EXHIBIT B

I & J WATERWAY SITE

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

WORK PLAN ADDENDUM

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MEMORANDUM

To:	Lucy McInerney, Department of Ecology	**Date:**	March 13, 2012
From:	Dan Berlin, Leslie McKee, and Mark Larsen, Anchor QEA, LLC		
Cc:	Mike Stoner, Port of Bellingham Jay Bornstein, Bornstein Seafoods		
Re:	I & J Waterway RI/FS Work Plan Addendum		

INTRODUCTION

This Work Plan Addendum (Addendum) describes additional work to be performed as part of the Sediments Remedial Investigation and Feasibility Study (RI/FS) for the I & J Waterway Site (Site) in Bellingham, Washington (Figure 1). The work described in this Addendum will be conducted pursuant to Agreed Order (No. DE1090), which requires completion of an RI/FS for the site. The Agreed Order was signed in January 2005 by the Washington State Department of Ecology (Ecology) and the Port of Bellingham (Port). The First Amendment to the Agreed Order was signed in October 2005, which included as Exhibit A the *Sediments RI/FS Work Plan* (*Work Plan*; RETEC 2005).

Based on discussions between the Port and Ecology, additional work was determined to be necessary to complete the RI/FS. This additional work will be conducted under a Second Amendment to the Agreed Order. That amendment provides a revised schedule for completion of the RI/FS and requires additional investigation activities to be conducted. This Addendum describes the scope of additional activities to be conducted in order to complete the RI/FS. These additional sampling and testing activities will be conducted according to the methods identified in the *Work Plan* (RETEC 2005) unless otherwise specified in this Addendum.

BACKGROUND

RI/FS data collection was conducted during 2005 and 2006, consistent with the Ecology-approved *Work Plan* (RETEC 2005). Activities included surface sediment chemical and biological testing and subsurface sediment chemical testing. Results of the 2005/2006 sampling event were summarized in the *Preliminary Sediment Data Summary* (RETEC 2006) and submitted to Ecology. Subsurface sediment concentrations indicated that levels of dioxin/furans would be unlikely to meet Dredged Material Management Program (DMMP) guidelines for unconfined open-water disposal.

Updates to the DMMP suitability guidelines for dioxin/furans were initiated in 2006. As part of a separate process, advisory committees started development of a Model Toxics Control Act rule revision (the MTCA rule) and MTCA/Sediment Management Standards (SMS) integration. In February 2007, the Port and Ecology agreed that technical, scientific, and policy elements associated with the MTCA rule revision, MTCA/SMS integration, and changes to the DMMP suitability guidelines had the potential to affect FS evaluation and decisions at the I&J Waterway Site.

In December 2010, the DMMP approved interim guidelines for dioxin/furan compounds. Proposed revisions to SMS were developed by the Sediment Cleanup Advisory Committee in late 2011. Ecology anticipates proposing draft rule language for revisions to SMS in 2012. Subsequently, the Port and Ecology have proposed to finalize the RI/FS for the Site, which includes collection of additional information. This Addendum describes the supplemental sampling activities to be conducted at the site to complete the RI/FS and support the identification of a preferred remedial alternative for the Site.

This Addendum was prepared consistent with the process defined under MTCA and SMS, as outlined in the Agreed Order and its amendments. The work described in this Addendum will be performed by Anchor QEA on behalf of the Port. Following is a summary of previous investigations, additional investigation and data collection activities, and any key changes to sampling and analysis requirements since the 2005 *Work Plan*. Laboratory analyses will be performed by an Ecology-accredited laboratory. All work will be performed consistent with a project Health and Safety Plan (provided under separate cover) that describes the safety measures for the planned site investigation activities.

SUMMARY OF PREVIOUS STUDIES

Numerous sediment sampling activities have been performed at the Site in 1996 (Hart Crowser 1997), 1998 (Anchor Environmental 1999), 2000 (ThermoRetec 2001), and 2005 and 2006 (RETEC 2006), as described in Section 2 of the *Work Plan* (RETEC 2005) and in the

Preliminary Sediment Data Summary (RETEC 2006). Consistent with SMS guidance, which prioritizes the use of data from the past 10 years (Ecology 1993), the 2005/2006 data collected under the Agreed Order are considered appropriate for quantitative use as part of the RI/FS. The older data provide supporting information regarding changes in sediment quality over time, but may not represent current conditions.

Findings from these previous studies are summarized in Figures 2 to 4. Figure 2 summarizes historical surface sediment chemical concentrations for SMS chemicals and nickel[1] from 1996 to 2001; Figure 3 summarizes data collected in 2005/2006. Figure 4 summarizes the 2006 surface sediment bioassay test results compared to SMS criteria (RETEC 2006).

RI/FS ADDENDUM ACTIVITIES

This Addendum includes supplemental activities that are necessary for finalization of the RI/FS. These activities include bathymetric surveying, additional surface sediment collection and testing, subsurface sediment testing, sampling of storm drain solids from four locations, and structural condition surveys of the existing bulkheads along the south side of the waterway. This section describes specific field investigation activities and rationale. Proposed sampling locations are shown on Figure 5. Proposed analytical parameters are listed in Table 1. Tables 2 through 5 include the analytical specifications, including sampling parameters, analytical methods, and chemical criteria (Table 2), container requirements, holding times, and preservation methods (Table 3), laboratory quality control (Table 4), and data quality objectives (Table 5).

Bathymetric Survey

Single-beam bathymetry was collected most recently in October 2005. A multi-beam bathymetric survey is proposed in order to understand any elevation changes since the 2005 investigation and to fill bathymetry data gaps in the underpier areas.

[1] SMS chemicals are compared to SMS criteria. For reference, nickel is compared to the former DMMP Screening Level (SL) and Bioaccumulation Trigger (BT).

Surface Sediment Sampling

The nature and extent of SMS contaminants and nickel in surface sediment was characterized during the 2005/2006 RI/FS sampling (RETEC 2005, 2006). Figure 5 identifies the Site Focus Area within which surface sediments were found to exceed the SQS chemical or biological testing criteria (based on Figures 3 and 4). Data regarding dioxin/furan quality is available for much of Bellingham Bay from recent studies by Ecology and others (Hart Crowser 2009; SAIC 2008; Anchor QEA 2010; and Ecology 2011); however, no surface data for dioxin/furans are available within the Site Focus Area.

Eleven surface sediment samples will be collected as part of this Work Plan Addendum. In order to confirm the lateral boundary of the Site Focus Area and establish dioxin/furan concentrations at the Site, surface sediment testing will be conducted from stations IJ12-02, -03, -05, -06, -07, and -08 (Figure 5). Surface sediment will be archived at stations IJ12-09 and IJ12-10, and may be tested based on the outcome of sample IJ12-07. Station IJ12-11 will be sampled to assess sediment quality that is more representative of the general Bellingham Bay condition (near the I & J Waterway). Surface sediment from stations IJ12-01, -04, -06, and -08 will be tested to identify potential sources of contamination from outfalls (Figure 5). As summarized in Table 1, testing will include SMS parameters, nickel, and dioxin/furans. Sediment toxicity testing will be performed regardless of chemistry concentrations at two stations (IJ12-05 and IJ12-07) and may be conducted at seven stations (IJ12-01, -02, -03, -06, -08, -09, -10, and -11), depending upon the presence of chemical concentrations above SMS criteria or the former DMMP SL for nickel.

Surface sediment sampling will be conducted in accordance with the procedures and methods described in the *Work Plan* (RETEC 2005) unless otherwise specified. Stations IJ12-02, -03, -05, -06, -07, -09, -10 will re-occupy locations sampled in 2005/2006. Surface sediment testing will be conducted in accordance with Tables 1 through 5. Sediment toxicity testing will be conducted according to the procedures and methods described in the *Work Plan* (RETEC 2005).

Subsurface Sediment Sampling

Subsurface sediment sampling was conducted as part of RI/FS activities in 2006, with testing performed on composite samples. Those results indicated that sediments from within the Site Focus Area are unlikely to qualify for open-water disposal if dredged as part of site cleanup. The potential thickness of contaminated sediments was estimated based on previous dredging thicknesses and available information regarding the elevation of the undisturbed, native glacial marine drift layer (i.e., clay layer). Nearly all cores collected in 2006 encountered this native layer. These data will be used to assess the extent of recently deposited sediment above native material to support alternative development in the FS.

As part of a separate study performed by the U.S. Army Corps of Engineers (USACE), sediment cores were recently collected (in September 2011) at seven locations within the I & J Waterway, with selected samples being analyzed for dioxin/furan concentrations. As shown in Figure 5, one of these locations is within the Site Focus Area (I-1), and two are located just outside of the Site Focus Area (I-2, I-3). The remaining cores (I-4 through I-7) were located in areas well offshore of the Site Focus Area.

The sediment cores were collected according to a Sampling and Analysis Plan developed by the USACE (USACE 2011) using sampling and analysis methods comparable to those in the 2005 *Work Plan*. The analytical results of the USACE study provide supplemental information regarding the lateral and vertical distribution of dioxin/furan concentrations in subsurface sediments in the vicinity of the Site Focus Area and are attached as Appendix A. The USACE study included collection and analysis or archiving of several samples from approximately -20 to -22 feet MLLW, which would represent the post-dredge surface following dredging to the federally authorized navigation channel depth. The authorized elevation in the federal navigation channel is -18 feet MLLW, and the USACE assumed a maximum overdredge allowance of 2-feet (to -20 feet MLLW). The samples collected by the USACE from -20 to -22 feet MLLW represent the Z-layer, or concentrations of remaining sediments following dredging to the authorized channel depth. These Z-layer samples can be useful in assessing the thickness of potential dredging for certain RI/FS remedial alternatives. Historical bathymetric surveys suggest previous dredging activities have removed sediment to approximately -20 feet MLLW in most areas of the navigation channel, but as deep as -23 feet MLLW in a few areas. The USACE has agreed to make remaining archived samples available to the Port for chemical analysis in support of the RI/FS.

