Port Of Seattle

Pier 66 (Pier 64/65) Thin-Layer Sediment Cap

Supplemental Report

Contingency Plan Sediment Investigation

March 2004

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July 23, 2004

Polaris Project No. 1002

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LIST OF ABBREVIATIONS / ACRONYMS

AET	Apparent Effects Threshold
BC	Below cap sample (top 10 cm of sediments under cap)
BEHP	bis(2-ethylhexyl)phthalate
BT	Bioaccumulation Trigger guidance value
CAD	Confined Aquatic Disposal
Corps	US Army Corps of Engineers
CSO	Combined Sewer Overflow
DC	Diver Core
DGPS	Differential GPS
DMMP	Dredged Material Management Program
DNR	Department of Natural Resources
DY	Dredging Year
Ecology	Washington State Department Of Ecology
ENR	Enhanced Natural Recovery
EPA	US Environmental Protection Agency
FD	Field Duplicate sample
FR	Field Replicate sample
FS	Field Split sample
GPS	Global Positioning System
GS	Grain-size
HPAH	High Molecular Weight PAH
INCL	Inclusion sample (black silt/clay inclusions)
LPAH	Low Molecular Weight PAH
MCUL	Minimum Cleanup Level criteria
MDL	Maximum Detection Limit
Metro	Municipality of Metropolitan Seattle
ML	Maximum Level guidance value
MLLW	Mean Lower Low Water
MSD	Matrix Spike Duplicate
MSS	Marine Sampling System
MST	Matrix Spike Triplicate
NAD	North American Datum
NOAA	National Oceanic and Atmospheric Administration
OC	Organic Carbon
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
Port	Port of Seattle
PSDDA	Puget Sound Dredged Disposal Analysis
PSEP	Puget Sound Estuary Program
PSWQA	Puget Sound Water Quality Authority
PSWQAT	Puget Sound Water Quality Action Team
QA	Quality Assurance
QC	Quality Control
RL	Reporting limit

RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SEDQUAL	Sediment Quality Information System Database
SL	Screening Level guidance value
SMS	Washington State Sediment Management Standards (Chapter 173-204 WAC)
SPM	Settling Particulate Matter
SQS	Sediment Quality Standard criteria
SR	Surface sample (top 10 cm)
SRM	Standard Reference Material
SS	Sub-surface sample (10 to 20 cm above cap interface)
TOC	Total Organic Carbon
TPPS	Toxicant Pre-treatment Planning Study
VC	Vibra-core
VV	Van Veen
WAC	Washington State Administrative Code
WGS	World Geodetic System

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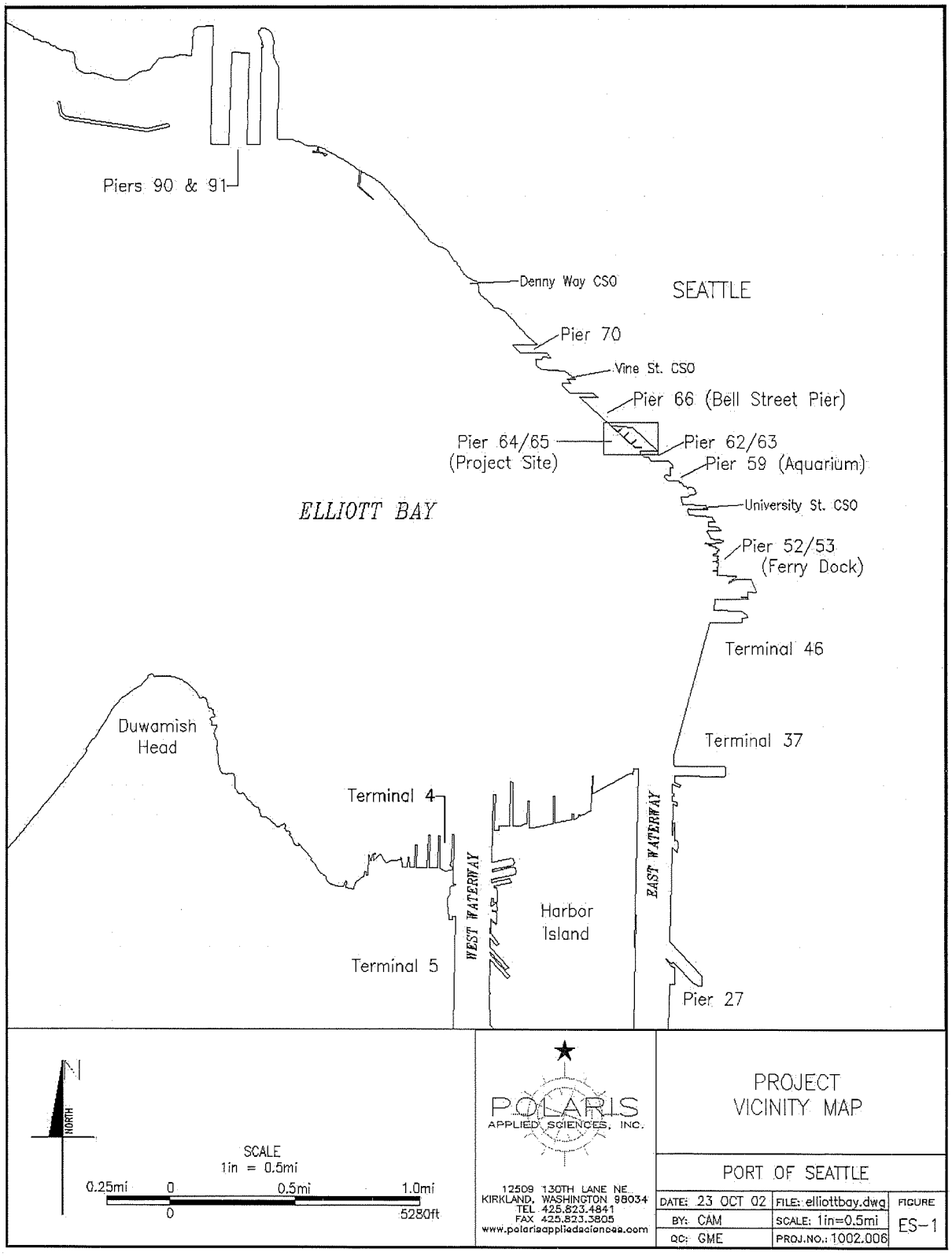
Polaris Applied Sciences

July 23, 2004

EXECUTIVE SUMMARY

In 1994, a 3.9-acre "thin-layer" sediment cap (Corps Permit No. 93-2-01145) was placed at the former site of Pier 64/65 as part of the overall redevelopment of the Port of Seattle's central waterfront along Elliott Bay. This development site included shoreline and over water areas historically occupied by Piers 64, 65 and 66 (Figure ES-1). Other key elements of redevelopment included a new concrete cruise pier, the Bell Harbor Marina, fish habitat structures and other features, public access plazas, restaurants, a museum, and other offices. Multiple permits were issued for various project elements.

Ecology, Metro and others had documented contamination of sediments along the central waterfront in the 1980's (summarized in Polaris, 2002). Although area-wide remediation of sediments was seen as occurring, at the time of redevelopment, resource agencies had expressed considerable interest in placement and monitoring of a "thin-layer" cap. The thin layer cap was viewed as a possible additional option that might be added to the array of possible sediment remedial solutions. These included placement of a thicker cap of clean sediments (3 feet deep or more) or dredging contaminated sediments down to clean native material. Thus the Port proposed placement of the 3.9 acre thin-layer cap together with a multi year monitoring program to evaluate the effectiveness of the cap. The thin-layer cap was seen as an "interim solution" to


Piers 90 & 91
Denny Way CSO
SEATTLE
Pier 70
Vine St. CSO
Pier 66 (Bell Street Pier)
Pier 64/65
(Project Site)
Pier 62/63
Pier 59 (Aquarium)
ELLIOTT BAY
University St. CSO
Pier 52/53
(Ferry Dock)
Terminal 46
Duwamish
Head
Terminal 37
Terminal 4
WEST WATERWAY
Harbor
Island
EAST WATERWAY
Terminal 5
Pier 27
N
NORTH
SCALE
1in = 0.5mi
0.25mi 0 0.5mi 1.0mi
0 5280ft
POLARIS
APPLIED SCIENCES, INC.
12509 130TH LANE NE
KIRKLAND, WASHINGTON 98034
TEL 425.823.4841
FAX 425.823.3805
www.polarisappliedsciences.com
PROJECT
VICINITY MAP
PORT OF SEATTLE
DATE: 23 OCT 02
FILE: elliottbay.dwg
FIGURE
ES-1
BY: CAM
SCALE: 1in=0.5mi
QC: GME
PROJ.NO.: 1002.006

be reevaluated following project monitoring. As part of permit approval, the Port was required to develop and implement a sediment cap-monitoring program. Elements to be monitoring included construction impacts, cap thickness, vertical migration of contaminants from underlying sediments up into the cap, and recontamination of the cap from adjacent areas over time. After agency approval, the Port identified performance criteria and implemented a monitoring plan (Parametrix 1994) to assess cap performance.

Monitoring data collected between 1994 and 2002 indicated that the Pier 66 sediment cap was generally successful and effective in reducing exposure of underlying contaminants (Polaris 2002). However, in several samples collected on the cap in April 2002, elevated concentrations of several contaminants were found in surface sediments that exceeded Washington State Department of Ecology (Ecology) Sediment Management Standards (SMSs) criteria. As a result of these exceedances, one of the performance standards for the sediment cap was not met, triggering the contingency planning process for the project, as outline in Parametrix (1994).

Other concerns were that elevated concentrations of contaminants were found at one station within the cap – which had been designated as "clean" material. And finally, cap thickness data was simply too limited to assess compliance with applicable performance criteria (Polaris 2003a).

In 2003, the Port initiated the contingency planning process with resource agencies. A series of meetings were held among the Port, and state and federal agencies to determine appropriate next steps. As a result of the contingency planning process, the Port developed and implemented a supplemental sediment investigation in March 2004 consistent with the approved February 2004 sampling plan (Polaris 2004). An additional 13 sediment sampling stations were added to augment the original sediment characterization program.

The overall conclusion of the March 2004 sediment investigation is that the project generally does meet performance criteria as required under the permit, with minor exceptions along the outside edges of the cap. In addition, the Port has provided considerable data and information, which can be used to design and evaluate the effectiveness of other thin layer cap projects.

At one location (Station BH-12), no cap material was found, and at another (Station CS-1), the cap material had elevated concentrations of contaminants (exceeding SMSs criteria). However, benefits of additional actions (placing additional cap material or dredging contaminated sediments) provide relatively little benefit and would disrupt mitigation habitat that has become established. Finally, because of concerns with recontamination, further action outside of the context of an area wide investigation and remediation along the waterfront is not warranted.

Questions Addressed and Objectives of the March 2004 Core Sampling Program

Questions:

The objectives of the March 2004 Core Sampling Program are designed to provide additional information toward addressing the following questions:

1) How thick is the Pier 64/65 thin-layer sediment cap at an adequate number of representative locations distributed over the cap surface?

2) What is the distribution of PCBs and mercury in Pier 64/65 cap sediments?

3) How strong is the association between elevated concentrations of PCBs and mercury and black silt/clay inclusions in the cap material?

4) What is the distribution of PAHs in Pier 64/65 cap surface sediments?

5) Are elevated concentrations of contaminants in the cap material from outside sources or could they be contaminants migrating up into the cap from contaminated sediments underlying the sediment cap existing at the project site prior to cap placement?

Objectives:

The objectives of the March 2004 Core Sampling Program are to:

1) Obtain additional measurements of the thickness of the Pier 64/65 thin-layer sediment cap at the original and new sampling stations as per the 2003 Corps letter to supplement measurements presented in the cap thickness monitoring report for the project (Polaris 2003a) to help assess compliance with cap performance criteria.

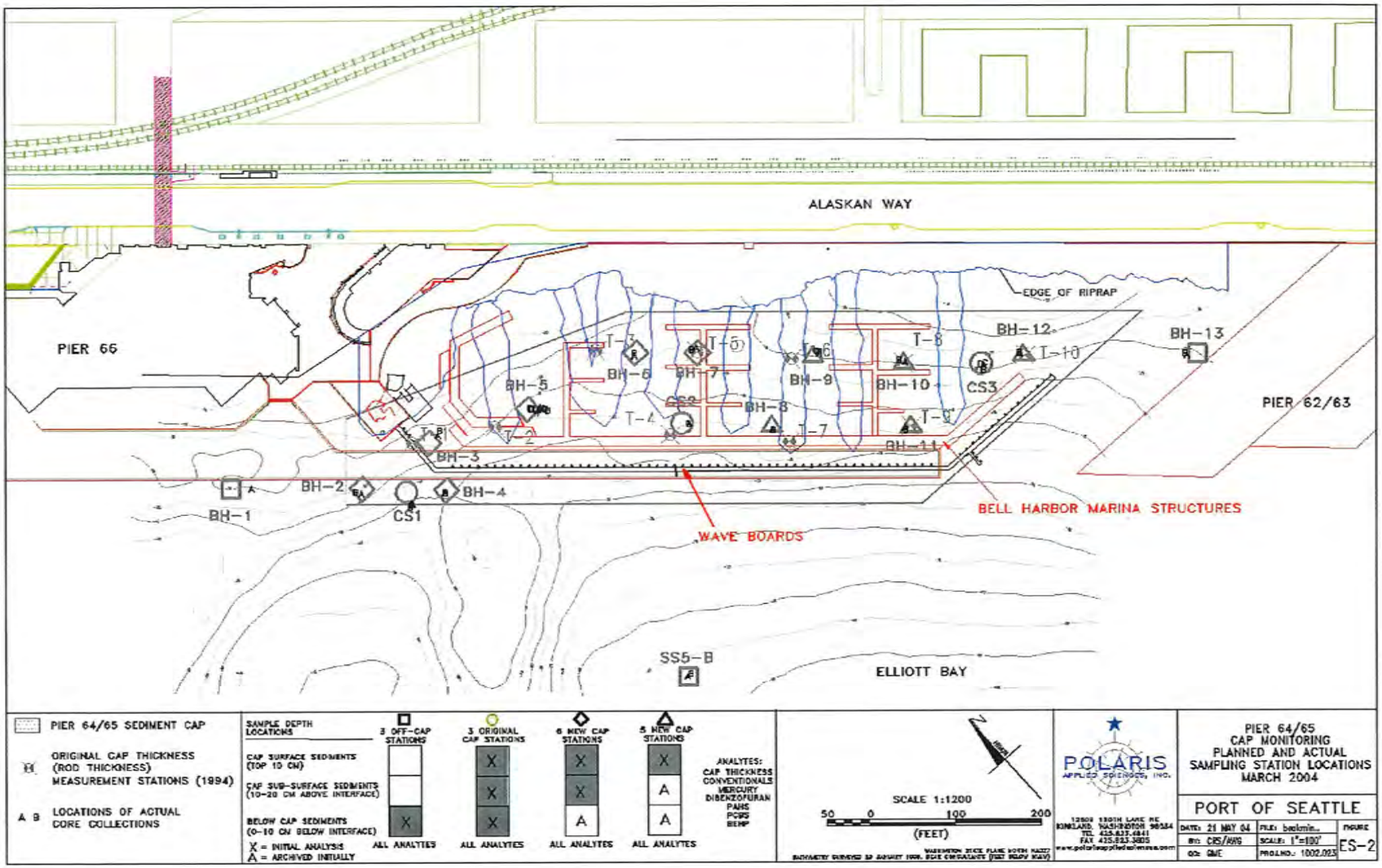
2) Resample PCBs, mercury and PAHs in surface and sub-surface sediments at the original three sampling stations (CS-1, CS-2, and CS-3) to provide additional data to help assess compliance with performance criteria.

3) Obtain additional data on the spatial extent of elevated concentrations of contaminants at additional sampling stations located primarily on the sediment cap.

4) Analyze core sediments under and in the cap material at selected locations in order to evaluate the potential for vertical contaminant migration up into the cap from contaminated sediments existing at the site prior to cap placement.

Methods

Sediment cores were collected in March 2004 at a total of 17 stations. The 17 stations included: 1) the three previously sampled cap stations (CS-1, CS-2 and CS-3; identified with green circles in Figure ES-2), 2) the off-cap station SS5-B (previously sampled as one of three composited stations), and 3) a total of 13 new sampling stations (BH-1 to BH-13) as per the final sampling plan (Polaris 2004), using methods specified in PSWQAT (1997a) and Ecology (2003). The new stations are identified with black squares, diamonds or triangles in Figure ES-2.


ALASKAN WAY
EDGE OF RIPRAP
PIER 66
PIER 62/63
BH-1
BH-2
BH-3
BH-4
BH-5
BH-6
BH-7
BH-8
BH-9
BH-10
BH-11
BH-12
BH-13
CS1
CS2
CS3
T-1
T-2
T-3
T-4
T-5
T-6
T-7
T-8
T-9
T-10
WAVE BOARDS
BELL HARBOR MARINA STRUCTURES
SS5-B
ELLIOTT BAY
PIER 64/65 SEDIMENT CAP
ORIGINAL CAP THICKNESS (ROD THICKNESS) MEASUREMENT STATIONS (1994)
A B LOCATIONS OF ACTUAL CORE COLLECTIONS
SAMPLE DEPTH LOCATIONS
CAP SURFACE SEDIMENTS (TOP 10 CM)
CAP SUB-SURFACE SEDIMENTS (10-20 CM ABOVE INTERFACE)
BELOW CAP SEDIMENTS (0-10 CM BELOW INTERFACE)
X = INITIAL ANALYSIS
A = ARCHIVED INITIALLY
3 OFF-CAP STATIONS
3 ORIGINAL CAP STATIONS
6 NEW CAP STATIONS
5 NEW CAP STATIONS
ALL ANALYTES
ANALYTES:
CAP THICKNESS
CONVENTIONALS
MERCURY
DIBENZOFURAN
PAHS
PCBS
BEHP
SCALE 1:1200
50 0 100 200
(FEET)
POLARIS APPLIED SCIENCES, INC.
PIER 64/65
CAP MONITORING
PLANNED AND ACTUAL
SAMPLING STATION LOCATIONS
MARCH 2004
PORT OF SEATTLE
DATE: 21 MAY 04
SCALE: 1"=100'
PROJ.NO.: 1002.025
FIGURE
ES-2

Sediment core samples were collected from March 16 to 19, 2004, by Marine Sampling Systems (MSS) using a vibra-coring rig, with the assistance and oversight of Polaris Applied Sciences personnel. At least two sediment cores were collected at each of the sampling stations to obtain enough sediment volume for analysis. Sediment cores could not be collected at Station BH-1 due to the presence of too much gravel. As noted in Section 6.2, one of the proposed new sampling stations (BH-3), was in an area of the marina that could not be accessed by boat (see Figure ES-2). This station was subsequently sampled using a crane positioned on the deck of Pier 66.

The collected sediment core tubes were capped, labeled and transported to ARI laboratories where they were stored vertically and held at 4° C. The core tubes were split open and sub-sampled at ARI from March 23 to 26, 2004. The cores were split open longitudinally, using a circular saw set to just break the tube wall and not penetrate into the sediment, with the sediment inside the tubes split apart with a de-contaminated sharp knife. Cap thickness was measured in the sediment exposed in the split cores, sediment layers were described and diagramed on log sheets, and photographs were taken.

Sub-samples were collected and composited from three core layers in each of the two sediment cores per station: 1) surface sediments (top 10 cm), 2) sub-surface sediments (between 10 to 20 cm above the cap interface), and 3) sediments lying below the sediment cap materials (between 0 to 10 cm below the cap interface). Thirty-nine samples were analyzed initially; 18 samples were archived.

Physical and Chemical Sediment Analyses

The following parameters were analyzed in the samples selected for initial analysis:

- Cap thickness (except in cores collected at off-cap stations)
- Sediment grain size (includes total solids)
- Total sulfides
- Total Organic Carbon (TOC)

- Mercury
- Total and individual PAHs
- Bis(2-ethylhexyl)phthalate (BEHP)
- Dibenzofuran
- Total PCBs and individual Aroclors

Findings and Conclusions

This study supports the following conclusions:

- Cap thickness measurements were obtained at 14 stations, including 10 stations located at or near the original rebar stations established in 1994, as requested in a letter from the Corps to the Port (Corps 2003).

- Cap thickness meets design thickness ($\geq$ 1.0 foot) at all sampled cap stations with the exception of Stations BH-3 and BH-7, where mean cap thickness is slightly less than 1.0 foot, and Station BH-12, which did not have any cap material present. Overall mean cap thickness for all stations was 1.49 feet (45.35 cm) including Station BH-12 and 1.60 feet (48.84 cm) without Station BH-12.

- No exceedances of SMSs (or DMMP) criteria for any contaminants occurred in surface or sub-surface samples collected at cap stations with the exception of samples at collected at Station CS-1, and at Station BH-12 where no cap material was present (and existing contaminated pre-cap sediments were sampled).

- Surface and sub-surface samples collected at Station CS-1 showed elevated concentrations of mercury, PAHs, dibenzofuran and total PCBs exceeding SMSs criteria.

- Elevated concentrations of contaminants exceeding criteria found at Station CS-1 are limited to that station, as they were not found in surface or sub-surface sediments at the closest adjacent cap stations or elsewhere on the cap.

- Surface samples collected at Station BH-12 appeared to consist of existing contaminated pre-cap sediments with elevated concentrations of mercury and total PCBs exceeding SMSs criteria, and characteristics similar to samples collected at off-cap Stations BH-13 and SS5-B.

- Black silt/clay inclusion layers observed in the Pier 64/65 cap material are associated with elevated concentrations of mercury, PAHs and PCBs greater than criteria, based on results for inclusion (INCL) samples collected at Station CS-1.

- Based on the differences in contaminants and their concentration levels detected above and below the cap interface in samples collected at Stations CS-1, CS-2 and CS-3, most evidence shows there has not been vertical migration of contaminants from underlying sediments up into the cap. This is consistent with findings presented in Polaris 2002.

- As discussed in the Addendum on PCB Issues (Polaris 2002b), the Duwamish River turning basin is the most likely source of elevated concentrations of cap material contaminants associated with black silt/clay inclusion layers observed at Station CS-1. The turning basin may also be the source of low concentrations of contaminants below criteria in samples collected at other stations on the cap, as most of these samples contained black silt/clay inclusion layers.

- PAHs detected at low concentrations in surface and sub-surface sediments collected at cap stations may be from off-site recontamination and/or contaminants associated with black silt/clay inclusion layers in the cap material.

Further Actions

Of the 17 stations sampled in March 2004, contaminant concentrations exceeding SMSs criteria in surface or sub-surface samples were limited to Station CS-1 and Station BH-12, (where no cap material was present). This raises the question of whether additional action is warranted at these

locations. Options include: 1) placing additional clean cap material in these areas, 2) dredging contaminated material from the areas, or 3) no further action unless conducted and justified as part of an areawide (along the waterfront) remedial action following completion of source control. Considerations of these options include:

Station CS-1. It may not be practical to add additional cap material or remove contaminated cap material at Station CS-1. Station CS-1 is outside the Bell Harbor Marina wave boards (Figure ES-2), subject to direct exposure to prevailing southwest winds and waves and vessel traffic at the site. Thus, this location may not be a stable environment for additional cap material. Maintaining berthing (navigation) depth is also a limiting factor at this location. Alternately, removal of contaminated cap material in the berthing area by dredging would expose contaminated sediments underlying the cap and could require additional stabilization of the steep slope area.

Station BH-12. Placement of additional cap material at Station BH-12 would destroy existing macroalgae beds serving as fish and invertebrate habitat on top of the cap. These habitat features were constructed in 1994 as part of the total habitat mitigation for the project. Macroalgae surveys conducted in September 2002 have documented the presence of very productive *Laminaria* beds at the location of Station BH-12 (Polaris 2002b). *Laminaria* is a brown alga that serves as habitat for fish and invertebrates at the site.

Because historical sediment contamination has been documented along the entire Elliott Bay seawall, further action would be the most cost effective if systematically addressed in the context of broader source control and cleanup efforts along the central waterfront. Conversely, if source control and area wide controls were not implemented concurrently with efforts at Pier 66, the potential for recontamination would be very high and the added costs and disruptions would not be justified.

Port Of Seattle

Pier 66 (Pier 64/65) Thin-Layer Sediment Cap

Supplemental Report

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March 2004

Polaris Applied Sciences

July 23, 2004

1.0 INTRODUCTION

This report presents and discusses the results of the March 2004 sediment core sampling of the Port of Seattle's (Port) Pier 66 cap (also referred to as the Pier 64/65 thin-layer sediment cap) (Corps Permit No. 93-2-01145). This additional sediment investigation was conducted by the Port of Seattle in March 2004 as part of contingency planning actions agreed to by state and federal agencies.

Monitoring data collected between 1994 and 2002 indicated that the Pier 66 sediment cap was generally successful and effective in reducing exposure of underlying contaminants (Polaris 2002). However, in several samples collected on the cap in April 2002, elevated concentrations of several contaminants were found in surface sediments that exceeded Washington State Department of Ecology (Ecology) Sediment Management Standards (SMSs) criteria. As a result of these exceedances, one of the performance standards for the sediment cap was not met, triggering the contingency planning process for the project, as outline in Parametrix (1994) and as required pursuant to Corps Permit No. 93-2-01145.

Other concerns were that very high concentrations of contaminants were found at one station within the cap material itself. This finding raised concerns because cap material had previously been designated as "clean" material. And finally, cap thickness data was simply too limited to assess that cap thickness complied with applicable performance criteria (Polaris 2003a).

In 2003, the Port initiated the contingency planning process with resource agencies. A series of meetings were held among the Port, and state and federal agencies to determine appropriate next steps. As a result of the contingency planning process, the Port developed and implemented a supplemental sediment investigation in March 2004 consistent with the approved February 2004 sampling plan (Polaris 2004).

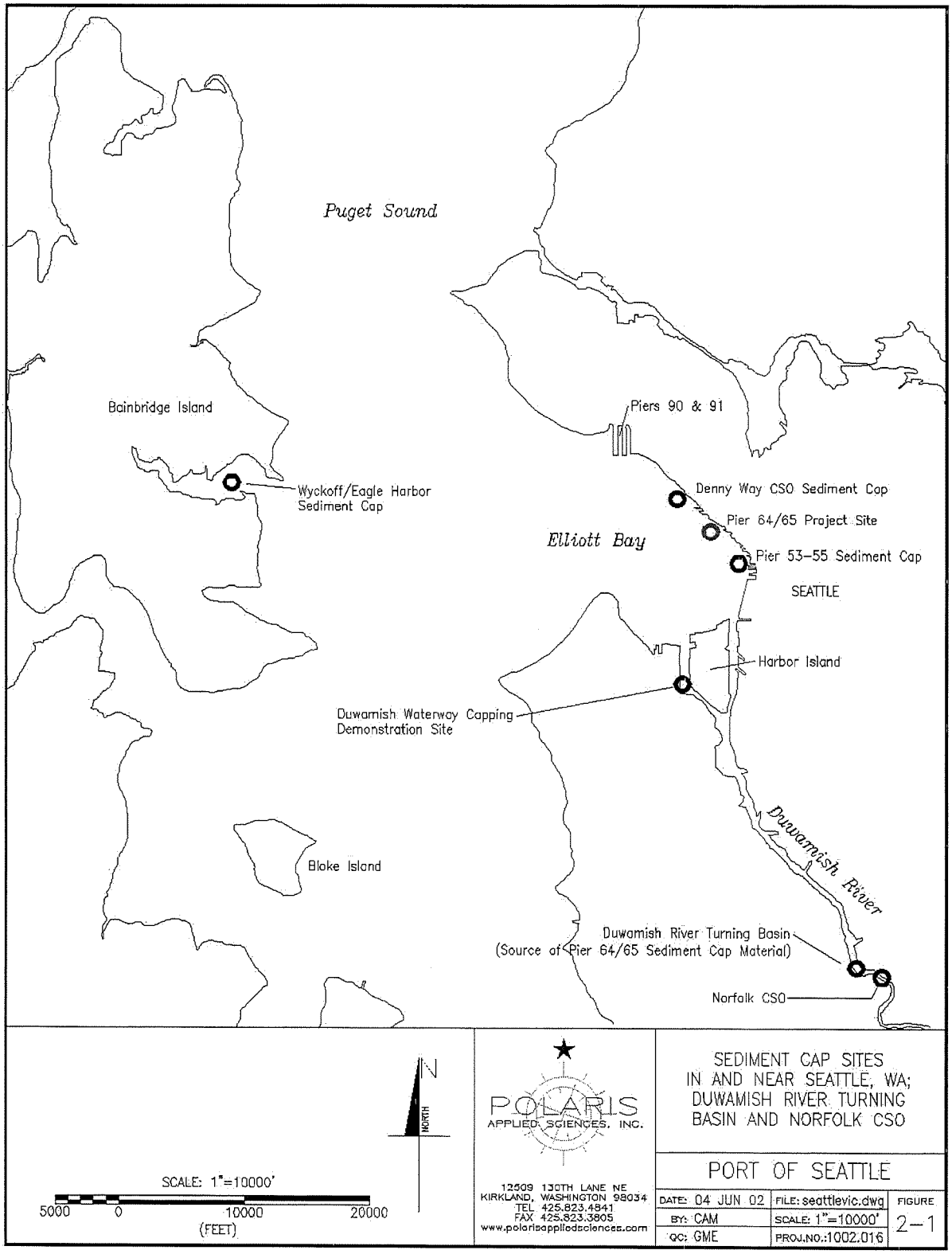
This supplemental report is organized in the following way: Section 2.0 provides a brief overview of relevant background information, including a report on previous recontamination of the Pier 64/65 thin-layer sediment cap as well as information on other sediment cap projects in Elliott Bay and Puget Sound. Section 3.0 summarizes the findings of previous cap thickness and sediment chemistry project reports that are relevant to this supplemental report. Sections 4.0 and 5.0 present the questions being addressed, the objectives for the March 2004 sediment core sampling effort, and sampling design considerations. Section 6.0 presents the field and laboratory methods used for the March 2004 sediment investigation. Section 7.0 presents results including cap thickness measurements and the results of grain-size and sediment chemistry analyses. Comparisons of the results to sediment quality criteria are also presented and discussed. Section 8.0 compares the results of the March 2004 sampling effort to the objectives and questions addressed as part of the contingency plan (as presented in Section 4.0). Section 9.0 presents the conclusions supported by the sampling results and discusses alternative actions that may be pursued as a result of the findings of this study.

