LOWER DUWAMISH WATERWAY
SLIP 4 EARLY ACTION AREA

TECHNICAL MEMORANDUM FOR TIER 2 ANALYSES

Submitted to:
U.S. Environmental Protection Agency, Region 10
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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

AOC	Administrative Order on Consent
CSL	cleanup screening level
EPA	Environmental Protection Agency
LDW	Lower Duwamish Waterway
OC	organic carbon
PCB	polychlorinated biphenyl
SAP	sampling and analysis plan
SEA	Striplin Environmental Associates
SMS	Sediment Management Standards
SQS	sediment quality standard
SOW	Statement of Work
TOC	total organic carbon

INTRODUCTION

This technical memorandum provides recommendations for additional analyses that are part of the Slip 4 Early Action Area site characterization program. Slip 4 is located approximately 2.8 miles from the mouth of the Duwamish River in Seattle, WA. The Slip 4 characterization is being performed by the City of Seattle and King County under Tasks 9 and 10 of the existing Administrative Order on Consent (AOC) Statement of Work (SOW) for the Lower Duwamish Waterway (LDW), and per requirements of the Slip 4 Work Plan (SEA 2003). Details of the Slip 4 site characterization are provided in the sampling and analysis plan (SAP) (Integral 2004).

Surface and subsurface sediments were collected from Slip 4 during the week of April 5-9, 2004, following methods presented in the Slip 4 SAP (Integral 2004). Surface sediments from 30 locations, including one intertidal composite area, and subsurface samples from 11 locations were collected. Subsurface cores were sectioned into 2 ft intervals. Samples were prepared for analysis of all analytes listed in the Washington State Sediment Management Standards (SMS) (WAC 173-204).

As described in the Slip 4 SAP (Integral 2004), sample analyses are to occur in two tiers that have been termed Tier 1 and Tier 2. The SAP states:

"Surface and subsurface samples will initially be analyzed for PCB Aroclors, total organic carbon (TOC), percent solids, and grain size. Following the receipt of these data from the laboratory, the City of Seattle and King County will recommend to EPA the samples that will be analyzed for some or all of the remaining suite of SMS analytes. The primary goal of this iteration will be to characterize concentrations of the remaining SMS analytes in the area immediately outside of where PCBs exceed the CSL. A secondary goal will be to analyze select organic compounds near potential sources. The following will be considered in the selection of surface samples for full SMS analysis:

1. *Proximity to sources that may influence chemical distributions*
2. *Proximity to existing data points that may be used in the evaluation of the boundary*
3. *Proximity to the area where PCB concentrations exceed the CSL*
4. *Proximity to existing data Station SL4-12 (Landau 1990) that exceeded the CSL for bis(2-ethylhexyl)phthalate (see SEA 2004)."*

"A similar iteration will occur for subsurface samples. Subsurface samples will initially be analyzed for PCB Aroclors, TOC, percent solids, and grain size. For each core, all SMS analytes will be characterized in either the sediment horizon below the horizon containing the deepest PCBs CSL exceedance pending approval by EPA. These data will help to determine the appropriate depth

of a removal action. The recommended horizons for full SMS analysis will be forwarded to EPA along with the recommendations for SMS analyses of surface sediments."

As called for by the SAP, the initial analyses (termed Tier 1 analyses in the remainder of this document) were conducted on all surface samples and the 0-2 ft, 2-4 ft, and 4-6 ft intervals of seven of the eleven subsurface cores (samples from cores SC08 – SC11 were archived) during April 2004. The remainder of this technical memorandum contains a brief description of the Tier 1 analytical data, recommendations for additional analyses on archived samples (termed Tier 2 analyses), and recommendations for additional samples.

REVIEW OF TIER 1 ANALYSIS RESULTS

Surface sediments were collected from 29 stations and 1 intertidal composite area in Slip 4 (Figure 1). Subsurface sediments were collected from 11 stations (Figure 2). The subsurface core stations were co-located with surface locations to increase our understanding of the vertical trends in contaminant distributions at these 11 locations. The samples were analyzed by Analytical Resources, Inc., Tukwila, WA.

The resulting data were reviewed for data quality by an external data validator and found to be acceptable for use. EPA's Quality Assurance office has reviewed the first batch of data and currently has the remaining data under review. No data quality issues have been raised to date. Formal results of the data validation process will be reported in the Slip 4 Cruise and Data Report that will be submitted to EPA in July 2004.

The Boeing Company took splits of surface and subsurface samples collected from their property and provided these data and associated data validation reports to EPA and the City of Seattle on July 6, 2004 (Landau 2004). These data are included within this report. Boeing's data package and associated validation results will be more fully described in the Slip 4 Cruise and Data Report.