USACE dioxin/furan concentration data are available for subsurface sediment and Z-layer samples from locations I-1 and I-3. Remaining archived sediment is available from these locations and location I-2. Sediment was archived on September 9, 2011, and additional testing will be limited by the hold-time schedule summarized in Table 3. Archived material collected from the Z-layer of station I-1 will be analyzed for available SMS parameters and nickel. The Z-layer sample from station I-2 will be analyzed for available SMS parameters, nickel, and dioxin/furan concentrations. No further testing is required for station I-3. Subsurface sediment testing will be conducted in accordance with Tables 2 through 5.

Testing of Storm Drain Solids

The RI/FS will include discussion of the status of source control and the potential for sediment recontamination or natural recovery. To support this analysis, sampling will be conducted to evaluate the quality of storm drain solids within four of the storm drainage basins that have outfalls discharging to I & J Waterway. Though these solids are not necessarily released to the waterway under normal operating conditions, the data from these locations will be useful in assessing the potential for storm drain discharges to affect sediment quality within the waterway.

The four outfalls to be sampled include two Bornstein Seafoods outfalls (Outfalls 001 and 002), the City of Bellingham outfall located at the head of the waterway serving a substantial off-site storm drainage basin (near Roeder Avenue), and a smaller City of Bellingham outfall located near Bellwether Way. Sampling of these outfalls will require coordination with the City and Bornstein Seafoods in order to identify locations for solids sampling and ensure that sampling is coordinated with any planned cleaning or maintenance of these systems.

A field inspection will be conducted to identify possible solids sampling locations within each storm drain and to verify presence of solids. In-line solid samples will be collected where available, as close as possible to the outfall. Solids testing will include SMS parameters, nickel, and dioxin. In-line solids from the two stormwater drainage basins will be collected and handled according to the procedures described below:

- The storm drain solids will be collected from the location closest to the outfall containing sufficient material for sampling. The samples will be collected from maintenance holes or drain lines along the main flow path if possible (catch basins located in isolated areas are likely to be less representative of system solids as a whole).

- The sampling location will be photographed, and observations will be recorded on a sample collection form, including color and turbidity of the stormwater, the presence of any sheen on the water or solids, and any odors observed.
- A single surface sample of accumulated solids will be collected from each sampling location using a decontaminated stainless steel spoon attached to a telescoping rod. Sampling will not involve scraping of hardened solids that may be adhered to the drainage structures, as these are unlikely to provide information regarding the quality of recent storm drain solids.
- The storm drain solids sample will be placed in a decontaminated stainless steel bowl, homogenized until a uniform color and texture is achieved, and subsampled into separate certified, pre-cleaned, pre-labeled containers.
- The storm drain solids samples will be submitted for analysis per the requirements set forth in Tables 2 to 5.
- If insufficient sample volume is present at any single sampling location to meet the sample volume requirements, sampling at the next upstream location may be performed with the two samples composited as necessary to meet sample volume requirements. The final composite volume will be placed into a decontaminated stainless steel bowl, homogenized until a uniform color and texture is achieved, and subsampled into separate certified, pre-cleaned, pre-labeled containers. The sample collection form will document the approximate volume of solids collected from each location.
- Information will be recorded on a chain-of-custody form and samples will be placed in a chilled cooler at or below approximately 4 degrees Celsius for transport to the laboratory.
- Chain-of-custody protocols will be adhered to during sample transport and submittal to the laboratory, as described in the *Work Plan* (RETEC 2005).
- All disposable sampling and health and safety supplies and equipment will be disposed of consistent with applicable requirements.

Bulkhead Condition Survey

Wooden bulkhead structures are located along the southeastern shoreline of the Site. The condition of bulkheads can influence cleanup alternatives or cleanup methods in shoreline areas. To support RI/FS cleanup evaluations, a condition survey of these bulkheads will be performed by a licensed structural engineer. The condition survey will be based on direct inspection of the structure and review of the existing as-builts or design drawings, if available. The Bornstein Seafoods dock structure may also be inspected if a recent condition survey is not available.

REPORTING

Historical data and data generated as part of this Addendum will be summarized in a Supplemental Investigation Memorandum following completion of field activities. Data generated as part of this Addendum will be submitted to Ecology's Electronic Information Management System (EIM) database. This information will be combined into the RI/FS report following Ecology review of the Memorandum. The RI/FS will be prepared consistent with MTCA and SMS requirements, as specified in WAC 173-340-350 and WAC 173-204-560, respectively.

SCHEDULE

The anticipated schedule for completion of key activities and deliverables associated with this Addendum are summarized below. These dates are estimated based on the effective date of the Second Amendment to the Agreed Order being no later than March 2012.

Anticipated RI/FS Schedule

Key Dates	Project Tasks
April to July 2012	Sediment and Storm Drain Solids Sampling and Testing and Data Validation; Bathymetric Survey; Bulkhead Condition Survey
October 2012	Supplemental Investigation Memorandum
February 2013	Draft RI/FS Report to Ecology
March 2013	Ecology Review
May 2013	Revised RI/FS Report Available for Public Review

REFERENCES

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SAIC, 2008. *Dioxin/furan Concentrations at the Non-Dispersive Open-Water Dredged Material Disposal Sites in Puget Sound*. Prepared by SAIC on behalf of the Washington State Department of Natural Resources. July, 2008.

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TABLES

Table 1
Summary of Proposed I&J Waterway RI/FS Supplemental Data Collection Activities

Station ID	Sample ID	Latitude (WGS 84)	Longitude (WGS 84)	Sample Method	Target Depth (below mudline)	Primary Analyses[1]	Contingent Analyses[2]	Comments/Rationale
Surface Sediments								
IJ12-01	IJ12-01	48 45.346 N	122 29.527 W	Beach grab	0-12 cm	SMS, Nickel, Dioxin/furans	Bioassays	Assess impact of solids discharging from city outfall.
IJ12-02	IJ12-02	48 45.317 N	122 29.560 W	Sediment grab	0-12 cm	SMS, Nickel, Dioxin/furans	Bioassays	Reoccupy IJW-SS-09 (2005) where nickel concentrations and bioassays exceeded criteria. Confirm lateral boundary of the Site Focus Area.
IJ12-03	IJ12-03	48 45.310 N	122 29.591 W	Sediment grab	0-12 cm	SMS, Nickel, Dioxin/furans	Bioassays	Reoccupy IJW-SS-07 (2005) where nickel concentrations and bioassays exceeded criteria. Confirm lateral boundary of the Site Focus Area.
IJ12-04	IJ12-04	48 45.286 N	122 29.563 W	Beach grab	0-12 cm	SMS, Nickel, Dioxin/furans	None	Assess impact of solids discharging from Central Waterfront Outfall 002.
IJ12-05	IJ12-05	48 45.294 N	122 29.604 W	Sediment grab	0-12 cm	SMS, Nickel, Dioxin/furans, Bioassays	--	Reoccupy IJW-SS-13 (2005) where SMS chemistry and nickel concentrations were below criteria but bioassays failed. Confirm lateral boundary of the Site Focus Area.
IJ12-06	IJ12-06	48 45.283 N	122 29.632 W	Sediment grab	0-12 cm	SMS, Nickel, Dioxin/furans	Bioassays	Reoccupy IJW-SS-05 (2005) where SMS chemistry and nickel concentrations were below criteria and bioassays were not tested. Measure surface concentrations to understand potential impact of solids discharging from city outfall.
IJ12-07	IJ12-07	48 45.258 N	122 29.642 W	Sediment grab	0-12 cm	SMS, Nickel, Dioxin/furans, Bioassays	--	Reoccupy IJW-SS-04 (2005) where SMS chemistry and nickel concentrations were below criteria and bioassays were not tested. Confirm lateral boundary of the Site Focus Area.
IJ12-08	IJ12-08	49 45.243 N	123 29.626 W	Beach grab	0-12 cm	SMS, Nickel, Dioxin/furans	Bioassays	Assess impact of solids discharging from Bornstein Outfall 001.
IJ12-09	IJ12-09	48 45.234 N	122 29.669 W	Sediment grab	0-12 cm	Archive	SMS, Nickel, Dioxin/furans, Bioassays	Reoccupy IJW-SS-01 (2005) where SMS chemistry and nickel concentrations were below criteria and bioassays were not tested. Archive and analyze if needed to confirm boundary of Site Focus Area (contingent upon outcome of IJ12-07).

Table 1
Summary of Proposed I&J Waterway RI/FS Supplemental Data Collection Activities

Station ID	Sample ID	Latitude (WGS 84)	Longitude (WGS 84)	Sample Method	Target Depth (below mudline)	Primary Analyses[1]	Contingent Analyses[2]	Comments/Rationale
IJ12-10	IJ12-10	48 45.261 N	122 29.663W	Sediment grab	0-12 cm	Archive	SMS, Nickel, Dioxin/furans, Bioassays	Reoccupy IJW-SS-02 (2005) where SMS chemistry and nickel concentrations were below criteria and bioassays were not tested. Archive and analyze if needed to confirm boundary of Site Focus Area (contingent upon outcome of IJ12-07).
IJ12-11	IJ12-11	48 45.174 N	122 29.780 W	Sediment grab	0-12 cm	SMS, Nickel, Dioxin/furans	Bioassays	Assess chemical composition at station representative of Bellingham Bay.
Subsurface Sediments								
I-1[3]	I-1-Z	48 45.300 N	122 29.584 W	Previously sampled by vibracore	4.6-6.4 feet	SMS, Nickel [4]	None	Measure SMS and nickel subsurface concentrations in Z-sample to evaluate vertical extent of contamination within the Site Focus Area. Dioxin/furans previously tested at this location.
I-2-A[3]	I-2-A-Z	48 45.241 N	122 29.676 W	Previously sampled by vibracore	3.2-5.0 feet	SMS, Nickel, Dioxin/furans	None	Measure subsurface concentrations in Z-sample to evaluate vertical extent of contamination outside the current Site Focus Area.
I-3[3] (co-located with IJ12-11)	I-3-Z	48 45.174 N	122 29.780 W	Previously sampled by vibracore	2-4.8 feet	None[4]	None	Dioxin/furan concentrations were previously tested at this location to evaluate vertical extent of contamination outside the Site Focus Area.
Storm Drain Solids[5]								
Bornstein Outfall 001	CB-001-DATE	48 45.242N	122 29.624 W	grab	NA	SMS, Nickel, Dioxin/furans	None	Evaluate possible source of contamination from upland areas in storm drain solids.
Central Waterfront Outfall 002	CB-002-DATE	48 45.283 N	122 29.561 W	grab	NA	SMS, Nickel, Dioxin/furans	None	
City of Bellingham Outfall (Roeder)	CB-003-DATE	48 45.348 N	122 29.526 W	grab	NA	SMS, Nickel, Dioxin/furans	None	
City of Bellingham Outfall (Bellwether)	CB-004-DATE	48 45.302 N	122 29.636 W	grab	NA	SMS, Nickel, Dioxin/furans	None	