2.0 BACKGROUND INFORMATION

A number of sediment chemistry studies were conducted at the Pier 64/65 project site prior to and during the current study. These are discussed in detail in Section 2.0 of Polaris (2002). Also discussed in Polaris (2002) are various sediment contaminant transport and fate studies conducted in Elliott Bay. These studies provide information relevant to potential recontamination of surface sediments at the project site. Information on other sediment cap projects in Elliott Bay and nearby areas of Puget Sound is also presented and discussed in Polaris (2002), as well as monitoring results for these projects (Figure 2-1). Selected portions of the background information presented in Section 2.0 of Polaris (2002) are presented below. Results and conclusions drawn from various studies of these projects are reported here because the study results were used to support conclusions concerning the effectiveness and condition of the Pier 66 cap.

2.1 Pier 62/63 Sediment Trap Study

Three sediment traps were moored in the vicinity of Pier 62/63 from February to April 1996 to monitor the effects of piling removal and replacement activities under Pier 62/63 by the Seattle Parks Department (Norton 1996). There was a concern that resuspension of contaminated sediments by piling jetting would recontaminate the sediment cap at the Pier 64/65 site. Sediment traps were moored at the Pier 62/63 construction site on the southern portion of the Pier 64/65 sediment cap and at a reference location southeast of the construction site between Piers 57 and 59 at the Waterfront Park. Sediment collected in the traps was analyzed for: conventional parameters, mercury low molecular weight polynuclear aromatic hydrocarbons (LPAHs), high molecular weight polynuclear aromatic hydrocarbons (HPAHs), dibenzofuran, retene, carbazole, 1-methylnaphthalene, 2-methylnaphthalene, and 2-chloronaphthalene. In addition, sedimentation rates were estimated using the data from the sediment traps.


Puget Sound
Bainbridge Island
Wyckoff/Eagle Harbor
Sediment Cap
Piers 90 & 91
Denny Way CSO Sediment Cap
Pier 64/65 Project Site
Elliott Bay
Pier 53-55 Sediment Cap
SEATTLE
Harbor Island
Duwamish Waterway Capping
Demonstration Site
Duwamish River
Blake Island
Duwamish River Turning Basin
(Source of Pier 64/65 Sediment Cap Material)
Norfolk CSO
N
NORTH
SCALE: 1"=10000'
5000 0 10000 20000
(FEET)
POLARIS
APPLIED SCIENCES, INC.
12509 130TH LANE NE
KIRKLAND, WASHINGTON 98034
TEL 425.823.4841
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SEDIMENT CAP SITES
IN AND NEAR SEATTLE, WA;
DUWAMISH RIVER TURNING
BASIN AND NORFOLK CSO
PORT OF SEATTLE
DATE: 04 JUN 02
FILE: seattlevic.dwg
FIGURE
BY: CAM
SCALE: 1"=10000'
2-1
QC: GME
PROJ.NO.:1002.016

Results of chemical analyses of the trap sediments and sedimentation rate calculations indicate that piling jetting activities at Pier 62/63 were causing contaminated sediments to be resuspended in the vicinity of the construction site. Both chemical concentrations and sedimentation rates were found to be the highest at the construction site trap with one individual LPAH, six individual HPAHs, and total HPAHs exceeding SQS (or MC) criteria, and nine organic chemical (four LPAHs, three HPAHs and two other organics) concentrations exceeding SMS Cleanup Screening Level (CSL, the same as minimum cleanup level (MCUL)) criteria, as well as total LPAHs. There was also evidence that contaminated sediments were being resuspended onto the Pier 64/65 cap, as indicated by concentrations of: 1) two LPAHs, eight HPAHs, total HPAHs and 2-methylnaphthalene exceeding SQS criteria, and 2) two LPAHs, total LPAHs and dibenzofuran exceeding CSL criteria in sediments collected from the trap moored on the cap. The LPAHs were expected to weather relatively rapidly and not present a long-term problem unlike HPAHs, which are more persistent.

It should be noted that additional "emergency piling replacement" work was conducted at Pier 62/63 by the Seattle Parks and Recreation Department in the late winter of 2002 just prior to the April 2002 sediment sampling on the Pier 64/65 sediment cap discussed in this report (City of Seattle Board of Park Commissioners 2002). However, it appears that no piling replacement work occurred at Pier 62/63 in 2004 prior to core sampling in March 2004 (City of Seattle Finance Department 2004).

2.2 Other Sediment Capping Projects in Elliott Bay and Vicinity

Figure 2-1 shows the locations of sediment cap projects in Elliott Bay and near Seattle, Washington completed over the past two decades. Projects include: 1) the Denny Way combined sewer overflow (CSO) sediment cap, 2) the Port's Pier 64/65 thin-layer sediment cap (Pier 66 cap), 3) the Pier 53/55 sediment cap, 4) the Duwamish Waterway capping demonstration site, and 5) the Wyckoff/Eagle Harbor sediment cap. The figure also shows the location of the Duwamish River turning basin, the source of capping material for a number of these projects including the Pier 64/65 project, and the Norfolk CSO.

2.2.1 Duwamish waterway demonstration project

Brannon and Poindexter-Rollings (1990) describe the results of the Duwamish Waterway field demonstration of sediment capping (Figure 2-1). In this project, dredged contaminated sediments were placed into a depression in the Duwamish Waterway, and subsequently capped using the clean sediments dredged (upriver) from the Duwamish River turning basin. Monitoring conclusions were that most sediment consolidation occurred in the first two weeks after deposition of the sediments, and that no movement of contaminants into the cap had occurred during the 18 months of monitoring.

Sediment chemistry analyses showed that the cap material had low or undetectable levels of copper, lead, and zinc and the PCBs Aroclors 1242, 1254, and 1260, whereas the contaminated dredged sediments had much higher levels of these contaminants. The cap material from the Duwamish River turning basin was found to have inclusions of clay in the mostly sandy sediments.

2.2.2 Pier 53/55 and Denny Way CSO sediment cap projects

Romberg et al. (1995) reviewed the results of two sediment cap projects on the Seattle waterfront, the Pier 53/55 and Denny Way CSO sediment cap projects (Figure 2-1). The results of these two capping projects are presented in more detail in Polaris (2002). As part of his review of these two projects, Romberg et al. discussed the advantages and disadvantages of various sediment remediation methods proposed for the projects. The remediation methods considered included: 1) natural recovery, 2) dredging with nearshore confined aquatic disposal, 3) dredging with upland confined disposal, and 4) sediment capping. Natural recovery was considered too slow, as it was estimated that 20 to 60 years would be required for natural accumulation of new clean sediments on top of the contaminated sediments. Dredging was also not chosen due to its expense and the lack of suitable disposal sites. In-situ capping of contaminated sediments present at both sites was chosen as the best alternative. An added

advantage was the availability of a source of clean capping material, dredged from the Duwamish River as part of ongoing maintenance of the waterway.

Romberg et al. (1995) list the desired characteristics of a sediment cap as: 1) clean sediment placed on the sea bed which isolates contaminated sediments providing a clean substrate for marine organisms, 2) having minimal porosity, and 3) to thick for marine organisms to burrow through. In Elliott Bay nearshore areas, 3 feet was considered to be the appropriate thickness for a sediment cap.

The authors also discuss the concept of "enhanced natural recovery" or thin-layer sediment caps. This sediment remediation technique can be used when there are concerns about maintaining adequate water depths for navigation in an area being considered for sediment capping. In this case, instead of placing a 3-foot-thick sediment cap, a thin-layer, 1-foot-thick (30 cm) sediment cap is used. A thin-layer cap: 1) may not completely isolate underlying contaminated sediments, 2) provides a clean substrate for marine organisms, and 3) is designed to promote certain aspects of natural recovery of contaminated sediments. A thin-layer cap initially isolates contaminated sediments, but also provides the opportunity for contaminants to be oxidized or degraded through the process of bioturbation, in which burrowing marine organisms bring contaminated sediments up into the upper oxidized layers of sediment. Chemical contaminants such as metals that do not degrade are reduced in concentration by dispersion into clean sediments. Thus, for all the above reasons, thin-layer caps are called "enhanced natural recovery" sediment caps. This technique was used in a portion of the sediment remediation project at Pier 53/55, described in more detail below, and was also used for the Pier 66 (Pier 64/65) thin-layer sediment cap project (Port of Seattle 1993).

2.2.3 Eagle Harbor Bainbridge Island sediment cap

A sediment cap was chosen and put into place in Eagle Harbor on Bainbridge Island, Washington, as one of the primary actions to isolate contaminated sediments in the harbor from a wood treatment facility that had been located there from about 1900 to 1987 (Figure 2-1; Corps 2002). The sediment cap was one aspect of a broader cleanup program at the site. Other actions

were taken in stages to clean up sediments, soils, and groundwater contaminated with creosote and other chemicals at the Wyckoff/Eagle Harbor superfund site. From 1993 to 1994, in the first phase of the project, the Corps laid down a sediment cap in Eagle Harbor (Nakayama et al. 1998). This sediment cap covers 54 acres and varies between 1 and 6 feet thick. In the winter of 2000-2001, in the second phase of the project, sediment capping material was placed over an additional 13 acres of contaminated sediments (Corps 2002).

Monitoring fieldwork of the Eagle Harbor sediment cap was carried out in 1995, 1997, and 1999. The sediment cap was monitored for: 1) physical stability, 2) effectiveness in isolating contaminated sediments, 3) compliance with Washington State SMS regulations, and 4) recolonization by benthic and epibenthic organisms. Results of monitoring indicate that: 1) the cap is physically stable, 2) recolonization of the cap by benthic and epibenthic organisms is occurring, with a trend of improving habitat quality except for a few areas near an ongoing contaminant source and with heavy wood debris, and 3) the cap is effective in maintaining isolation of the underlying contaminated sediments with the exception of two small areas in the southern portion of the cap, which have increased contaminant levels. Monitoring of the original and new areas of the sediment cap will continue in 2002.

3.0 SUMMARY OF 1994-2002 CAP THICKNESS AND SEDIMENT CHEMISTRY MONITORING

As required by development permits and as specified in the mitigation and monitoring plan for the thin-layer sediment cap (Parametrix 1994), the Port of Seattle conducted a variety of monitoring efforts between 1994 and 2002. These previous monitoring efforts were to measure cap thickness and to collect sediment chemistry samples. The results of these monitoring efforts are summarized below. Complete results for these monitoring events can be found in Polaris (2003a) and Polaris (2002).

3.1 Cap Thickness Monitoring

Prior to placement of the cap in 1994, ten rebar stations were set up on the project site prior to serve as cap thickness measurement stations (Figure 3-1) (Polaris 2003a). Placement of cap material on steep slopes and subsequent marina and habitat construction over the cap surface destroyed or displaced most of the rebar stations. Only two of the ten rebar cap thickness measurement stations remained viable for the entire monitoring period from 1994 to 1999 (T-3 and T-9) (Table 3-1). Data from these two stations as well as cap thickness data measured in sediment cores collected on the cap in April 2002 indicated that cap thickness generally met the design thickness of 1 foot (Tables 3-1 and 3-2). However, as there were only limited thickness measurements available to evaluate cap performance, the Corps requested that additional measurements be taken as part of the March 2004 sampling event (Corps 2003).

3.2 Sediment Chemistry Monitoring

The methods, results, and main conclusions of the 2002 sediment chemistry monitoring report are briefly summarized below. The full results are presented and discussed in Polaris Applied Sciences (2002).

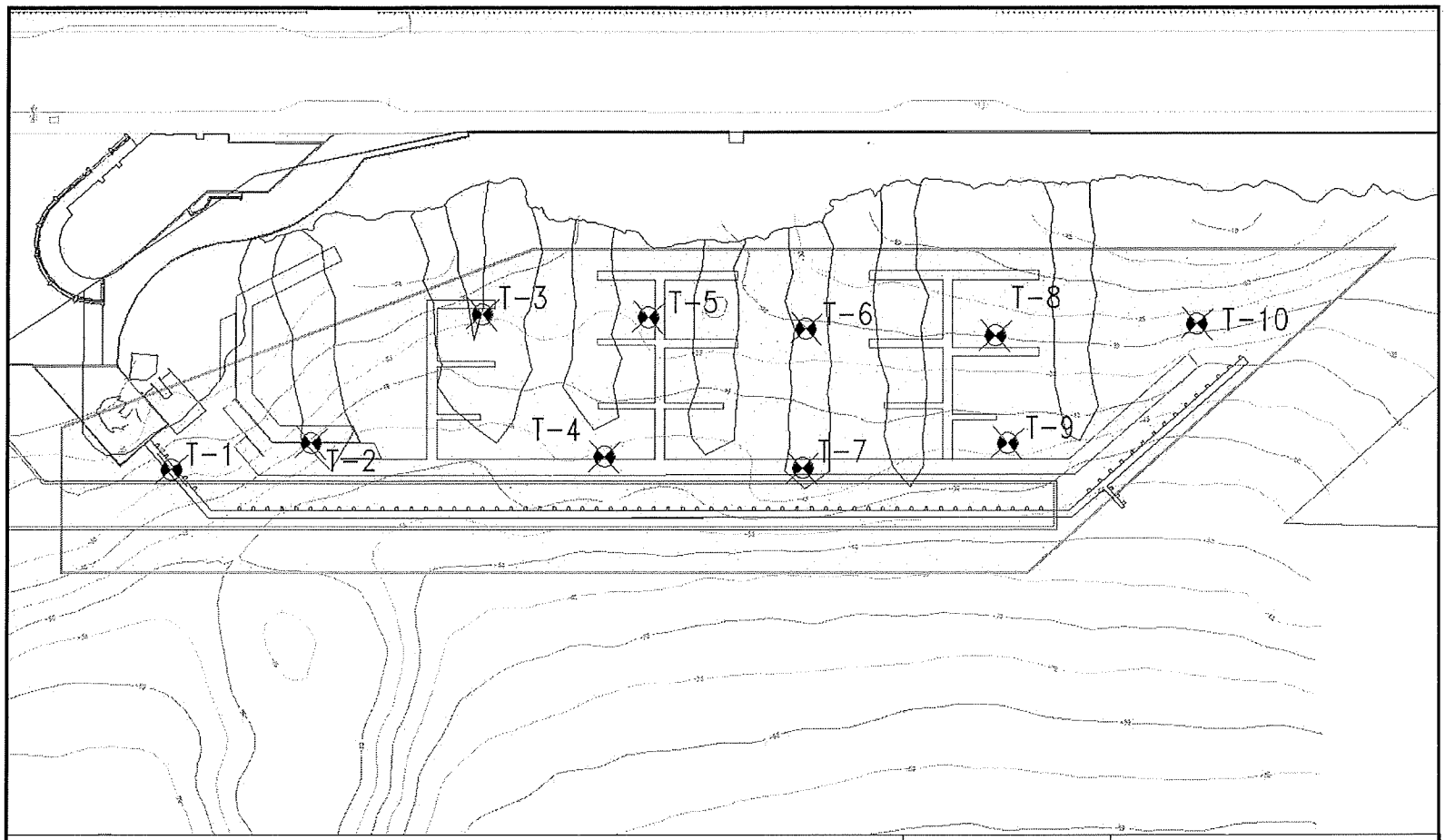

T-1
T-2
T-3
T-4
T-5
T-6
T-7
T-8
T-9
T-10
SEDIMENT CAP
CAP THICKNESS (1994 RE-BAR) MEASUREMENT STATION
SCALE 1:1200
50 0 100 200
(FEET)
WASHINGTON STATE PLANE NORTH NAD27
BASEMAP PROVIDED BY PORT OF SEATTLE
BATHYMETRY SURVEYED MARCH 1994, USACOE (FEET BELOW MLLW)
NORTH
POLARIS
APPLIED SCIENCES, INC.
12509 130TH LANE NE
KIRKLAND, WASHINGTON 98034
TEL 425.823.4841
FAX 425.823.3805
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CAP THICKNESS
(1994 RE-BAR)
STATION
LOCATIONS
PORT OF SEATTLE
DATE: 20 JUL 04
FILE: beakmin..
BY: CAM
SCALE: 1"=100'
QC: CME
PROJ.NO.: 1002.002
FIGURE
3-1

Table 3-1 Results of Rebar Readings – Pre-Capping through 1996.

Station	4 March 1994		11 March 1994		21 September 1994		16 January 1996
	Cap Thickness (Actual Measurement of Exposed Rebar) Units = Feet						
T1	0.0 (4.5)	7-10 March 1994 – Initial Cap Placed	1.0 (3.5)	14 March 1994 – Final Cap Placed	1.5 (3.0)	1995 Rock Corridor Construction and Bell Harbor Marina Construction	Rebar Lost/Destroyed
T2	0.0 (3.0)		0.0 (3.0)		0.05 (2.95)		Rebar Bent
T3 *	0.0 (3.0)		1.2 (1.8)		1.56 (1.44)		1.7 (1.3) *
T4	0.0 (3.0)		1.0 (2.0)		1.15 (1.85)		Rebar Bent
T5	0.0 (3.0)		1.1 (1.9)		1.09 (1.91)		Rebar Bent
T6	0.0 (3.0)		Not Found		0.89 (2.11)		Rebar Buried by Rock
T7	0.0 (3.0)		0.7 (2.3)		0.4 (2.6)		Rebar Buried by Rock
T8	0.0 (3.0)		1.3 (1.7)		1.2 (1.8)		1.0 (2.0)
T9 **	0.0 (3.0)		0.5 (2.5)		1.05 (1.95)		0.9 (2.1) **
T10	0.0 (3.0)		0.4 (2.6)		Rebar Bent		Rebar Bent

* Additional measurements for station T3 (1996-1999); 1.72, 1.72, 1.75, 1.70 ft

** Additional measurements for station T9 (1996-1999); 0.95, 0.90, 0.88, 0.90 ft

Table 3-2 Direct Measurements of Cap Thickness from Sediment Cores (1997 and 2002).

Station	1997		2002	
	Core 1	Core 2	Core 1	Core 2
	Cap Thickness (inches)			
CS-1	1-3		14.6	11.5
CS-2	8.2	9.4	18.7	16
CS-2 Dup			10.9 – 13.3	16.8
CS-3	8	11	13.7	12.5

3.2.1 Methods

Following the placement of cap material in 1994, surface (top 2 cm) sediment chemistry and grain-size samples were collected in September 1994 at Stations CS1, CS2, and CS3 on the Pier 66 cap (Figure 3-2). Additional surface (top 2 cm) sediment samples were collected in December 1997/March 1998, and in April 2002 at these same locations. In addition, an off-cap sample was composited from samples collected at three locations (SS5-A, B and C). Sediment cores were collected by vibra-coring in 1997 and 2002 at the cap stations, with sub-samples of sediment collected 10 to 20 cm above the cap interface in the cores. Finally, divers collected sediment cores of the top 10 cm of surface sediment at these stations in 2002. The chemical analysis results for these sediment samples were compared to Ecology, SMSs, SQS, MCUL criteria (WAC 173-204; Ecology 1995).

3.2.2 Findings

The findings of the Polaris (2002) report are summarized below and are presented in Table 3-3. Sediment samples collected in the 1994, 1997, and 2002 sampling events that exceed SMSs criteria for various contaminants are highlighted in the table. However, specific concentration values are reported only in the full report. Possible explanations for each of the SMSs exceedances (fully discussed in Polaris 2002) are also presented in the table.

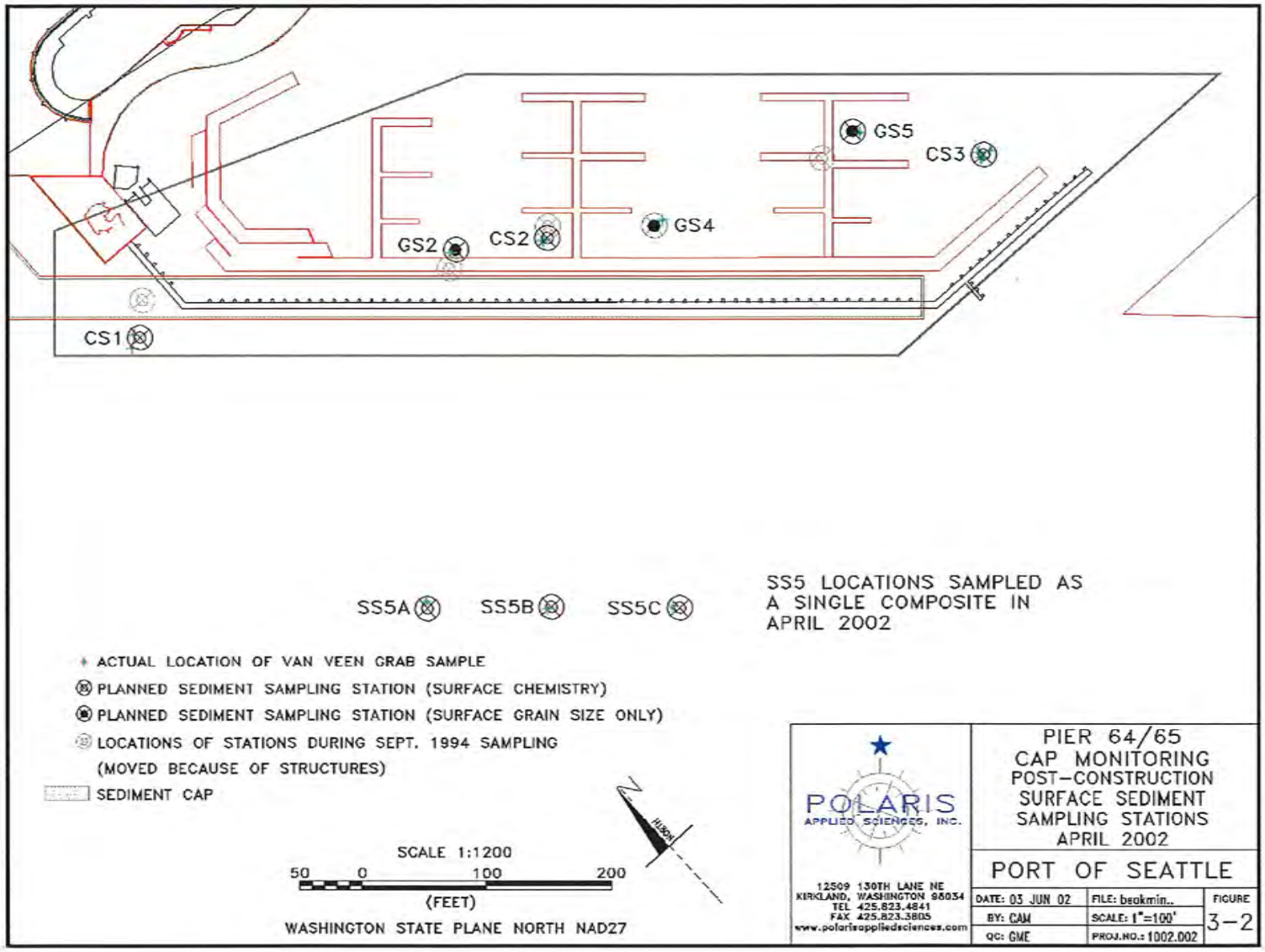

GS5
CS3
GS4
GS2
CS2
CS1
SS5A
SS5B
SS5C
SS5 LOCATIONS SAMPLED AS A SINGLE COMPOSITE IN APRIL 2002
ACTUAL LOCATION OF VAN VEEN GRAB SAMPLE
PLANNED SEDIMENT SAMPLING STATION (SURFACE CHEMISTRY)
PLANNED SEDIMENT SAMPLING STATION (SURFACE GRAIN SIZE ONLY)
LOCATIONS OF STATIONS DURING SEPT. 1994 SAMPLING
(MOVED BECAUSE OF STRUCTURES)
SEDIMENT CAP
NORTH
SCALE 1:1200
50 0 100 200
(FEET)
WASHINGTON STATE PLANE NORTH NAD27
POLARIS
APPLIED SCIENCES, INC.
12509 130TH LANE NE
KIRKLAND, WASHINGTON 98034
TEL 425.823.4841
FAX 425.823.3805
www.polarisappliedsciences.com
PIER 64/65
CAP MONITORING
POST-CONSTRUCTION
SURFACE SEDIMENT
SAMPLING STATIONS
APRIL 2002
PORT OF SEATTLE
DATE: 03 JUN 02
FILE: beakmin..
BY: CAM
SCALE: 1"=100'
QC: GME
PROJ.NO.: 1002.002
FIGURE
3-2

Table 3-3. Contaminants detected in Pier 64/65 cap sediments exceeding SMSs criteria and possible explanations (1994, 1997 and 2002) (*).

Sampling Event	Station CS1	Station CS2	Station CS3	Possible Explanation
		SEPTEMBER 1994		
Surface sediments (top 2 cm)(van veen samples)	No exceedances in surface sediments	Total PCBs > SQS in surface sediments (1)	No exceedances in surface sediments	(1) Contaminants in turning basin cap sands
		DECEMBER 1997		
Surface sediments (top 2 cm)(van veen samples)	No exceedances in surface sediments Gravel fractions present (2?)	No exceedances in surface sediments	Total PCBs > SQS in surface sediments (1)	(2) Pier 66 dredging
Core sediments (10-20 cm above cap interface) (vibra-core samples)	Gravel fractions present (2?) Exceedances in core sediments (3): Total LPAHs and 3 ind. LPAHs > MCUL Total HPAHs and 1 ind. HPAH > SQS Dibenzofuran > MCUL	No exceedances in core sediments	No exceedances in core sediments	(3) Low TOC or thin cap Dry weight concentrations only exceeded DMMP SL criteria for 2 ind. LPAHs
		APRIL 2002		
Surface sediments (top 2 cm)(van veen samples)	Gravel fractions present (2) 3 ind. HPAHs > SQS in surface sediments (top 2 cm)(4)	No exceedances in surface sediments (top 2 cm)	2 ind. HPAHs > SQS in surface sediments (top 2 cm)(4)	(4) Pier 62/63 piling replacement work
Surface sediments (top 10 cm) (diver core samples)	Gravel fractions present (2) No exceedances in surface sediments (top 10 cm)	1 ind. HPAH > SQS in surface sediments (top 10 cm)(4)	Exceedances in surface sediments (top 10 cm)(4): 1 ind. LPAH > SQS Total HPAHs and 5 ind. HPAHs > SQS	
Core sediments (10-20 cm above cap interface) (vibra-core samples)	Mercury > SQS and Total PCBs > MCUL in core sediments (1) (**)	No exceedances in core sediments	No exceedances in core sediments	

(*) Complete analytical results presented in Polaris (2002) (**) Remaining sediment from CS1 core sample reanalyzed with total PCBs <MCUL but > SQS

PCBs and mercury in surface and sub-surface sediments

- Total PCB concentrations in surface sediments exceeded the SQS criterion at Station CS2 in September 1994, and at Station CS3 in December 1997.
- The sub-surface core sediments sampled at Station CS1 in April 2002 had a concentration of mercury exceeding the SQS criterion and a concentration of total PCBs that exceeds the MCUL criterion. The remaining sediment from this sample was reanalyzed in 2003, with total PCBs found to be below the MCUL, but above the SQS criteria as reported in Polaris (2003b).
- The most likely explanation for these exceedances is the presence of contaminated black silt/clay inclusions or lenses present in the cap sands dredged from the Duwamish River turning basin.

PAHs and dibenzofuran in 1997 CS1 core sediments

- Concentrations of total and individual LPAHs, HPAHs and dibenzofuran exceeded SMSs criteria in sub-surface core sediments sampled at Station CS1 in December 1997.
- The core sample had a very low total organic carbon (TOC) percentage (undetected at 0.05%), causing SMS exceedances when normalized to organic carbon. Dry weight concentrations only exceeded Dredged Material Management Program (DMMP) SL criteria for two individual LPAHs. A thin cap at this location is also possible.

PAHs in surface sediments

- Concentrations of various individual LPAHs and HPAHs, as well as total HPAHs, were found to exceed SQS criteria at the three cap stations in surface sediments (both top 2 cm and top 10 cm samples) collected in April 2002.
- The most likely explanation for these exceedances is that the cap was recontaminated by resuspended PAHs derived from offsite activities to the south. This is reflected in a decreasing concentration gradient in the cap stations from southeast to northwest, in line with prevailing surface currents.

- The most likely source of the resuspended PAHs is piling replacement work conducted at Pier 62/63 in 1996 and the late winter of 2002 just prior to the April 2002 sampling event.

3.3 PCB Addendum (Polaris 2003b)

An addendum to the Polaris (2002) sediment chemistry report was written in response to issues raised by the high concentrations of total PCBs (746 parts-per-million (ppm) organic carbon (OC)) found in a sample of sub-surface cap sediment at Station CS1 in April 2002 (Polaris 2003b). To begin to address this concern, the Port re-analyzed archived remaining sediment from this sample in 2003. This analysis indicated a considerably reduced concentration (22 ppm OC) of total PCBs. This finding was reported and discussed in the addendum.