PCBs distributions in surface sediments from the 2004 sampling program are shown in Figure 1 and the data are reported in Table 1. The concentrations shown in Figure 1 have been normalized to the organic content of the sediments. Four stations (i.e., Stations SG03, SG04, SG06 and IC01) exceeded the Washington State Sediment Management Standards (SMS) Cleanup Screening Level (CSL) for total PCBs, and six additional stations (i.e., Stations SG02, SG07, SG08, SG09, SG12, and SG16) exceeded the SMS Sediment Quality Standard (SQS) for total PCBs. Total PCBs at the remaining 20 surface sediment stations were below the SQS for total PCBs.

When the surface PCB concentrations from 2004 are mapped and compared with historical data collected between 1990 and 1998 (Figure 3), it is evident that PCBs concentrations in surface sediments in many areas are less in 2004 than they were between 1990 and 1998 suggesting that the surface sediments are undergoing natural recovery. This decrease in PCBs concentrations is likely the result of physical processes (e.g., sedimentation, dispersion, dilution, bioturbation) occurring within Slip 4, rather than chemical or biological degradation. Subsurface sediment results show a pattern of PCB contamination similar to that seen for surficial sediment data collected between 1990 and 1998 (see below). CSL exceedances in the 2004 surface sediment data set are confined to three stations at the head of the slip and the intertidal composite sample located along the southern end of First South Properties.

The distribution of PCBs in subsurface sediments is shown in Figure 2. In all cases total PCB concentrations in the co-located surface sample (surface to 10 cm) are less than those in the uppermost core interval (0-2 ft). Six of the eight cores contain samples that exceed the PCBs CSL. Some cores (i.e., SC02, SC03, and SC06) have lower concentrations in the 0-2 ft interval than the 2-4 ft interval, indicating long-term natural recovery. In other cores (i.e., SC01, SC04, SC07 and SC11) the highest PCBs concentrations are found in the 0-2 ft section yet the concentrations of PCBs in the collocated surface sample (i.e., 0-10 cm) at these stations are an order of magnitude less than those in the 0-2 ft interval. These results are indicative of recent natural recovery of subsurface sediments at Slip 4, as observed above with surface sediments.

The 2004 and historical (i.e., Landau 1990) subsurface PCBs data are shown in Figure 4. The Landau data show gradients in the vertical distribution of PCBs that are similar to those observed in 2004.

POSSIBLE REMOVAL ACTION AREA AND RECOMMENDATIONS FOR TIER 2 ANALYSES

The area where the Tier 1 PCBs data suggest the removal action boundary could be located is approximately at the midpoint of the slip, as shown with a bracket in Figures 3 and 4. Sediment between the bracketed area and the head of the slip is included in the possible removal action area. The possible boundary area will be better defined with the inclusion of Tier 2 data for other SMS analytes. The possible boundary area was identified by considering the distributions of surface and subsurface stations with SQS and CSL exceedances of PCBs, and is more conservative than if identified based solely on CSL exceedances in surface sediments, as was recommended in the Slip 4 SAP (Integral 2004). With the exception of one surface station with a minor SQS exceedance (i.e., Station SG16 containing 15 mg/kg OC PCBs), all 2004 surface and subsurface samples outside of the possible removal action area have total PCBs concentrations that are below the SQS. In the inner half of the slip (and within the possible removal action area), surface PCBs are highest near the head of the slip and along the First South Properties shoreline. Stations located offshore of First South Properties have PCBs concentrations that are less than 20 mg/kg OC and in many cases are less than the SQS (Figure 1).

Subsurface PCBs concentrations are also highest near the head of the slip (Figures 2 and 4); however, substantially elevated concentrations in the 0-2 ft horizon were also found approximately 300 ft (i.e., Station SC04) and 600 ft (i.e., Station SC07) from the head of the slip. The PCBs concentrations in surface sediments associated with Stations SC04 and SC07 were 23.4 mg/kg OC (approximately twice the SQS but only 36% of the CSL) and 10.5 mg/kg OC (less than the SQS), respectively. As described earlier, the concentrations of PCBs in the surface sample (i.e., 0-10 cm) at these stations are an order of magnitude less than those in the 0-2 ft interval indicating substantial natural recovery of the surficial sediments in these areas.

PCBs also exceed the CSL in the 0-2 ft horizon at Station SC11 located near the mouth of the slip. PCBs in the 2-4 ft horizon of this core exceed the SQS. It appears that PCBs at this location do not originate from the same source(s) as the PCBs within the possible removal area because PCBs at Station SC09, located between Stations SC11 and SC07 were substantially below the SQS throughout the core (Figure 2).