Notes:
1 SMS list includes metals, semivolatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs). Conventional analysis includes ammonia, sulfide, grain size, total organic carbon, and total solids, which will be tested in each sample tested as part of this Work Plan Addendum.
2 Contingency analyses will be triggered after receipt of chemical data and subsequent to discussions with Ecology.
3 USACE station where a core was collected in September 2011 with additional material available for chemical analysis.
4 Samples from I-1 (0-4.6 feet, 4.6-6.4 foot intervals) and I-3 (0-2 and 2-4.8 feet intervals) were previously tested for dioxin/furans by USACE.
5 Outfall coordinates are preliminary and will be confirmed in the field.
NA = not applicable

Table 2
Sampling Parameters, Analytical Methods, and Chemical Criteria

			Sediment Management Standards Criteria		SAPA Recommended Practical Quantitation Limit (PQL)[d]	
Parameter	Analytical Method	Units	Sediment Quality Standards	Cleanup Screening Level		Laboratory PQL
Conventional Parameters						
Grain size	ASTM D-422 w/ hydrometer	%	--	--	1	1
Total solids	PSEP, 1986	% wet wt	--	--	0.1	0.1
Total organic carbon (TOC)	PSEP, 1986	% dry wt	--	--	0.1	0.1
Total sulfides	PSEP, 1986	% dry wt	--	--	10	1.0
Ammonia	Plumb, 1981	mg-N/kg dry wt	--	--	100	0.1
SVOCs						
PAHs						
Total LPAH	8270D	µg/kg dry wt	370 mg/kg OC	780 mg/kg OC	--	20
Naphthalene	8270D	µg/kg dry wt	99 mg/kg OC	170 mg/kg OC	700	20
Acenaphthylene	8270D	µg/kg dry wt	66 mg/kg OC	66 mg/kg OC	433	20
Acenaphthene	8270D	µg/kg dry wt	16 mg/kg OC	57 mg/kg OC	167	20
Fluorene	8270D	µg/kg dry wt	23 mg/kg OC	79 mg/kg OC	180	20
Phenanthrene	8270D	µg/kg dry wt	100 mg/kg OC	480 mg/kg OC	500	20
Anthracene	8270D	µg/kg dry wt	220 mg/kg OC	1,200 mg/kg OC	320	20
2-Methylnaphthalene[a]	8270D	µg/kg dry wt	38 mg/kg OC	64 mg/kg OC	223	20
Total HPAHs	8270D	µg/kg dry wt	960 mg/kg OC	5,300 mg/kg OC	--	20
Fluoranthene	8270D	µg/kg dry wt	160 mg/kg OC	1,200 mg/kg OC	567	20
Pyrene	8270D	µg/kg dry wt	1,000 mg/kg OC	1,400 mg/kg OC	867	20
Benzo(a)anthracene	8270D	µg/kg dry wt	110 mg/kg OC	270 mg/kg OC	433	20
Chrysene	8270D	µg/kg dry wt	110 mg/kg OC	460 mg/kg OC	467	20
Total benzo(b+k)fluoranthenes	8270D	µg/kg dry wt	230 mg/kg OC	450 mg/kg OC	1,067	20
Benzo(a)pyrene	8270D	µg/kg dry wt	99 mg/kg OC	210 mg/kg OC	533	20
Indeno(1,2,3-cd)pyrene	8270D	µg/kg dry wt	34 mg/kg OC	88 mg/kg OC	200	20
Dibenz(a,h)anthracene	8270D	µg/kg dry wt	12 mg/kg OC	33 mg/kg OC	77	20
Benzo(g,h,i)perylene	8270D	µg/kg dry wt	31 mg/kg OC	78 mg/kg OC	223	20
Phenols						
Phenol	8270D	µg/kg dry wt	420	1,200	140	20
2-Methylphenol	8270D	µg/kg dry wt	63	63	63	20
4-Methylphenol	8270D	µg/kg dry wt	670	670	223	20
2,4-Dimethylphenol	8270D	µg/kg dry wt	29	29	29	20
Pentachlorophenol	8270D	µg/kg dry wt	360	690	120	20
Chlorinated Benzenes						
1,4-Dichlorobenzene	8260C	µg/kg dry wt	3.1 mg/kg OC	9 mg/kg OC	37	1.0
1,2-Dichlorobenzene	8260C	µg/kg dry wt	2.3 mg/kg OC	2.3 mg/kg OC	35	1.0
1,2,4-Trichlorobenzene	8260C	µg/kg dry wt	0.81 mg/kg OC	1.8 mg/kg OC	31	5.0
Hexachlorobenzene	8081A	µg/kg dry wt	0.38 mg/kg OC	2.3 mg/kg OC	22	0.5
Phthalates						
Dimethyl phthalate	8270D	µg/kg dry wt	53 mg/kg OC	53 mg/kg OC	24	20
Diethyl phthalate	8270D	µg/kg dry wt	61 mg/kg OC	110 mg/kg OC	67	20
Di-n-butyl phthalate	8270D	µg/kg dry wt	220 mg/kg OC	1,700 mg/kg OC	467	20
Butyl benzyl phthalate	8270D	µg/kg dry wt	4.9 mg/kg OC	64 mg/kg OC	21	20
Bis(2-ethylhexyl) phthalate	8270D	µg/kg dry wt	47 mg/kg OC	78 mg/kg OC	433	20
Di-n-octyl phthalate	8270D	µg/kg dry wt	58 mg/kg OC	4,500 mg/kg OC	2,067	20
Miscellaneous Extractables						
Benzyl Alcohol	8270D	µg/kg dry wt	57	73	57	100
Benzoic Acid	8270D	µg/kg dry wt	650	650	217	200
Dibenzofuran	8270D	µg/kg dry wt	15 mg/kg OC	58 mg/kg OC	180	20
Hexachlorobutadiene	8081A	µg/kg dry wt	3.9 mg/kg OC	6.2 mg/kg OC	11	0.5
N-Nitrosodiphenylamine	8270D	µg/kg dry wt	11 mg/kg OC	11 mg/kg OC	28	20
Metals						
Arsenic	6010B/6020	mg/kg dry wt	57	93	19	5.0
Cadmium	6010B/6020	mg/kg dry wt	5.1	6.7	1.7	0.2
Chromium	6010B/6020	mg/kg dry wt	260	270	87	0.5
Copper	6010B/6020	mg/kg dry wt	390	390	130	0.2
Lead	6010B/6020	mg/kg dry wt	450	530	150	2.0
Mercury	7471A	mg/kg dry wt	0.41	0.59	0.14	0.02
Nickel[b]	6010B/6020	mg/kg dry wt	--	--	47	0.2
Silver	6010B/6020	mg/kg dry wt	6.1	6.1	2	0.5
Zinc	6010B/6020	mg/kg dry wt	410	960	137	1.0
PCBs						
Total PCB Aroclors	8082	µg/kg dry wt	12 mg/kg OC	65 mg/kg OC	6	20
Dioxin/Furans[c]						
Dioxins						
2,3,7,8-TCDD	1613B	ng/kg dry wt	--	--	--	1.0
1,2,3,7,8-PeCDD	1613B	ng/kg dry wt	--	--	--	5.0
1,2,3,4,7,8-HxCDD	1613B	ng/kg dry wt	--	--	--	5.0
1,2,3,6,7,8-HxCDD	1613B	ng/kg dry wt	--	--	--	5.0
1,2,3,7,8,9-HxCDD	1613B	ng/kg dry wt	--	--	--	5.0
1,2,3,4,6,7,8-HpCDD	1613B	ng/kg dry wt	--	--	--	5.0
OCDD	1613B	ng/kg dry wt	--	--	--	10
Furans						
2,3,7,8-TCDF	1613B	ng/kg dry wt	--	--	--	1.0
1,2,3,7,8-PeCDF	1613B	ng/kg dry wt	--	--	--	5.0
2,3,4,7,8,-PeCDF	1613B	ng/kg dry wt	--	--	--	5.0
1,2,3,4,7,8-HxCDF	1613B	ng/kg dry wt	--	--	--	5.0
1,2,3,6,7,8-HxCDF	1613B	ng/kg dry wt	--	--	--	5.0
1,2,3,7,8,9-HxCDF	1613B	ng/kg dry wt	--	--	--	5.0
2,3,4,6,7,8-HxCDF	1613B	ng/kg dry wt	--	--	--	5.0
1,2,3,4,6,7,8-HpCDF	1613B	ng/kg dry wt	--	--	--	5.0
1,2,3,4,7,8,9-HpCDF	1613B	ng/kg dry wt	--	--	--	5.0
OCDF	1613B	ng/kg dry wt	--	--	--	10

Notes:

a - 2-Methylnapthalene is not included in the sum of LPAHs

b - The former Dredge Material Management Program (DMMP) Screening Level (SL) and Bioaccumulation Trigger/Maximum Level (BT/ML) for nickel is 140 mg/kg dry wt and 370 mg/kg dry wt, respectively.

c - TEQs will be calculated using WHO 2005 Mammalian TEFs with ND=DL, EMPC=EMPC & ND=DL/2, EMPC=EMPC

d - Washington State Department of Ecology Sediment Sampling and Analysis Plan Appendix, February 2008