The addendum also discussed potential sources of PCBs in the cap material. The addendum concluded that the most likely source was the Duwamish River turning basin, from which the cap material was dredged (Polaris 2003b). The location where the cap material was dredged is just downstream of the Norfolk CSO, a known historical source of PCBs.

In 2002, it was not known if the high concentrations of total PCBs found in sub-surface cap sediments at Station CS-1 were an isolated anomaly or not. Thus, one of the objectives of the March 2004 sampling (described in this report) was to gather additional data to more accurately assess the concentration(s) and extent of PCBs in the cap material in the vicinity of Station CS1 and elsewhere on the cap.

4.0 QUESTIONS AND OBJECTIVES OF MARCH 2004 CONTINGENCY PLAN SEDIMENT INVESTIGATION

This section presents the questions addressed and objectives of the March 2004 Core Sampling Investigation as presented in the February 10, 2004, Final Sampling Plan (Polaris 2004).

4.1 Questions Addressed

The objectives of the March 2004 Core Sampling Program are designed to provide additional information toward addressing the following questions:

1) How thick is the Pier 64/65 thin-layer sediment cap at an adequate number of representative locations distributed over the cap surface?

2) What is the distribution of PCBs and mercury in Pier 64/65 cap sediments?

3) How strong is the association between elevated concentrations of PCBs and mercury and black silt/clay inclusions in the cap material?

4) What is the distribution of PAHs in Pier 64/65 cap surface sediments?

5) Are elevated concentrations of contaminants in the cap material from outside sources or could they be contaminants migrating up into the cap from contaminated sediments underlying the sediment cap existing at the project site prior to cap placement?

4.2 Objectives

The objectives of the March 2004 Core Sampling Program are to:

1) Obtain additional measurements of the thickness of the Pier 64/65 thin-layer sediment cap at the original and new sampling stations as per the 2003 Corps letter to supplement measurements presented in the cap thickness monitoring report for the project (Polaris 2003a) to help assess compliance with cap performance criteria.

2) Resample PCBs, mercury and PAHs in surface and sub-surface sediments at the original three sampling stations (CS-1, CS-2, and CS-3) to provide additional data to help assess compliance with performance criteria.

3) Obtain additional data on the spatial extent of elevated concentrations of contaminants at additional sampling stations located primarily on the sediment cap.

4) Analyze core sediments under and in the cap material at selected locations in order to evaluate the potential for vertical contaminant migration up into the cap from contaminated sediments existing at the site prior to cap placement.

5.0 2004 SEDIMENT INVESTIGATION SAMPLING DESIGN

This section presents the design of the March 2004 Core Sampling Investigation. This information was first presented in the February 10, 2004, final sampling plan (Polaris 2004).

Under the final sampling plan, sediment cores will be collected at 17 stations on and adjacent to the Pier 64/65 sediment cap (Figure 5-1). Each set of two cores collected at each station will be split, sub-sampled and composited at three core depths: 1) surface sediment (top 10 cm), 2) sub-surface sediment (10 to 20 cm above the cap interface), and 3) below cap sediment (0 to 10 cm below the cap interface). Only surface (top 10 cm) samples will be collected at the three off-cap stations. The sub-samples collected will either be analyzed initially or archived in a phased manner (Table 5-1). Analytical results for selected contaminants will initially be evaluated for sub-samples collected at specific sampling stations and core depths. If warranted, selected archived sub-samples may also be analyzed.

5.1 Cap Thickness

Cap thickness will be measured at the three original sampling stations (Stations CS-1, CS-2, and CS-3) and 11 of the 13 new sampling stations by examining sediment cores collected on the sediment cap. Ten of the stations are located as close as possible to the original 10 cap thickness rebar stations (T-1 to T-10) established in March 1994 (Polaris 2003a; Figures 3-2 and 5-1), as requested in the Corp's July 29, 2003, letter the Port (Corps 2003). Cap thickness will not be measured at the three sampling stations located off the sediment cap (BH-1, BH-13, and SS5-B).

Table 5-1. Initial sediment chemistry analyses by station and core depth sub-sample (see Figure 5-1 for station locations). Two cores were collected at each station except where noted. Sub-samples will be collected at all core depths at all stations; those indicated (X) will be analyzed initially; those indicated (A) will be initially archived.

Station	Cap Thickness (+ relation to 1994 rebar stations (a))	Core Depth Sub-sample	Grain-size, Total solids, Total sulfides, TOC	PCBs, Mercury, Dibenzofuran (b)	PAHs, BEHP	Notes
CS-1	X	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X, I X, I X, I	X, I X, I X, I	X, I X, I X, I	Original sampling station + inclusion (I) sampling (b) (where located) - 2 additional cores
CS-2	X (near T-4)	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X X X	X X X	X X X	Original sampling station
CS-3	X	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X, FR X, FR X, FR	X, FR X, FR X, FR	X, FR X, FR X, FR	Original sampling station + Field Replicate (FR) - 2 additional cores
BH-1	Off-cap	Surface (top 10 cm)	X	X	X	Off-cap to NW
BH-2	X	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X X A	X X A	X X A	
BH-3	X (near T-1)	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X X A	X X A	X X A	Sampled from Pier 66 (?)
BH-4	X	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X X A	X X A	X X A	
BH-5	X (near T-2)	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X, MSD, MST X, MSD, MST A, MSD, MST	X, MSD, MST X, MSD, MST A, MSD, MST	X, MSD, MST X, MSD, MST A, MSD, MST	+ MSD and MST samples - 4 additional cores
BH-6	X (near T-3)	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X X A	X X A	X X A	

Table 5-1. (Continued).

Station	Cap Thickness (+ relation to 1994 rebar stations (a))	Core Depth Sub-sample	Grain-size, Total solids, Total sulfides, TOC	PCBs, Hg, Dibenzofuran (b)	PAHs, BEHP	Notes
BH-7	X (at T-5)	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X X A	X X A	X X A	
BH-8	X (near T-7)	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X A A	X A A	X A A	
BH-9	X (near T-6)	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X, FS A, FS A, FS	X, FS A, FS A, FS	X, FS A, FS A, FS	+ Field Split (FS) - 2 additional cores
BH-10	X (at T-8)	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X A A	X A A	X A A	
BH-11	X (at T-9)	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X A A	X A A	X A A	
BH-12	X (at T-10)	Surface (top 10 cm) Sub-surface (*) Below cap (**)	X A A	X A A	X A A	
BH-13	Off-cap	Surface (top 10 cm)	X	X	X	Off-cap to SE; Adjacent to Pier 62/63 In Virginia St. Right-of-way (City)
SS5-B	Off-cap	Surface (top 10 cm)	X	X	X	Off-cap to SW

(a) Cap measurement rebar stations as established in March 1994 (Polaris 2003b)
(b) Limited number of black silt/clay inclusions will also be sub-sampled and archived; analyzed if PCBs, Mercury ≥ SQS
(*) 10 to 20 cm above cap interface
(**) 0 to 10 cm below cap interface
BEHP = bis(2-ethylhexyl)phthalate
MSD = Matrix spike duplicate; MST = Matrix spike triplicate

5.2 Extent and Concentrations of PCBs, Mercury, and Dibenzofuran in Surface and Sub-surface Sediments

The extent and concentrations of PCBs, mercury, and dibenzofuran in the sediment cap material will be evaluated by examining analytical results for: 1) surface, sub-surface and below-cap sub-samples taken from cores collected at the three original sampling stations CS-1, CS-2 and CS-3; 2) surface and sub-surface sub-samples taken from cores collected at seven of the 13 new stations (BH-1 to BH-7), and 3) surface sub-samples taken from cores collected at the off-cap stations (BH-13 and SS5-B) (Table 5-1; Figure 5-1). This sampling effort will provide additional data that will help characterize the concentration and extent of these contaminants in the cap.

The seven new sampling stations (BH-1 to BH-7) are located on the northwest end of the cap in accessible places at increasing distances from Station CS-1. These locations were proposed under the hypothesis that elevated concentrations of PCBs and mercury in the April 2002 sub-surface core sample CS1-VC may have originated from a single barge load of capping material dredged from the turning basin and deposited at this location (NW end of cap). Further supporting this hypothesis are data showing elevated concentrations of dibenzofuran in a sub-surface core sample collected at Station CS1 in December 1997. One of the seven new sampling stations (BH-1) is located off the cap to the northwest of Station CS-1 to assess contaminant concentrations that occur down current (and off site) from Station CS-1. Surface sediment (top 10 cm) will also be collected and analyzed at two additional off-cap stations (BH-13 and SS5-B) to provide further data on background (anthropogenic) contaminants in the vicinity of the Pier 66 sediment cap.

Analytical results for PCBs, mercury, and dibenzofuran will be evaluated in sub-samples collected from split cores of surface sediment (top 10 cm) and sub-surface sediment (10 to 20 cm above the cap interface). Cap thickness will be measured in all cores, and all sub-samples will also be analyzed for grain-size, total solids, total sulfides, and TOC. Photographs will be taken of the split cores, and the core sediments will be described in core log diagrams.

Any black silt/clay inclusions observed in any of the cores will be measured and their relative position in the core noted. Two additional cores will be collected at station CS-1, and a limited number of sub-samples of the black silt/clay inclusions themselves will be collected and analyzed.

5.3 Extent and Concentration of PAHs and BEHP in Surface Sediments

Analytical results for PAHs in surface (top 10 cm) sediments will be evaluated to characterize the presence, concentration, and spatial extent of PAHs. Analytical results for PAHs will be evaluated in samples collected at the original cap stations (CS-1, CS-2 and CS-3), at the off-cap station SS5-B, and all 13 new sampling stations (Table 5-1; Figure 5-1).

Station BH-13 is located adjacent to Piers 62/63 which is the presumed source of PAHs recontaminating surface sediments on the Pier 66 sediment cap. Other stations are located at varying distances from Pier 62/63 to provide additional data. Sub-samples will be analyzed for grain-size, total solids, total sulfides, TOC, and PAHs. Bis(2-ethylhexyl)phthalate (BEHP) will also be analyzed in these sub-samples, as a general indicator of re-contamination.

5.4 Potential Contaminant Migration

Data from the on-cap stations sampled in April 2002 showed no indication of vertical, upward migrating of contaminants (from underlying sediment into the cap). However, to provide additional data on this issue, analytical results will be examined in core samples collected at Stations CS-1, CS-2, and CS-3 (Figure 5-1). Analytical results will be examined in sub-samples collected at these stations in the following layers of the split cores: 1) surface sediment (top 10 cm), 2) sub-surface sediment (10 to 20 cm above the cap interface), and 3) sub-cap sediment (0 to 10 cm below the cap interface). Cap thickness will be measured in all cores, and sub-samples will be analyzed for all of the parameters listed in Section 6.6. Results will be compared to baseline chemistry data collected at the project site prior to cap placement, and to data for other sampling locations collected off the cap.

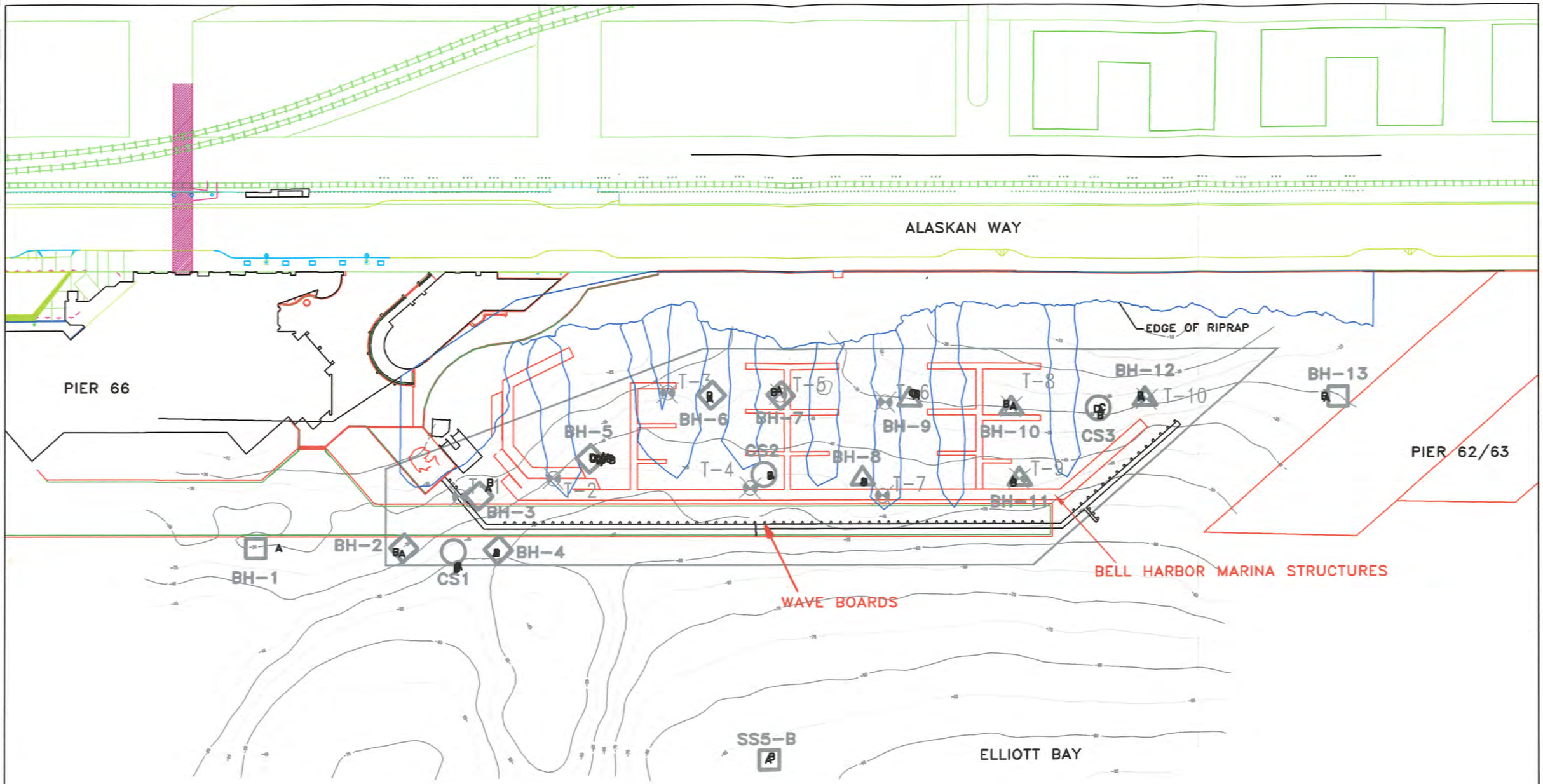
6.0 2004 SEDIMENT INVESTIGATION SAMPLING METHODS

6.1 Sampling Station Locations

Sediment cores were collected in March 2004 at 17 stations: 1) the three previously sampled cap stations (CS-1, CS-2 and CS-3, identified by green circles in Figure 5-1), 2) the off-cap station SS5-B (previously sampled as one of three composited stations), and 3) all 13 of the new sampling stations (BH-1 to BH-13) as per the final sampling plan (Polaris 2004), using methods specified in Puget Sound Water Quality Action Team (PSWQAT) (1997a) and Ecology (2003). The 13 new stations are identified by black squares, diamonds, or triangles in Figure 5-1, with planned station coordinates and actual core collection coordinates listed in Table 6-1. Actual individual core grab locations are indicated in Figure 5-1 by letters designating the individual cores.

Sub-sets of sampling stations, sub-sample core depths, and analytical parameters designed to address particular sediment contamination issues are described in Section 5.0 and in Table 5-1. Ten of the new stations have been located as close as possible to the original 10 rebar cap thickness measurement stations established in March 1994 (Figures 3-2 and 5-1; Table 5-1) (Polaris 2003a), as specified by the Corps in its July 29, 2003, letter to the Port (Corps 2003). Only four of the cap thickness station locations (T-5, T-8, T-9, and T-10) were reoccupied, as the remaining station locations are under subsequently constructed rock corridors and/or marina structures.

Some sampling stations were relocated in the field in March 2004 due to substratum penetration difficulties, inaccessibility, and other conditions encountered at the individual sites (Stations BH-1, CS-1, BH-3, BH-5 and BH-13), as noted in the field logs (Appendix A) and as shown in Figure 5-1. It was not possible to collect adequate sediment volume at Station BH-1 or its near vicinity due to the presence of gravel substrata that caused core tube bending and very limited penetration. One short core section was collected at Station BH-1, but it contained almost all gravel and did not contain enough volume of finer sediment fractions to sample and analyze.



PIER 64/65 SEDIMENT CAP

ORIGINAL CAP THICKNESS (ROD THICKNESS) MEASUREMENT STATIONS (1994)

A B LOCATIONS OF ACTUAL CORE COLLECTIONS

SAMPLE DEPTH LOCATIONS	3 OFF-CAP STATIONS	3 ORIGINAL CAP STATIONS	6 NEW CAP STATIONS	5 NEW CAP STATIONS
CAP SURFACE SEDIMENTS (TOP 10 CM)		X	X	X
CAP SUB-SURFACE SEDIMENTS (10-20 CM ABOVE INTERFACE)		X	X	A
BELOW CAP SEDIMENTS (0-10 CM BELOW INTERFACE)	X	X	A	A
	ALL ANALYTES	ALL ANALYTES	ALL ANALYTES	ALL ANALYTES

X = INITIAL ANALYSIS
A = ARCHIVED INITIALLY

ANALYTES:
CAP THICKNESS
CONVENTIONALS
MERCURY
DIBENZOFURAN
PAHS
PCBS
BEHP

SCALE 1:1200

50 0 100 200

(FEET)

WASHINGTON STATE PLANE NORTH NAD27
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PIER 64/65 CAP MONITORING PLANNED AND ACTUAL SAMPLING STATION LOCATIONS MARCH 2004

PORT OF SEATTLE

DATE: 21 MAY 04	FILE: beakmin..	FIGURE
BY: CRS/AWG	SCALE: 1"=100'	5-1
QC: GME	PROJ.NO.: 1002.023	

Table 6-1. Planned sampling stations and actual (March 2004) sediment core grab locations (see also Figure 5-1).

Station	Core	Planned Northing Planned Easting (WSP N; NAD 83)	Planned Latitude Planned Longitude (NAD 83)	Actual Northing Actual Easting (WSP N; NAD 83)	Actual Latitude Actual Longitude (NAD 83)	Water Depth (feet MLLW)
CS-1	Core A	226307.23 1266607.92	47° 36.619' 122° 20.932'	226287.7 1266603	47° 36.616' 122° 20.9335'	50.6
	Core B			226288.9 1266601	47° 36.6162' 122° 20.9339'	
	Core C			226288.9 1266603	47° 36.6162' 122° 20.9335'	
	Core D			226287.8 1266600	47° 36.616' 122° 20.9342'	
CS-2	Core A	226143.37 1266900.76	47° 36.593' 122° 20.860'	226138.8 1266906	47° 36.5925' 122° 20.859'	44.3
	Core B			226140.1 1266906	47° 36.5927' 122° 20.8591'	
CS-3	Core A	225961.12 1267201.47	47° 36.564' 122° 20.786'	225957.8 1267206	47° 36.5637' 122° 20.7851'	29.9
	Core B			225954.2 1267203	47° 36.5631' 122° 20.786'	
	Core C			225959 1267210	47° 36.5639' 122° 20.7843'	
	Core D			225961.5 1267205	47° 36.5643' 122° 20.7855'	
BH-1	Core A	226444.74 1266458.93	47° 36.641' 122° 20.969'	226428.2 1266476	47° 36.6387' 122° 20.9649'	37.1
BH-2	Core A	226340.81 1266572.87	47° 36.625' 122° 20.941'	226337.2 1266567	47° 36.6241' 122° 20.9423'	38.9
	Core B			226343.8 1266564	47° 36.6251' 122° 20.9431'	
BH-3	Core A	226328.32 1266666.49	47° 36.623' 122° 20.918'	226327.2 1266680	47° 36.6262' 122° 20.9151'	33.0
	Core B			226330.6 1266686	47° 36.6233' 122° 20.9136'	

Table 6-1 (continued).

Station	Core	Planned Northing Planned Easting (WSP N; NAD 83)	Planned Latitude Planned Longitude (NAD 83)	Actual Northing Actual Easting (WSP N; NAD 83)	Actual Latitude Actual Longitude (NAD 83)	Water Depth (feet MLLW)
BH-4	Core A	226272.98 1266644.54	47° 36.614' 122° 20.923'	226272.4 1266640	47° 36.6136' 122° 20.9243'	48.8
	Core B			226272.3 1266641	47° 36.6136' 122° 20.924'	
BH-5	Core A	226278.03 1266778.47	47° 36.615' 122° 20.891'	226269.5 1266786	47° 36.6136' 122° 20.8887'	42.4
	Core B			226269.5 1266788	47° 36.6136' 122° 20.8883'	
	Core MSD A			226272.5 1266788	47° 36.6141' 122° 20.8884'	
	Core MSD B			226270.7 1266788	47° 36.6138' 122° 20.8884'	
	Core MST A			226268.8 1266790	47° 36.6135' 122° 20.8879'	
	Core MST B			226267.6 1266789	47° 36.6133' 122° 20.8881'	
BH-6	Core A	226241.57 1266916.58	47° 36.609' 122° 20.857'	226240.3 1266912	47° 36.6092' 122° 20.8579'	33.3
	Core B			226243.9 1266915	47° 36.6098' 122° 20.8573'	
BH-7	Core A	226195.21 1266969.80	47° 36.602' 122° 20.844'	226198.3 1266972	47° 36.6025' 122° 20.8433'	33.6
	Core B			226200.9 1266968	47° 36.6029' 122° 20.8443'	
BH-8	Core A	226072.39 1266975.58	47° 36.582' 122° 20.842'	226068.8 1266973	47° 36.5812' 122° 20.8423'	42.7
	Core B			226068.2 1266974	47° 36.5811' 122° 20.8421'	

Table 6-1 (continued).

Station	Core	Planned Northing Planned Easting (WSP N; NAD 83)	Planned Latitude Planned Longitude (NAD 83)	Actual Northing Actual Easting (WSP N; NAD 83)	Actual Latitude Actual Longitude (NAD 83)	Water Depth (feet MLLW)
BH-9	Core A	226100.31 1267066.54	47° 36.587' 122° 20.820'	226097.8 1267074	47° 36.5863' 122° 20.818'	29.9
	Core B			226099 1267076	47° 36.5865' 122° 20.8175'	
	Core C			226102.7 1267073	47° 36.5871' 122° 20.8182'	
	Core D			226100.9 1267074	47° 36.5868' 122° 20.8179'	
BH-10	Core A	226023.21 1267139.69	47° 36.574' 122° 20.802'	226021.7 1267141	47° 36.574' 122° 20.8012'	30.9
	Core B			226029.1 1267138	47° 36.5752' 122° 20.802'	
BH-11	Core A	225962.21 1267095.69	47° 36.564' 122° 20.812'	225965 1267089	47° 36.5645' 122° 20.8136'	45.7
	Core B			225963.2 1267089	47° 36.5642' 122° 20.8137'	
BH-12	Core A	225934.21 1267249.69	47° 36.560' 122° 20.774'	225938.8 1267246	47° 36.5607' 122° 20.7753'	30.0
	Core B			225941.2 1267247	47° 36.5611' 122° 20.775'	
BH-13	Core A	225800.37 1267398.83	47° 36.538' 122° 20.738'	225807.1 1267389	47° 36.5395' 122° 20.74'	31.8
	Core B			225810.7 1267389	47° 36.5401' 122° 20.74'	
SS5-B	Core A	225924.22 1266705.69	47° 36.557' 122° 20.907'	225922.7 1266706	47° 36.5563' 122° 20.9067'	83.3
	Core B			225923.2 1266711	47° 36.5564' 122° 20.9054'	

Station CS-1 was moved to the southwest of the planned location to avoid gravel (Figure 5-1). Station BH-3 was sampled using a crane operated from the deck of Pier 66, and was moved to the east of the planned location to avoid diagonal steel piling supporting the wave boards (Figure 6-1 and 5-1). Station B-5 was moved to the southeast of the planned location to avoid the edge of an underlying rock corridor (see Figure 5-1), and Station BH-13 was moved to the northwest to avoid wood and other debris immediately below Pier 62/63.

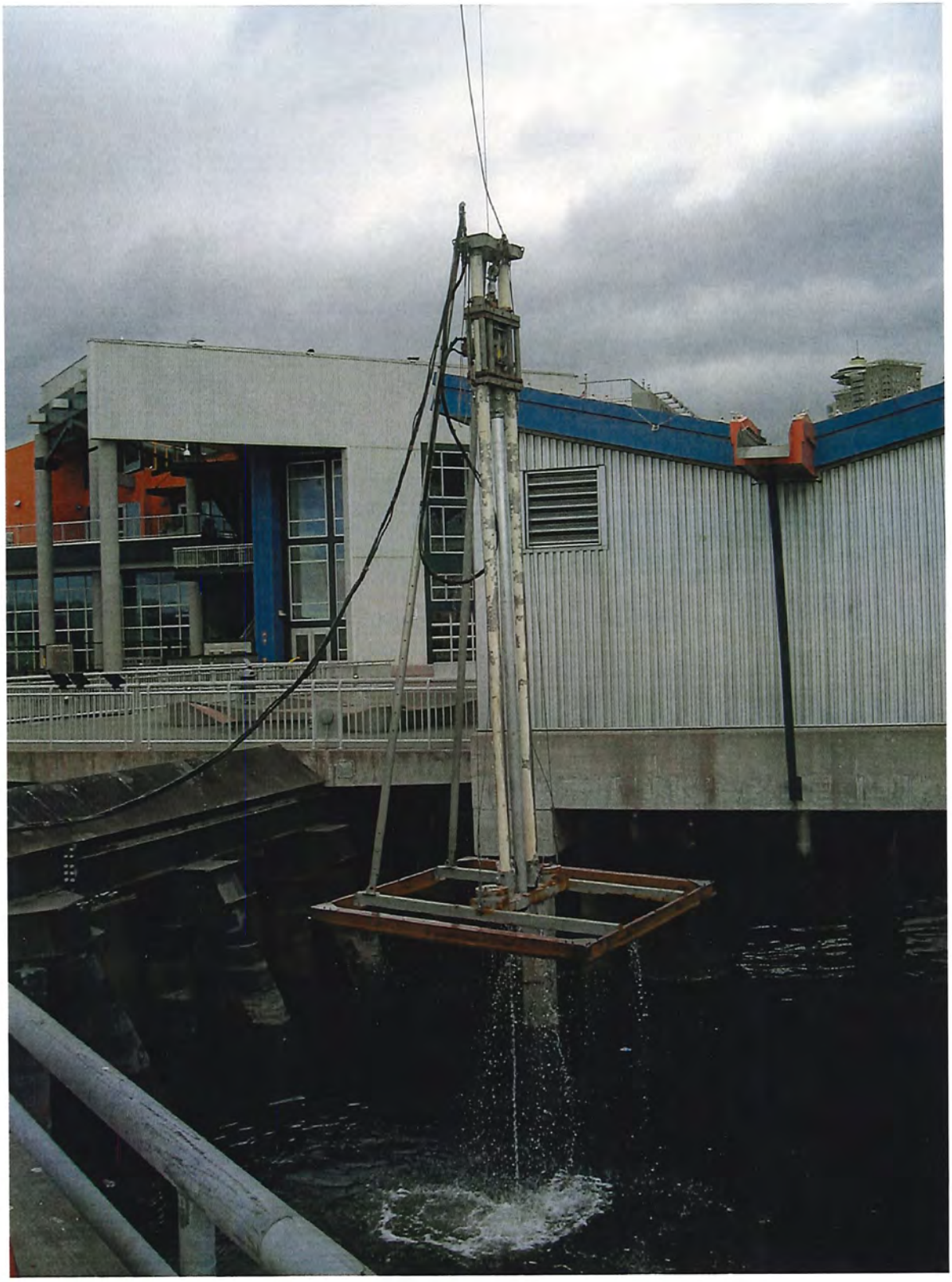
6.2 Navigation and Positioning

Navigation to the planned sampling stations was accomplished where possible with real-time differential global positioning system (DGPS), as described in the Puget Sound protocols (PSWQAT 1998). Differential corrections were acquired via a U.S. Coast Guard (USCG) DGPS navigation beacon. The "remote" GPS receiver, on the sampling vessel, receives differential corrections from the base receiver via a radio telemetry link (or from the USCG navigation beacon) and inputs the vessel coordinates into a navigation computer. The accuracy of the vessel position using this method is 1 to 5 meters (95% Circular Error Probability). Locations of sampling stations were reported in state plane coordinates to the nearest foot and in latitude and longitude (WGS84 or NAD83) to the nearest one-hundredth second and in latitude and longitude coordinates in decimal minutes.

GPS positioning was not possible at Station BH-3, which was sampled by crane from the deck of Pier 66 (Figure 6-1). The coordinates for this station were determined by measurements from known landmarks on the pier and by photographs.

Sampling station water depths measured in the field were corrected and reported in feet in Table 6-1. Corrected water depths in this table are referenced to the Mean Lower Low Water (MLLW) datum, using predicted tides for Seattle (Madison Street) (Nautical Software 1997).

Figure 6-1. Station BH-3 Core A being sampled by crane from Pier 66 on March 16, 2004 (1104 PST).