Surface stations that are recommended for further analysis of archived sediment as part of Tier 2, and the associated rationale, are shown in Table 2. Tier 2 analyses are recommended in areas adjacent to where the boundary of the removal action may be placed based on available PCBs data. Data for the additional analytes that are analyzed in Tier 2 will be used with the existing PCBs data to finalize the removal action boundary. The Tier 2 data will also be used to assess if potential sources that were indicated in the

historical data affect sediment quality in the outer slip. This recommendation satisfies the second and third objectives for analysis of Tier 2 samples presented in the Slip 4 SAP and on page 1 of this document. Analyses are also recommended in areas outside of the potential removal area where historical data suggests potential sources may affect sediment quality (and satisfying the first and fourth objectives for additional analyses). Archived sediment samples from these stations will be analyzed for the remaining SMS analytes unless otherwise indicated.

Tier 2 analyses are also proposed for certain archived subsurface core sections to quantify chemical concentrations at depth to support the engineering and design effort for sediment removal (Table 3). Subsurface samples from each of the seven cores analyzed for PCBs in Tier 1 will be analyzed. The objectives of analyzing additional subsurface sediments are to better understand the vertical distribution of PCBs, and to obtain data for all SMS analytes in the horizon where PCBs do not exceed the CSL, which may be an acceptable sediment surface following a removal action. Although the Slip 4 SAP (Integral 2004) proposed Tier 2 analysis of the core interval beneath the deepest interval with an exceedance of the PCB CSL, the guidelines in Table 3 expand upon that recommendation.

Subsurface core intervals that are proposed for Tier 2 analysis are shown in Figure 4. With the exception of Stations SC01, SC04 and SC05, full SMS analysis will be performed, including metals, SVOCs, PCB Aroclors, total organic carbon and grain size. Only metals and SVOCs will be analyzed on the samples from Station SC01, SC04 and SC05 because the other SMS analytes (total PCBs, grain size and total organic carbon) were analyzed in Tier 1.

RECOMMENDATIONS FOR BANK SAMPLES

It is recommended that bank samples be collected at six locations (Figure 3) to determine whether the banks are sources of PCBs to sediments in the slip. Collection of bank data prior to preparing the EE/CA will allow this potential source to be addressed in the EE/CA. Bank samples will be analyzed for PCBs, total organic carbon and grain size to fully document the potential for this area to be a source of chemical contamination to the slip.

Proposed bank samples are placed in locations up the bank from sediment areas with elevated PCBs based on either the 2004 or historical data sets. The sample locations are broadly distributed along the bank to capture potential sources in areas of the slip where the shoreline isn't covered by either rip rap or the Crowley pier.

REFERENCES

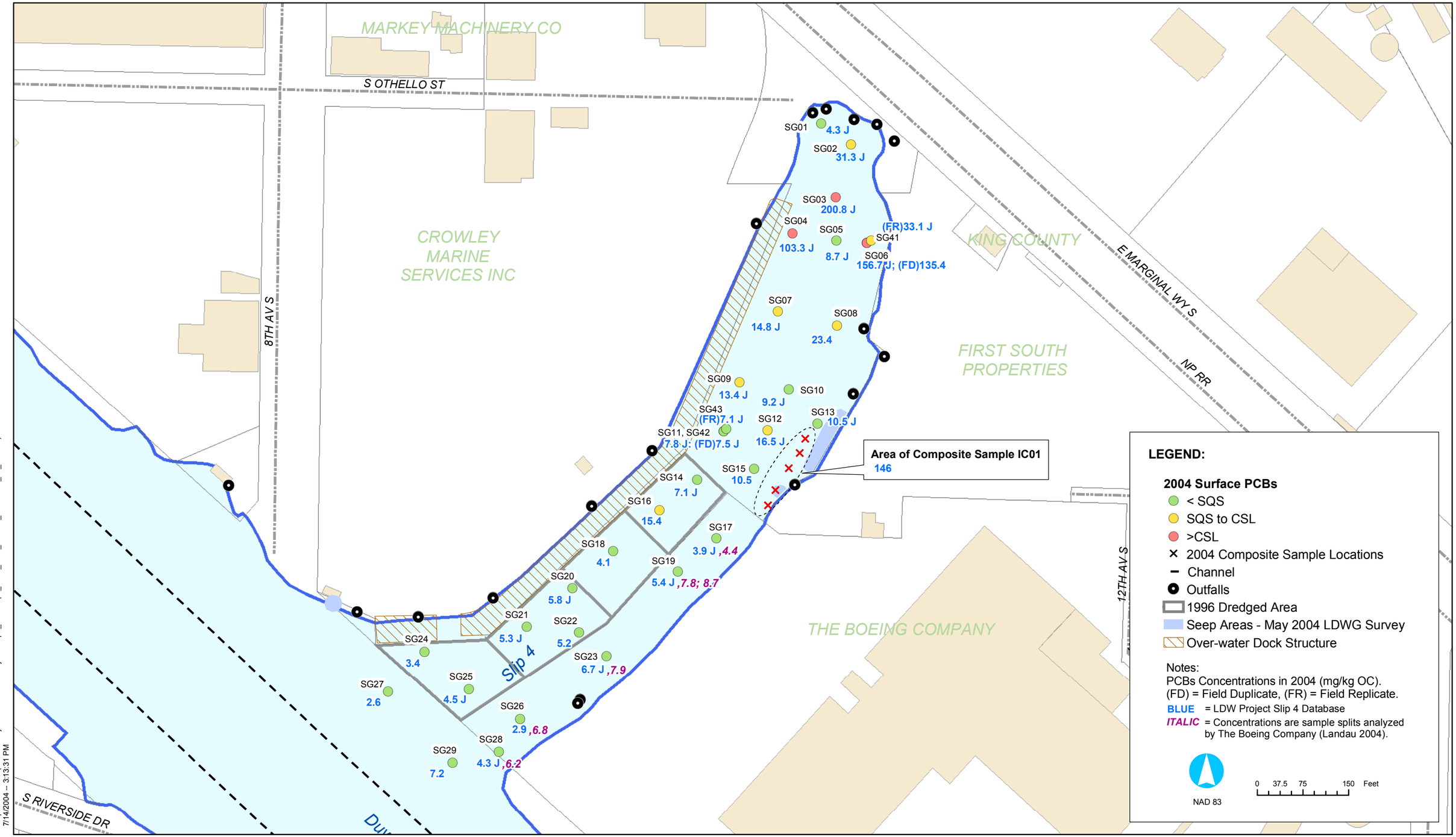
Integral. 2004. Lower Duwamish Waterway Slip 4 Early Action Area: Sampling and Analysis Plan for Boundary Definition. Prepared for the City of Seattle and King County. Integral Consulting, Olympia, WA.