NA - Not Applicable

Table 3
Container Requirements, Holding Times, and Preservation Methods

Parameter	Sample Size	Container Size and Type	Holding Time (Newly Collected Material)	Sample Preservation Technique	Maximum Date of Extraction/Analysis for Site Archived Sediments (USACE Samples[b])
Grain size	300 g	16-oz HDPE	6 months	Cool/4°C	Cannot Be Analyzed
Total solids	50 g	4-oz Glass	14 days	Cool/4°C	--
			6 months	Freeze -18°C	March 9, 2012
Total organic carbon	50 g	from TS container	14 days	Cool/4°C	--
			6 months	Freeze -18°C	March 9, 2012
Total sulfides[a]	50 g	2-oz Glass, no headspace	7 days	5 mL 2N Zn acetate/Cool/4°C	Cannot Be Analyzed
Ammonia	40 g	from TS/TVS container	7 days	Cool/4°C	Cannot Be Analyzed
Metals	50 g	4-oz Glass	6 months; 28 days for Hg	Cool/4°C	--
			2 years (except Hg)	Freeze -18°C	September 9, 2013
Semivolatile organic compounds	150 g	16-oz Glass	14 days until extraction	Cool/4°C	--
			1 year until extraction	Freeze -18°C	September 9, 2012
			40 days after extraction	Cool/4°C	--
PCBs	150 g	from SVOC jar	14 days until extraction	Cool/4°C	--
			1 year until extraction	Freeze -18°C	September 9, 2013
			40 days after extraction	Cool/4°C	--
Dioxins/furans	150 g	8-oz Glass	1 year to extraction	Freeze -18°C	September 9, 2013
			2 years after extraction	Freeze -18°C	--
Archival	16 oz	wide-mouth glass	1 year	Freeze -18°C	September 9, 2013

Notes:

a. Samples for total sulfides will be collected prior to compositing.

b. Subsurface sediment samples collected by USACE (I-1-Z, I-2-A-Z, and I-3-Z) were archived frozen on September 9, 2011.

Table 4
Laboratory Quality Control Sample Analysis Frequency

Analysis Type	Initial Calibration	Ongoing Calibration	Replicates	Matrix Spikes	LCS/OPR	Matrix Spike Duplicates	Method Blanks	Surrogate Spikes
Grain size	Each batch [a]	NA	1 per 20 samples	NA	NA	NA	NA	NA
Total solids	Each batch [b]	NA	1 per 20 samples	NA	NA	NA	NA	NA
Total organic carbon	Daily or each batch	1 per 10 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	NA	1 per 20 samples	NA
Ammonia	Each batch [b]	1 per 10 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	NA	1 per 20 samples	NA
Total sulfides	Each batch [b]	1 per 10 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	NA	1 per 20 samples	NA
SVOCs	As needed [c]	Every 12 hours	NA	1 per 20 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	Every sample
Metals	Daily	1 per 10 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	NA	1 per 20 samples	NA
PCBs	As needed [c]	1 per 10 samples	NA	1 per 20 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	Every sample
Dioxin/furans	As needed [c]	Every 12 hours	NA	NA[d]	1 per 20 samples	NA[d]	1 per 20 samples	Every sample

Notes:

a = Calibration and certification of drying ovens and weighing scales are conducted bi-annually.

b = Initial calibration verification and calibration blank must be analyzed at the beginning of each batch.

c = Initial calibrations are considered valid until the ongoing continuing calibration no longer meets method specifications. At that point, a new initial calibration is performed.

d = Isotope dilution method- labeled standards are spiked in every dioxin/ furan sample to assess method performance in the sample matrix.

NA = Not applicable

LCS = Laboratory control sample

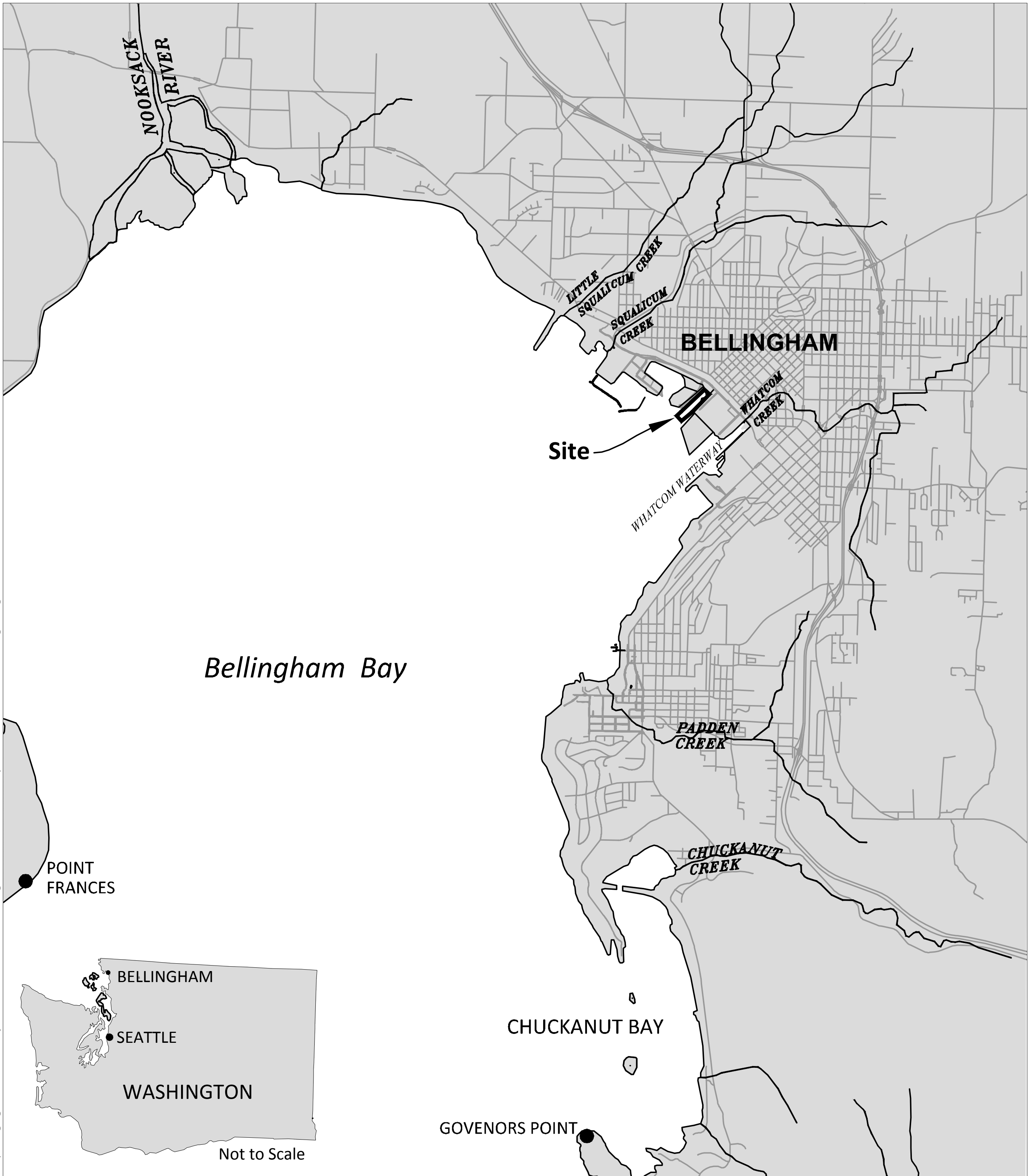
OPR = Ongoing Precision and Recovery sample (used for dioxin/furan analysis)

Table 5
Data Quality Objectives

Parameter	Precision (duplicates)	Laboratory Control Spike Recoveries	Matrix Spike Recoveries	Completeness
Grain size	± 20% RPD	NA	NA	95%
Total solids	± 20% RPD	NA	NA	95%
Total organic carbon	± 20% RPD	80-120% R	75-125% R	95%
Ammonia	± 20% RPD	80-120% R	75-125% R	95%
Sulfide	± 20% RPD	65-135% R	65-135% R	95%
Total metals	± 20% RPD	80-120% R	75-125% R	95%
Semivolatile organic compounds	± 35% RPD	50-150% R	50-150% R	95%
PCBs	± 35% RPD	50-150% R	50-150% R	95%
Dioxin and furans	± 35% RPD	50-150% R	50-150% R	95%