6.3 Field Operations and Sample Collection

Sediment core samples were collected from March 16 to 19, 2004, by Marine Sampling Systems (MSS) using a vibra-coring rig, with the assistance of Polaris Applied Sciences personnel. In order to obtain enough sediment volume for analysis, at least two sediment cores were collected at each of the sampling stations. As noted in Section 6.2, one of the new stations (BH-3), northeast of Station CS-1, is near Pier 66 in an area of the marina that cannot be accessed by boat (Figure 5-1), and was therefore sampled by crane from the deck of Pier 66.

Additional sediment cores were collected at Stations CS3 and BH-9 to obtain enough sediment for field replicate and field split (FR and FS) samples for Quality Assurance/Quality Control (QA/QC) of sample collection procedures, and as a measure of matrix heterogeneity (Table 5-1). Field replicate (FR) samples collected at Station CS3 consisted of two separately collected samples at the same location using the same methods, as per the definition in the Puget Sound Estuary Program (PSEP) protocol for sampling marine sediment (PSWQAT 1997a). Field split (FS) samples collected at Station BH-9 consisted of two samples collected from the composited sediment from the appropriate layers in four sediment cores.

Four additional sediment cores (BH-5 MSD Cores A and B; MST Cores A and B) were collected at Station BH-5 to provide the analytical lab with additional sediment volume for laboratory QA/QC purposes (Tables 5-1 and 6-1). Field logs and core diagrams are provided for these cores, but sediment chemistry and grain-size results are only reported for the samples taken from BH-5 Cores A and B (BH-5-SR and BH-5-SS, with BH-5-BC archived).

Field logs were kept for each station during core collection; recorded information included location coordinates, water depth, penetration depth, and core recovery. Field log tables are found in Appendix A.

6.4 Decontamination Procedures

Aluminum core tubes were decontaminated by MSS prior to use in the field. In the laboratory, prior to collecting sub-samples from split cores collected at each sampling station, the sediment sampling equipment (including stainless steel mixing bowls and spoons) was decontaminated using the following procedure:

- Wash with Alconox™ detergent and site water
- Rinse with de-ionized water
- Rinse with pesticide-grade acetone
- Rinse with instrument-grade methanol
- Allow residual methanol to evaporate if practical
- Rinse with de-ionized water

Utensils and bowls used were then covered with aluminum foil to prevent airborne or other contamination. All equipment and sample handling was conducted wearing disposable nitrile gloves that were changed after work was completed on split cores from each sampling station. Gloves were disposed of between sampling stations to prevent cross-contamination.

6.5 Core Splitting and Sub-Sampling

The collected sediment core tubes were capped, labeled, and transported to Analytical Research Inc, (ARI) laboratories, where they were stored vertically and held at 4° C. The core tubes were split open and sub-sampled at ARI from March 23 to 26, 2004. The core tubes were longitudinally split open using a circular saw (set to just break the tube wall and not penetrate into the sediment), with the sediment inside the tubes split apart with a decontaminated sharp knife. Cap thickness was measured in the sediment exposed in the split cores, sediment layers were described and diagramed on log sheets, and photographs were taken. The cap interface location in the cores was determined by visual and physical inspection of the sediment grains in

the cores. Core diagram figures are found in Appendix B; core photographs are found in Appendix C.

Sub-samples were collected and composited from three core layers in each of the two sediment cores per station (Table 5-1; Section 5.0). Sediment for the sub-samples was collected from the following core layers: 1) surface sediments (top 10 cm), 2) sub-surface sediments (between 10 to 20 cm above the cap interface), and 3) sediments lying below the sediment cap materials (between 0 to 10 cm below the cap interface). Care was taken not to collect sediment within approximately 0.5 cm of the core tube walls. To obtain enough sediment volume for analysis, a minimum of two sediment cores were collected at each station. Sub-samples of particular sediment layers were thus composites of sediment from the cores collected at specific stations. An exception to this procedure was necessary when collecting sediment for analysis of total sulfides due to the fact that sulfides are volatile compounds. To assure accurate sulfide analysis prior to compositing, sediment was collected from each of the three sub-sample layers in the first of the two cores to be split open for each station, as per procedures in Ecology (2003). Sediment from the two cores was composited using a decontaminated stainless steel bowl and spoon. Sub-samples were collected from the composited sediment using decontaminated stainless steel spoons or other tools, and placed in labeled clean jars as described in Table 6-2. After sub-sampling, the core halves, with remaining sediment in place, were wrapped in aluminum foil and archived in the laboratory walk-in refrigerator at 4^{o} C.

Table 6-2. Sample sizes, containers, preservation, and holding times from Ecology (2003) and ARI.

Parameter	Container[1]	Sample preservation[2]	Holding time[3]
Grain-Size, Total Solids	16 oz. wide mouth glass jar	Cool, 4° C	6 months
Total Sulfides	2 oz wide mouth glass jar	Cool, 4° C (2N zinc acetate) (no headspace)	7 days
Total Organic Carbon (TOC)	4 oz wide mouth glass jar	Cool, 4° C Freeze, -18° C	14 days 6 months
Mercury	2 oz wide mouth glass jar	Freeze, -18° C	28 days
Semi-Volatiles (PAHs, dibenzofuran, BEHP, PCBs)	16 oz wide mouth glass jar	Cool, 4° C Freeze, -18° C	14 days 40 days (after extraction) 1 year

1 - Recommended minimum field sample sizes for one laboratory analysis. Actual volumes collected will be increased to provide for a margin of error and allow for retests.
2 - During transport to the lab, samples will be stored on blue ice. The mercury will be frozen upon receipt at the lab.
3 - Recommended holding time (Ecology 2003)

6.6 Physical and Chemical Sediment Analyses

The following parameters were analyzed in the samples selected for initial analysis (as specified in Table 5-1 and Section 5.0), using the analytical methods specified in Table 6-3:

- Cap thickness (except in cores collected at off-cap stations)
- Sediment grain-size (includes total solids)
- Total sulfides
- Total Organic Carbon (TOC)
- Mercury
- Total and individual PAHs
- Bis(2-ethylhexyl)phthalate (BEHP)
- Dibenzofuran
- Total PCBs and individual Aroclors

ARI has prepared laboratory analysis reports with case narratives that document all activities associated with the sample analyses. These reports are found in Appendix E.

Table 6-3. Physical and chemical analytical methods, detection limits and SMS criteria (from Table 5 in Ecology (2003), and ARI).

Chemical	Recommended sample preparation method	Recommended analytical method	MDL[1] dry wt. (µg/kg)	SQS[2]	MCUL[2]
CONVENTIONALS					
Grain Size (%)		PSEP[3]	1%		
Total Solids (% wet weight)		PSEP[3]	0.02% (*)		
Total Organic Carbon (%)		PSEP[3]	0.003% (*)		
Total Sulfides		PSEP[3]	1.0 mg/kg (*)		
METALS				**mg/kg dry wt.**	**mg/kg dry wt.**
Mercury	--	7471[4]	140	0.41	0.59
SEMI-VOLATILE ORGANICS				**mg/kg OC**	**mg/kg OC**
LPAH:				370	780
Naphthalene	3550[5]	8270[6]	700	99	170
Acenaphthylene	3550[5]	8270[6]	433	66	66
Acenaphthene	3550[5]	8270[6]	167	16	57
Fluorene	3550[5]	8270[6]	180	23	79
Phenanthrene	3550[5]	8270[6]	500	100	480
Anthracene	3550[5]	8270[6]	320	220	1200
2-Methylnaphthalene	3550[5]	8270[6]	223	38	64
HPAH:				960	5300
Fluoranthene	3550[5]	8270[6]	567	160	1200
Pyrene	3550[5]	8270[6]	867	1000	1400
Benzo(a)anthracene	3550[5]	8270[6]	433	110	270
Chrysene	3550[5]	8270[6]	467	110	460
Total benzofluoranthenes	3550[5]	8270[6]	1067	230	450
Benzo (b) fluoranthene	3550[5]	8270[6]			
Benzo (k) fluoranthene	3550[5]	8270[6]			
Benzo(a)pyrene	3550[5]	8270[6]	533	99	210
Indeno(1,2,3-c,d)pyrene	3550[5]	8270[6]	200	34	88
Dibenzo(a,h)anthracene	3550[5]	8270[6]	77	12	33
Benzo(g,h,i)perylene	3550[5]	8270[6]	223	31	78
PHTHALATES					
Bis(2-ethylhexyl) Phthalate	3550[5]	8270[6]	433	47	78
MISCELLANEOUS					
Dibenzofuran	3550[5]	8270[6]	180	15	58

Table 6-3 (continued).

Chemical	Recommended sample preparation method	Recommended analytical method	MDL[1] dry wt. (µg/kg)	SQS[2]	MCUL[2]
PCBs:				mg/kg OC	mg/kg OC
Total PCBs	3550[5]	8082[7]		12	65
Aroclor-1016	3550[5]	8082[7]	4 (*)		
Aroclor-1221	3550[5]	8082[7]	8 (*)		
Aroclor-1232	3550[5]	8082[7]	4 (*)		
Aroclor-1242	3550[5]	8082[7]	4 (*)		
Aroclor-1248	3550[5]	8082[7]	4 (*)		
Aroclor-1254	3550[5]	8082[7]	4 (*)		
Aroclor-1260	3550[5]	8082[7]	4 (*)		

(*) – ARI MDLs

1 - Recommended Maximum Detection Limits (MDLs) - Dry weight. Practical Quantification Limits from Table 5 in Ecology (2003) or ARI).

2. - Washington State Sediment Management Standards, Sediment Quality Standards (SQS) and Minimum Cleanup Levels (MCUL) Chemical Criteria (Ecology, 1995).

3 - Puget Sound Estuary Program (PSEP): *Recommended Protocols for Measuring Conventional Sediment Variables in Puget Sound*, Puget Sound Water Quality Authority (PSWQA). March 1986.

4 - Mercury digestion and cold vapor atomic absorption (CVAA) spectrometry - Method 7471, SW-846, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*, EPA 1992.

5 - Method 3550, SW-846, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*, EPA 1986.

6 - Gas Chromatography/Mass Spectroscopy (GC/MS) capillary column - Method 8270, SW-846, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*, EPA 1992.

7 - Method 8000 series - SW-846, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*, EPA 1992.

6.7 Chain-of-Custody

A chain-of-custody record for all samples was maintained throughout sampling activities and accompanied the samples in coolers when submitted to the laboratory. Copies of the chain-of-custody forms are included with the ARI laboratory analysis reports in Appendix E.

6.8 Limits of Detection

The Sediment Sampling and Analysis Plan Appendix (Ecology 2003) was used as a guide for setting detection limits for these analyses. Detection limits for all contaminants of concern were

at or below the SMS SQS chemical criteria specified in Table I of WAC 173-204-320 (Ecology 1995) with any exceptions (such as for sample dilutions) noted in case narratives in the ARI analysis reports in Appendix E. The recommended dry weight Maximum Detection Limits (MDL) are presented in Table 6-3, as specified in Table 5 in the Sediment Sampling and Analysis Plan Appendix (Ecology 2003). ARI uses lower reporting limits (RLs) of 0.02% for total solids, 1.0 mg/kg for total sulfides and 0.003% for TOC. In addition, ARI uses MDLs of 4 parts-per-billion (ppb) (dry weight) for six of the individual Aroclors (PCBs) and 8 ppb (dry weight) for Aroclor 1221, in contrast to the recommended MDL of 6 ppb in Ecology (2003).

Actual detection limits for non-polar organics will vary from the values in this table depending on the water and TOC content of the collected sediments. All reasonable means, including additional cleanup steps and methods modifications, were used to bring all detection limits below SQS criteria.

6.9 Quality Assurance/Quality Control

The minimum laboratory QA/QC requirements which represent Ecology Level 1 Quality Assurance (QA1) requirements (shown in Table 6-4) were met by ARI (see ARI laboratory analysis reports and case narratives in Appendix E). This will include reconstructed gas chromatography/mass spectroscopy (GC/MS), gas chromatography/electron capture detection (GC/ECD) and gas chromatography/flame ionization detection (GC/FID) chromatograms for each sample, mass spectra of targeted compounds and the associated library spectra, raw data quantification reports, a calibration data summary, all analyte concentrations, recovery assessments and replicate sample summary, and the results for all QA/QC checks initiated by ARI. The laboratory QA1 data has been retained at the analytical laboratory for inspection if necessary.

Additional sediment cores were collected at Stations CS3 and BH-9 to obtain enough sediment for field replicate and field split (FR and FS) samples for QA/QC of sample collection procedures, and as a measure of matrix heterogeneity (Table 5-1). Field replicate (FR) samples

collected at Station CS3 consisted of two separately collected samples at the same location using the same methods, as per the definition in the PSEP protocol for sampling marine sediment (PSWQAT 1997a). Field split (FS) samples collected at Station BH-9 consisted of two samples collected from the composited sediment from the appropriate layers in four sediment cores. Relative percent difference (RPD) values were calculated for these pairs of samples and are reported in Section 7.0.

Table 6-4. Laboratory quality control analyses (Ecology QA1 level).

Parameter	Method Blanks[1]	Matrix Spike[1]	MSD or Duplicate[1]	SRM[1]	Surrogates	Triplicates
Volatiles	X	X	X		X	
Semi-volatiles	X	X	X		X	
Pesticides / PCBs	X	X	X		X	
Metals	X	X	X	X		
Ammonia	X	X	X			X
Total sulfides	X	X	X			X
Total Organic Carbon	X	X	X	X		X
Total solids						X
Total volatile solids						X
Grain size						X

1- One per batch or at a 5% frequency (except for surrogates, which are performed with each sample).
MSD = matrix spike duplicate
SRM = standard reference material

Note that BH-5-MSD and BH-5-MST were collected and sent to the lab to provide extra sediment for laboratory QA purposes. Field logs and core diagrams were provided for these cores, but sediment chemistry and grain-size results are only reported for the samples taken from BH-5 Cores A and B (BH-5-SR and BH-5-SS, with BH-5-BC archived).

6.10 Data Comparison to Sediment Quality Criteria

For reporting and interpretation the results of the chemical analysis were compared to Ecology SMSs Table I, Marine Sediment Quality Standards (SQS) - Chemical Criteria (WAC 173-204-320 [2]) and Table III, Puget Sound Marine Sediment Impact Zones – Minimum Cleanup Levels – Chemical Criteria (MCUL) (WAC 173-204-420 [2]) (Ecology 1995). The non-polar organic compounds were first normalized to the TOC percentage of the sediment before

comparison to the criteria. Analytical result data found to exceed the SMS SQS or MCUL criteria were highlighted in color in tables summarizing the results of the chemical analyses (tables found in Appendix D).

If warranted (e.g. a very low or undetected TOC), analytical results were also compared to Dredged Material Management Program (DMMP) Dredging Year 2003/2004 (DY02/DY03) Screening Level (SL) and Maximum Level (ML) chemistry guidance values (Corps 2004), with exceedances highlighted in color in tables similar to the SMSs comparison tables. The DMMP guidance value comparison tables are also found in Appendix D.

In samples with very low TOC (i.e., less than or equal to 0.2%), normalization to TOC may not be appropriate (Michelsen and Bragdon-Cook 1993), and comparison to Puget Sound Apparent Effects Thresholds (AETs) may be more appropriate (U.S. Environmental Protection Agency (EPA) 1988). DMMP guidance values are based on Puget Sound AETs, and thus are used for this comparison.

6.11 Data Validation Report

As part of the QA/QC process, Saylor Data Solutions performed a summary evaluation of the laboratory analytical results and prepared a data validation report. The data validation report is attached to this report as Appendix F.

6.12 SEDQUAL and EMIS Data Submittal

Raw dry weight data results from laboratory analyses will be entered into Excel spreadsheet templates (most recent version provided by Ecology) suitable for input into the Sediment Quality Information System (SEDQUAL) database, administered by Ecology. The spreadsheets will be submitted to Ecology electronically as a separate submittal from the final report. Sediment chemistry data will also be entered into the Port's EMIS system (geographical information computer base).

7.0 2004 SEDIMENT INVESTIGATION RESULTS

7.1 Cap Thickness

Cap thickness was measured in the split sediment cores obtained at each sampling station. Thickness measurements and observations of the split cores were recorded on core log sheets in the form of diagrams. Core diagrams figures for each station are found in Appendix B. Cap thickness measurements are also shown in Table 7-1, with mean thickness values shown in Figure 7-1.

Table 7-1 shows the mean thickness of the sediment cap at all stations sampled in March 2004. Numerical values are based on measurements in individual sediment cores collected at each of the stations. Ten of the 17 stations sampled were located to be at or as near as possible to the 10 original 1994 re-bar measuring stations as requested by the Corps (Corps 2003). Figure 5-1 shows both the 1994 43-bar stations and the March 2004 sampling stations. Figure 7-1 shows the mean cap thickness (in feet) at each of the stations within the planned cap boundaries (as per drawings in Parametrix 1994).

As noted in Parametrix (1994) and described in Section 3.1, the plan design was to place approximately one foot of cap material over contaminated sediments at the site. The performance criteria was that cap thickness changes over time were not to be greater than one foot at any of the re-bar measuring stations (and confirmed by bathymetry). Evaluation of sediment cores collected in March 2004 shows that adequate cap material ($\geq$ 1 foot) is present at 11 of the 14 sampling stations on the cap. At two of the three remaining stations (BH-3 and BH-7), mean cap thickness is slightly under one foot. Station BH-3 has a mean cap thickness of 0.95 feet (29.0 cm) and Station BH-7 has a mean cap thickness of 0.88 feet (26.75 cm). There was no cap material in the sediment cores collected at Station BH-12, which is located in the southeast corner of the planned cap boundaries (Figures 5-1 and B-22).

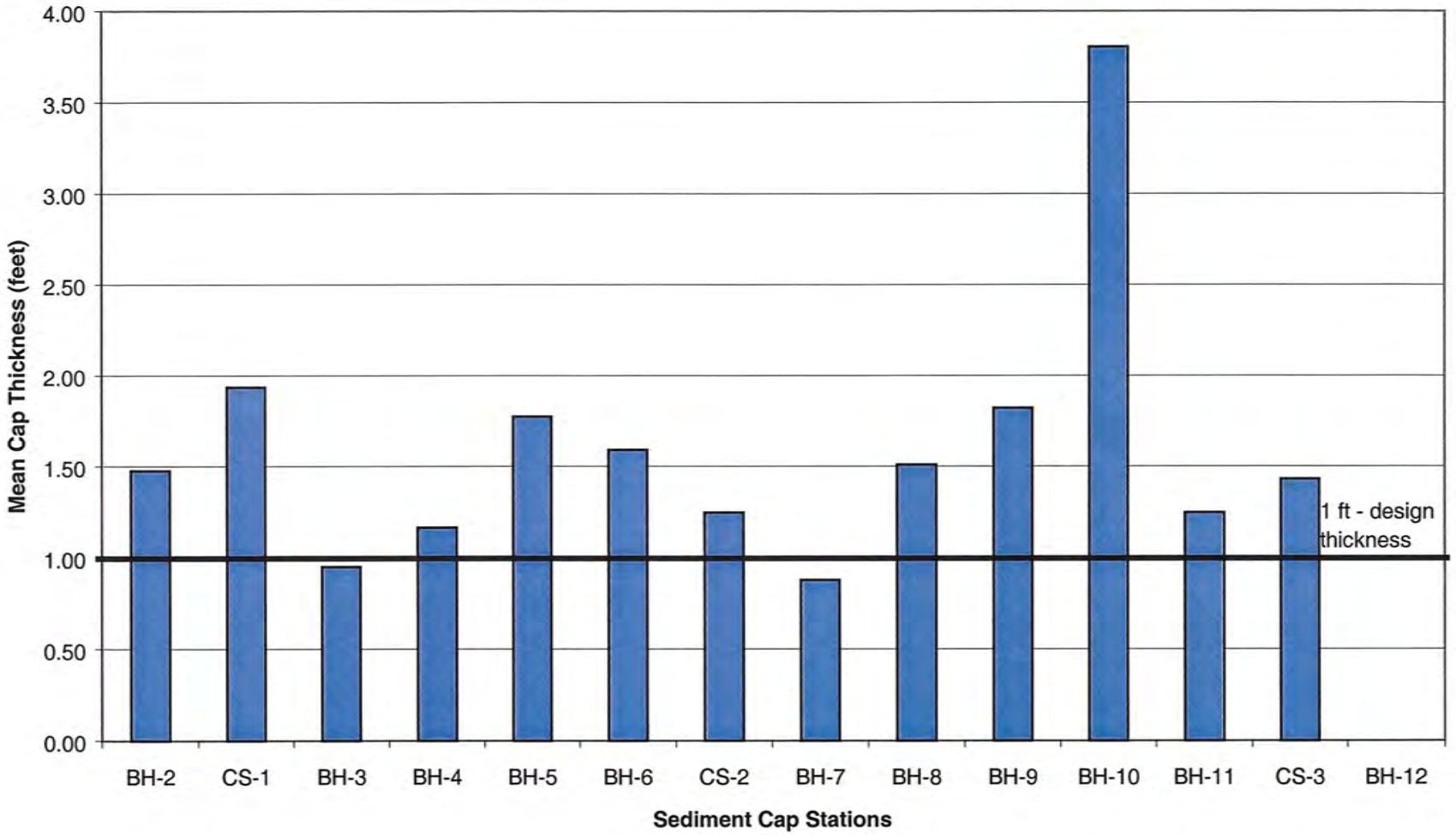
As shown in Table 7-1 and Figure 7-1, mean cap thickness ranges from 0 (Station BH-12) to 3.80 feet (116.0 cm; Station BH-10) for the 14 stations within the planned cap boundaries and

Table 7-1. Cap thickness (in cm and feet) at sediment core stations sampled in March 2004, based on visual and physical inspections of split cores; diagonal cap interfaces averaged.

Station	Core A	Core B	Core C	Core D	Mean Cap Thickness	Notes
BH-1	**0 cm** 0 ft				**0 cm** 0 ft	Off-cap station
BH-2	**50 cm (*)** 1.62 ft (*)	**40 cm (*)** 1.30 ft (*)			**45 cm** 1.48 ft	
CS-1	**65 cm (*)** 2.11 ft (*)	**47 cm (*)** 1.53 ft (*)	**68 cm (*)** 2.21 ft (*)	**56 cm (*)** 1.82 ft (*)	**59 cm** 1.94 ft	
BH-3	**32 cm** 1.04 ft	**26 cm** 0.84 ft			**29 cm** 0.95 ft	
BH-4	**26 cm** 0.84 ft	**45 cm (*)** 1.46 ft (*)			**35.5 cm** 1.16 ft	
BH-5	**65 cm** 2.11 ft	**37 cm** 1.20 ft			**54.08 cm** 1.77 ft	
	70/76 cm 2.27/2.47 ft	**50/53 cm** 1.62/1.72 ft				MSD cores (diagonal interfaces)
	28 cm 0.91 ft	**68/72 cm** 2.21/2.34 ft				MST cores (Core B - diagonal interface)
BH-6	**48 cm** 1.56 ft	**49 cm** 1.59 ft			**48.5 cm** 1.59 ft	
CS-2	**42 cm** 1.36 ft	**34 cm** 1.10 ft			**38 cm** 1.25 ft	
BH-7	**34 cm** 1.10 ft	**17/22 cm** 0.55/0.71 ft			**26.75 cm** 0.88 ft	Core B – diagonal interface
BH-8	**51 cm** 1.66 ft	**41 cm** 1.33 ft			**46 cm** 1.51 ft	
BH-9	**41 cm (*)** 1.33 ft (*)	**36 cm** 1.17 ft	**55 cm (*)** 1.79 ft (*)	**90 cm** 2.92 ft	**55.5 cm** 1.82 ft	
BH-10	**58 cm** 1.88 ft	**174 cm** 5.65 ft			**116 cm** 3.80 ft	
BH-11	**34 cm** 1.10 ft	**42 cm** 1.36 ft			**38 cm** 1.25 ft	
CS-3	**39 cm** 1.27 ft	**41/44 cm** 1.33/1.43 ft	**47 cm** 1.53 ft	**46 cm** 1.49 ft	**43.63 cm** 1.43 ft	Core B – diagonal interface
BH-12	**0 cm** 0 ft	**0 cm** 0 ft			**0 cm** 0 ft	Station w/in planned cap boundary; No cap material present
BH-13	**0 cm** 0 ft	**0 cm** 0 ft			**0 cm** 0 ft	Off-cap station
SS5B	**0 cm** 0 ft	**0 cm** 0 ft			**0 cm** 0 ft	Off-cap station
Mean cap thickness (all cap stations, plus BH-12)					**45.35 cm** 1.49 ft	
Mean cap thickness (all cap stations without BH-12)					**48.84 cm** 1.60 ft	

(*) Cap interface appears to be at this location based on visual and physical inspections of split cores

Figure 7-1. Pier 64/65 Sediment Cap Thickness
March 2004 Core Measurements



0.88 feet (Station BH-7) to 3.80 feet (26.8 to 116.0 cm) for the 13 cap stations where cap material is present. Thus, the mean thickness of the cap is 1.49 feet (45.35 cm), calculated using all 14 stations within the planned cap boundaries (including 0 feet at Station BH-12) and the mean thickness of the cap is 1.60 feet (48.84 cm) at the 13 stations where cap material is present (i.e., without Station BH-12).

Cap material was present at rebar Station T-10, (at the same location as Station BH-12) in March 1994 (Table 3-1; Figure 5-1; Polaris 2003a). Station T-10 had 0.4 feet of cap material when measured on March 11, 1994, prior to the final cap material being placed at the site. However, the rebar at Station T-10 was found bent in September 1994, precluding further measurements. At the next closest rebar Stations T-8 and T-9, the last measurements showed 1.0 foot of cap material at Station T-8 in January 1996, and 0.9 feet of cap material at Station T-9 in 1999 (Table 3-1; Figure 5-1).

7.2 Sediment Chemistry And Grain-Size

7.2.1 Appendix D tables and figures

The results of sediment chemistry and grain-size analyses for samples collected in March 2004 are presented in tables and figures found in Appendix D, which are derived from data in the ARI laboratory analysis reports found in Appendix E. The tables in Appendix D show dry weight and organic carbon (OC) normalized concentrations of the analyzed contaminants for each of the samples, with additional tables and figures showing the grain-size analysis results.

In addition to numerical sediment chemistry results, color shading is used in the data tables presented in Appendix D to visually indicate if the OC normalized concentrations for each analyte exceed SMSs SQS or MCUL criteria. If warranted (i.e. very low or undetected TOC), analytical results were also compared to DMMP Dredging Year 2003/2004 (DY02/DY03) Screening Level (SL) and Maximum Level (ML) chemistry guidance values (Corps 2004).

These exceedances are also highlighted in color. The DMMP guidance value comparison tables are also found in Appendix D.

It should be noted that in the PCBs analyses of the March 2004 samples, results for Aroclor 1248 were sometimes flagged with a "Y" qualifier. This is defined as: "Indicates raised reporting limit due to background interferences or to activity on the instrument. Compound is still not detected at or above the raised level." For this reason, where Aroclor 1248 is flagged "Y", it has not been summed into the total PCBs concentration value in the Appendix D and Section 7.0 tables and figures. However, Ms. Mary Lou Fox at ARI indicated that the Aroclor may or may not be present at or below the reported concentration, when qualified with a "Y" (Pers. Communication to J. Erickson (Polaris) June 7, 2004)

7.2.2 Summary tables

The numerical sediment chemistry results were also used to create summary tables (Tables 7-2, 7-3, and 7-4) and summary bar graphs (Figure 7-2 to 7-9) showing results for all the sampling stations arranged in approximately geographical order from the northwest to the southeast across the cap, as shown in Figure 5-1. The summary tables show relative station location, mean cap thickness, grain-size percentages, sediment chemistry results, and split core observations. Not all results are shown in the tables, for example, concentrations for total LPAHs, HPAHs and PCBs are shown, but not the concentrations for individual PAHs and PCB Aroclors. These values can be found in the tables in Appendix D.

Table 7-2 shows the sediment chemistry and grain-size results for surface sediment (top 10 cm) samples collected in March 2004. Table 7-3 shows the results for sub-surface (10 to 20 cm above the cap interface) sediment samples, and Table 7-4 shows the results for the below cap (0 to 10 cm below the cap interface) sediment samples.

