'51.34"	-122.21581944//-122°12'56.95"	8	0 to 10 cm
SG-32	47.99765278// 47°59'51.55"	-122.21588333//-122°12'57.18"	12	0 to 10 cm
SG-33	47.99761111// 47°59'51.40"	-122.21599167//-122°12'57.57"	12	0 to 10 cm
SG-34	47.99754444// 47°59'51.16"	-122.21589444//-122°12'57.22"	12	0 to 10 cm
SG-35	48.0304814638889// 48°1'49.7333"	-122.520411508333//-122°31'13.4814"	NA	0 to 10 cm

Table 2
Summary of Proposed Sediment Analyses

Location	SVOCs	Bulk and Porewater Organotin	Conventional Variables	Bioassays	Additional Sediment Archived
SG-28	✓	✓	✓	---	✓
SG-29	✓	✓	✓	---	✓
SG-30	✓	✓	✓	---	✓
SG-31	---	---	✓	✓	---
SG-32	---	---	✓	---	✓
SG-33	---	---	✓	---	✓
SG-34	---	---	✓	---	✓
SG-35	---	---	✓	✓	---

Notes:

SVOCS – Semi-volatile organic compounds

✓ - Analysis to be performed
--- - Analysis not performed

Table 3
Bioassay Organisms

Bioassay	Test Organism
Acute amphipod	*Eohaustorius estuarius*
Acute larval	*Dendraster excentricus* or *Mytilus galloprovincialus*
Chronic	*Neanthes arenaceodentata*

Table 4
Environmental and Quality Control Sample Quantities for Marine Sediment Analyses

Analyses	Analytical Method	Environmental Samples	Field Duplicates	Matrix QC*	Field Blanks	Total Samples
Semi-Volatile Organic Compounds	EPA SW846 8270D/8270-SIM	3	1	1/1+1	1	8
Grain Size	PSEP Method (1986a)	8	1	0	0	9
Total Organic Carbon	Plumb, 1981	8	1	0	0	9
Ammonia	Plumb, 1981-modified	8	1	0	0	9
Total sulfides	EPA SW846 9030B	8	1	0	0	9
Total Solids	PSEP Method (1986a)	8	1	0	0	9
Total Volatile Solids	EPA 160.4 2540 B, E	8	1	0	0	9
Tributyltin (bulk)	Method PSEP/Krone 1988	3	1	1/1+1	1	8
Tributyltin (porewater)	Method PSEP/Krone 1988	3	1	1/1+1	1	8

* Matrix QC – MS/MSD and/or laboratory duplicate analyses.

Table 5
Summary of Proposed Soil Sample Analyses

				Laboratory Analyses			
Area of Concern/Rationale	**Boring IDs**	**Sample Type**	**Approximate Sample Depth Interval (feet bgs)**	**Diesel- and Oil-Range Petroleum Hydrocarbons**	**cPAHs**	**Metals**	**VOCs**
Assess western extent of soil impacts near the former location of MW-3	SB-43	Boring	1.0 – 2.0	NA	X	X	Soil samples will be screened in the field with a PID using standard headspace technique. If elevated PID readings are measured, up to five (5) soil samples will also be submitted for VOC analyses.
			2.0 - 3.0	NA	Hold	Hold	
Assess northern extent of soil impacts and provide data to address contingencies such as access to Mall Building during cleanup	SB-44 through SB-47	Boring	0 - 0.5	NA	X	X	
			2.0 - 3.0	NA	Hold	Hold	
Assess eastern extent of soil impacts and likelihood cleanup of public right-of-way will be required	SB-48 through SB-52	Boring	0 - 0.5	NA	X	X	
			2.0 - 3.0	NA	Hold	Hold	
Assess soil conditions beneath the office and wood shop and further delineate potential impacts beneath the weld shop and boat shed.	SB-53 through SB-61	Boring	0 - 0.5	X (SB-53, -54, -60, -61)	X	X	
			2.0 - 3.0	Hold	Hold	Hold	
Assess extent of soil impacts beneath the former Everett Engineering buildings.	SB-62 through SB-79	Boring	0 - 0.5	X	X	X	
			2.0 - 3.0	X (SB-71, -72, -73, -74)	Hold	Hold	
Assess the whether the CPAHs detected at SB-31 are related to the site or are associated with the asphalt in this area.	SB-80 through SB-83	Boring	0 - 0.5	NA	X	X	
			2.0 - 3.0	NA	Hold	Hold	
Assess southern extent of soil impacts.	SB-84 through SB-86	Boring	0 - 0.5	X (SB-86)	X	X	
			2.0 - 3.0	Hold	Hold	Hold	
Assess southern extent of soil impacts near marine railway.	SB-87	Boring	0 - 0.5	NA	X	X	
			2.0 - 3.0	NA	Hold	Hold	
Assess potential impacts beneath former fish processing building and lateral extent of soil impacts near boring SB-42	SB-88 through SB-92	Boring	0 - 0.5	NA	X	X	
			2.0 - 3.0	NA	Hold	Hold	

Notes:
NA - Sample will not be analyzed for theses

constituents.