Notes:
R = Recovery
RPD = Relative percent difference

FIGURES

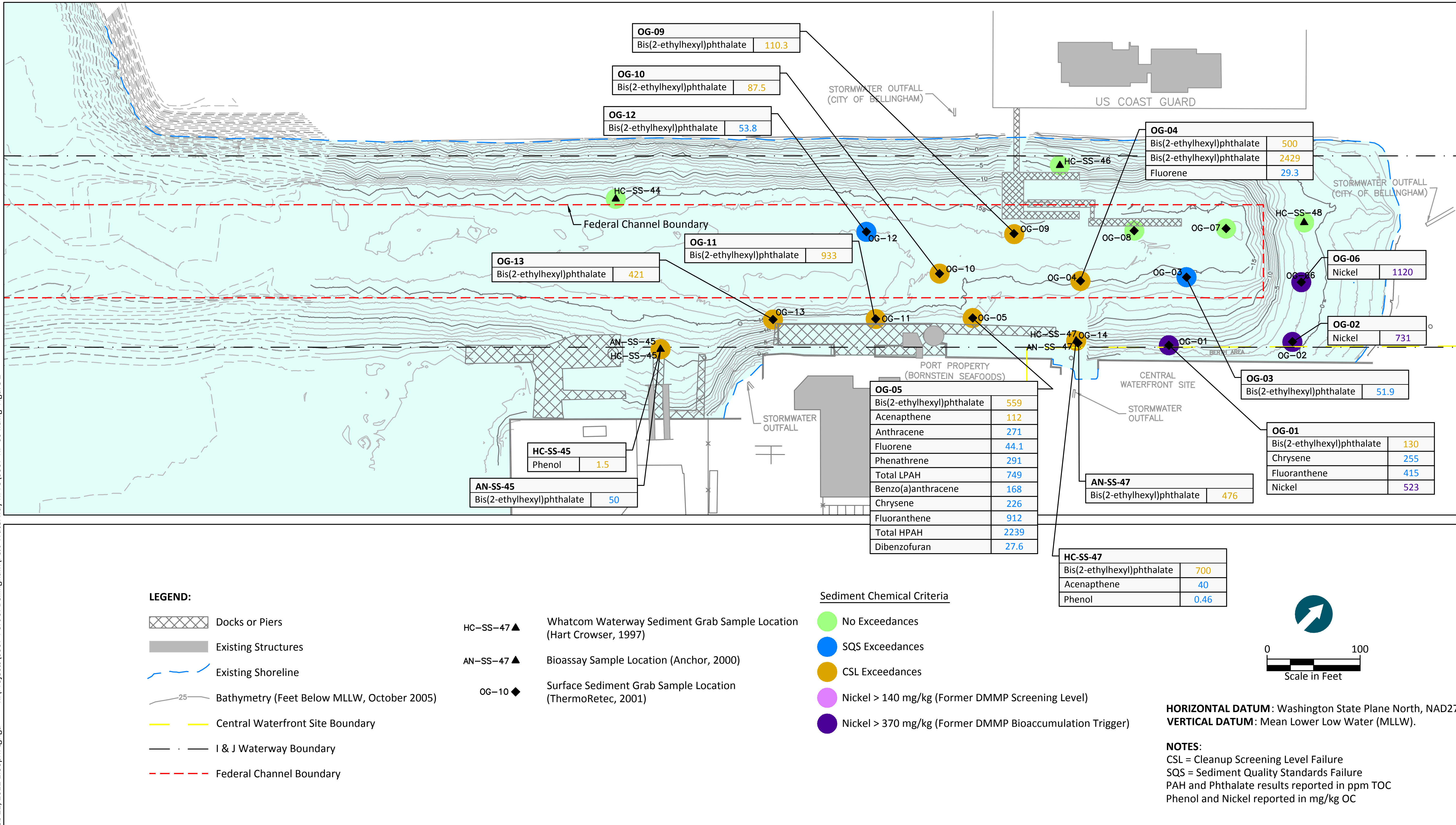


SOURCE: Prepared from GIS data
HORIZONTAL DATUM: Washington State Plane North, NAD27.

0 6000
Scale in Feet

Figure 1
Vicinity Map
I & J Waterway RI/FS WP Addendum
Port of Bellingham

Dec 07, 2011 4:22pm tgriga K:\Projects\0007-Port of Bellingham\I & J Waterway RI-FS\0007-RP-005.dwg Figure 1

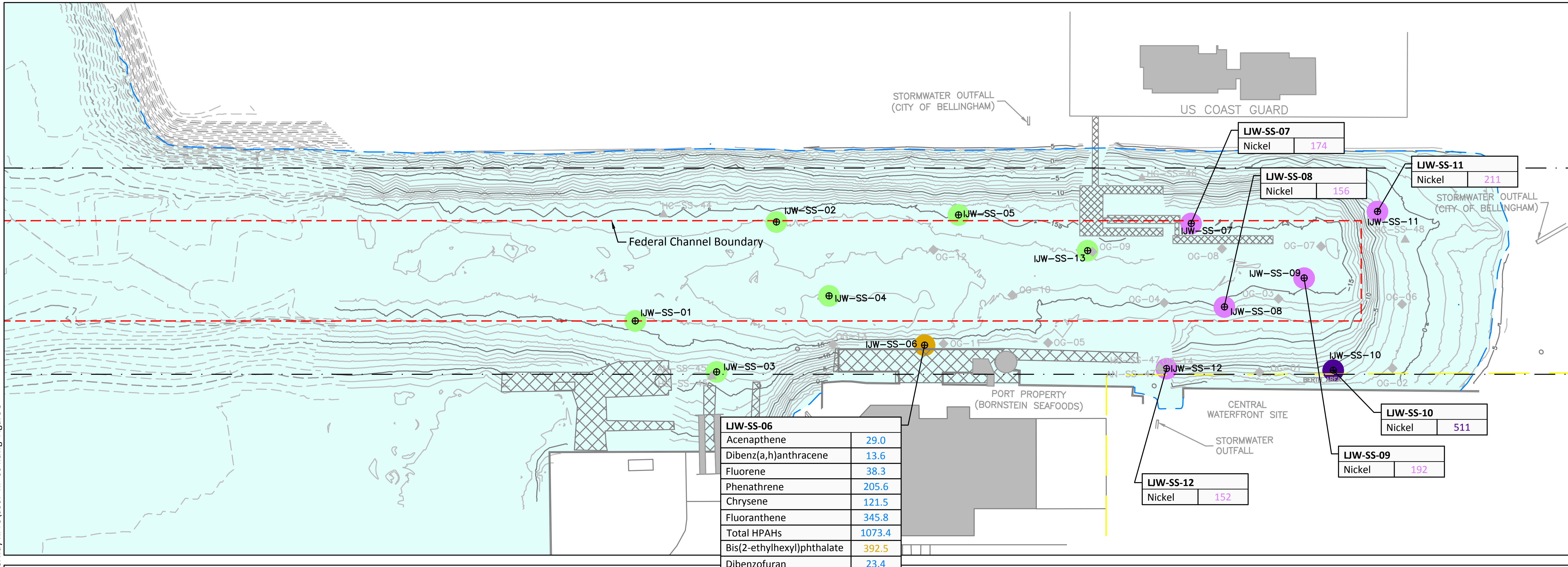


K:\Projects\0007-Port of Bellingham\I & J Waterway RI-FS\0007-RP-004.dwg Figure 2

Feb 22, 2012 1:50pm tgriga

ANCHOR QEA

Figure 2
Summary of 1996-2001 Surface Sediment Chemical Results
I & J Waterway RI/FS WP Addendum
Port of Bellingham



LEGEND:

- Docks or Piers
- Existing Structures
- Existing Shoreline
- Bathymetry (Feet Below MLLW, October 2005)
- Central Waterfront Site Boundary
- I & J Waterway Boundary
- Federal Channel Boundary
- HC–SS–47 Whatcom Waterway Sediment Grab Sample Location (Hart Crowser, 1997)
- AN–SS–47 Bioassay Sample Location (Anchor, 2000)
- OG–10 Surface Sediment Grab Sample Location (ThermoRetec, 2001)
- IJW–SS–02 RI/FS Surface Sample Location (RETEC, 2006)

Sediment Chemical Criteria

- No Exceedances
- SQS Exceedances
- CSL Exceedances
- Nickel > 140 mg/kg (Former DMMP Screening Level)
- Nickel > 370 mg/kg (Former DMMP Bioaccumulation Trigger)

0 100
Scale in Feet

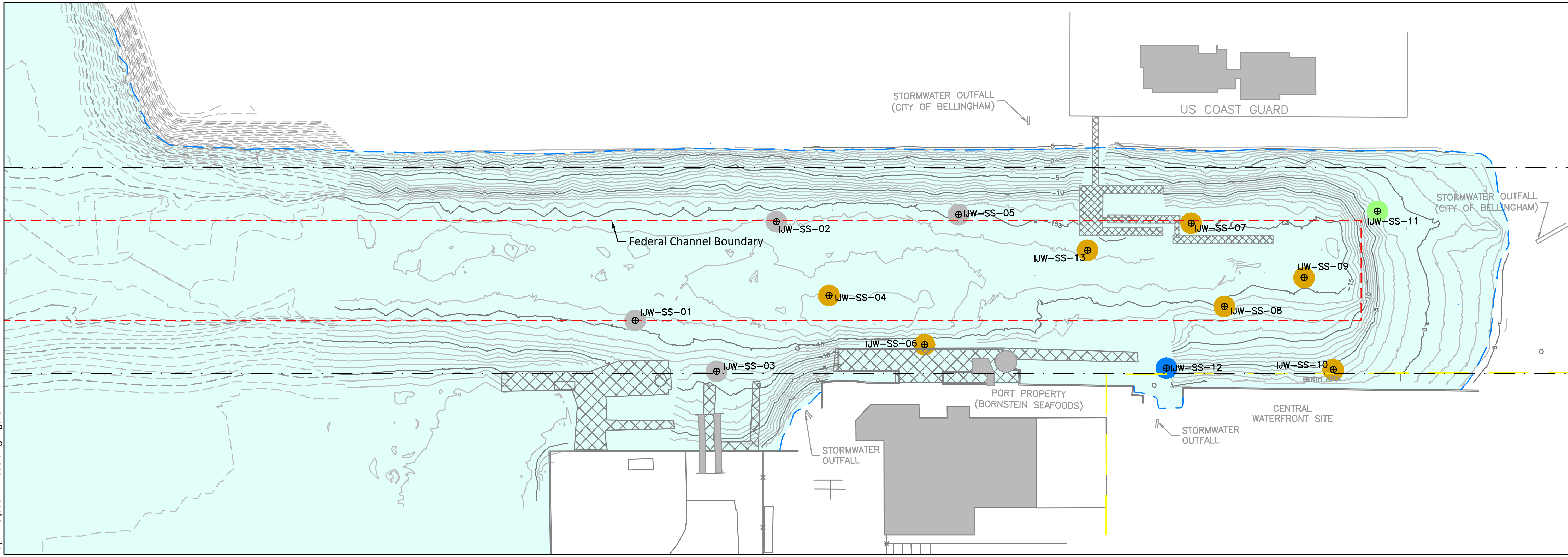
HORIZONTAL DATUM: Washington State Plane North, NAD27.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

NOTES:
CSL = Cleanup Screening Level Failure
SQS = Sediment Quality Standards Failure
PAH and Phthalate results reported in ppm TOC
Phenol and Nickel reported in mg/kg OC