In addition to the numerical sediment chemistry results, the summary tables also indicate if the OC normalized concentrations exceed SMSs SQS or MCUL criteria. This is indicated by color shading in the tables. Some of the samples had very low TOC percentages (Samples BH-2-SR,

Table 7-2. **Results summary for surface (SR) sediment (top 10 cm) samples collected on or near the Pier 64/65 thin-layer sediment cap in March 2004. Individual PAHs and PCB Aroclors not all shown - see Appendix D for full results tables.**

Stations / Samples (off-cap and inclusion (INCL) sample results included for comparison - sample IDs gray-shaded):

Parameters	BH-1	BH-2-SR	CS-1-SR	CS1-INCL1	CS1-INCL2	CS1-INCL3	BH-3-SR	BH-4-SR	BH-5-SR	BH-6-SR	CS-2-SR	BH-7-SR	BH-8-SR	BH-9-SR	BH-9-SR-FS	BH-10-SR	BH-11-SR	CS-3-SR	CS-3-SR-FR	BH-12-SR	BH-13-SR	SS5-B-SR
Sample archived?	not collected																					
Station location:																						
Off, on or below cap?	off cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	off cap	off cap
Outside waveboards?	outside	outside	outside	outside	outside	outside	inside	outside	inside	inside	inside	inside	inside	inside	inside	inside	inside	inside	inside	inside	outside	outside
Mean Cap thickness (cm)	0.0	45.0	59.0	59.0	59.0	59.0	29.0	35.5	54.1	48.5	38.0	26.8	46.0	55.5	55.5	116.0	38.0	43.6	43.6	0.0	0.0	0.0
Mean Cap thickness (feet)	0.00	1.48	1.94	1.94	1.94	1.94	0.95	1.16	1.77	1.59	1.25	0.88	1.51	1.82	1.82	3.80	1.25	1.43	1.43	0.00	0.00	0.00
Grain size analysis:																						
Percent gravel		39.6	5.4	5.9	14.8	4.5	16.9	7.2	0.9	1.4	1.4	1.6	1.9	1.3	1.7	1.8	1.6	1.8	0.4	15.7	10.9	0.2
Percent sands		56.5	62.6	64.9	39.0	46.7	63.3	82.5	70.6	85.2	76.6	81.1	71.5	81.3	82.5	84.3	81.4	89.0	89.9	47.1	35.8	26.7
Percent fines (silts + clays)		3.8	32.1	29.3	46.2	48.8	19.8	10.3	28.7	13.4	22.0	17.2	26.5	17.4	15.8	13.8	17.0	9.1	9.6	37.3	53.4	73.2
Total solids (%)		94.9	68.7	68.9	62.2	59.6	62.9	80.3	65.5	71.6	70.6	65.5	64.6	66.8	63.9	71.5	71.7	75.5	74.5	45.9	44.3	56.2
Ratio sands/fines		14.87	1.95	2.22	0.84	0.96	3.20	8.01	2.46	6.36	3.48	4.72	2.70	4.67	5.22	6.11	4.79	9.78	9.36	1.26	0.67	0.36
Sediment chemistry analysis:																						
TOC (%)		**0.12 ***	**4.1**	**3.3**	**3.6**	**3.3**	**2.6**	**2.4**	**3.0**	**2.1**	**2.9**	**3.3**	**2.5**	**2.9**	**3.0**	**3.8**	**2.2**	**2.4**	**2.4**	**5.9**	**4.9**	**2.0**
Sulfides (mg/kg)		**23.0**	**980**	**2200**	**1800**	**2100**	**1200**	**240**	**1600**	**2700**	**860**	**1300**	**840**	**2700**	**1800**	**990**	**2400**	**430**	**730**	**3900**	**3600**	**150**
Mercury (mg/kg)		0.05 U	**1.28**	**0.68**	**3.58**	**2.01**	**0.19**	**0.14**	**0.22**	**0.17**	**0.09**	**0.11**	**0.10**	0.06 U	0.07 U	**0.20**	**0.06**	**0.07**	**0.10**	**1.2**	**1.9**	**0.89**
Total LPAHs (ppm OC)		**260 ***	**125.1**	**149.4**	**127.2**	**104.2**	**86.5**	**20.8**	**15.2**	**12.4**	**9.0**	**12.1**	**102.9**	**21.7**	**23.8**	**39.7**	**8.5**	**42.1**	**18.5**	**81.9**	**81.6**	**45.9**
Total HPAHs (ppm OC)		**2508 ***	**487.8**	**1646.1**	**866.4**	**538.2**	**275.4**	**137.1**	**94.4**	**103.6**	**79.4**	**112.4**	**221.1**	**63.9**	**72.9**	**326.8**	**74.8**	**167.1**	**88.9**	**621.2**	**425.5**	**252.5**
Ratio HPAHs/LPAHs		9.65	3.90	11.02	6.81	5.17	3.18	6.59	6.21	8.35	8.82	9.29	2.15	2.94	3.06	8.23	8.80	3.97	4.81	7.58	5.21	5.50
BEHP (ppm OC)		**62 ***	**8.8**	**6.1**	**8.9**	**5.8**	**5.0**	4.6 U	**3.0**	**4.6**	**4.8**	**4.8**	**5.2**	**4.8**	**3.3**	**3.9**	**3.7**	**6.3**	**9.2**	**9.0**	**5.3**	**5.0**
Dibenzofuran (ppm OC)		57 U *	**8.8**	**4.5**	**5.6**	**5.5**	4.6 U	4.6 U	1.3 U	1.8 U	1.3 U	3.6 U	2.4 U	**1.4**	**1.4**	2.0 U	1.7 U	5.0 U	1.6 U	**2.0 J**	**3.1**	2.9 U
Total PCBs (ppm OC)		**5.6 ***	**10.9**	**10.6**	**20.3**	**13.6**	**6.4**	**2.6**	**2.5**	**1.9**	**1.4**	**1.3**	**2.3**	**1.8**	**1.2**	**1.6**	**1.3**	**1.6**	**0.8**	**13.7**	**6.3**	**14.5**
Aroclor 1248		3.8 U *	**1.8**	2.4 Y	4.4 Y	2.4 Y	**1.2**	0.6 Y	**0.4**	0.4 Y	**0.3**	**0.2**	**0.4**	**0.5**	**0.4**	**0.2**	0.4 Y	0.2 U	0.2 U	**3.1 P**	0.8 U	**2.0**
Aroclor 1254		**5.6 ***	**5.1 P**	**6.7**	**10.8**	**6.7**	**3.5 DL**	**1.4**	**1.2**	**1.0**	**0.6**	**0.5**	**1.0**	**0.8**	**0.5**	**0.7**	**0.6**	**0.8 P**	**0.5**	**6.8**	**4.5 P**	**7.0 DL**
Aroclor 1260		3.8 U *	**3.9**	**3.9**	**9.4**	**7.0**	**1.7**	**1.2 P**	**0.9**	**0.9**	**0.6**	**0.5**	**0.9 P**	**0.5 P**	**0.3**	**0.7**	**0.6**	**0.8**	**0.4**	**3.9**	**1.8**	**5.5 DL**
Split core observations:																						
Black silt / clay inclusions?	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	no	no	no
Core A/C primary substratum	large gravel coarse sand	gray sand	gray sand w/ bk silt/clay	bk silt/clay w/ dk gry sand	bk silt/clay w/ sand, wd		sand w/ bk silt, shells	gry sand w/ bk silt/clay	bk sand w/ black silt	sand w/ some fines	dk gray sand w/ bk silt/clay	sand w/ some bk silt	gray sand w/ bk silt/clay	black sand	black sand + org, wood	dk gray sand	dk gry sand w/ bk silt/clay	dk gray sand some bk silt	dk gray sand	bk clay/silt shell debris	dk gray clay / silt	fine gray silt / clay
Core B/D primary substratum		gray sand w/ sm gravel	bk silt/clay w/ gry sand, wd			gry sand w/ bk silt/clay	sand w/ black silt	gry sand w/ bk silt/clay	bk sand w/ bk silt/clay	sand w/ black silt	black sand	sand w/ some bk silt	gray sand	black sand	black sand w/ silt, org	dk gry sand w/ bk silt/clay	black sand w/ bk silt/clay	dk gry/bk sand w/ some bk silt	dk gray sand some bk silt	bk clay/silt shell debris	dk gray clay / silt	fine gray silt / clay

* very low TOC -
ug/kg (ppb) dry weight concentrations shown w/ DMMP criteria comparison

Abbreviations used:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hydrocarbons
BEHP = bis(2-ethylhexyl)phthalate
PCBs = polychlorinated biphenyls
DMMP = Dredged Material Management Program; SL (screening level) and ML (maximum level) guidance values (DY02/DY03)

Detected compounds indicated in bold

U = Undetected at the reported concentration
J = estimated concentration when value is less than calculated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required

Core observation abbreviations:

w/ = with
sm = small
bk = black
gry = gray
wd = wood
dk = dark
org = organic matter
grav = gravel

br = brown
debr = debris
sulf = sulfur

Sediment sample types:

SR = surface sediment (top 10 cm) core sample
SS = sub-surface core sample
10 to 20 cm above cap interface
BC = below cap core sample
top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

Analyte concentration exceeds MCUL criterion (* or DMMP ML guidance value)

Analyte concentration exceeds SQS criterion (* or DMMP SL guidance value)

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table 7-3. **Results summary for sub-surface (SS) sediment (10 to 20 cm above cap interface) samples collected on or near the Pier 64/65 thin-layer sediment cap in March 2004. Individual PAHs and PCB Aroclors not all shown - see Appendix D for full results tables.**

Stations / Samples (off-cap and inclusion (INCL) sample results included for comparison - sample IDs gray-shaded):

Parameters	BH-1	BH-2-SS	CS-1-SS	CS1-INCL1	CS1-INCL2	CS1-INCL3	BH-3-SS	BH-4-SS	BH-5-SS	BH-6-SS	CS-2-SS	BH-7-SS	BH-8-SS	BH-9-SS	BH-9-SS-FS	BH-10-SS	BH-11-SS	CS-3-SS	CS-3-SS-FR	BH-12-SR	BH-13-SR	SS5-B-SR
Sample archived?	not collected												Archived	Archived	Archived	Archived	Archived					
Station location:																						
Off, on or below cap?	off cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	off cap	off cap
Outside waveboards?	outside	outside	outside	outside	outside	outside	inside	outside	inside	inside	inside	inside	inside	inside	inside	inside	inside	inside	inside	inside	outside	outside
Mean Cap thickness (cm)	0.0	45.0	59.0	59.0	59.0	59.0	29.0	35.5	54.1	48.5	38.0	26.8	46.0	55.5	55.5	116.0	38.0	43.6	43.6	0.0	0.0	0.0
Mean Cap thickness (feet)	0.00	1.48	1.94	1.94	1.94	1.94	0.95	1.16	1.77	1.59	1.25	0.88	1.51	1.82	1.82	3.80	1.25	1.43	1.43	0.00	0.00	0.00
Grain size analysis:																						
Percent gravel		61.1	6.5	5.9	14.8	4.5	2.9	31.3	1.2	6.3	3.1	GS						3.1	2.5	15.7	10.9	0.2
Percent sands		37.3	55.4	64.9	39.0	46.7	81.0	64.6	56.8	82.3	89.8	sample						77.7	83.7	47.1	35.8	26.7
Percent fines (silts + clays)		1.6	38.1	29.3	46.2	48.8	16.2	4.2	42.1	11.4	7.3	not						19.1	13.7	37.3	53.4	73.2
Total solids (%)		96.3	63.0	68.9	62.2	59.6	72.2	88.3	56.9	70.3	68.7	collected						69.1	68.2	45.9	44.3	56.2
Ratio sands/fines		23.31	1.45	2.22	0.84	0.96	5.00	15.38	1.35	7.22	12.30							4.07	6.11	1.26	0.67	0.36
Sediment chemistry analysis:																						
TOC (%)		**0.08 ***	**4.3**	**3.3**	**3.6**	**3.3**	**1.4**	**0.51 ***	**2.9**	**2.6**	**5.0**	**2.7**						**3.2**	**2.9**	**5.9**	**4.9**	**2.0**
Sulfides (mg/kg)		1.10 U	**780**	**2200**	**1800**	**2100**	**1400**	**570**	**1800**	**3700**	**2400**	**880**						**2500**	**3400**	**3900**	**3600**	**150**
Mercury (mg/kg)		0.05 U	**6.12**	**0.88**	**3.58**	**2.01**	**0.09**	**0.08**	**0.07**	**0.09**	0.07 U	0.05 U						**0.08**	**0.07**	**1.2**	**1.9**	**0.89**
Total LPAHs (ppm OC)		19 U *	**1622.8**	**149.4**	**127.2**	**104.2**	**43.6**	**76 ***	**1.7**	**15.4**	0.8 U	**3.7**						**17.8**	1.3 U	**81.9**	**81.6**	**45.9**
Total HPAHs (ppm OC)		19 U *	**1165.8**	**1646.1**	**866.4**	**538.2**	**323.6**	**618 ***	**19.8**	**163.1**	**1.9**	**48.9**						**56.2**	**11.7**	**621.2**	**425.5**	**252.5**
Ratio HPAHs/LPAHs			0.72	11.02	6.81	5.17	7.42	8.13	11.65	10.59		13.22						3.16		7.58	5.21	5.50
BEHP (ppm OC)		19 U *	**3.3**	**6.1**	**8.9**	**5.8**	8.6 U	**39 ***	**2.7**	4.6 U	0.8 U	**3.3**						**3.4**	**2.1**	**9.0**	**5.3**	**5.0**
Dibenzofuran (ppm OC)		19 U *	**179.1 DL**	**4.5**	**5.6**	**5.5**	8.6 U	20 U *	1.3 U	4.6 U	0.8 U	1.4 U						**1.3**	1.3 U	**2.0 J**	**3.1**	2.9 U
Total PCBs (ppm OC)		3.8 U *	**8.1**	**10.6**	**20.3**	**13.6**	**6.6**	**37 ***	**1.2**	**2.8**	**0.4**	**0.7**						**0.8**	**0.4**	**13.7**	**6.3**	**14.5**
Aroclor 1248		3.8 U *	0.5 U	2.4 Y	4.4 Y	2.4 Y	**1.1**	4.0 U *	**0.4**	**0.4**	**0.2**	0.3 Y						0.1 U	0.1 U	**3.1 P**	0.8 U	**2.0**
Aroclor 1254		3.8 U *	**4.0 PDL**	**6.7**	**10.8**	**6.7**	**3.9**	**11 ***	**0.5**	**1.3**	**0.1**	**0.4**						**0.4**	**0.3**	**6.8**	**4.5 P**	**7.0 DL**
Aroclor 1260		3.8 U *	**4.2 PDL**	**3.9**	**9.4**	**7.0**	**1.6**	**26 ***	**0.3**	**1.1**	**0.1 J**	**0.3**						**0.3**	**0.2**	**3.9**	**1.8**	**5.5 DL**
Split core observations:																						
Black silt / clay inclusions?	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes						yes	yes	no	no	no
Core A/C primary substratum	large gravel coarse sand	gry sand + some grav	bk silt/clay w/ dk gry sand	bk silt/clay w/ dk gry sand	bk silt/clay w/ sand, wd		sand w/ bk silt, shells	gry sand w/ bk silt/clay	black silt/clay w/ dk gry sand	sand w/ some bk silt	dk gray sand w/ bk silt/clay,wd	sand w/ black silt						dk gray sand w/ bk silt/clay	dk gray sand w/ bk silt/clay	bk clay/silt shell debris	dk gray clay / silt	fine gray silt / clay
Core B/D primary substratum		gry sand + large grav	bk silt/clay w/ dk gry sand			gry sand w/ bk silt/clay	sand w/ black silt	dk gry sand w/ sm gravel	black silt/clay w/ dk gry sand	sand w/ bk silt bands	black sand w/ org, wood, silt	(not enough sediment)						dk gray sand w/ bk silt/clay	dk gray sand w/ bk silt/clay	bk clay/silt shell debris	dk gray clay / silt	fine gray silt / clay

* very low TOC - ug/kg (ppb) dry weight concentrations shown w/ DMMP criteria comparison

* low TOC - ug/kg (ppb) dry weight concentrations shown w/ DMMP criteria comparison

Abbreviations used:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hydrocarbons
BEHP = bis(2-ethylhexyl)phthalate
PCBs = polychlorinated biphenyls
DMMP = Dredged Material Management Program; SL (screening level) and ML (maximum level) guidance values (DY02/DY03)

Detected compounds indicated in bold

U = Undetected at the reported concentration
J = estimated concentration when value is less than calculated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required

Core observation abbreviations:

w/ = with
sm = small
bk = black
gry = gray
wd = wood
dk = dark
org = organic matter
grav = gravel

br = brown
debr = debris
sulf = sulfur

Sediment sample types:

SR = surface sediment (top 10 cm) core sample
SS = sub-surface core sample 10 to 20 cm above cap interface
BC = below cap core sample top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

Analyte concentration exceeds MCUL criterion (* or DMMP ML guidance value)

Analyte concentration exceeds SQS criterion (* or DMMP SL guidance value)

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table 7-4. **Results summary for below cap (BC) sediment (top 10 cm of underlying sediment) samples collected on or near the Pier 64/65 thin-layer sediment cap in March 2004. Individual PAHs and PCB Aroclors not all shown - see Appendix D for full results tables.**

Stations / Samples (off-cap and inclusion (INCL) sample results included for comparison - sample IDs gray-shaded):

Parameters	BH-1	BH-2-BC	CS-1-BC	CS1-INCL1	CS1-INCL2	CS1-INCL3	BH-3-BC	BH-4-BC	BH-5-BC	BH-6-BC	CS-2-BC	BH-7-BC	BH-8-BC	BH-9-BC	BH-9-BC-FS	BH-10-BC	BH-11-BC	CS-3-BC	CS-3-BC-FR	BH-12-SR	BH-13-SR	SS5-B-SR
Sample archived?	not collected	Archived					Archived	Archived	Archived	Archived		Archived	Archived	Archived	Archived	Archived	Archived					
Station location:																						
Off, on or below cap?	off cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	on cap	off cap	off cap
Outside waveboards?	outside	outside	outside	outside	outside	outside	inside	outside	inside	inside	inside	inside	inside	inside	inside	inside	inside	inside	inside	inside	outside	outside
Mean Cap thickness (cm)	0.0	45.0	59.0	59.0	59.0	59.0	29.0	35.5	54.1	48.5	38.0	26.8	46.0	55.5	55.5	116.0	38.0	43.6	43.6	0.0	0.0	0.0
Mean Cap thickness (feet)	0.00	1.48	1.94	1.94	1.94	1.94	0.95	1.16	1.77	1.59	1.25	0.88	1.51	1.82	1.82	3.80	1.25	1.43	1.43	0.00	0.00	0.00
Grain size analysis:																						
Percent gravel			38.9	5.9	14.8	4.5					17.0							0.5	16.8	15.7	10.9	0.2
Percent sands			59.7	64.9	39.0	46.7					51.3							44.4	40.1	47.1	35.8	26.7
Percent fines (silts + clays)			1.4	29.3	46.2	48.8					31.5							55.1	43.0	37.3	53.4	73.2
Total solids (%)			87.8	68.9	62.2	59.6					55.1							41.5	47.4	45.9	44.3	56.2
Ratio sands/fines			42.64	2.22	0.84	0.96					1.63							0.81	0.93	1.26	0.67	0.36
Sediment chemistry analysis:																						
TOC (%)			**0.13 ***	**3.3**	**3.6**	**3.3**					**4.9**							**6.7**	**6.5**	**5.9**	**4.9**	**2.0**
Sulfides (mg/kg)			**39.0**	**2200**	**1800**	**2100**					**8200**							**6700**	**15000**	**3900**	**3600**	**150**
Mercury (mg/kg)			0.05 U	**0.68**	**3.58**	**2.01**					**0.53**							**1.3**	**1.25**	**1.2**	**1.9**	**0.89**
Total LPAHs (ppm OC)			**11646 ***	**149.4**	**127.2**	**104.2**					**141.0**							**109.0**	**111.5**	**81.9**	**81.6**	**45.9**
Total HPAHs (ppm OC)			**11112 ***	**1646.1**	**866.4**	**538.2**					**1254.1**							**1148.2**	**992.5**	**621.2**	**425.5**	**252.5**
Ratio HPAHs/LPAHs			0.95	11.02	6.81	5.17					8.89							10.53	8.90	7.58	5.21	5.50
BEHP (ppm OC)			20 U *	**6.1**	**8.9**	**5.8**					**3.9**							**14.8**	**11.1**	**9.0**	**5.3**	**5.0**
Dibenzofuran (ppm OC)			**1000 ***	**4.5**	**5.6**	**5.5**					**4.3**							**8.8**	8.9 U	**2.0 J**	**3.1**	2.9 U
Total PCBs (ppm OC)			3.9 U *	**10.6**	**20.3**	**13.6**					**6.4**							**6.6**	**8.3**	**13.7**	**6.3**	**14.5**
Aroclor 1248			3.9 U *	2.4 Y	4.4 Y	2.4 Y					**1.1**							**1.8 P**	**1.5**	**3.1 P**	0.8 U	**2.0**
Aroclor 1254			3.9 U *	**6.7**	**10.8**	**6.7**					**3.1 PDL**							**2.7**	**3.5**	**6.8**	**4.5 P**	**7.0 DL**
Aroclor 1260			3.9 U *	**3.9**	**9.4**	**7.0**					**2.2 PDL**							**2.1**	**3.2**	**3.9**	**1.8**	**5.5 DL**
Split core observations:																						
Black silt / clay inclusions?	no		no	yes	yes	yes					no							no	no	no	no	no
Core A/C primary substratum	large gravel coarse sand		coarse br/bk sand, sm grav	bk silt/clay w/ dk gry sand	bk silt/clay w/ sand, wd						black clay / silt							black silt slight sulf odor	bk clay/silt shells, wood	bk clay/silt shell debris	dk gray clay / silt	fine gray silt / clay
Core B/D primary substratum			coarse gry sand w/ sm gravel			gry sand w/ bk silt/clay					bk clay/silt w/ shell debr							bk clay/silt shells, wood	bk clay/silt shells, wood	bk clay/silt shell debris	dk gray clay / silt	fine gray silt / clay

* very low TOC

ug/kg (ppb) dry weight concentrations shown w/ DMMP criteria comparison

Abbreviations used:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hydrocarbons
BEHP = bis(2-ethylhexyl)phthalate
PCBs = polychlorinated biphenyls
DMMP = Dredged Material Management Program; SL (screening level) and ML (maximum level) guidance values (DY02/DY03)

Detected compounds indicated in bold

U = Undetected at the reported concentration
J = estimated concentration when value is less than calculated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required

Sediment sample types:

SR = surface sediment (top 10 cm) core sample
SS = sub-surface core sample 10 to 20 cm above cap interface
BC = below cap core sample top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

Analyte concentration exceeds MCUL criterion (* or DMMP ML guidance value)

Analyte concentration exceeds SQS criterion (* or DMMP SL guidance value)

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Core observation abbreviations:

w/ = with
sm = small
bk = black
gry = gray
wd = wood
dk = dark
org = organic matter
grav = gravel

br = brown
debr = debris
sulf = sulfur

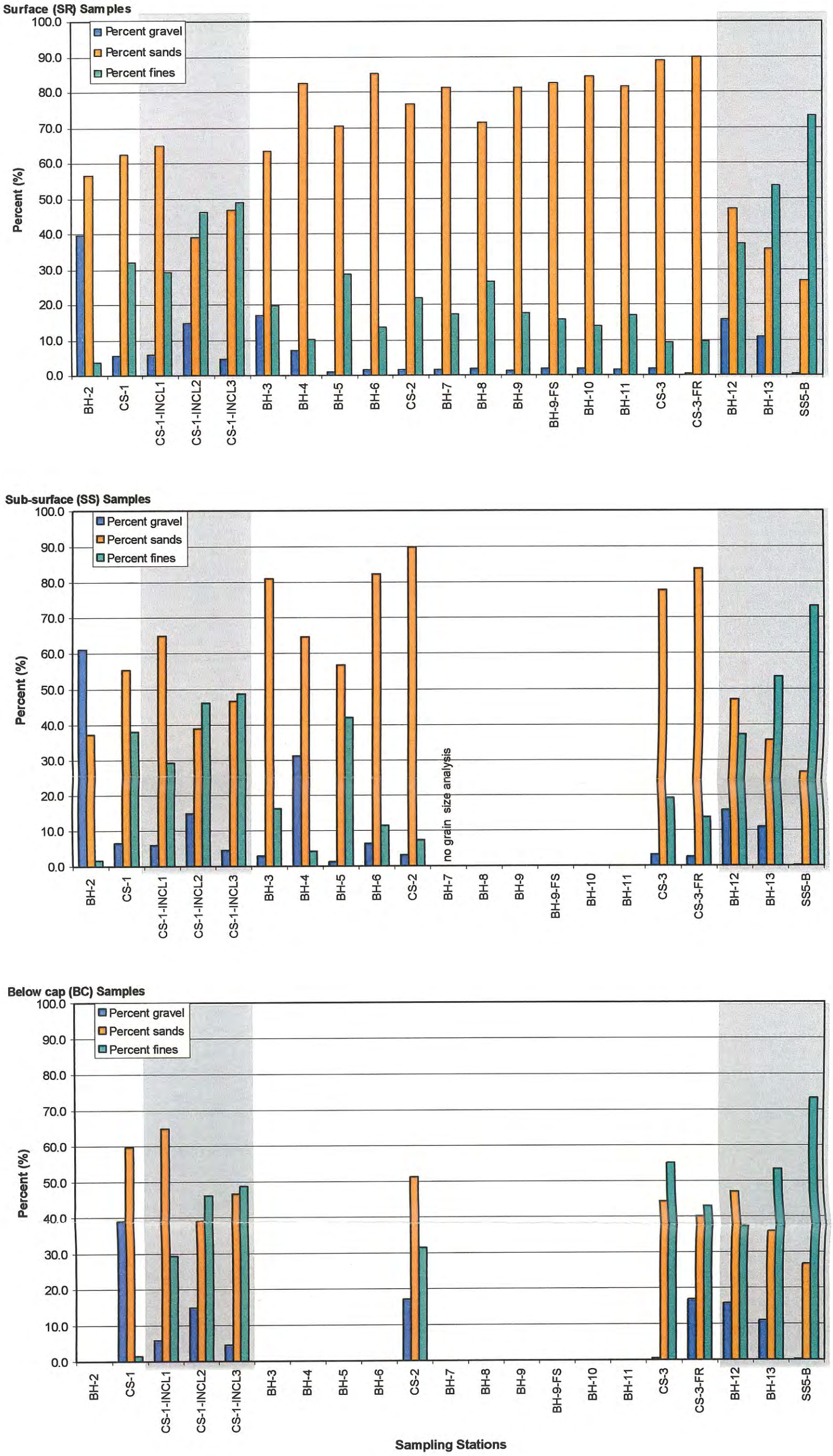


Figure 7-2. Grain size analysis for samples collected on or near the Pier 64/65 Sediment Cap in March 2004. Results for off-cap stations (BH-12, BH-13 and SS5-B) and station CS-1 inclusion (INCL) samples included for comparison in each graph.

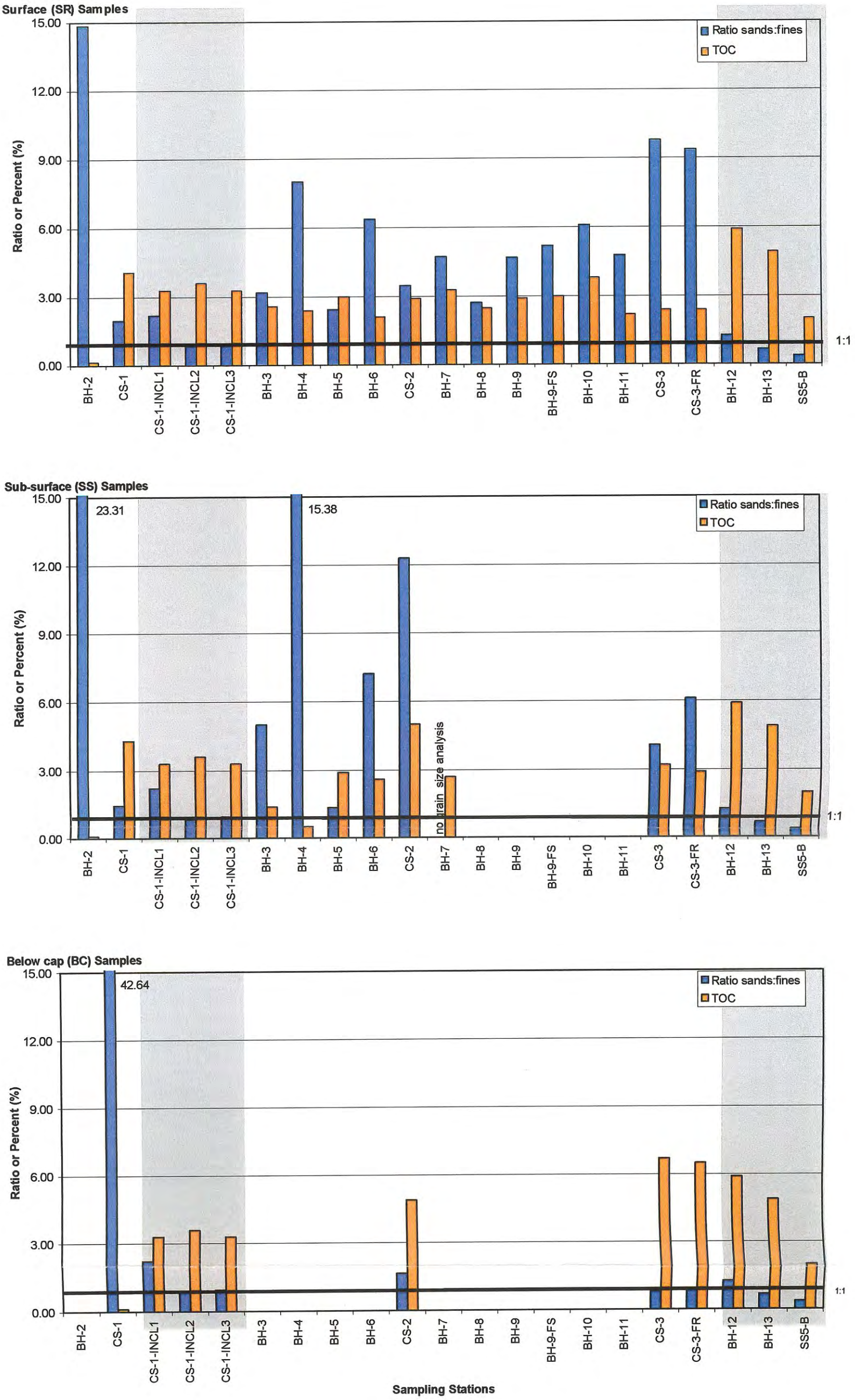


Figure 7-3. Ratio of sands to fines and total organic carbon for samples collected on or near the Pier 64/65 Sediment Cap in March 2004. Results for off-cap stations (BH-12, BH-13 and SS5-B) and station CS-1 inclusion (INCL) samples included for comparison in each graph.