Landau. 1990. Environmental Site Assessment, First Interstate Bank of Washington Property, 7400 8th Ave S. & 7343 E. Marginal Way S. Prepared for The Boeing Company, Seattle, WA. Landau Associates, Inc., Edmonds, WA.

Landau. 2004. Data Package for Slip 4 Split Samples. Prepared for The Boeing Company, Seattle, WA. Landau Associates, Inc., Edmonds, WA.

SEA. 2003. Lower Duwamish Waterway Slip 4 Early Action Area: Work Plan for Investigation Tasks. Prepared for City of Seattle and King County, WA. Striplin Environmental Associates, Olympia, WA.

SEA. 2004. Lower Duwamish Waterway Slip 4 Early Action Area: Summary of Existing Information and Identification of Data Gaps. Prepared for City of Seattle and King County, WA. Striplin Environmental Associates, Olympia, WA.



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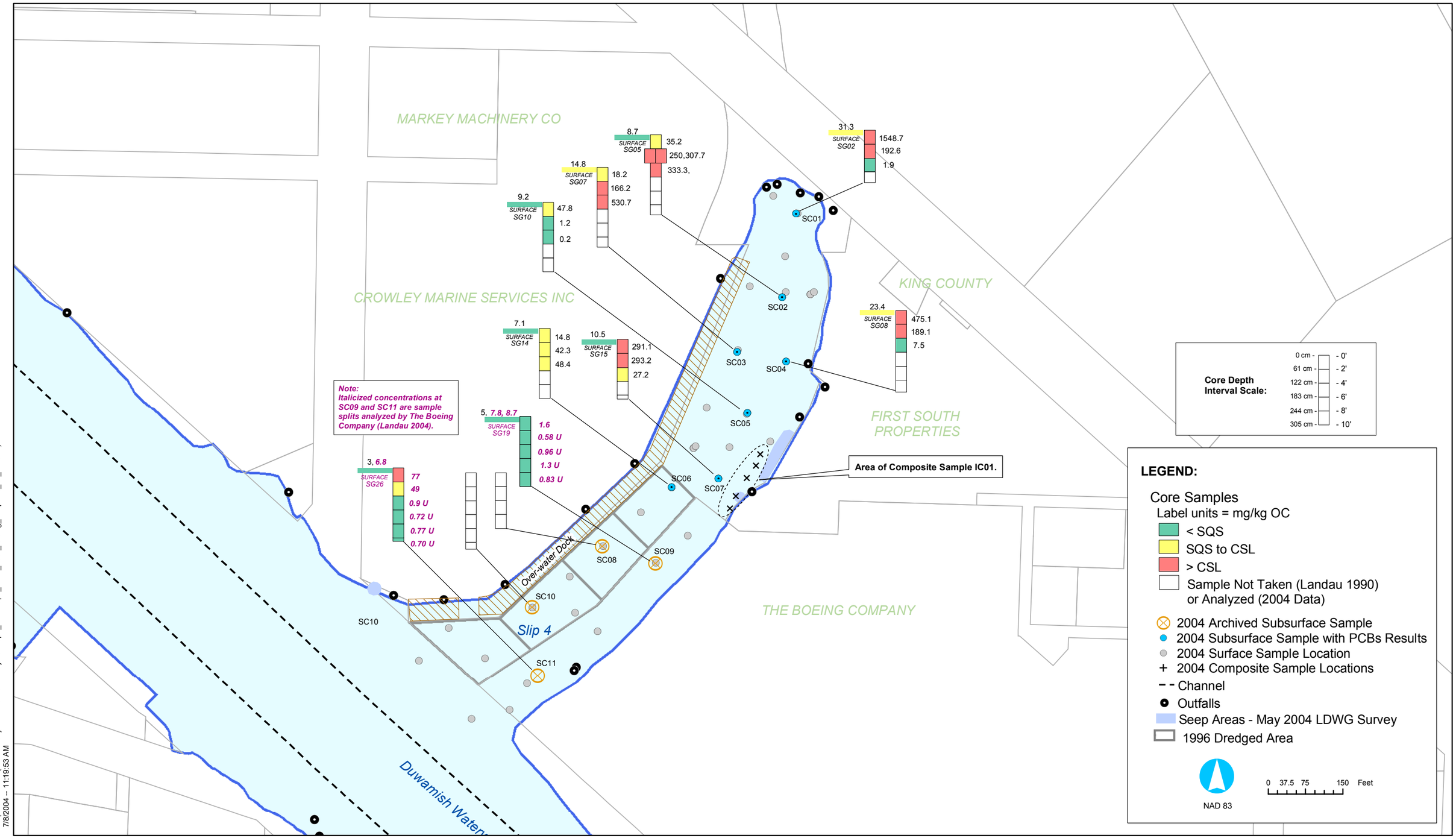
integral consulting inc