X - Analyze soil samples from designated interval from all borings at area of concern for indicated analytes

Table 5 (continued)

Notes (continued):

bgs - below ground surface; Sample depth intervals are below ground surface or below asphalt/concrete and base course, if present

Diesel- and oil-range petroleum hydrocarbons by Ecology Method NWTPH-Dx

Metals by EPA Methods 6010/7421 - analyte list will include: antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc.

cPAHs - Carcinogenic polynuclear aromatic hydrocarbons by EPA Method 8270 SIM

VOCs - Volatile organic compounds by EPA Method 8260B

Hold - Samples will be placed on hold at the analytical laboratory pending receipt of results for shallow samples. Deeper samples will then be analyzed for constituents that exceed preliminary cleanup levels in the shallow soil samples

NA - Not analyzed

See Appendix G of the RI/FS work Plan (URS 2008) for sampling procedures and complete analyte list and detection limits for analyses

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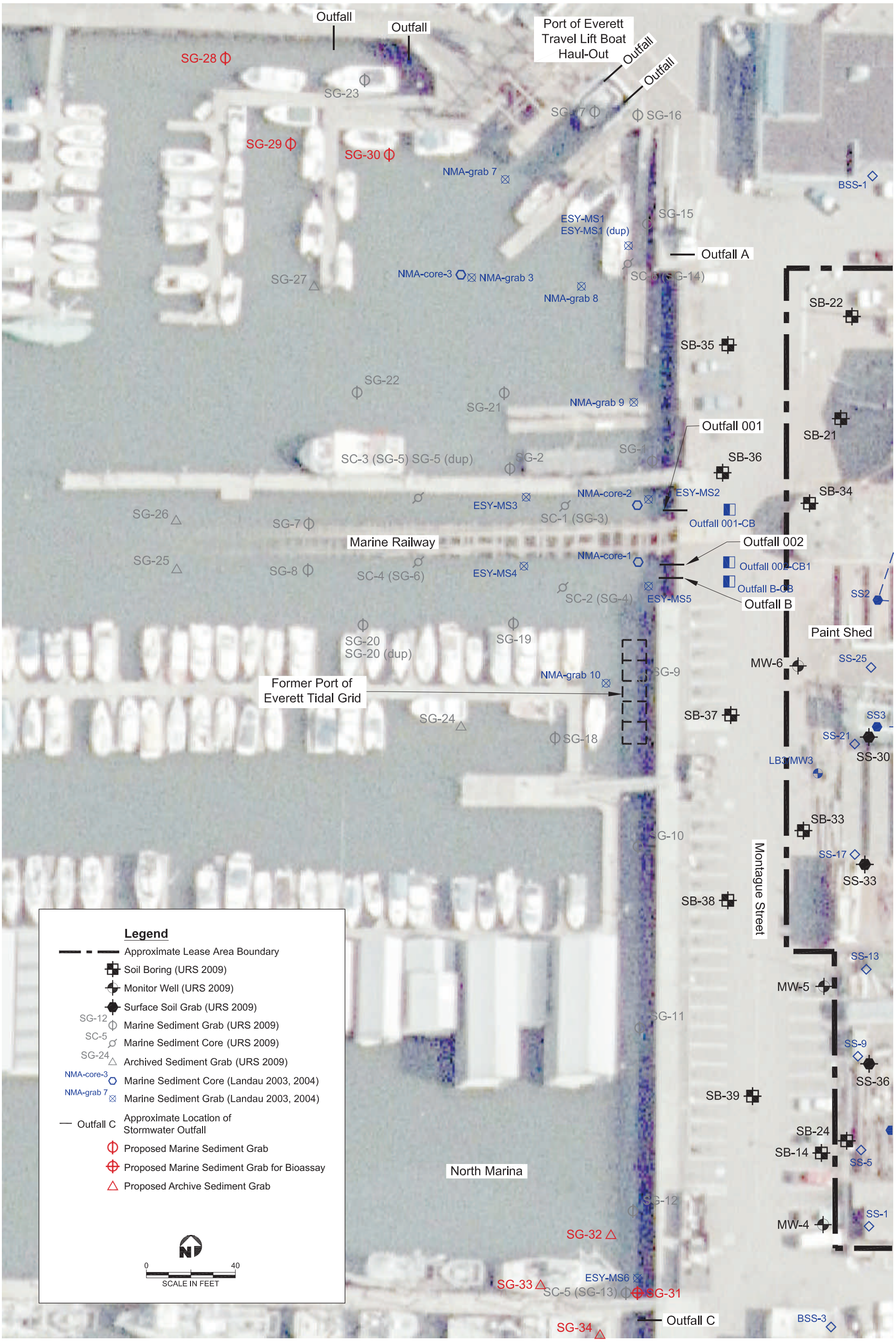

Figure 1

Proposed Supplemental Sediment Sample Locations

Job No. 33761354

URS

Everett Shipyard
Everett, Washington
SUPPLEMENTAL RI WORK PLAN

Note

2003 composite soil sample locations not shown.

Legend

- Elevation Contour (1 ft Interval)
- Storm Drain
- Catch Basin
- Monitoring Well
- Soil Boring Sample
- Surface Soil Sample
- Hand Auger
- Approximate Lease Area Boundary
- 2008/2009 Soil Samples
- Historical Soil Samples
- Proposed Soil Boring

NE	Does Not Exceed Preliminary Cleanup Level
X	Exceeds Preliminary Cleanup Level by less than a factor of 2
X	Exceeds Preliminary Cleanup Level by more than a factor of 2
NA	Not Analyzed
TPH	Total Petroleum Hydrocarbons
CPAH	Carcinogenic Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl

2.0 ← Estimated Vertical Extent of Contamination Exceeding Preliminary Cleanup Level (ft)

TPH	Metals
CPAH	PCB

Lateral Extent of Impacted Soil, Dashed Where Inferred

0 15 30
SCALE IN FEET

Basemap provided by Port of Everett. Field observations did not confirm catch basin and outfall connections in some cases.

Job No. 33761354

Figure 2
Proposed Supplemental Soil Sample Locations

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Everett Shipyard
Everett, Washington
PRELIMINARY RI DATA SUBMITTAL