Feb 22, 2012 1:54pm tgriga K:\Projects\0007-Port of Bellingham\I & J Waterway RI-FS\0007-RP-004.dwg Figure 3

ANCHOR QEA

Figure 3
Summary of 2005-2006 Surface Sediment Chemical Results
I & J Waterway RI/FS WP Addendum
Port of Bellingham



LEGEND:

Docks or Piers

Existing Structures

Existing Shoreline

Bathymetry (Feet Below MLLW, October 2005)

Central Waterfront Site Boundary

I & J Waterway Boundary

Federal Channel Boundary

Bioassay SMS Criteria

No Exceedances

SQS Exceedance

CSL Exceedance

Not Tested

IJW-SS-02 ⊕ RI/FS Surface Sample Location (RETEC, 2006)

0 100

Scale in Feet

HORIZONTAL DATUM: Washington State Plane North, NAD27.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

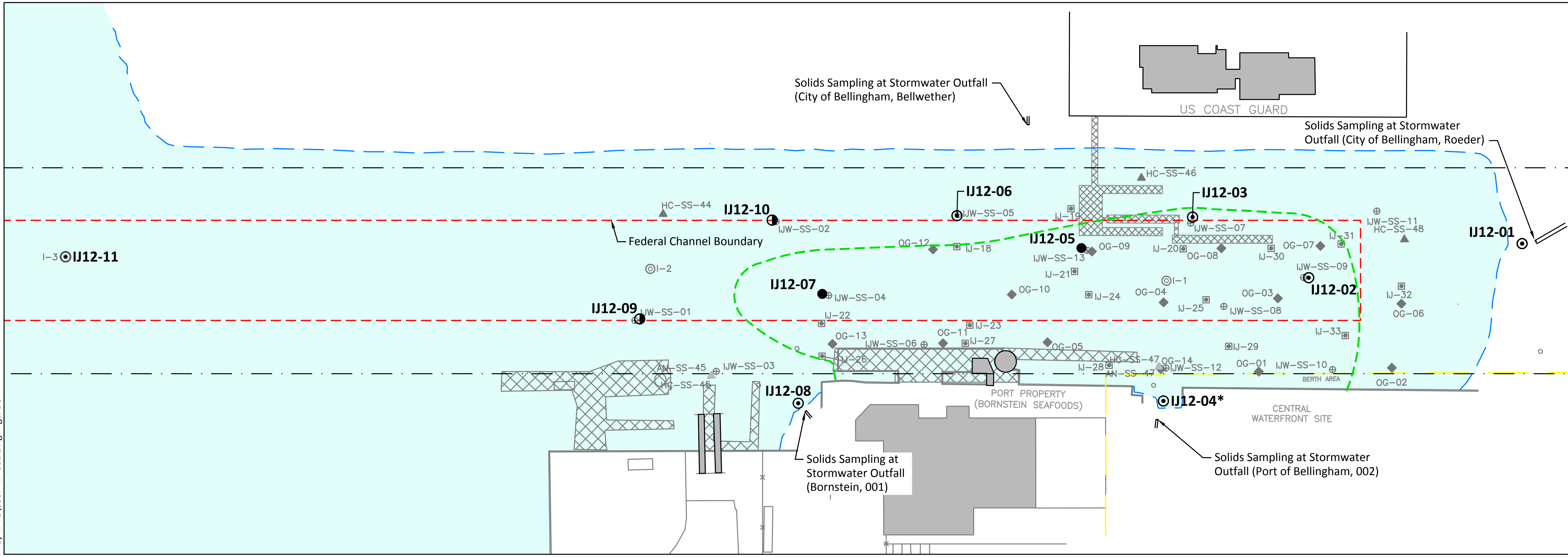
NOTES:
CSL = Cleanup Screening Level Failure
SQS = Sediment Quality Standards Failure

K:\Projects\0007-Port of Bellingham\I & J Waterway RI-FS\0007-RP-003.dwg Figure 4

Feb 22, 2012 1:55pm tgriga

ANCHOR QEA

Figure 4
Summary of 2006 Surface Sediment Bioassay Test Results
I & J Waterway RI/FS WP Addendum
Port of Bellingham



LEGEND:

- Docks or Piers
- Existing Structures
- Federal Channel Boundary
- Existing Shoreline
- Central Waterfront Site Boundary
- I & J Waterway Boundary
- Site Focus Area

Proposed RI/FS Sampling Station

- Surface Sediment Sample Location Dioxin, SMS, and Nickel (and Contingent Bioassays)
- Surface Sediment Sample Location Dioxin, SMS, Nickel, and Bioassays
- Archive Sample Location

Historic Sampling Station

- HC-SS-47 Whatcom Waterway Sediment Grab Sample Location (Hart Crowser, 1997)
- AN-SS-47 Bioassay Sample Location (Anchor Environmental, 2000)
- OG-10 Surface Sediment Grab Sample Location (ThermoRetec, 2001)
- IJ-28 Subsurface DMMP Composite Sample Location (RETEC, 2006)
- IJW-SS-02 RI/FS Surface Sample Location (RETEC, 2006)
- I-2 USACE Subsurface Core Location (USACE, 2011)

0 100
Scale in Feet

HORIZONTAL DATUM: Washington State Plane North, NAD27.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

NOTES:

1. *Sample IJ12-04 will not include bioassay data collection.

Mar 09, 2012 11:15am spark K:\Projects\0007-Port of Bellingham\I & J Waterway RI-FS\0007-RP-002.dwg Figure 5

ANCHOR QEA

Figure 5
Proposed RI/FS Sampling Locations
I & J Waterway RI/FS WP Addendum
Port of Bellingham

APPENDIX A

Table 1. Field Collection Summary Table

Waterway	Station ID	Actual Coordinates[1,2] Latitude (X)	Actual Coordinates[1,2] Longitude (Y)	Date	Time	Water Depth[3] (ft)	Tide Height[4] (ft)	Penetration (ft)	Core Recovery (%)	Mudline Elevation (MLLW)[1,2]	Collection and Drive Notes
Squalicum Creek	S-1	48 45.603 N	122 30.622 W	9/6/2011	1729	31.0	7.1	10	99.7	-23.9	2 of 2 attempts. Free fall 0 - 3 feet, easy coring 3 - 10 feet.
	S-2	48 45.588 N	122 30.592 W	9/6/2011	1634	32.3	7.3	9.6	87.5	-25.0	2 of 2 attempts. Smooth, easy coring 0 - 9.6 feet.
	S-3	48 45.551 N	122 30.649 W	9/7/2011	934	26.0	0.8	10	97.5	-25.2	2 of 2 attempts. Smooth, easy coring 0 - 7.5 feet, moderately hard coring 7.5 - 10 feet.
	S-4	48 45.513 N	122 30.693 W	9/6/2011	1550	31.0	7.8	8.6	86.0	-23.2	2 of 2 attempts. Smooth, easy coring 0 - 8 feet, hard coring to refusal at 8.6 feet.
	S-5	48 45.474 N	122 30.736 W	9/6/2011	1500	32.5	7.9	10	100	-24.6	1 of 1 attempts. Smooth, easy coring 0 - 9.8 feet, moderately hard coring 9.8 - 10 feet.
	S-6	48 45.455 N	122 30.824 W	9/6/2011	1412	32.2	7.7	8.0	96.3	-24.5	1 of 1 attempts. Smooth, easy coring 0 - 8 feet, abrupt refusal at 8 feet.
	S-7	48 45.404 N	122 30.805 W	9/6/2011	1305	31.0	6.8	9.6	93.0	-24.2	4 of 4 attempts. Smooth, easy coring 0 - 9.6 feet, abrupt refusal at 9.6 feet.
	S-8	48 45.345 N	122 30.890 W	9/6/2011	1045	31.6	3.4	7.5	89.3	-28.2	1 of 1 attempts. Smooth, easy coring 0 - 7.5 feet.
	S-9	48 45.294 N	122 30.956 W	9/7/2011	1035	30.5	1.8	10	84.0	-28.7	1 of 1 attempts. Smooth, easy coring 0 - 10 feet.
	S-10	48 45.251 N	122 30.991 W	9/7/2011	1105	31.1	2.5	10	94.0	-28.6	1 of 1 attempts. Smooth, easy coring 0 - 10 feet.
	S-11	48 45.189 N	122 31.073 W	9/7/2011	1140	34.7	3.4	10	84.0	-31.3	1 of 1 attempts. Smooth, easy coring 0 - 10 feet.
	S-12	48 45.121 N	122 31.147 W	9/7/2011	1235	34.8	4.8	9.0	91.0	-30.0	1 of 1 attempts. Smooth, easy coring 0 - 9 feet.
	S-13	48 45.083 N	122 31.191 W	9/7/2011	1320	36.2	6.0	10	91.5	-30.2	1 of 1 attempts. Smooth, easy coring 0 - 8 feet, moderately hard coring 8 - 10 feet.
	S-14	48 45.041 N	122 31.236 W	9/7/2011	1400	36.5	6.9	10	88.0	-29.6	1 of 1 attempts. Smooth, easy coring 0 - 10 feet.
	S-15	48 44.990 N	122 31.296 W	9/7/2011	1500	39.4	7.9	10	88.0	-31.5	1 of 1 attempts. Smooth, easy coring 0 - 10 feet.
	S-16	48 44.923 N	122 31.371 W	9/7/2011	1545	42.3	8.1	10	88.0	-34.2	1 of 1 attempts. Smooth, easy coring 0 - 10 feet.
I&J Street	I-1	48 45.300 N	122 29.584 W	9/8/2011	955	15.6	0.5	9.0	93.0	-15.1	2 of 2 attempts. Easy coring 0 - 5 feet, very hard coring 5 - 9 feet. Core driven to refusal.
	I-2	48 45.241 N	122 29.676 W	9/8/2011	1055	17.6	1.3	9.0	93.0	-16.3	2 of 2 attempts. Easy coring 0 - 7 feet, very hard coring 7 - 9 feet.
	I-3	48 45.174 N	122 29.780 W	9/8/2011	1155	19.8	2.6	8.0	80.0	-17.2	1 of 1 attempts. Easy coring 0 - 3 feet, very hard coring 3 - 8 feet, refusal at 8 feet.
	I-4	48 45.114 N	122 29.869 W	9/8/2011	1505	25.1	7.4	9.5	82.0	-17.7	3 of 3 attempts. Easy coring 0 - 2 feet, hard coring 2 - 9.5 feet.
	I-5	48 45.066 N	122 29.936 W	9/8/2011	1315	21.2	4.6	10	98.0	-16.6	1 of 1 attempts. Smooth, easy coring 0 - 10 feet.
	I-6	48 45.019 N	122 30.006 W	9/8/2011	1405	22.2	6.0	10	84.0	-16.2	1 of 1 attempts. Smooth, easy coring 0 - 10 feet; 0.5' of sediment fell off core bottom during retrieval.
	I-7	48 44.959 N	122 30.096 W	9/7/2011	1635	24.2	7.9	10	83.0	-16.3	1 of 1 attempts. Smooth, easy coring 0 - 10 feet.