Map Feature Sources:
King County GIS, Seattle Public Utilities, USACE, Ecology, Windward Environmental, David Evans, Inc., and others.
Sediment Chemistry:
Lower Duwamish Project Database and 2004 Slip 4 Survey PCB analysis results.

Figure 1. PCBs Concentrations in Surface Sediments Collected from Slip 4 in 2004.



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Map Feature Sources:
King County GIS, Seattle Public Utilities, USACE, Ecology, Windward Environmental, David Evans, Inc., and others.
Sediment Chemistry:
Lower Duwamish Project Database and 2004 Slip 4 Survey PCB analysis results.

Figure 2. PCBs Concentrations in Subsurface Sediments Collected from Slip 4 in 2004.

MARKEY MACHINERY CO

S OTHELLO ST

8TH AV S

CROWLEY MARINE SERVICES INC

KING COUNTY

E MARGINAL WY S

NP RR

FIRST SOUTH PROPERTIES

12TH AV S

THE BOEING COMPANY

Slip 4

S RIVERSIDE DR

SL4-06 SL4-07 SG01 EIT069 SG02 SL4-08 DR178 SG03 EIT070 SG04 SG05 SL4-09 SG41 DR179 SG06 EIT072 SG07 R9 SG08 EST163 R10 EST164 R11 SL4-10A EST165 SL4-05 R12 EIT063 SG09 SG10 SG11 SG42 SG43 SG12 SG13 EST168 DR177 R13 R14 SG15 EST169 EIT064 SG14 DR181 R15 SG16 DR180 SG17 SG18 EST170 SG19 EIT066 SL4-11 SG20 DR182 SG21 SG22 SL4-12A SG23 SL4-12 SG24 EST172 SG25 SG27 EST173 EST171 SG26 DR183 EIT067 EIT068 SG28 SG29

DR174 DR213 EST180 EIT078 WST337 CH0022 EST181 DR175 WST338 WIT275 DR222 WST333 DR232 CH0018

Area of Composite Sample IC01. Tier 2 Analyses will be conducted on composite sample IC01.

LEGEND:

Historical and 2004 Surface PCBs

- <SQS
- SQS to CSL
- >CSL
- 2004 Composite Sample Locations
- 2004 Surface Sample Location
- Sample for Tier 2 Analyses
- Historic Station Omitted due to low TOC
- Bank Sample
- Channel
- Outfalls
- 1996 Dredged Area
- Seep Areas - May 2004 LDWG Survey
- Over-water Dock Structure