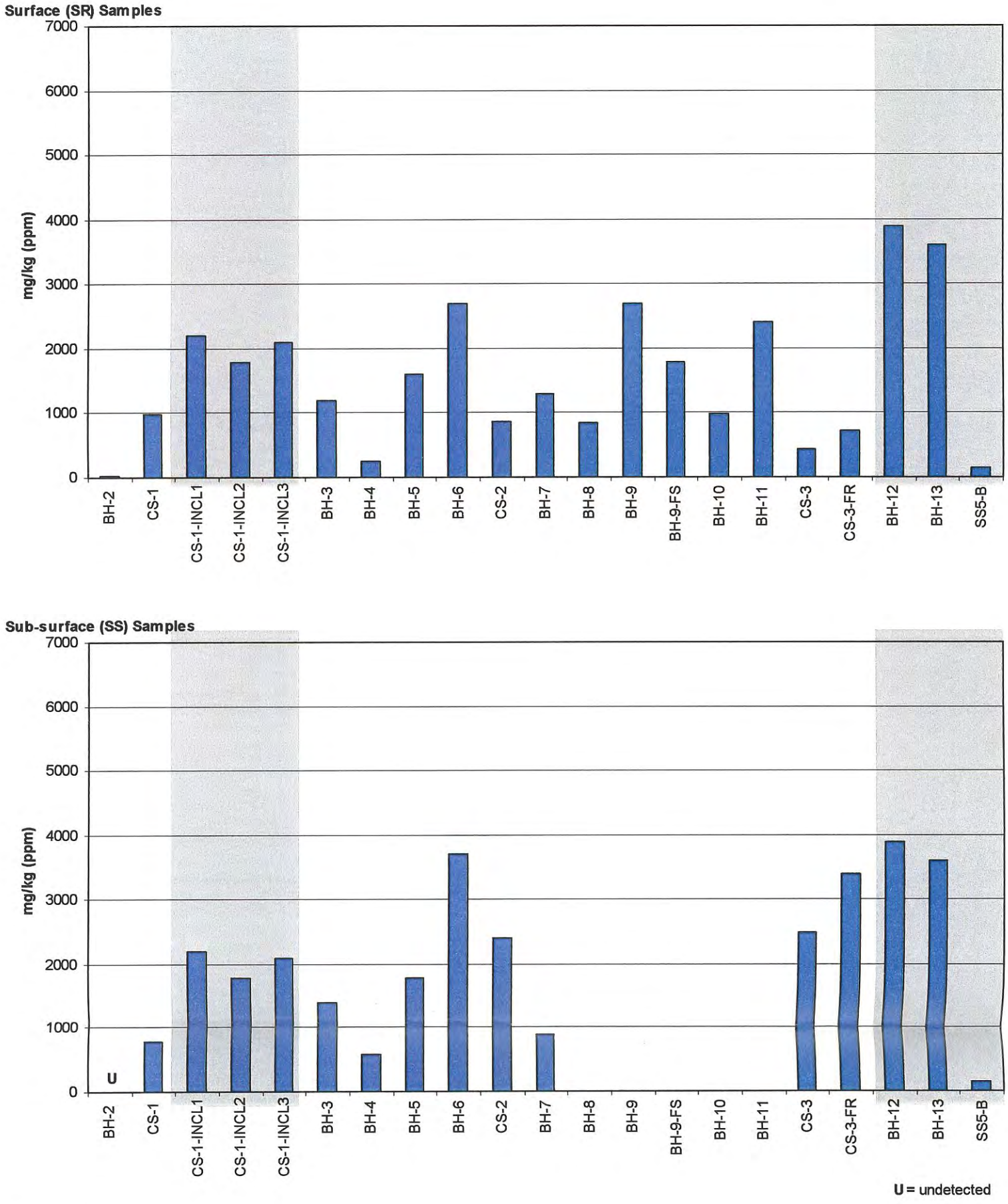


Figure 7-4. Sulfides for samples collected on or near the Pier 64/65 Sediment Cap in March 2004. Results for off-cap stations (BH-12, BH-13 and SS5-B) and station CS-1 inclusion (INCL) samples included for comparison in each graph.

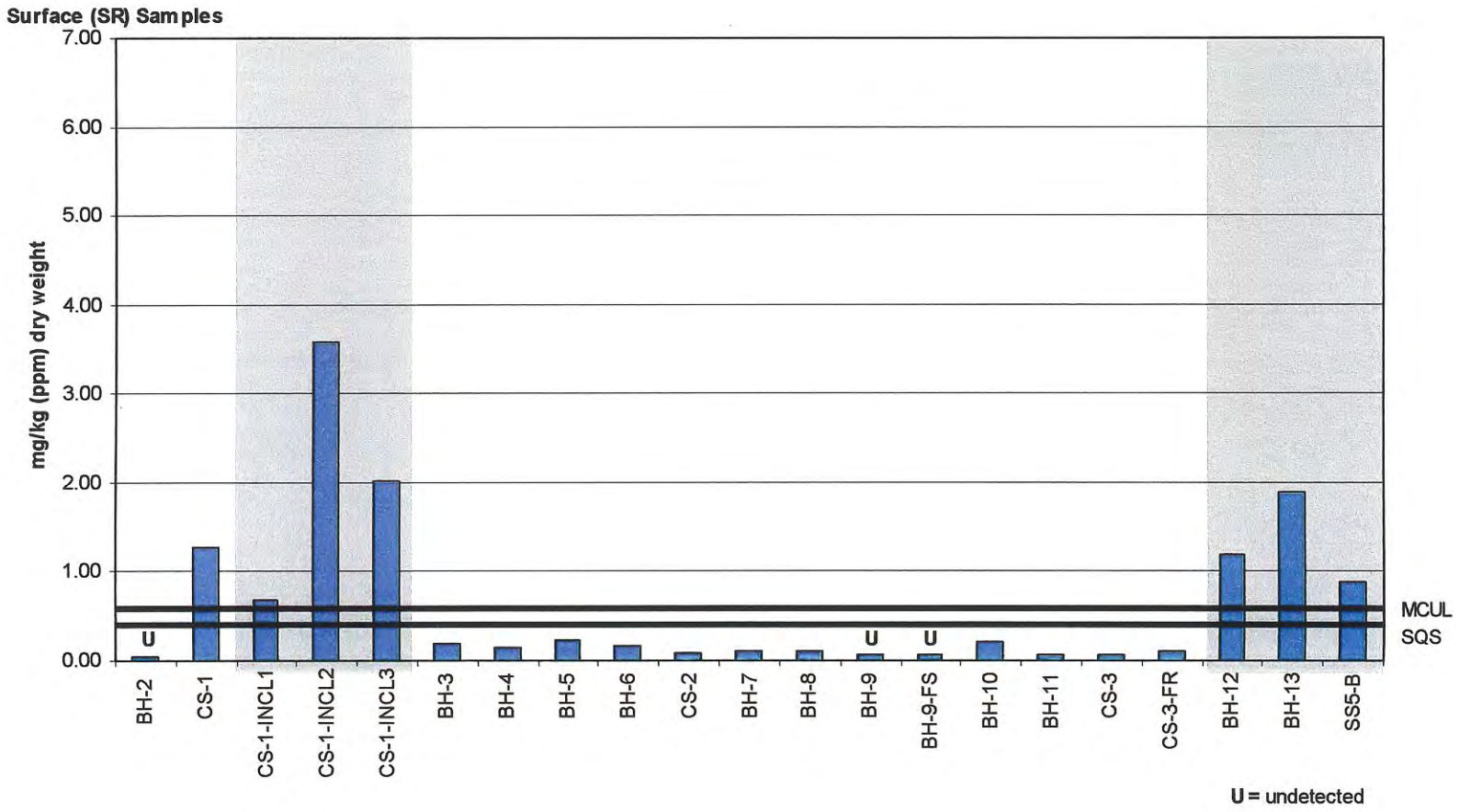
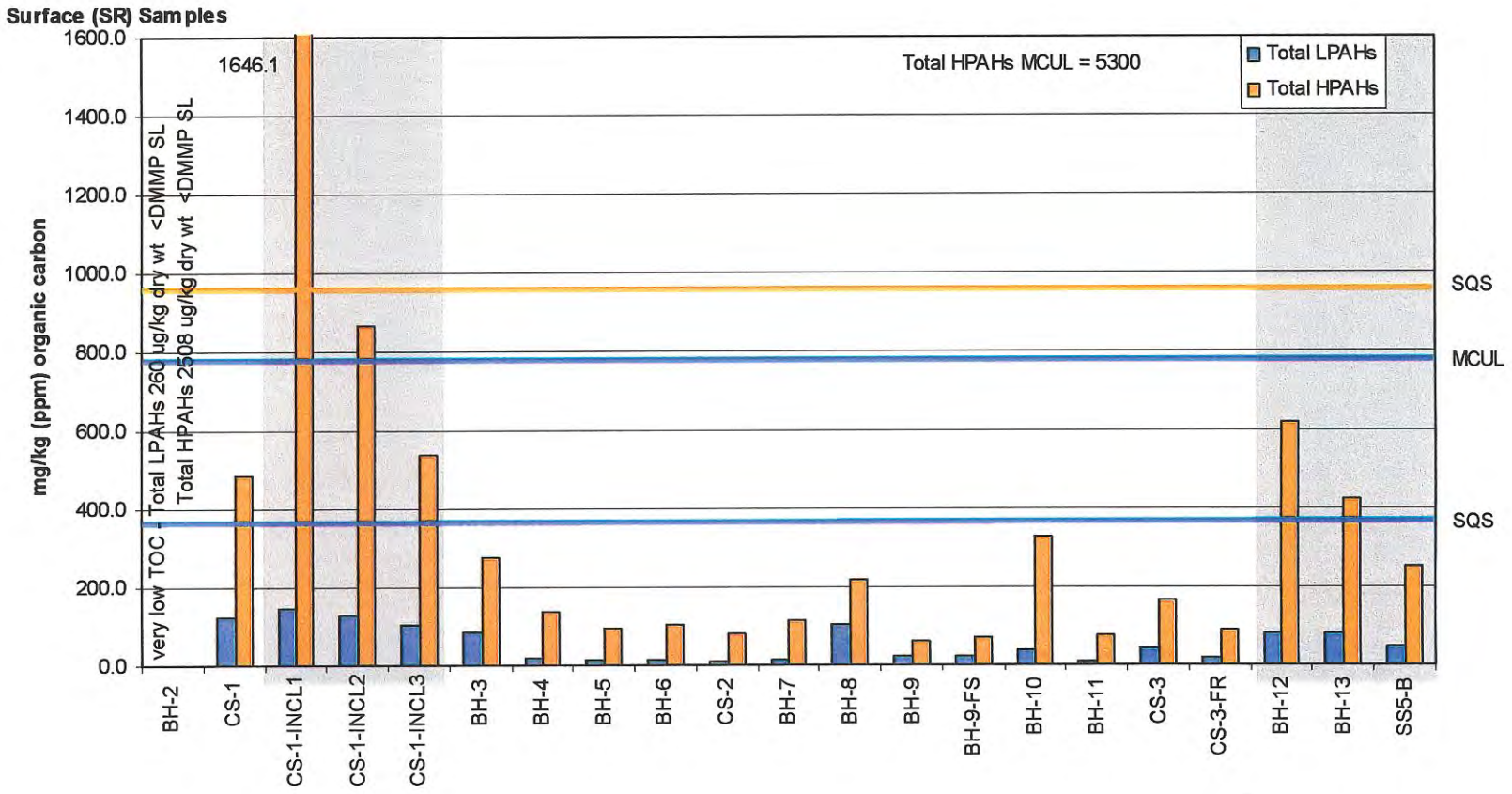
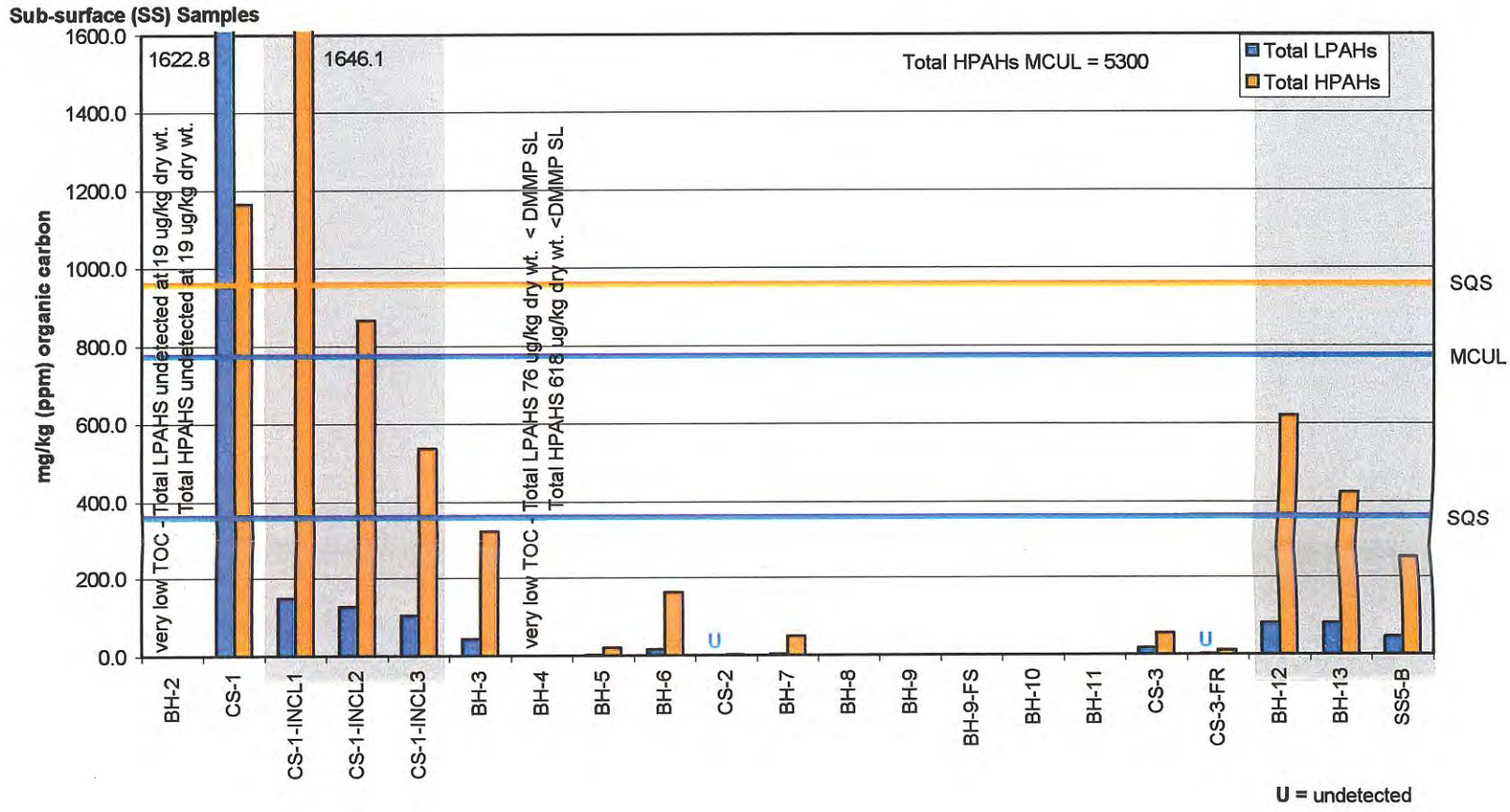


Figure 7-5. Mercury for samples collected on or near the Pier 64/65 Sediment Cap in March 2004. Results for off-cap stations (BH-12, BH-13 and SS5-B) and station CS-1 inclusion (INCL) samples included for comparison in each graph.





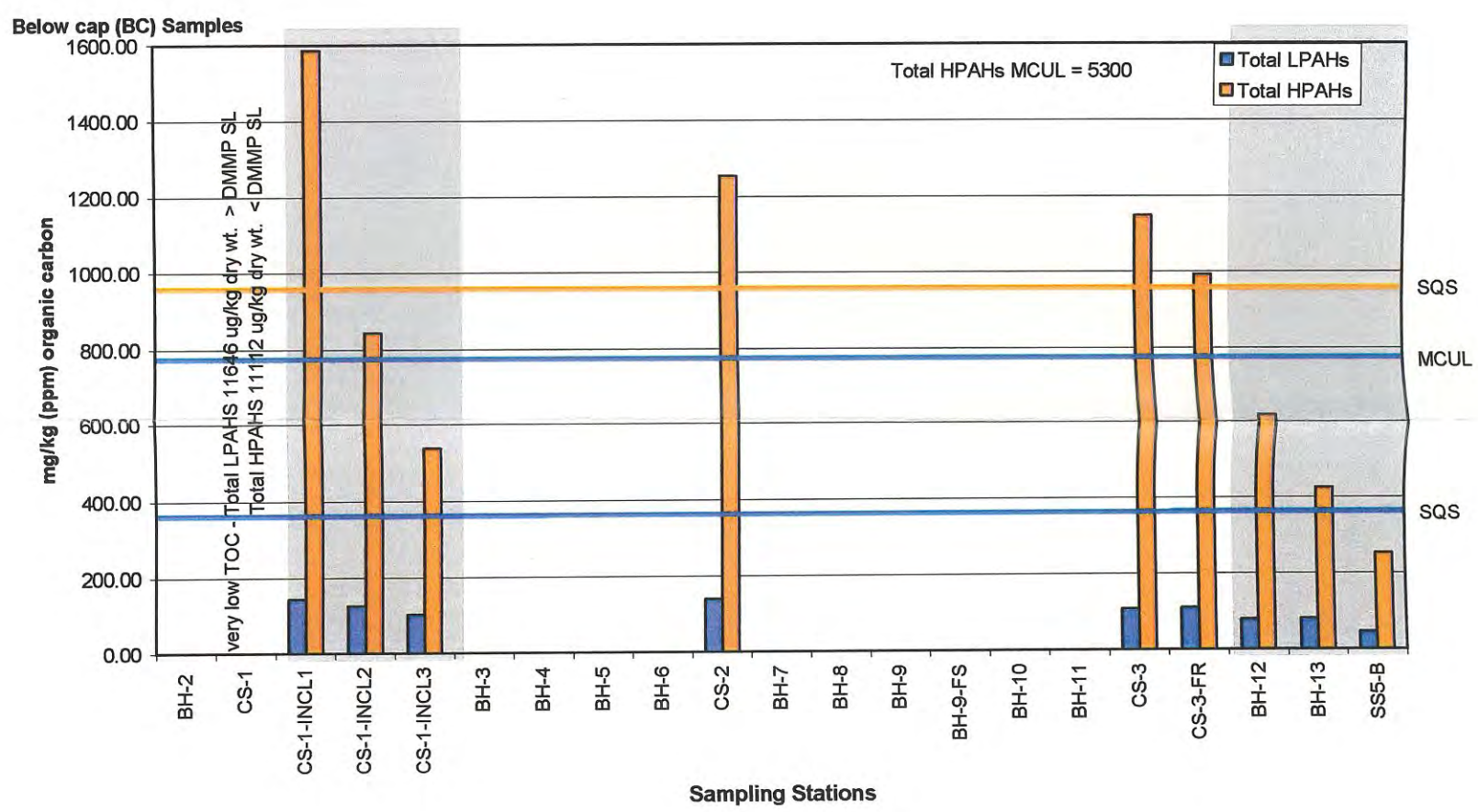


Figure 7-6. Total LPAHS and total HPAHs for samples collected on or near the Pier 64/65 Sediment Cap in March 2004. Results for off-cap stations (BH-12, BH-13 and SS5-B) and station CS-1 inclusion (INCL) samples included for comparison in each graph.

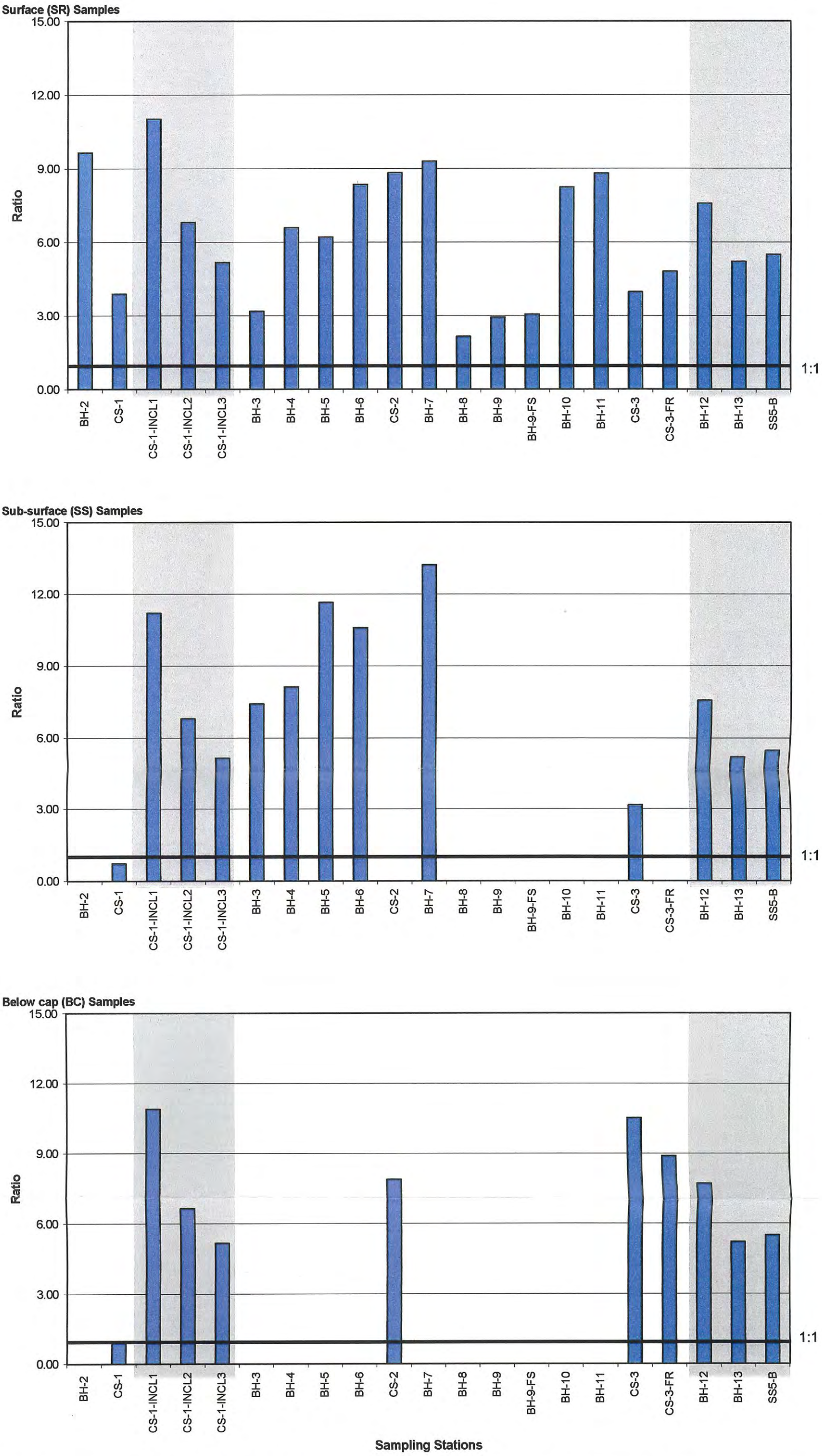
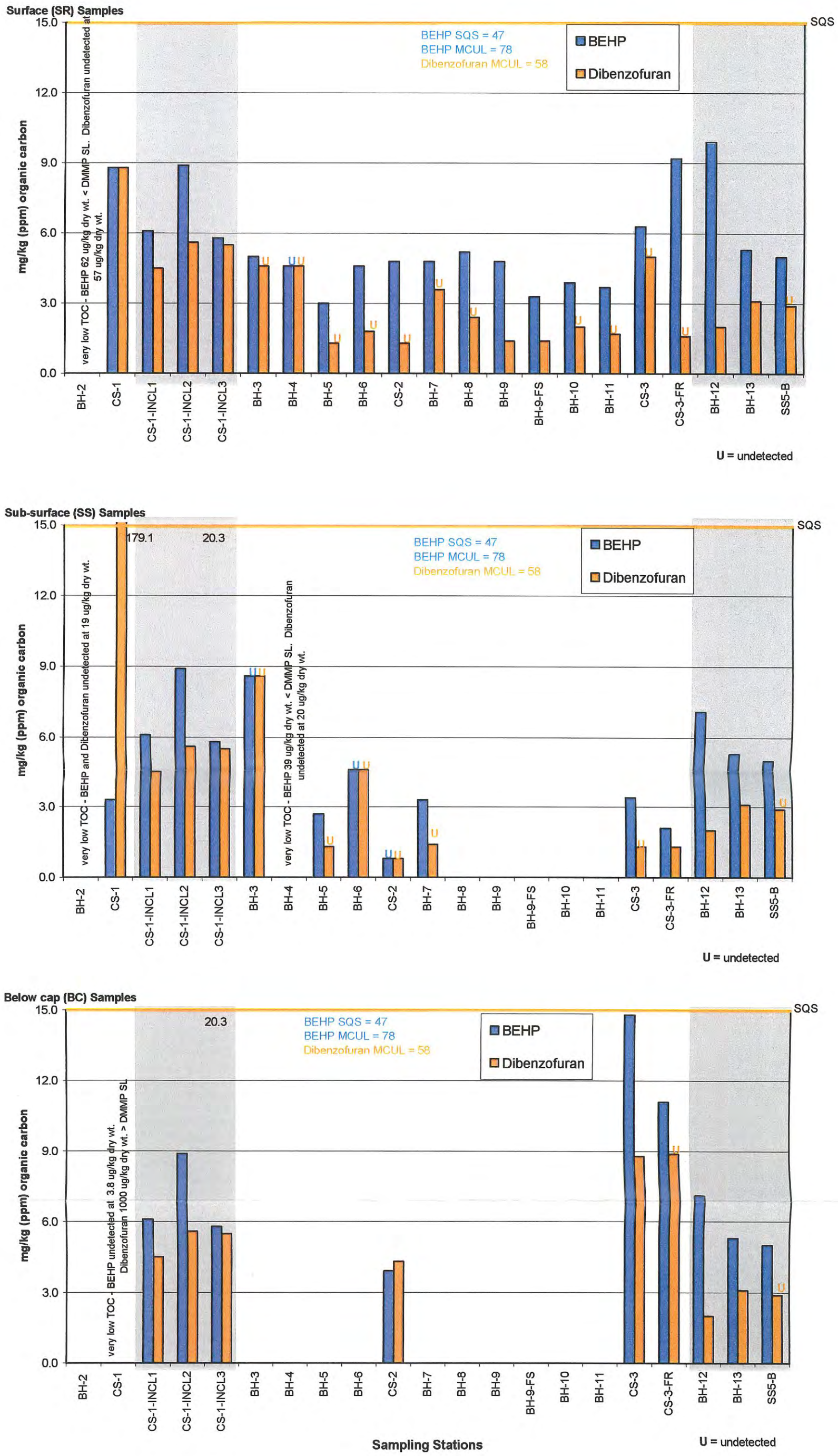
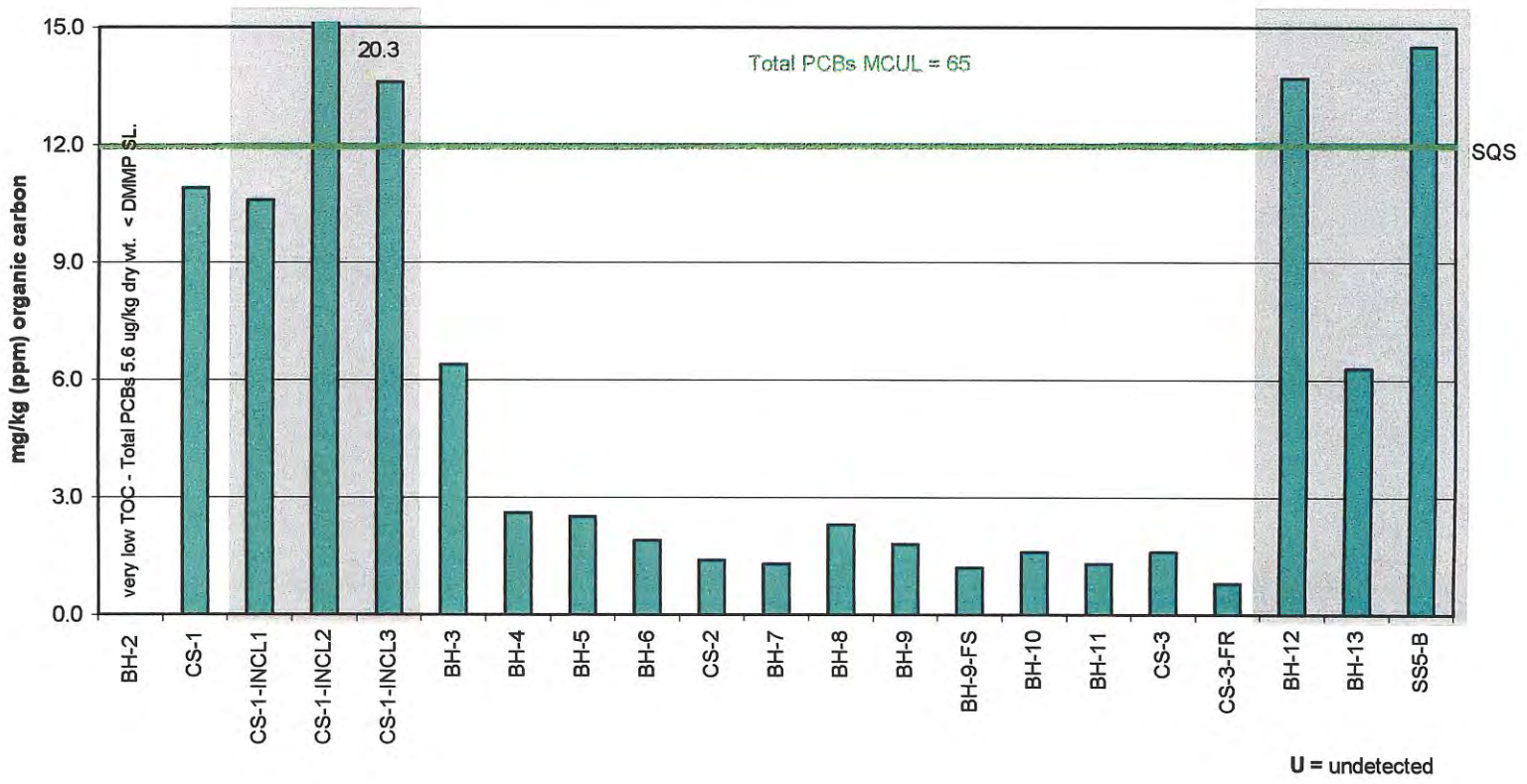