Notes:
1 Subsurface sediment samples were collected by vibratory core sampler. Actual coordinates and mudlines are presented for accepted cores only.
2 Horizontal Datum is North American Datum of 1983 (NAD) 83 HARN State Plane Washington South, U.S. Survey feet. Vertical datum is Mean Lower Low Water (MLLW).
3 Water depth presented is at the time of sample collection. Water levels in Bellingham Bay are tidally influenced. Water depth was determined by lead line. Ft: feet.
4 Tides heights are predicted. Source: Tides and Currents Pro.

Table 2. Sampling and Analysis Summary Table

Waterway	Station ID	Subsurface Sediment Sample ID	Sample Interval [1] (ft)	Subsurface Sediment Testing[2]	Archived Sample Analyses[3]
Squalicum Creek	S-1	S-1-DM	0 - 4.1	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		S-1-Z	4.1 - 6.1	Archive	D/F
	S-2	S-2-DM	0 - 2.6	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		S-2-Z	2.6 - 4.4	Archive	--
	S-3	S-3-DM	0 - 2.7	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		S-3-Z	2.7 - 4.7	Archive	--
		S-3-DMB	0 - 2.7	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		S-3-DMC	0 - 2.7	Archive	--
	S-4	S-4-DM	0 - 4.1	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		S-4-Z	4.1 - 5.9	Archive	--
	S-5	S-5-DM	0 - 3.4	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		S-5-Z	3.4 - 5.4	Archive	--
	S-6	S-6-DM	0 - 3.4	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		S-6-Z	3.4 - 5.3	Archive	--
	S-7[4]	S-7-DM	0 - 3.5	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		S-7-Z	3.5 - 5.4	Archive	D/F
	S-8[4]	S-8-DM	0 - 0.2	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		S-8-Z	0.2 - 2.0	Archive	D/F
	S-9	S-9-Z	0 - 1.7	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
	S-10	S-10-A-Z	0 - 1.9	Archive	--
	S-11	S-11-Z	0 - 1.7	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
	S-12	S-12-A-Z	0 - 1.8	Archive	D/F
	S-13	S-13-Z	0 - 1.8	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
	S-14	S-14-A-Z	0 - 1.8	Archive	--
	S-15	S-15-Z	0 - 1.8	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
	S-16	S-16-A-Z	0 - 1.8	Archive	--
I&J Street	I-1	I-1-DM	0 - 4.6	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		I-1-Z	4.6 - 6.4	Archive	D/F
	I-2	I-2-A-DM	0 - 3.3	Archive	--
		I-2-A-Z	3.3 - 5.1	Archive	--
	I-3	I-3-DM	0 - 2.2	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		I-3-Z	2.2 - 3.8	Archive	D/F
	I-4	I-4-A-DM	0 - 1.9	Archive	--
		I-4-A-Z	1.9 - 3.5	Archive	--
	I-5	I-5-A-DM	0 - 3.3	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		I-5-A-Z	3.3 - 5.3	Archive	D/F
	I-6	I-6-A-DM	0 - 3.2	Archive	--
		I-6-A-Z	3.2 - 4.9	Archive	--
	I-7	I-7-A-DM	0 - 3.1	D/F, GS, TS, TVS, TOC, NH3, S2, Archive	--
		I-7-A-Z	3.1 - 4.7	Archive	--

Notes:

1 Core depths represent in situ values. Cores were compaction-corrected and samples were taken based on these values. Ft: feet.

2 D/F: Dioxin/Furans; GS: Grain Size (not frozen); TS: Total Solids; TVS: Total Volatile Solids; TOC: Total Organic Carbon; NH3: Ammonia; S2: Total Sulfides

3 Additional core samples were analyzed in a second round of testing as selected by USACE.

4 Cores S-7 and S-8 were cut using electric-handsaw causing lexan core tube to melt. The DM-layer of S-8 was discarded due to potential impacts. Other intervals were retained due to no visible impacts. Sediment from all other cores was extruded.