NAD 83

0 37.5 75 150 Feet

Map Document: (C:\GIS\Projects\Duwamish\Projects\Slip4_FSP\Slip4_2004_wHISTORIC_PCB_Results_LABELED_v2_rfn.mxd)
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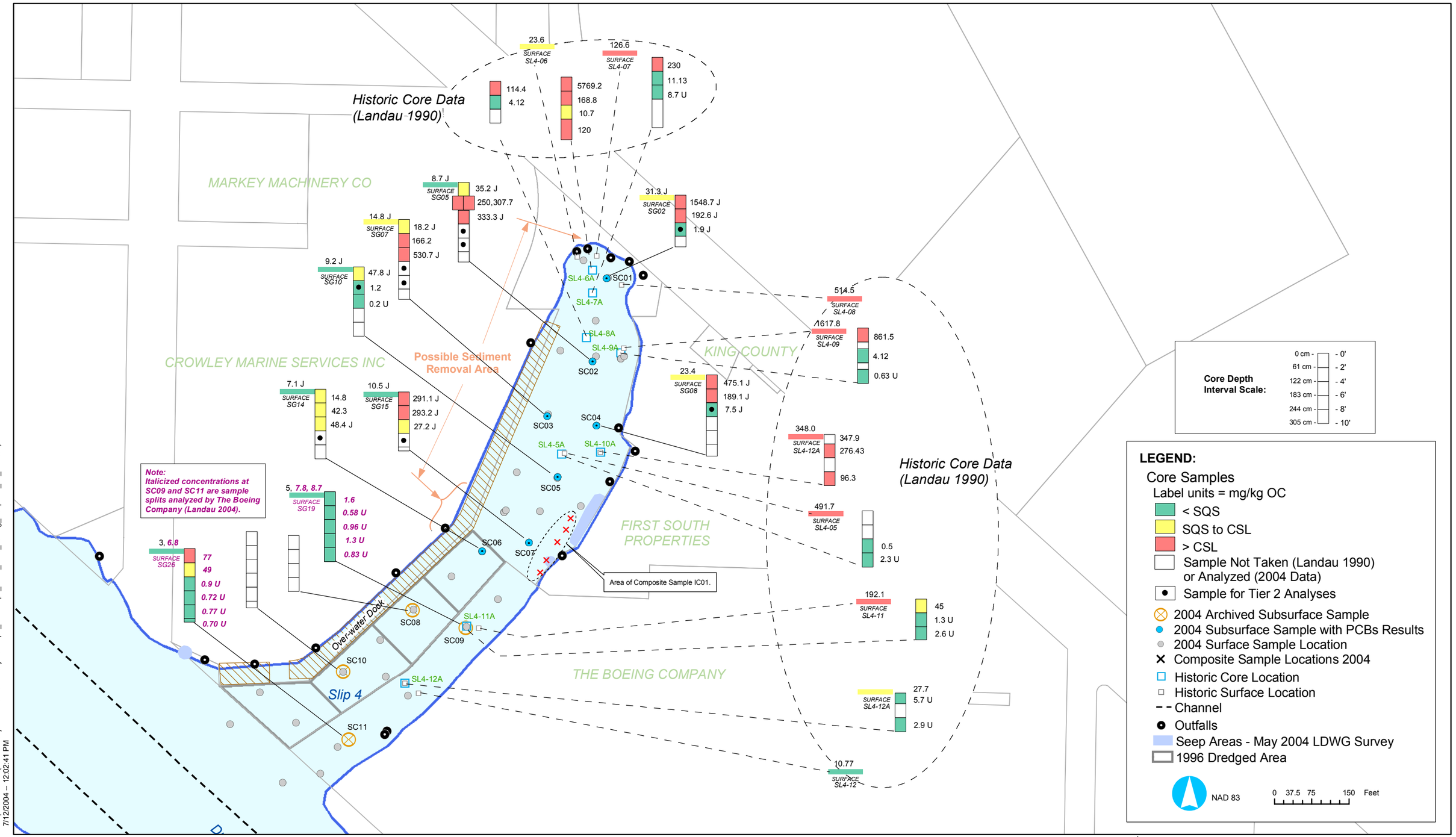
Map Feature Sources:
King County GIS, Seattle Public Utilities, USACE, Ecology, Windward Environmental, David Evans, Inc., and others.
Sediment Chemistry:
Lower Duwamish Project Database and 2004 Slip 4 Survey PCB analysis results.

Figure 3. Historical and 2004 PCBs Concentrations in Surface Sediments in Slip 4 with Proposed Tier 2 Surface Analyses and Bank Samples.



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Map Feature Sources:
King County GIS, Seattle Public Utilities, USACE, Ecology, Windward Environmental, David Evans, Inc., and others.
Sediment Chemistry:
Lower Duwamish Project Database and 2004 Slip 4 Survey PCB analysis results, The Boeing Company.

Figure 4. Historical and 2004 PCBs Concentrations in Subsurface Sediments in Slip 4 and Samples for Tier 2 Analyses.