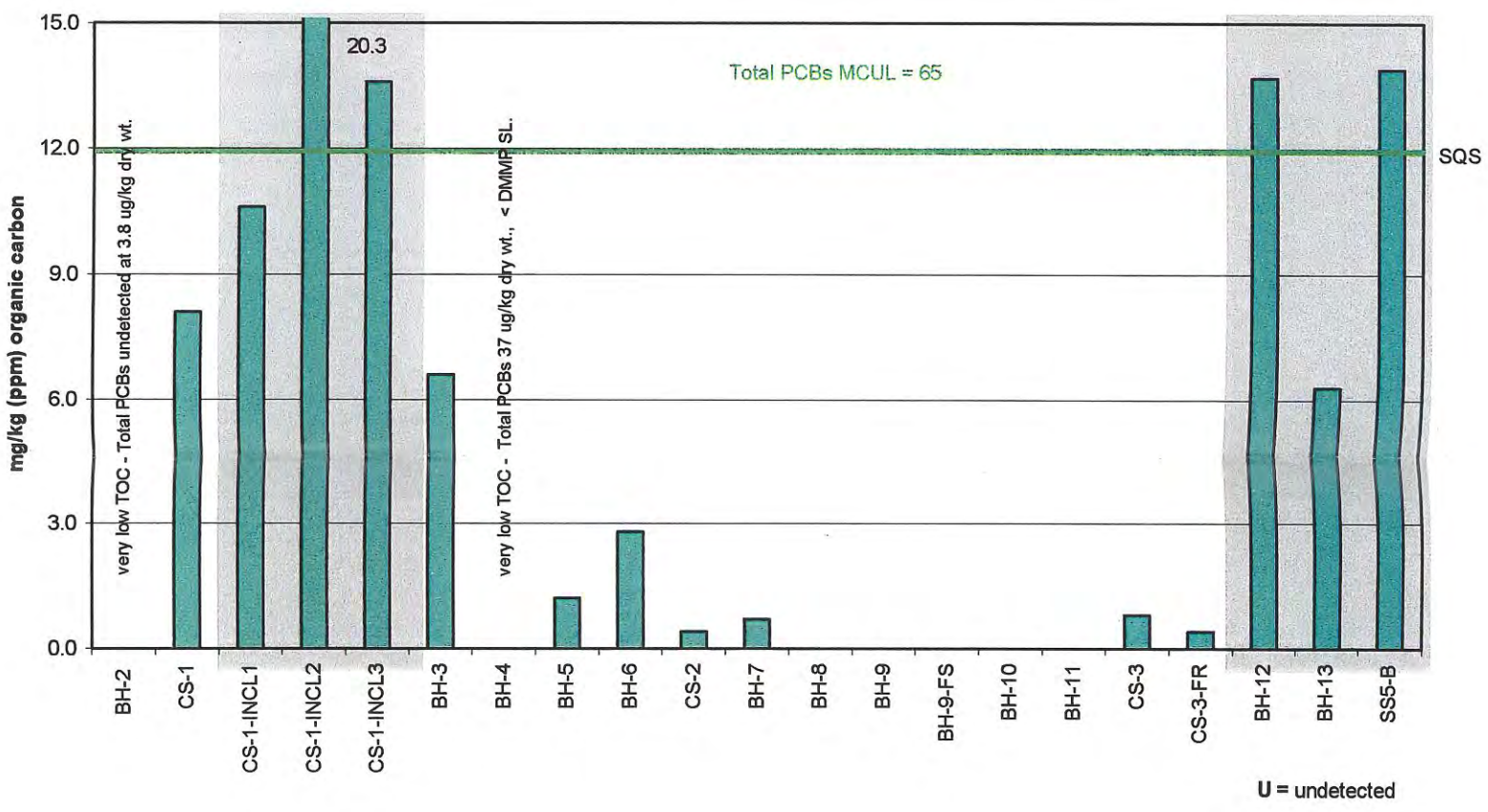
Figure 7-7. Ratio of HPAHs to LPAHs for samples collected on or near the Pier 64/65 Sediment Cap in March 2004. Results for off-cap stations (BH-12, BH-13 and SS5-B) and station CS-1 inclusion (INCL) samples included for comparison in each graph.


Surface (SR) Samples
mg/kg (ppm) organic carbon
15.0
12.0
9.0
6.0
3.0
0.0
SQS
BEHP SQS = 47
BEHP MCUL = 78
Dibenzofuran MCUL = 58
BEHP
Dibenzofuran
very low TOC - BEHP 62 ug/kg dry wt. < DMMP SL. Dibenzofuran undetected at 57 ug/kg dry wt.
U
U U
U
U

Surface (SR) Samples



Sub-surface (SS) Samples



Below cap (BC) Samples

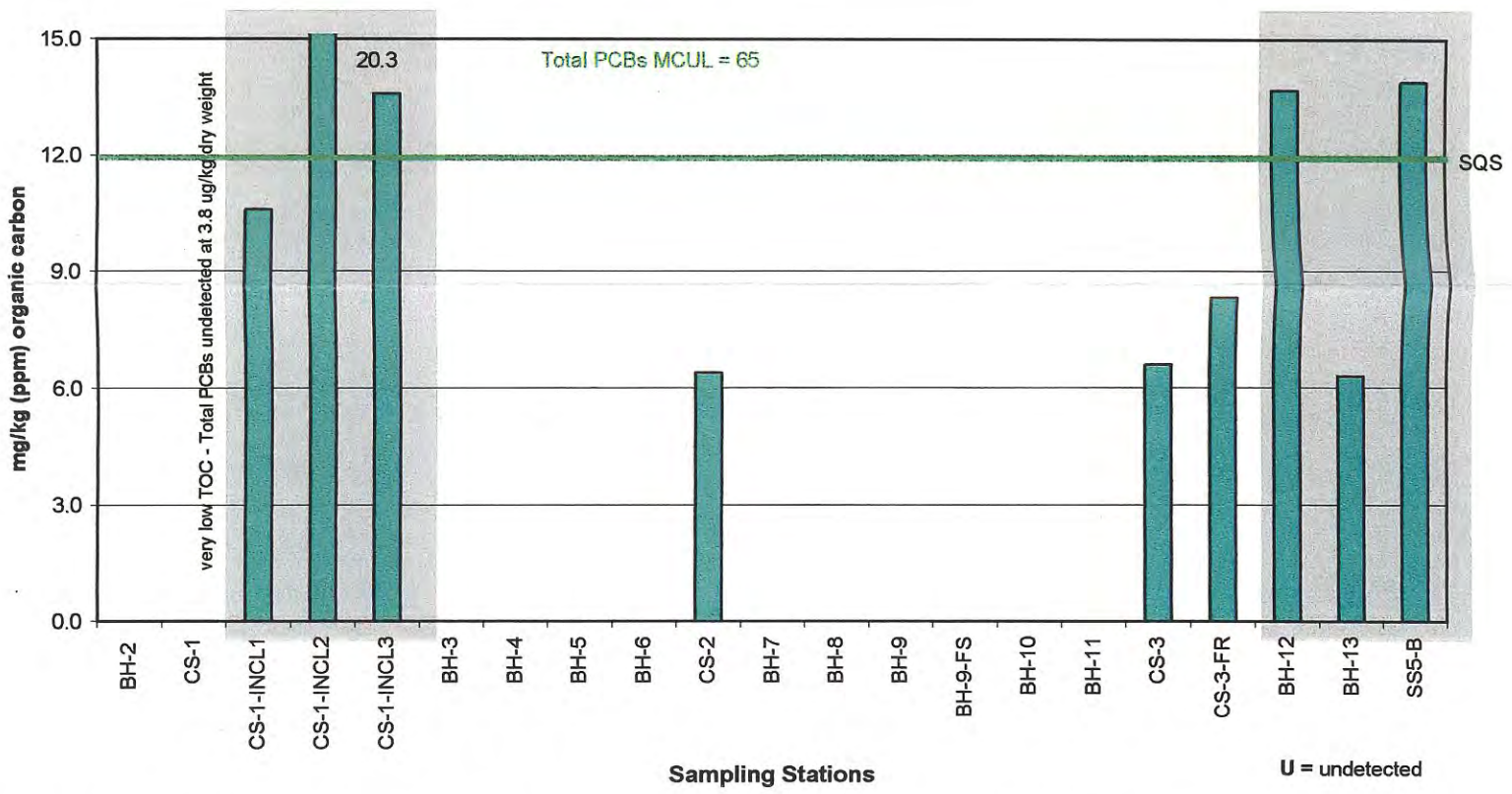


Figure 7-9. Total PCBs for samples collected on or near the Pier 64/65 Sediment Cap in March 2004. Results for off-cap stations (BH-12, BH-13 and SS5-B) and station CS-1 inclusion (INCL) samples included for comparison in each graph.

BH-2-SS, BH-4-SS and CS-1-BC). For these samples, dry weight concentrations are shown, and shading is added if the concentrations exceed DMMP chemistry guidance values (Corps 2004).

Summary Tables 7-2 to 7-4 also show ratios of total HPAH to total LPAH concentrations for each sample. These ratios give some indication of how recently PAHs may have been deposited in the sediment. LPAHs, which are PAHs with molecular weights smaller than fluoranthene, are more susceptible to weathering processes than HPAHs. As a result, over time there is a selective degradation and loss of LPAHs in the sediment (Merrill and Wade 1985; Norton 1996). For example, Goyette and Brooks (1998), in a study of creosote-treated pilings in the Sooke Basin (Vancouver Island, British Columbia), found that there was a loss of LPAHs over time in creosote deposited in sediments near the treated pilings. This loss resulted in a higher proportion of HPAHs in sediment samples collected over a year later (384 days). This selective degradation of LPAHs is reflected in HPAH : LPAH ratio values greater than one for sediments with PAHs deposited in the past ($\geq$ 1 year approximately) and values less than one indicating more recently deposited PAHs ($<$ 1 year approximately). This is just a rough indicator, with the most important information being whether the ratio is greater than or less than 1.0.

In each of the three summary tables, the results for the off-cap surface samples (BH-1, BH-13, and SS5-B) are shown, as well as the results for the surface sample collected at BH-12, which is equivalent to an off-cap station as there was no cap material found. As noted elsewhere, only one sediment core was collected at Station BH-1, with not enough sediment fine fractions present to analyze. In addition to the results for these samples, the results for the three black silt/clay inclusion (INCL) samples collected at Station CS-1 are also shown on each table for comparison.

Sample BH-9-SR-FS is a field split (FS) of sample BH-9-SR. Sediment composited together from the surface layer of four cores (see core diagrams for BH-9 Cores A to D), with sediment removed for two complete samples; as per PSWQAT (1997a) definition. Samples CS-3-SR-FR, CS-3-SS-FR, and CS-3-BC-FR are field replicates (FR) of samples CS-3-SR, CS-3-SS, and CS-3-BC.

7.3 Cap Stations Inside the Wave Boards

Eleven of the 17 stations sampled in March 2004 were located in protected waters inside the Bell Harbor Marina wave boards (Figure 5-1) and have different characteristics than stations located outside the wave boards (Section 7.4) and off the cap (Section 7.5). These stations were also within the planned Pier 64/65 thin-layer sediment cap boundaries as depicted in the habitat mitigation plan (Parametrix 1994). These 11 stations consist of Stations CS-2, CS-3, BH-3, and Stations BH-5 through BH-12. Although Station BH-12 is located within the planned cap boundaries, no cap material was found in the cores collected at this station. Therefore, this station is effectively an off-cap station; the results for sample BH-12-SR are also discussed in Section 7.2.3 (off-cap stations) for comparison.

Sediment chemistry and grain-size analysis results are presented and discussed below for these stations, with the results summarized in Tables 7-2 to 7-4 and in Figures 7-2 to 7-9. Full analysis results for each station are found in appropriate tables and figures in Appendix D and in the ARI laboratory reports in Appendix E.

7.3.1 Grain-size analysis

Grain-size analysis results for surface and sub-surface samples CS-2-SR and CS-2-SS show primarily sand fractions (76.6% and 89.8% sands versus 22.0% and 7.3% fines (silts + clays)) characteristic of the Pier 64/65 cap material (sands retained on 0.25, 0.5, and 0.125 mm sieve mesh sizes; Tables 7-2 and 7-3, Figures 7-2 and 7-3, Table D-6, and Figure D-2). As discussed in Polaris (2002), three grain-size fractions classified as sands were the most prevalent in samples containing cap material, with sand retained on a sieve mesh size of 0.25 mm being the most prevalent, generally followed by sand retained on the 0.5 mm mesh sieve and sands on the 0.125 mm mesh sieve. Grain-size results for sample CS-2-BC (below cap sample; Table 7-4) show sediment fraction patterns characteristic of native sediments (only 51.3% sands versus 31.5% fines), such as seen at Stations BH-12 and BH-13.

Grain-size analysis results for surface and sub-surface samples CS-3-SR, CS-3-SR-FR, CS-3-SS, and CS-3-SS-FR also show primarily the three sand fractions characteristic of the Pier 64/65 cap material (sand fractions from 77.7% to 89.9% versus 9.1% to 19.1% fines; Table D-9 and Figure D-3). Grain-size results for samples CS-3-BC and CS-3-BC-FR (below cap samples) show sediment fraction patterns characteristic of native sediments (44.4% and 40.1% sands versus 55.1% and 43.0% fines), such as seen at Stations BH-12 and BH-13.

Grain-size analysis results for surface and sub-surface samples BH-3-SR and BH-3-SS show sand fraction sizes and percentages (63.3% and 81.0% sands versus 19.8% and 16.2% fines) present in the surface and sub-surface samples that are characteristic of the sand cap material, although sample BH-3-SR also has 16.9% gravel fractions present (Table D-14 and Figure D-4).

Grain-size results for surface and sub-surface samples BH-5-SR, BH-6-SR, BH-6-SS and BH-7-SR show primarily the three sand fractions characteristic of the Pier 64/65 cap material (70.6% to 85.2% sands versus 11.4% to 28.7% fines; Table D-18 and Figure D-5). However, the grain-size results for sample BH-5-SS (sub-surface sample) show a sediment fractions pattern not typical of cap material (56.8% sands versus 42.1% fines). The core diagram for this sample shows that the sample consisted mostly of black silt/clay inclusion material (Figure B-10).

Grain-size results for surface samples BH-8-SR, BH-9-SR, and BH-9-SR-FS show primarily the three sand fractions characteristic of the Pier 64/65 cap material (71.5% to 82.5% sands versus 15.8% to 26.5% fines; Table D-20 and Figure D-6). An additional note for Station BH-9 is that compacted black leaves were present in Cores C and D (see core diagrams in Figure B-17). These leaves are likely from the Duwamish turning basin, the source of the cap material.

Grain-size analysis results for surface samples BH-10-SR and BH-11-SR show primarily the three sand fractions characteristic of the Pier 64/65 cap material (84.3% and 81.4% sands versus 13.8% and 17.0% fines; Table D-23 and Figure D-7). However, sample BH-12-SR has a sediment fraction pattern characteristic of native sediments (47.1% sands versus 37.3% fines). This pattern is similar to that seen in sample BH-13-SR, collected at an off-cap station. Station BH-12 is located within the planned boundaries of the Pier 64/65 thin-layer sediment cap (Figure

5-1), but no cap material was observed in the split cores (Figure B-22; see also Figure B-23 for Station BH-13).

7.3.2 Conventionals

Total Organic Carbon (TOC)

Total Organic Carbon (TOC) percentages for the surface samples collected at the eleven cap stations inside the marina wave boards ranged from 2.1% (sample BH-6-SR) to 3.8% (sample BH-10-SR), excluding sample BH-12-SR (Table 7-2 and Figure 7-3). As discussed above, there was no cap material present at Station BH-12. Sample BH-12-SR had a TOC percentage of 5.9% higher than the other 11 surface samples collected on the Pier 64/65 sediment cap. This is similar to the surface sample (BH-13-SR) collected at the nearby off-cap Station BH-13, which had a TOC percentage of 4.9%.

Total organic carbon (TOC) percentages for the seven sub-surface samples collected and analyzed at cap stations inside the wave boards ranged from 1.4% (sample BH-3-SS) to 5.0% (sample CS-2-SS)(Table 7-3). Total organic carbon (TOC) percentages for the three below-cap samples collected and analyzed at cap stations inside the wave boards ranged from 4.9% (sample CS-2-BC) to 6.7% (sample CS-3-BC)(Table 7-4).

Total Sulfides

Concentrations of total sulfides (mg/kg) for the surface samples collected at the cap stations inside the marina wave boards ranged from 430 mg/kg (sample CS-3-SR) to 2,700 mg/kg (samples BH-6-SR and BH-9-SR) (Table 7-2 and Figure 7-4). Sample BH-12-SR, with no cap material present, had a higher concentration of 3,900 mg/kg total sulfides (Table 7-2), similar in value to the off-cap sample BH-13-SR with a concentration of 3,600 mg/kg.

Concentrations of total sulfides were higher for sub-surface samples collected and analyzed at cap stations inside the wave boards, ranging from 880 mg/kg (sample BH-7-SS) to 3700 mg/kg

(sample BH-6-SS) (Table 7-3). Total sulfides concentrations for below-cap samples collected and analyzed at cap stations inside the wave boards, ranging from 6700 mg/kg (sample CS-3-BC) to 15000 (sample CS-3-BC-FR).

7.3.3 Mercury

Mercury concentrations in surface samples collected on the sediment cap at stations inside the wave boards ranged from undetected (samples BH-9-SR and BH-9-SR-FS) to 0.22 mg/kg (sample BH-5-SR) (Table 7-2 and Figure 7-5). The surface sample (BH-12-SR) collected at Station BH-12, which had no cap material, had a much higher mercury concentration of 1.2 mg/kg.

Mercury concentrations in analyzed sub-surface samples for cap stations inside the wave boards ranged from undetected (samples CS-2-SS and BH-7-SS) to 0.09 mg/kg (samples BH-3-SS and BH-6-SS). Mercury concentrations in analyzed below-cap samples, collected at cap stations inside the wave boards, were higher, ranging from 0.53 (sample CS-2-BC) to 1.3 mg/kg (sample CS-3-BC).

7.3.4 PAHs

Total LPAH concentrations in surface samples collected on the sediment cap at stations inside the wave boards ranged from 8.5 mg/kg (or ppm) normalized to OC (sample BH-11-SR) to 102.9 mg/kg OC (sample BH-8-SR) (Table 7-2 and Figure 7-6). Total HPAH concentrations in these samples ranged from 63.9 mg/kg OC (sample BH-9-SR) to 326.8 mg/kg OC (sample BH-10-SR). Ratios of HPAH to LPAH concentrations ranged from 2.15 (sample BH-8-SR) to 8.80 (sample BH-11-SR) (Figure 7-7). The fact that these PAH ratios are greater than 1.0 may indicate that the PAHs in these samples were not deposited recently (1 year (or more) ago) (Norton 1996; Merrill and Wade 1985; Goyette and Brooks 1998).

The surface sample (BH-12-SR) collected at Station BH-12 (within the cap boundaries but with no cap material present) had concentrations of LPAHs of 81.9 mg/kg OC, concentrations of HPAHs of 621.2 mg/kg OC, and a HPAH to LPAH ratio of 7.58.

Total LPAH concentrations in sub-surface cap material samples collected and analyzed at stations inside the wave boards ranged from undetected (samples CS-2-SS and CS-3-SS-FR) to 43.6 mg/kg OC (sample BH-3-SS)(Table 7-3). Total HPAH concentrations in these samples ranged from 1.9 mg/kg OC (sample CS-2-SS) to 323.6 mg/kg OC (sample BH-3-SS). Ratios of HPAH to LPAH concentrations ranged from 3.16 (sample CS-3-SS) to 13.22 (sample BH-7-SS).

Total LPAH concentrations in below-cap samples collected and analyzed on the sediment cap at stations inside the wave boards ranged from 109.0 mg/kg OC (sample CS-3-BC) to 141.0 mg/kg OC (sample CS-2-BC)(Table 7-4). Total HPAH concentrations in these samples ranged from 992.5 mg/kg OC (sample CS-3-BC-FR) to 1254.1 mg/kg OC (sample CS-2-BC) higher than HPAH concentrations in surface and subsurface samples. Ratios of HPAH to LPAH concentrations ranged from 8.89 (sample CS-2-BC) to 10.53 (sample CS-3-BC).

7.3.5 PCBs

Total PCB concentrations in surface samples collected on the sediment cap at stations inside the wave boards ranged from 0.8 mg/kg OC (sample CS-3-SR-FR) to 6.4 mg/kg OC (sample BH-3-SR) (Table 7-2 and Figure 7-9)). The surface sample (BH-12-SR) collected at Station BH-12 (within the cap boundaries but with no cap material present) had a higher total PCB concentration of 13.7 mg/kg OC. Of the 13 total surface samples collected on the cap inside the wave boards, Aroclors 1248, 1254 and1260 were detected in eight samples (including BH-12-SR). Only Aroclors 1254 and 1260 were detected in the other five samples, with Aroclor 1248 undetected in two samples (at Station CS-3) and flagged "Y" in three other samples (from Stations BH-4, BH-6 and BH-11).

Total PCB concentrations in sub-surface samples collected and analyzed on the sediment cap at stations inside the wave boards ranged from 0.4 mg/kg OC (samples CS-2-SS and CS-3-SS-FR;

Table 7-3) to 7.3 mg/kg OC (sample BH-4-SS; Table D-12). Sample BH-4-SS has low TOC (0.51%), so dry weight concentrations are shown in Table 7-3. Of the seven sub-surface samples, Aroclors 1248, 1254 and 1260 were detected in four samples. Only Aroclors 1254 and 1260 were detected in the other three samples, with Aroclor 1248 undetected in two samples (from Station CS-3) and flagged "Y" in the sample from Station BH-7.

Total PCB concentrations in below-cap samples collected and analyzed on the sediment cap at stations inside the wave boards ranged from 6.4 mg/kg OC (sample CS-2-BC) to 8.3 mg/kg OC (sample CS-3-BC-FR) (Table 7-4). Aroclors 1248, 1254 and 1260 were detected in all three below-cap samples.

7.3.6 Other organic compounds

Bis(2-ethylhexyl)phthalate (BEHP)

Bis(2-ethylhexyl)phthalate (BEHP) concentrations in surface samples collected on the sediment cap at stations inside the wave boards ranged from 3.0 mg/kg OC (sample BH-5-SR) to 9.2 mg/kg OC (sample CS-3-SR-FR) (Table 7-2 and Figure 7-8). The surface sample (BH-12-SR) collected at Station BH-12 (within the cap boundaries but with no cap material present) had a BEHP concentration of 9.0 mg/kg OC.

BEHP concentrations in sub-surface samples collected and analyzed on the sediment cap at stations inside the wave boards ranged from undetected (samples BH-3-SS, BH-6-SS and CS-2-SS; Table 7-3) to 7.6 mg/kg OC (sample BH-4-SS; Table D-12). Sample BH-4-SS has low TOC (0.51%), so dry weight concentrations are shown in Table 7-3. BEHP concentrations in below-cap samples collected and analyzed on the sediment cap at stations inside the wave boards ranged from 3.9 mg/kg OC (sample CS-2-BC) to 14.8 mg/kg OC (sample CS-3-BC).

Dibenzofuran

Dibenzofuran concentrations were undetected in 10 of the 12 surface samples collected on the sediment cap at stations inside the wave boards, with 1.4 mg/kg OC detected in both samples BH-9-SR and BH-9-SR-FS (Table 7-2 and Figure 7-8). The surface sample (BH-12-SR) collected at Station BH-12 (within the planned cap boundaries but with no cap material present) had an estimated dibenzofuran concentration of 2.0 mg/kg OC.

Dibenzofuran concentrations were only detected in one of the sub-surface samples collected and analyzed on the sediment cap at stations inside the wave boards (Table 7-3). Sample CS-3-SS had a dibenzofuran concentration of 1.3 mg/kg OC. Dibenzofuran concentrations in below-cap samples collected and analyzed on the sediment cap at stations inside the wave boards ranged from undetected (sample CS-3-BC-FR) to 8.8 mg/kg OC (sample CS-3-BC) (Table 7-4).

7.3.7 Comparisons to sediment quality criteria

There were no exceedances of SMSs SQS or MCUL criteria in any of the samples collected at stations located inside the marina wave boards and within the cap boundaries, with the exception of three below-cap samples (CS-2-BC, CS-3-BC and CS-3-BC-FR), and the surface sample (BH-12-SR) collected at Station BH-12, which is within the planned cap boundary, but with no cap material present (Table 7-2).

The below-cap sample CS-2-BC exceeded SMSs criteria for mercury, total HPAHs and six individual HPAHs (Table D-5). Sample CS-2-BC had a concentration of 0.53 mg/kg mercury; this exceeds the SQS criterion for mercury of 0.41 mg/kg, but is below the MCUL criterion of 0.59 mg/kg. The total HPAHs concentration of 1,254.1 mg/kg OC in this sample exceeds the SQS criterion for total HPAHs of 960 mg/kg OC, but is below the MCUL criterion of 5,300 mg/kg OC. Individual HPAHs exceeding their respective SQS criteria in this sample are chrysene, total benzofluoranthenes, benzo(a)pyrene, Indeno(1,2,3,-cd)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,I)perylene.

Sample CS-3-BC exceeded SMSs criteria for mercury, total HPAHs and four individual HPAHs (Table D-7). Sample CS-3-BC had a concentration of 1.3 mg/kg mercury, exceeding the MCUL criterion of 0.59 mg/kg. The total HPAHs concentration of 1,148.2 mg/kg OC in this sample exceeds the SQS criterion for total HPAHs of 960 mg/kg OC, but is below the MCUL criterion of 5,300 mg/kg OC. The individual HPAHs exceeding their respective SQS criteria in this sample are benzo(a)anthracene, chrysene, total benzofluoranthenes, and benzo(a)pyrene.

Sample CS-3-BC-FR had SMSs criteria exceedances for mercury, total HPAHs and three individual HPAHs (Table D-8). Sample CS-3-BC-FR had a concentration of 1.25 mg/kg mercury, which exceeds the MCUL criterion for mercury of 0.59 mg/kg. The total HPAHs concentration of 992.5 mg/kg OC in this sample exceeds the SQS criterion for total HPAHs of 960 mg/kg OC, but is below the MCUL criterion of 5,300 mg/kg OC. The individual HPAHs that exceed their respective SQS criteria in this sample are chrysene, total benzofluoranthenes, and benzo(a)pyrene.

Sample BH-12-SR had SMSs exceedances for mercury and total PCBs (Table D-22). Sample BH-12-SR had a concentration of 1.2 mg/kg mercury, which exceeds the MCUL criterion for mercury of 0.59 mg/kg. The total PCBs concentration of 13.7 mg/kg OC in this sample exceeds the SQS criterion for total PCBs of 12.0 mg/kg OC. Individual Aroclors 1248, 1254, and 1260 were present.

7.4 Cap Stations Outside the Wave Boards

Three of the 17 stations sampled in March 2004 were inside the planned Pier 64/65 thin-layer sediment cap boundaries as depicted in Parametrix (1994), but were located in unprotected waters outside the Bell Harbor Marina wave boards (Figure 5-1). These were Stations CS-1, BH-2, and BH-4.

Sediment chemistry and grain-size analysis results are presented and discussed below for these stations, with results summarized in Tables 7-2 to 7-4 and Figures 7-2 to 7-9. Full results for

each station are found in appropriate tables and figures in Appendix D and in the ARI laboratory reports in Appendix E.

7.4.1 Grain-size analysis

Station CS-1 Samples

Grain-size analysis results for surface and sub-surface samples CS-1-SR and CS-1-SS show primarily sand fractions (62.6% and 55.4% sands versus 32.1% and 38.1% fines (silts + clays)) characteristic of the Pier 64/65 cap material (sands retained on 0.25, 0.5 and 0.125 mm sieve mesh sizes; Tables 7-2 and 7-3, Figures 7-2 and 7-3, and Table D-4 and Figure D-1). However, these samples have higher fines percentages than other cap station samples discussed in Section 7.3.1. This may be due to the presence of black silt/clay inclusion layers at the sub-sample locations (Figure B-1).