Table 3. Summary of Analytical Testing Results

Waterway	I & J Street Waterway							Squalicum Waterway																
Location ID	I-1	I-1	I-3	I-3	I-5	I-5	I-7	S-1	S-1	S-2	S-3	S-3	S-3	S-4	S-5	S-6	S-7	S-7	S-8	S-9	S-11	S-12	S-13	S-15
Sample ID	I-1-DM	I-1-Z	I-3-DM	I-3-Z	I-5-DM	I-5-Z	I-7-DM	S-1-DM	S-1-Z	S-2-DM	S-3-DM	S-3-DMB	S-3-DMC	S-4-DM	S-5-DM	S-6-DM	S-7-DM	S-7-Z	S-8-Z	S-9-Z	S-11-Z	S-12-A-Z	S-13-Z	S-15-Z
Sample Date	9/8/2011	9/8/2011	9/8/2011	9/8/2011	9/8/2011	9/8/2011	9/7/2011	9/6/2011	9/6/2011	9/6/2011	9/7/2011	9/7/2011	9/7/2011	9/6/2011	9/6/2011	9/6/2011	9/6/2011	9/6/2011	9/6/2011	9/7/2011	9/7/2011	9/7/2011	9/7/2011	9/7/2011
Depth	0 - 4.6 ft	4.6 - 6.4 ft	0 - 2.2 ft	2.2 - 3.8 ft	0 - 3.3 ft	3.3 - 5.3 ft	0 - 3.1 ft	0 - 41 ft	4.1 - 6.1 ft	0 - 2.6 ft	0 - 2.7 ft	0 - 2.7 ft	0 - 2.7 ft	0 - 4.1 ft	0 - 3.4 ft	0 - 3.4 ft	0 - 3.5 ft	3.5 - 5.4 ft	0.2 - 2 ft	0 - 1.7 ft	0 - 1.7 ft	0 - 1.8 ft	0 - 1.8 ft	0 - 1.8 ft
Conventional Parameters (mg/kg)																								
Ammonia	113	--	10.6	--	87.9	--	28.6	70.7	--	106	53.2	61	47.8	41.8	48.8	61.9	61.6	--	--	86.8	34.5	--	20.2	24.4
Sulfide	2,650	--	1,830	--	2,320	--	1,970	3,810	--	2,730	1,710	1,410	1,380	895	1,040	2,070	1,630	--	--	2,030	1,650	--	2,340	1,930
Conventional Parameters (pct)																								
Total organic carbon	4.14	--	3.34	--	4.23	--	2.07	1.78	--	1.92	1.25	1.83	1.87	2.51	1.48	1.51	1.5	--	--	1.91	1.84	--	1.63	1.64
Total solids (preserved)	45.4	--	53.9	--	46.3	--	48.5	54.7	--	56.6	55.5	55.3	55.8	62.6	59.3	50.8	59.2	--	--	53.4	51.4	--	49.3	51.6
Total volatile solids	9.06	--	6.52	--	11.15	--	6.84	6.38	--	6.94	5.83	5.91	5.81	4.94	5.24	5.7	5.6	--	--	6.05	6.06	--	5.21	5.38
Total solids	48.3	--	57.6	--	46.7	--	49.7	55.1	--	54.5	55	54.5	54.9	61.1	58.3	54.2	57.4	--	--	50.9	53.3	--	53.8	53
Grain Size (pct)																								
Gravel	0.2	--	2.9	--	0.1 U	--	0.1 U	0.1 U	--	0.1 U	0.1 U	0.1	0.1 U	0.1 U	0.1 U	0.1 U	0.1	--	--	0.1 U	0.1 U	--	0.1 U	0.1 U
Sand, Very Coarse	3.5	--	2.5	--	6.4	--	1.5	0.5	--	2.2	0.6	0.5	0.4	0.5	0.5	0.9	0.4	--	--	0.7	1	--	2.4	1.3
Sand, Coarse	2.3	--	4	--	3.2	--	1.2	0.5	--	3.6	0.9	0.9	0.7	0.5	0.4	1	0.5	--	--	1.1	1	--	0.9	0.7
Sand, Medium	2	--	7	--	2.4	--	0.7	0.6	--	7.8	1.1	0.9	0.8	0.3	0.3	1	0.4	--	--	1.5	0.9	--	0.5	0.6
Sand, Fine	2.7	--	13.4	--	2.3	--	0.6	1.4	--	7.6	1.7	1.6	1.4	0.5	0.2	2	0.3	--	--	1.4	0.9	--	0.5	0.5
Sand, Very Fine	2.8	--	7.5	--	2.8	--	0.8	2.6	--	5.6	3.2	2.9	2.7	1.5	0.9	3.6	0.8	--	--	1.6	1.7	--	0.9	1.1
Silt, Coarse	3.2	--	3.4	--	2.8	--	3.4	9.2	--	7.9	13.1	14.4	12.9	21.7	20	12.9	13.1	--	--	6.8	7.8	--	4.5	13.8
Silt, Medium	8.1	--	7.1	--	11.2	--	12.4	26.9	--	22.7	30.4	28.9	30.3	33.3	35.2	32.2	35.8	--	--	28.8	22.9	--	15.2	9.8
Silt, Fine	19.8	--	12.6	--	18.4	--	24.6	25.2	--	21.2	23	22.4	23.6	18.3	18.3	22.4	21.7	--	--	28.9	26.7	--	28.9	23.9
Silt, Very Fine	15.5	--	11.3	--	15.7	--	16.2	11.1	--	6.5	8.4	9	8.8	7.7	8.1	8	8.4	--	--	8.6	10.7	--	13.8	14.8
Clay, Coarse	11.1	--	8.6	--	10.4	--	11.2	6.1	--	3.9	5.1	5.5	5.3	4.8	5	4.9	5.5	--	--	5.4	7.5	--	8.5	9.7
Clay, Medium	9.8	--	6.6	--	8.5	--	9.3	5.5	--	3.9	4.2	4.3	4.5	3.7	3.7	3.7	4.2	--	--	5.3	6.3	--	8.7	8.3
Clay, Fine	19.1	--	13	--	15.8	--	18.1	10.2	--	7.2	8.3	8.5	8.6	7.2	7.5	7.2	9	--	--	9.8	12.7	--	15.1	15.4
Fines (silt + clay)	86.5	--	62.6	--	82.8	--	95.2	94.4	--	73.2	92.6	93	94	96.7	97.6	91.4	97.6	--	--	93.7	94.5	--	94.7	95.8
Dioxin Furans (ng/kg)																								
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1.73	1.6	1.07	0.199 J	2.71	0.664 J	1.15	0.159 J	0.262 J	0.176 J	0.103 J	--	--	0.135 J	0.0747 U	0.0806 U	0.109 J	0.148 J	0.0918 U	0.106 J	0.0757 U	0.219 J	0.0813 U	0.297 J
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	7.22 J	6.49 J	4.09 J	0.904 J	5.82 J	3.42 J	4.67 J	0.947 J	1.34 J	1.02 J	0.537 J	--	--	0.444 J	0.427 J	0.382 J	0.405 J	0.655 J	0.449 J	0.614 J	0.404 J	0.851 J	0.285 J	1.67 J
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	14.5	7.68	7.68	1.09 J	9.95	3.73	11.5	1.53 J	2.39 J	1.45 J	0.78 J	--	--	0.618 J	0.625 J	0.536 J	0.622 J	1.19 J	0.611 J	0.972 J	0.629 J	2.11 J	0.252 J	4.63
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	49 J	34.2 J	37.9 J	7.29 J	51.9 J	32.3 J	30.4 J	6.29 J	7.47 J	6.19 J	3.38 J	--	--	2.93 J	2.56 J	2.45 J	2.8 J	4.21 J	2.78 J	3.75 J	2.24 J	4.45 J	0.892 J	8.1 J
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	24.4 J	15.7 J	13.9 J	2.24 J	19.6 J	9.31 J	15.5 J	3.03 J	4.31 J	3.22 J	1.7 J	--	--	1.35 J	1.25 J	1.25 J	1.16 J	2.15 J	1.27 J	1.85 J	1.2 J	2.64 J	0.585 J	5.64 J
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	971 J	677	815 J	153	1,200 J	767	493 J	150 J	164	143 J	79.4 J	--	--	69.9 J	61.3 J	58.7 J	67.3 J	84.3	62.1	75 J	47.2 J	66	15.1 J	93.1 J
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	7,750 J	5,790	7,250 J	1,370	11,100 J	7,070	3,830 J	1,260 J	1,310	1,220 J	679 J	--	--	611 J	534 J	521 J	637 J	730	570	653 J	405 J	438	118 J	488 J
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	16.8	9.02	10.6	0.918 J	21.7 J	5.42	13.8	0.676 J	1.69	0.558 J	0.4 J	--	--	0.388 J	0.435 J	0.369 J	0.423 J	1.55 J	0.449 J	1.36	0.606 J	3.8	0.559 J	6.85
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	4.45 J	3.11	4.29 J	0.637 J	7.12	4.51	2.8 J	0.453 J	0.908 J	0.503 J	0.299 J	--	--	0.261 J	0.222 J	0.213 J	0.288 J	0.423 J	0.272 J	0.367 J	0.221 J	0.419 J	0.208 J	0.788 J
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	4.73	4	4.01	0.828 J	5.88	3.92	2.73	0.592 J	0.932 J	0.616 J	0.354 J	--	--	0.277 J	0.258 J	0.282 J	0.357 J	0.532 J	0.326 J	0.398 J	0.277 J	0.488 J	0.256 J	0.812 J
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	13.9 J	11.1	14.8 J	3.06	23.3	15.4	7.27 J	1.8 J	2.54 J	1.82 J	1.04 J	--	--	0.992 J	0.773 J	0.827 J	1.09 J	3.98	0.934 J	1.16 J	0.701 J	0.93 J	0.279 J	1.26 J
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	6.58	5.99	5.23	1.28 J	7.54	5.45	3.08	0.936 J	1.51 J	0.954 J	0.505 J	--	--	0.439 J	0.378 J	0.411 J	0.451 J	0.897 J	0.446 J	0.548 J	0.363 J	0.53 J	0.216 J	0.725 J
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	4.57 J	3.62	4.22 J	0.926 J	7.36	5.02	2.26 J	0.617 J	1.03 J	0.691 J	0.378 J	--	--	0.374 J	0.287 J	0.294 J	0.407 J	0.523 J	0.31 J	0.42 J	0.253 J	0.373 J	0.111 J	0.432 J
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	9.76 J	10 J	7.24 J	2.15 J	10.5 J	7.71 J	4.64 J	1.34 J	1.96 J	1.4 J	0.714 J	--	--	0.62 J	0.531 J	0.56 J	0.713 J	0.842 J	0.63 J	0.749 J	0.49 J	0.681 J	0.25 J	0.959 J
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	145	153	137	46.7	213	160	77.9	21.4	25.7	19.9	11.8	--	--	10.1	8.22	8.16	9.66	14.5	9.43	10.6	6.8	8.75	2.46	10
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	9.94	10.4 J	9.78	2.92 J	14.7	11.2 J	5.33	1.48 J	1.92 J	1.51 J	0.836 J	--	--	0.78 J	0.578 J	0.683 J	0.751 J	1.67 J	0.709 J	0.807 J	0.512 J	0.759 J	0.157 J	0.759 J
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	381	445 J	395	140 J	615	486 J	251	73.8	83.5 J	69.4	39.2	--	--	34.3	26.3	26.8	31.4	39.4 J	30.8 J	34.2	23.7	27.7 J	8.38	29.2
Total Tetrachlorodibenzo-p-dioxin (TCDD)	339	157	180	12.4 J	227 J	40.2 J	457	11.8 J	27.9 J	11.8 J	8.37 J	--	--	5.84 J	7.41 J	6.86 J	7.18 J	28.2 J	8.88 J	26.8 J	13.1 J	88.6 J	10.2 J	225 J
Total Pentachlorodibenzo-p-dioxin (PeCDD)	394 J	172	211 J	15.1 J	260 J	53.5	485 J	14.1 J	31.3 J	14.3 J	9.48 J	--	--	6.81 J	8.29 J	7.64 J	8.1 J	22.6 J	9.91 J	25.7 J	13.5 J	84.2 J	9.06 J	227 J
Total Hexachlorodibenzo-p-dioxin (HxCDD)	705	378	415	53.6	548 J	236	692	49.5	77.2 J	49.2	27.9 J	--	--	22.7 J	24.4	22.2 J	24 J	61.5	27.5 J	50.7 J	26.8	139	15.1 J	324
Total Heptachlorodibenzo-p-dioxin (HpCDD)	2,300 J	1,550	1,620 J	325	2,360 J	1,490	983 J	332 J	365	311 J	174 J	--	--	149 J	143 J	131 J	145 J	176	132	153 J	99.7 J	132	31.2 J	179 J
Total Tetrachlorodibenzofuran (TCDF)	91.9 J	111 J	55 J	14.2 J	97 J	53.7 J	64.4 J	6.92 J	14.9 J	7.57 J	4.35 J	--	--	3.93 J	3.87 J	3.56 J	3.77 J	8.53 J	4.04 J	7.39 J	4.49 J	15.9 J	7.49 J	29.9 J
Total Pentachlorodibenzofuran (PeCDF)	113 J	170 J	83.2 J	28 J	125 J	101 J	54.5 J	12.3 J	23 J	12.8 J	6.73 J	--	--	5.67 J	5.08 J	5.25 J	5.86 J	8.25 J	6.09 J	7.28 J	4.62 J	7.65 J	3.4 J	13.2 J
Total Hexachlorodibenzofuran (HxCDF)	266	263 J	228 J	65.7 J	335	242 J	132	36.3 J	44.5 J	34.7	19.7	--	--	17.9 J	14.4 J	14.9 J	17.9 J	25.1 J	17.2 J	19.5	12.1	15.3 J	4.41 J	20.1 J
Total Heptachlorodibenzofuran (HpCDF)	505 J	575	510 J	160	825 J	611 J	307 J	77.7 J	89.3 J	71.6 J	41.4 J	--	--	37.2 J	29.2 J	29.6 J	36.6 J	46.7	33.5 J	38.5 J	25.2 J	29.2 J	8.3 J	35.2 J
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)	38.2 J	29.4 J	28.6 J	5.7 J	43 J	25 J	22.6 J	5 J	6.53 J	5.06 J	2.78 J	--	--	2.44 J	2.06 J	1.98 J	2.37 J	3.7 J	2.2 J	3 J	1.82 J	3.68 J	0.898 J	6.29 J
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)	38.2 J	29.4 J	28.6 J	5.7 J	43 J	25 J	22.6 J	5 J	6.53 J	5.06 J	2.78 J	--	--	2.44 J	2.1 J	2.02 J	2.37 J	3.7 J	2.2 J	3 J	1.85 J	3.68 J	0.938 J	6.29 J

Notes:

Bold = Detected result

J = Estimated value

U = Compound analyzed, but not detected above detection limit

Significant figures applied to calculations