Table 1. Slip 4 PCBs Data Collected in 2004. [1]

					TOC		Total PCBs			
			Depth Interval (cm)		percent		ug/kg		mg/kg, OC	
Location	Sample	Type	Minimum	Maximun	Value	Qual	Value	Qual	Value	Qual
IC01	IC01	N	0	10	1.13		1650	J	146	J
SC01	SC01A	N	0	61	2.26		35000	J	1548.7	J
SC01	SC01B	N	61	122	0.405		780	J	192.6	J
SC01	SC01C	N	122	183	0.202		3.9	J	1.931	J
SC02	SC02A	N	0	61	3.41		1200	J	35.19	J
SC02	SC02B	N	61	122	3.28		8200		250	
SC02	SC41S	FD	61	122	2.73		8400		307.7	
SC02	SC02C	N	122	183	3.27		10900	J	333.3	J
SC03	SC03A	N	0	61	3.08		560	J	18.18	J
SC03	SC03B	N	61	122	2.9		4820		166.2	
SC03	SC03C	N	122	183	2.77		14700	J	530.7	J
SC04	SC04A	N	0	61	3.01		14300	J	475.1	J
SC04	SC04B	N	61	122	5.13		9700	J	189.1	J
SC04	SC04C	N	122	183	4.01		300	J	7.481	J
SC05	SC05A	N	0	61	2.74		1310	J	47.81	J
SC05	SC05B	N	61	122	2.22		26.6		1.198	
SC05	SC05C	N	122	183	2.02		3.9	U	0.193	U
SC06	SC06A	N	0	61	2.39		354		14.81	
SC06	SC06B	N	61	122	2.34		990		42.31	
SC06	SC06C	N	122	183	1.59		770	J	48.43	J
SC07	SC07A	N	0	61	2.37		6900	J	291.1	J
SC07	SC07B	N	61	122	2.49		7300	J	293.2	J
SC07	SC07C	N	122	183	1.37		372	J	27.15	J
SC09	***SC09-0-2***	***N***	***0***	***61***	***1.35***		***22.1***		***1.6***	
SC09	***SC09-2-4***	***N***	***61***	***122***	***0.678***		***3.9***	***U***	***0.58***	***U***
SC09	***SC09-4-6***	***N***	***122***	***183***	***0.406***		***3.9***	***U***	***0.96***	***U***
SC09	***SC09-6-8***	***N***	***183***	***244***	***0.308***		***3.9***	***U***	***1.3***	***U***
SC09	***SC09-8-10***	***N***	***244***	***305***	***0.468***		***3.9***	***U***	***0.83***	***U***
SC11	***SC11-0-2***	***N***	***0***	***61***	***2.30***		***1770***		***77***	
SC11	***SC11-2-4***	***N***	***61***	***122***	***1.22***		***600***		***49***	
SC11	***SC11-4-6***	***N***	***122***	***183***	***0.434***		***3.9***	***U***	***0.90***	***U***
SC11	***SC11-6-8***	***N***	***183***	***244***	***0.539***		***3.9***	***U***	***0.72***	***U***
SC11	***SC11-8-10***	***N***	***244***	***305***	***0.505***		***3.9***	***U***	***0.77***	***U***
SC11	***SC11-10-12***	***N***	***305***	***366***	***0.541***		***3.8***	***U***	***0.70***	***U***
SG01	SG01	N	0	10	11.5		490	J	4.261	J
SG02	SG02	N	0	10	5.18		1620	J	31.27	J
SG03	SG03	N	0	10	2.54		5100	J	200.8	J
SG04	SG04	N	0	10	4.78		4940	J	103.3	J
SG05	SG05	N	0	10	5.11		444	J	8.689	J
SG06	SG06	N	0	10	3.35		5250	J	156.7	J
SG06	SG40	FD	0	10	3.11		4210		135.4	
SG41	SG41	FR	0	10	3.41		1130	J	33.14	J

Table 1. Slip 4 PCBs Data Collected in 2004. [1]

					TOC		Total PCBs			
			Depth Interval (cm)		percent		ug/kg		mg/kg, OC	
Location	Sample	Type	Minimum	Maximun	Value	Qual	Value	Qual	Value	Qual
SG07	SG07	N	0	10	3.18		470	J	14.78	J
SG08	SG08	N	0	10	3.04		710		23.36	
SG09	SG09	N	0	10	3.61		482	J	13.35	J
SG10	SG10	N	0	10	3.32		306	J	9.217	J
SG11	SG11	N	0	10	3.1		242	J	7.806	J
SG11	SG42	FD	0	10	3.21		242	J	7.539	J
SG11	SG43	FR	0	10	3.39		239	J	7.05	J
SG12	SG12	N	0	10	3.2		529	J	16.53	J
SG13	SG13	N	0	10	3.5		368	J	10.51	J
SG14	SG14	N	0	10	2.79		198	J	7.097	J
SG15	SG15	N	0	10	2.85		299		10.49	
SG16	SG16	N	0	10	0.817		126		15.42	
SG17	SG17	N	0	10	3.03		119	J	3.927	J
SG17	***SG17-split***	***N***	***0***	***10***	***2.85***		***124***		***4.4***	
SG18	SG18	N	0	10	3.17		130		4.101	
SG19	SG19	N	0	10	2.85		154	J	5.404	J
SG19	***SG19- split***	***N***	***0***	***10***	***2.93***		***230***		***7.8***	
SG19	***SG19 -split***	***FD***	***0***	***10***	***3.76***		***327***		***8.7***	
SG20	SG20	N	0	10	3.09		179	J	5.793	J
SG21	SG21	N	0	10	2.96		158	J	5.338	J
SG22	SG22	N	0	10	2.81		145		5.16	
SG23	SG23	N	0	10	0.54		36	J	6.667	J
SG23	***SG23 -split***	***N***	***0***	***10***	***0.891***		***70***		***7.9***	
SG24	SG24	N	0	10	2.88		99		3.438	
SG25	SG25	N	0	10	2.55		116	J	4.549	J
SG26	SG26	N	0	10	4.48		129		2.879	
SG26	***SG26- split***	***N***	***0***	***10***	***2.52***		***171***		***6.8***	
SG27	SG27	N	0	10	2.95		77		2.61	
SG28	SG28	N	0	10	1.68		72	J	4.286	J
SG28	***SG28 -split***	***N***	***0***	***10***	***1.54***		***96***		***6.2***	
SG29	SG29	N	0	10	2.93		210		7.167	

Qual = qualifier
N = normal environmental sample
FD = field duplicate
FR = field replicate
U = Undetected
J = Estimated. The result was quantified as estimated but met criteria for acceptance of data for use in site evaluation.

[1] The Boeing data are shown in bold italicized type, and are from split samples taken at stations located on Boeing property (Landau 2004). Sample nomenclature is taken from a data table provided in Landau (2004).

Table 2. Recommended Surface Samples for Tier 2 Analyses. [1]

Surface Sample	Rationale [2]	Analyses
IC01	Criteria 1 and 3: Near outfall that may be a source; in area with PCBs that exceed the CSL	Metals, SVOCs
SG14	Criteria 2: Adjacent to possible boundary	Metals, SVOCs
SG16	Criterion 2: Near possible boundary	Metals, SVOCs
SG17	Criterion 2: Near possible boundary	Metals, SVOCs
SG21	Criterion 1: Near outfall and area that historically had elevated HPAHs (see Section 5.1.4.4 in SEA 2004).	SVOCs
SG22	Criterion 4: Near historic sample with elevated bis(2-ethylhexyl)phthalate.	SVOCs
SG23	Criterion 4: Near historic sample with elevated bis(2-ethylhexyl)phthalate.	SVOCs
SG24	Criterion 1: Adjacent to outfall; near area that historically had elevated HPAHs (see Section 5.1.4.4 in SEA 2004).	SVOCs

1. Recommended stations for Tier 2 analyses are shown in Figure 3 with black dots.

2 Criteria for Tier 2 sample selection for surface samples:
1. Proximity to sources that may influence chemical distributions
2. Proximity to existing data points that may be used in the evaluation of the boundary
3. Proximity to the area where PCBs concentrations exceed the CSL
4. Proximity to existing data Station SL4-12 (Landau 1990) that exceeded the CSL for bis(2-ethylhexyl)phthalate (see SEA 2004).

Table 3. Recommended Subsurface Samples for Tier 2 Analyses. [1,2]

Tier 1 Analysis Results Category	Samples Intervals to be Analyzed for Remaining SMS Analytes and Associated Rationale	Applicable Stations	Samples
PCBs less than SQS in the 0-2 ft, 2-4 ft or 4-6 ft interval	Analyze remaining SMS analytes in the surface-most interval that has PCBs less than the SQS. Removal below this interval is not needed.	SC01, SC04, SC05	SC01: 4-6 ft interval SC04: 4-6 ft interval SC05: 2-4 ft interval
PCBs less than the CSL and greater than the SQS in the 0-2 ft, 2-4 ft or 4-6 ft interval	Analyze either all (if sample has been archived) or the remaining (if PCBs data were generated in Tier 1) SMS analytes in the first interval below where PCBs are between the SQS and CSL. This interval may represent an acceptable sediment surface following a removal action.	SC06, SC07	SC06: 6-8 ft interval SC07: 4-6 ft interval [3] 6-8 ft interval
PCBs CSL exceeded in the 4-6 ft interval	Analyze all SMS analytes in the 6-8 ft and 8-10 ft intervals to ensure that sediments located below the lowest interval with a CSL exceedance are analyzed.	SC02, SC03	SC02: 6-8 ft interval 8-10 ft interval SC03: 6-8 ft interval 8-10 ft interval

[1] Tier 2 analyses will include either all SMS analytes and conventional parameters (for those samples that were not analyzed in Tier 1), or the remaining metals and SVOCs (for samples that were analyzed in Tier 1).

[2] Recommended stations for Tier 2 analyses are shown in Figure 3 with black dots.

[3] The 4-6 ft interval is also being analyzed to obtain more complete characterization information in this region of the slip.