Grain-size results for sample CS-1-BC (below cap sample; Table 7-4) show a larger percentage of gravel and sand fractions (38.9% and 59.7%) than sediment fraction patterns characteristic of native sediments at other locations that have lower sands and higher fines percentages (such as sediment at Stations BH-12 and BH-13). However, as noted in the grain-size analysis case narrative for this sample (see Appendix E analysis report for GL75 samples), there were not enough sediment fines present (less than 5 grams) to properly quantify these fractions. Therefore, the percentages for these fractions were set at zero.

Station CS-1 Inclusion (INCL) Samples

Grain-size analysis results for sample CS-1-INCL1 show a sediment fraction pattern similar to that seen in surface sample CS-1-SR, with 64.9% sands and 29.3% fines (Table 7-2, Figures 7-2 and 7-3; Table D-4 and Figure D-1). In addition, the sand fractions present in sample CS-1-INCL1 are those characteristic of the Pier 64/65 sediment cap material. However, grain-size analysis results for samples CS-1-INCL2 and CS-1-INCL3 show higher percentages of fines (46.2% and 48.8%) and lower percentages of sands (39.0% and 46.7%) than in samples CS-1-SR and CS-1-INCL1. The sand fractions characteristic of the Pier 64/65 cap are still present in these

samples, but at lower percentages. The INCL samples were collected from the split cores in such a way as to include as much of the black silt/clay inclusion layer material as possible (see core diagrams in Figure B-2). The higher sediment fines percentages in these samples reflects this fact. However, the samples were collected inside the Pier 64/65 sediment cap material layer, thus they still include the cap sand fractions.

The sediment fractions pattern seen in the INCL samples collected at Station CS-1 appears to be quite different from that of the below-cap sample (CS-1-BC) collected at the same station. Thus, the black silt/clay inclusion material in these samples (and samples CS-1-SR and CS-1-SS) appears to be part of the Pier 64/65 cap material, and not the same as the below-cap native sediments at this location. In addition, the profile of silt and clay fractions in the INCL samples appears to be different from the fractions profile of silts and clays in the off-cap sample SS5B-SR (Table D-23 and Figure D-7). However, the fractions patterns seen in samples CS-1-INCL2 and CS-1-INCL3 appears to be somewhat similar to those seen in the off-cap samples BH-12-SR and BH-13-SR, due to similar percentages of sands versus fines. However, as noted above, these samples appear to consist of cap material and not native sediments.

Existing pre-cap sediments present just offshore of the wave boards (where Stations BH-1, BH-2, CS-1 and BH-4 are located) appear to consist of different and coarser sediment fractions (more sands and gravels) than existing pre-cap sediments seen inside the marina wave boards (at off-cap stations in below-cap samples) and farther off-shore (at Station SS5-B). This point is illustrated by comparing the existing pre-cap sediment characteristics and grain-size results seen in:

1) the core diagrams for Stations BH-1, BH-2, CS-1 and BH-4 (Figures B-6, B-7, B-1, B-2 and B-9) and grain-size results for sample CS-1-BC (Table D-4 and Figure D-1); and

2) core diagrams for cap stations inside the wave boards (showing existing sediments below cap material in Appendix B) and grain-size results for samples BH-12-SR, BH-13-SR and SS5-B-SR collected at off-cap stations (Table D-23 and Figure D-7) and

for below-cap samples CS-2-BC and CS-3-BC (Table D-6 and Figure D-2; Table D-9 and Figure D-3).

These sediment fractions patterns are also evident in Figures 7-2 and 7-3.

Stations BH-2 and BH-4 Samples

Grain-size analysis results for surface and sub-surface samples BH-2-SR and BH-2-SS show primarily gravel and sand fractions (39.2% and 61/1% gravels and 56.5% and 37.3% sands), with low percentages of fines (3.8% and 1.6%) present (Tables 7-2 and 7-3, Figures 7-2 and 7-3; Table D-14 and Figure D-4). However, the sediment fractions patterns for these samples do not show as close a match to the sand fractions pattern characteristic of the Pier 64/65 thin-layer sediment cap material as other cap samples. The BH-2 samples have higher percentages of gravel, and smaller relative percentages of the 0.125 mm sand fraction, than do other samples showing sand fractions characteristic of the Pier 64/65 cap. In addition, as noted in the grain-size analysis case narrative for sample BH-2-SS (see Appendix E analysis report for GL75 samples), there were not enough sediment fines present (less than 5 grams) in this sample to properly quantify these fractions. Therefore, the percentages for these fractions were set at zero.

Grain-size analysis results for samples BH-4-SR and BH-4-SS show sand fraction sizes and percentages (82.5% and 64.6% sands versus 10.3% and 4.2% fines) present in the surface and sub-surface samples characteristic of the sand cap material (Table 7-2 and 7-3; Table D-14 and Figure D-4). However, sample BH-4-SS also has 31.3% gravel fractions present.

7.4.2 Conventionals

Total Organic Carbon (TOC)

Total Organic Carbon (TOC) percentages for the three surface samples collected at cap stations outside the marina wave boards ranged from 0.12% (sample BH-2-SR) to 4.1% (sample CS-1-SR) (Table 7-2 and Figure 7-3; Tables D-1, D-10 and D-12). Total organic carbon (TOC)

percentages for the three black silt/clay inclusion samples collected at Station CS-1 ranged from 3.3% (CS-1-INCL1and CS-1-INCL3) to 3.6% (CS-1-INCL2) (Tables 7-2 and D-2).

Total organic carbon (TOC) percentages for the three sub-surface samples collected at the cap stations outside the wave boards ranged from a very low percentage of 0.08% and a low percentage of 0.51% (samples BH-2-SS and BH-4-SS) to 4.3% (sample CS-1-SS) (Table 7-3; Tables D-1, D-10 and D-12). The TOC percentage for the below-cap sample (CS-1-BC) collected at Station CS-1 was also very low at 0.13% (Table 7-4).

Total Sulfides

Concentrations of total sulfides (mg/kg) for the three surface samples collected at cap stations outside the marina wave boards ranged from 23.0 mg/kg (sample BH-2-SR) to 980 mg/kg (sample CS-1-SR) (Table 7-2 and Figure 7-4; Tables D-1, D-10 and D-12). Total sulfide concentrations for the three black silt/clay inclusion (INCL) samples collected at Station CS-1 ranged from 1800 to 2200 mg/kg (Tables 7-2 and D-2).

Concentrations of total sulfides (mg/kg) for the three sub-surface samples collected at cap stations outside the marina wave boards ranged from undetected at 1.10 mg/kg (sample BH-2-SS) to 780 mg/kg (sample CS-1-SS) (Table 7-3). Total sulfides concentration for the below-cap sample (CS-1-BC) collected at Station CS-1 was 39.0 mg/kg (Table 7-4).

7.4.3 Mercury

Mercury concentrations in the three surface samples collected at cap stations outside the marina wave boards ranged from undetected at 0.05 mg/kg (sample BH-2-SR) to 1.28 mg/kg (sample CS-1-SR)(Table 7-2 and Figure 7-5; Tables D-1, D-10 and D-12). Mercury concentrations for the three black silt/clay inclusion samples collected at Station CS-1 ranged from 0.68 (sample CS-1-INCL1) to 3.58 mg/kg (sample CS-1-INCL2)(Tables 7-2 and D-2).

Mercury concentrations (mg/kg) for the three sub-surface samples collected at cap stations outside the marina wave boards ranged from undetected at 0.05 mg/kg (sample BH-2-SS) to 6.12 mg/kg (sample CS-1-SS) (Table 7-3). The mercury concentration for the below-cap sample (CS-1-BC) collected at Station CS-1 was undetected at 0.05 mg/kg (Table 7-4).

7.4.4 PAHs

Surface samples

Total LPAH concentrations in surface samples collected on the sediment cap at stations outside the wave boards ranged from 20.8 mg/kg (or ppm) normalized to OC (sample BH-4-SR) to 125.1 mg/kg OC (sample CS-1-SR) (Table 7-2 and Figure 7-6; Tables D-1, D-10 and D-12). Total LPAH concentrations in black silt/clay inclusion samples collected at Station CS-1 ranged from 104.2 (sample CS-1-INCL3) to 149.4 mg/kg OC (sample CS-1-INCL1) (Tables 7-2 and D-2).

In Table 7-2, the total LPAH concentration for surface sample BH-2-SR is reported as 260 µg/kg (ppb) dry weight instead of a concentration normalized to ppm OC. This was done as sample BH-2-SR has very low TOC (0.12%), creating artificially high ppm concentrations with organic carbon normalization.

Total HPAH concentrations in the surface samples ranged from 137.1 mg/kg OC (sample BH-4-SR) to 487.8 mg/kg OC (sample CS-1-SR). Sample BH-2-SR is shown in Table 7-2 with a HPAH concentration of 2,508 µg/kg (ppb) dry weight. Total HPAH concentrations in the black silt/clay inclusion samples collected at Station CS-1 ranged from 538.2 (sample CS-1-INCL3) to 1,646.1 mg/kg OC (Tables 7-2 and D-2).

Ratios of HPAH to LPAH concentrations in the three surface samples ranged from 3.90 (sample CS-1-SR) to 9.65 (sample BH-2-SR) (Figure 7-7). In the black silt/clay inclusion samples collected at Station CS-1, HPAH to LPAH ratios ranged from 5.17 (sample CS-1-INCL3) to 11.02 (sample CS-1-INCL1) (Tables 7-2 and D-2). The fact that these PAH ratios are greater

than 1.0 may indicate that the PAHs in these samples were not recently deposited (1 year (or more) ago) (Norton 1996; Merrill and Wade 1985; Goyette and Brooks 1998).

Sub-surface samples

The total LPAHs concentration in sub-surface sample CS-1-SS was 1,622.8 mg/kg OC (Tables 7-3 and D-1). In samples with very low or low TOC, total LPAHs were undetected at 19 µg/kg (ppb) dry weight in sample BH-2-SS and had a concentration of 76 µg/kg (ppb) dry weight in sample BH-4-SS (Tables 7-3 and Figure 7-6, D-10 and D-12).

The total HPAHs concentration in sub-surface sample CS-1-SS was 1,165.8 mg/kg OC (Table 7-3 and D-1). In samples with very low or low TOC, total HPAHs were undetected at 19 µg/kg (ppb) dry weight in sample BH-2-SS and had a concentration of 618 µg/kg (ppb) dry weight in sample BH-4-SS (Tables 7-3, D-10 and D-12).

The ratio of HPAH to LPAH concentrations in sub-surface samples ranged from 0.72 in sample CS-1-SS to 8.13 in sample BH-4-SS (Figure 7-7). The fact that the PAH ratio for sample CS-1-SS is less than 1.0 may indicate that the PAHs in this sample were recently deposited (less than 1 year ago) (Norton 1996; Merrill and Wade 1985; Goyette and Brooks 1998). The significance and/or reason for the low ratio (reflecting higher concentrations of LPAHs than HPAHs) in this sample is unclear.

Below-cap samples

The total LPAHs concentration in below-cap sample CS-1-BC, a very low TOC (0.13%) sample collected on the sediment cap outside the marina wave boards, was 11,646 µg/kg (ppb) dry weight (Tables 7-4, Figure 7-6, and D-1). The total HPAH concentration in this sample was 11,112 µg/kg (ppb) dry weight. The ratio of HPAH to LPAH concentrations in this sample was 0.95, which is less than 1.0 potentially indicating recent PAH deposition (less than 1 year ago) (Figure 7-7). As with sample CS-1-SS, it is unclear what the significance is of the low ratio in this sample.

7.4.5 PCBs

Total PCB concentrations in surface samples collected at cap stations outside the marina wave boards ranged from 2.6 mg/kg OC (sample BH-4-SR) to 10.9 mg/kg OC (sample CS-1-SR) (Table 7-2 and Figure 7-9; Tables D-1, D-10 and D-12). The total PCB concentration in sample BH-2-SR, a very low TOC (0.12%) sample, was 5.6 µg/kg (ppb) dry weight. Total PCB concentrations for the three black silt/clay inclusion samples collected at Station CS-1 ranged from 10.6 mg/kg OC (sample CS-1-INCL1) to 20.3 mg/kg OC (sample CS-1-INCL2) (Table 7-2 and D-2).

The total PCB concentration for the sub-surface sample CS-1-SS collected on the cap outside the marina wave boards was 8.1 mg/kg OC (Tables 7-3 and D-1). Total PCB concentrations for samples BH-2-SS and BH-4-SS, samples with very low (0.08%) and low (0.51%) TOC percentages, were undetected at 3.8 µg/kg (ppb) dry weight and 37 µg/kg (ppb) dry weight. The total PCB concentration for the below-cap sample (CS-1-BC) collected at Station CS-1 was undetected at 3.9 µg/kg (ppb) dry weight (Tables 7-4 and D-1).

Aroclors 1254 and 1260 were detected in all the cap samples collected outside the marina wave boards, with the exception of sample BH-2-SR where only Aroclor 1254 was detected, and samples BH-2-SS and CS-1-BC where no PCB Aroclors were detected. Aroclor 1248 was only detected in sample CS-1-SR, with Aroclor 1248 flagged "Y" in the three inclusion (INCL) samples collected at Station CS-1, and in sample BH-4-SR.

7.4.6 Other organic compounds

Bis(2-ethylhexyl)phthalate (BEHP)

The BEHP concentrations in the three surface samples collected at cap stations outside the marina wave boards ranged from undetected at 4.6 mg/kg OC (sample BH-4-SR) to 8.8 mg/kg OC (sample CS-1-SR) (Table 7-2 and Figure 7-8; Tables D-1, D-10 and D-12). The BEHP concentration in sample BH-2-SR, a very low TOC (0.12%) sample, was 62 µg/kg (ppb) dry

weight. Concentrations of BEHP for the three black silt/clay inclusion samples collected at Station CS-1 ranged from 5.8 (sample CS-1-INCL3) to 8.9 mg/kg OC (sample CS-1-INCL2) (Tables 7-2 and D-2).

The BEHP concentration for the sub-surface sample CS-1-SS collected on the cap outside the marina wave boards was 3.3 mg/kg OC (Tables 7-3 and D-1). The BEHP concentrations for samples BH-2-SS and BH-4-SS, samples with very low (0.08%) and low (0.51%) TOC percentages, were undetected at 19 µg/kg (ppb) dry weight and 39 µg/kg (ppb) dry weight. The BEHP concentration for the below-cap sample (CS-1-BC) collected at Station CS-1 was undetected at 20 µg/kg (ppb) dry weight (Tables 74 and D-1).

Dibenzofuran

Dibenzofuran concentrations in the three surface samples collected at cap stations outside the marina wave boards ranged from undetected at 4.6 mg/kg OC (sample BH-4-SR) to 8.8 mg/kg OC (sample CS-1-SR) (Table 7-2 and Figure 7-8; Tables D-1, D-10 and D-12). The dibenzofuran concentration in sample BH-2-SR, a very low TOC (0.12%) sample, was undetected at 57 µg/kg (ppb) dry weight. Dibenzofuran concentrations for the three black silt/clay inclusion samples collected at Station CS-1 ranged from 4.5 (sample CS-1-INCL1) to 5.6 mg/kg OC (sample CS-1-INCL2)(Tables 7-2 and D-2).

The dibenzofuran concentration for the sub-surface sample CS-1-SS collected on the cap outside the marina wave boards was 179.1 mg/kg OC (Tables 7-3 and D-1). The dibenzofuran concentrations for samples BH-2-SS and BH-4-SS, samples with very low (0.08%) and low (0.51%) TOC percentages, were undetected at 19 µg/kg (ppb) dry weight and undetected at 20 µg/kg (ppb) dry weight. The dibenzofuran concentration for the belowcap sample (CS-1-BC) collected at Station CS-1 was 1,000 µg/kg (ppb) dry weight (Tables 7-4 and D-1).

The higher dibenzofuran concentrations were found in the same sample that had higher total LPAH concentrations (CS-1-SS and CS-1-BC) and HPAH: LPAH ratios less than 1.0.

Dibenzofuran has been found to be associated with LPAH compounds in Puget Sound samples, indicating similar sources (PTI 1991).

7.4.7 Comparisons to sediment quality criteria

As mentioned above, samples BH-2-SR, BH-2-SS and CS-1-BC have very low TOC percentages; sample BH-4-SS has a low TOC percentage. As mentioned in Section 6.10, if TOC is less than or equal to 0.2%, in samples with very low TOC (i.e., less than or equal to 0.2%), normalization to TOC may not be appropriate (Michelsen and Bragdon-Cook 1993), and comparison to Puget Sound Apparent Effects Thresholds (AETs) may be more appropriate (EPA 1988). Dredged Material Management Program (DMMP) guidance values are based on Puget Sound AETs, and thus are used for this comparison.

Station CS-1 samples

Surface sample CS-1-SR exceeded the SMSs criterion for mercury with a concentration of 1.28 mg/kg (Tables 7-2 and D-1). This concentration exceeds the MCUL criterion for mercury of 0.59 mg/kg.

Sub-surface sample CS-1-SS exceeded SMSs criteria for mercury, total LPAHs, three individual LPAHs, total HPAHs, one individual HPAH, and dibenzofuran (Tables 7-3 and D-1). This sample had a mercury concentration of 6.12 mg/kg, which exceeds the MCUL criterion for mercury of 0.59 mg/kg. In addition, the total LPAHs concentration of 1,622.8 mg/kg OC, exceeds the MCUL criterion for total LPAHs of 780 mg/kg OC. Three individual LPAHs, acenaphthene, fluorine, and phenanthrene, also exceeded their respective MCUL criteria. The total HPAHs concentration in sample CS-1-SS of 1,165.8 mg/kg OC exceeded the SQS criterion for Total HPAHs of 960 mg/kg OC, with the individual HPAH fluroanthene also exceeding its SQS criterion. The dibenzofuran concentration of 179.1 mg/kg OC in sample CS-1-SS exceeds the MCUL criterion for dibenzofuran of 58 mg/kg OC.

Below-cap sample CS-1-BC had a very low TOC percentage of 0.13%. Therefore, instead of normalizing ppb dry weight concentrations to ppm OC and comparing these values to SMSs criteria, the dry weight concentrations are compared to DMMP guidance values (Tables 7-4, D-1, and D-3). DMMP guidance values were exceeded for total LPAHs, three individual LPAHs, the HPAHs fluoranthene and pyrene and for dibenzofuran. Mercury and total PCBs were undetected in sample CS-1-BC. The total LPAHs concentration of 11,646 µg/kg (ppb) dry weight exceeds the DMMP SL guidance value of 5,200 µg/kg (ppb) dry weight, with the individual LPAHs acenaphthene, fluorene, and phenanthrene also exceeding their SL guidance values. The fluoranthene concentration of 5,400 µg/kg (ppb) dry weight in sample CS-1-BC exceeds the DMMP SL guidance value of 1,700 µg/kg (ppb) dry weight, and also the DMMP bioaccumulation trigger (BT) guidance value of 4,600 µg/kg (ppb) dry weight. The HPAH pyrene also exceeds its DMMP SL guidance value. In addition, the dibenzofuran concentration of 1,000 µg/kg (ppb) dry weight in this sample exceeds the DMMP SL guidance value of 540 µg/kg (ppb) dry weight.

Station CS-1 inclusion (INCL) samples

The black silt/clay inclusion sample CS-1-INCL1 had SMSs exceedances for mercury, total HPAHs, and eight individual HPAHs. This sample had a mercury concentration of 0.68 mg/kg, which exceeds the MCUL criterion of 0.59 mg/kg. Sample CS-1-INCL1 also had a total HPAHs concentration of 1,646.1 mg/kg OC that exceeds the SQS criterion for total HPAHs of 960 mg/kg OC. In addition, the concentrations of eight individual HPAHs in this sample, fluoranthene, benzo(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, and indeo(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene, exceed their respective SQS criteria. It should be noted that if Aroclor 1248 (flagged "Y" at 2.4 mg/kg OC) is added to the total PCBs concentration for this sample, it will exceed the SQS criterion for total PCBs of 12.0 mg/kg OC (10.6 + 2.4 = 13.0 mg/kg OC)

Samples CS-1-INCL2 and CS-1-INCL3 both had SMSs exceedances for mercury and total PCBs. Sample CS-1-INCL2 had a mercury concentration of 3.58 mg/kg, which exceeds the MCUL criterion of 0.59 mg/kg. Sample CS-1-INCL3 had a mercury concentration of 2.01

mg/kg, which also exceeded the MCUL criterion. In addition, sample CS-1-INCL2 had a total PCBs concentration of 20.3 mg/kg OC, and sample CS-1-INCL3 had a total PCBs concentration of 13.6 mg/kg OC. These concentrations both exceed the SQS criterion for total PCBs of 12 mg/kg OC.

Stations BH-2 and BH-4 samples

Samples BH-2-SR and BH-2-SS both had very low TOC percentages of 0.12% and 0.08%. Therefore, instead of normalizing ppb dry weight concentrations to ppm OC and comparing these values to SMSs criteria (Table D-10), which produces artificially high concentrations, the dry weight concentrations are compared to DMMP guidance values (Table D-13). In Table D-13, there were no DMMP guidance value exceedances for these two samples.

Samples BH-4-SR and BH-4-SS had no SMSs exceedances (Table D-12), but sample BH-4-SS had a low TOC percentage of 0.51%. Therefore, the dry weight concentrations for sample BH-4-SS are also compared to DMMP guidance values, with no exceedances (Table D-13).

7.5 Off-Cap Stations

Three of the 17 stations sampled in March 2004 were outside of the planned Pier 64/65 thin-layer sediment cap boundaries as depicted in Parametrix (1994)(Figure 5-1). These were Stations BH-1, BH-13 and SS5-B. Stations BH-1 and SS5-B were located in unprotected waters outside of the Bell Harbor Marina wave boards. Station BH-13 is also outside of the wave boards, but is in somewhat more protected waters adjacent to Pier 62/63. Although Station BH-12 is located within the planned cap boundaries, there was no cap material observed in the split cores collected at this station (Figure B-22). Therefore, this station is effectively an off-cap station; the results for sample BH-12-SR are also discussed in this section for comparison.

It was not possible to collect adequate sediment volume for analysis at Station BH-1 or its near vicinity, due to the presence of gravel substrata that caused core tube bending and very limited

penetration. One short core section was collected at BH-1, but it contained almost all gravel and did not contain enough volume of finer sediment fractions to sample and analyze (core diagram in Figure B-6). Therefore, there are no analytical results for Station BH-1 to report or discuss below.

Sediment chemistry and grain-size analysis results are presented and discussed below for these stations, with results summarized in Tables 7-2 to 7-4 and Figures 7-2 to 7-9. Full results for each station are found in appropriate tables and figures in Appendix D and in the ARI laboratory reports in Appendix E.

7.5.1 Grain-size analysis

Grain-size analysis results for surface sample BH-12-SR show 15.7% gravel, 47.1% sands, and 37.3% fines (Table 7-2; Table D-23 and Figure D-7). This sediment fractions pattern matches that seen for native sediments (at Stations BH-13 and SS5-B; Figure D-7), and not the Pier 64/65 cap material, which is primarily sand of three particular fractions (at Stations BH-10 and BH-11; Figure D-7). Although sample BH-12 has 47.1% sands, this is almost half of the percentages seen in samples taken of the cap material, and the sand is more evenly distributed among all the sand fractions, not primarily the three fractions seen in the cap samples. One additional note is that the 15.7% gravel in this sample may consist of shell debris as per core diagram notes in Figure B-22.

Grain-size analysis results for surface sample BH-13-SR, collected at an off-cap station, show 10.9% gravel, 35.8% sands, and 53.4% fines (Table 7-2; Table D-23 and Figure D-7). This sediment fractions pattern matches that seen in native sediments at the project site in below-cap samples (at Stations CS-2 and CS-3) and samples collected at off-cap stations (Stations BH-12 and SS5-B).

Grain-size analysis results for surface sample SS5-B-SR, collected at an off-cap station, show 0.2% gravel, 26.75 sands, and 73.2% fines (Table 7-2; Table D-23 and Figure D-7). This sediment fractions pattern matches that seen in native sediments at the project site in below-cap

and off-cap samples, although this sample has a larger percentage of fines than seen in the below-cap and off-cap samples. This may be due to the presence of finer grain-sizes farther offshore and in deeper water than the cap stations, as Station SS5-B is approximately 500 feet offshore and in water approximately 83 feet deep (MLLW) (Figure 5-1).

7.5.2 Conventionals

Total Organic Carbon (TOC)

Total Organic Carbon (TOC) percentages in surface samples collected at the three off-cap stations (BH-12, BH-13 and SS5-B) ranged from 2.0% (sample SS5-B-SR) to 5.9% (sample BH-12-SR)(Table 7-2; Table D-22).

Total Sulfides

Concentrations of total sulfides in surface samples collected at the three off-cap stations ranged from 150 mg/kg (sample SS5-B-SR) to 3900 mg/kg (sample BH-12-SR)(Table 7-2; Table D-22).

7.5.3 Mercury

Mercury concentrations in surface samples collected at the three off-cap stations (BH-12, BH-13 and SS5-B) ranged from 0.89 mg/kg (sample SS5-B-SR) to 1.9 mg/kg (sample BH-13-SR)(Table 7-2; Table D-22).

7.5.4 PAHs

Total LPAH concentrations in surface samples collected at the three off-cap stations (BH-12, BH-13 and SS5-B) ranged from 45.9 mg/kg OC (sample SS5-B-SR) to 81.9 mg/kg OC (sample BH-12-SR)(Table 7-2; Table D-22). Total HPAH concentrations in these samples ranged from 252.5 mg/kg OC (sample SS5-B-SR) to 621.2 mg/kg OC (sample BH-12-SR). Ratios of HPAH to LPAH concentrations ranged from 5.21 (sample BH-13-SR) to 7.58 (sample BH-12-SR). The

fact that these PAH ratios are greater than 1.0 may indicate that the PAHs in these samples were not recently deposited (1 year (or more) ago) (Norton 1996; Merrill and Wade 1985; Goyette and Brooks, 1998).

7.5.5 PCBs

Total PCB concentrations in surface samples collected at the three off-cap stations ranged from 6.3 mg/kg OC (sample BH-13-SR) to 14.5 mg/kg OC (sample SS5-B-SR)(Table 7-2; Table D-22). Aroclors 1248, 1254 and 1260 are present in samples BH-12-SR and SS5-B-SR. Aroclor 1248 was undetected in sample BH-13-SR.

7.5.6 Other organic compounds

Bis(2-ethylhexyl)phthalte (BEHP)

Bis(2-ethylhexyl)phthalte (BEHP) concentrations in surface samples collected at the three off-cap stations (BH-12, BH-13 and SS5-B) ranged from 5.0 mg/kg OC (sample SS5-B) to 9.0 mg/kg OC (sample BH-12-SR)(Table 7-2; Table D-22).

Dibenzofuran

Dibenzofuran concentrations in surface samples collected at the three off-cap stations ranged from undetected (sample SS5-B-SR) to 3.1 mg/kg OC (sample BH-13-SR) (Table 7-2; Table D-22).

7.5.7 Comparisons to sediment quality criteria

Sample BH-12-SR exceeded SMSs criteria for mercury and total PCBs (Table D-22). Sample BH-12-SR had a concentration of 1.2 mg/kg mercury, which exceeds the MCUL criterion for mercury of 0.59 mg/kg. Also, the total PCBs concentration of 13.7 mg/kg exceeds the SQS

criterion for total PCBs of 12.0 mg/kg OC. Individual Aroclors 1248, 1254 and 1260 were present.

Sample BH-13-SR exceeded a SMSs criterion for mercury (Table D-22). Sample BH-13-SR had a concentration of 1.9 mg/kg mercury, which exceeds the MCUL criterion of 0.59 mg/kg. The total PCBs concentration of 6.3 mg/kg OC in this sample does not exceed the SQS criterion for total PCBs of 12.0 mg/kg OC. Individual Aroclors 1254 and 1260 were present.

Sample SS5-B-SR exceeded SMSs criteria for mercury and total PCBs (Table D-22). Sample SS5-B-SR had a concentration of 0.89 mg/kg mercury, which exceeds the MCUL criterion for mercury of 0.59 mg/kg. The total PCBs concentration of 13.9 mg/kg OC in this sample exceeds the SQS criterion for total PCBs of 12.0 mg/kg OC. Individual Aroclors 1248, 1254 and 1260 were present.

7.6 QA/QC and Data Validation

7.6.1 Field replicate (FR) and field split (FS) samples

Additional sediment cores were collected at Stations CS3 and BH-9 to obtain enough sediment for field replicate and field split (FR and FS) samples for QA/QC of sample collection procedures, and as a measure of matrix heterogeneity (see Table 5-1). Field replicate (FR) samples collected at Station CS3 consisted of two separately collected samples (two cores each) at the same location using the same methods, as per the definition in the PSEP protocol for sampling marine sediment (PSWQAT, 1997a). Field split (FS) samples collected at Station BH-9 consisted of two samples collected from the composited sediment from the appropriate layers in four sediment cores.

Table 7-5 shows the sediment chemistry results for the three Station CS-3 samples and their field replicates, and for the Station BH-9 surface sample and its field split. In this table, relative percent difference (RPD) values have been calculated using the following formula from PSWQAT (1997b):

$$RPD = 100 \frac{|x_1 - x_2|}{(x_1 + x_2)/2}$$

Although analytical laboratory replicates and matrix spike duplicates have RPD control limits of $\leq 35\%$ for organics and $\leq 20\%$ for metals, field replicates do not have applicable RPD control limits (Tables 11 and 12 in Ecology, 2003). As can be seen in Table 7-5 the RPD percentages for the field split surface samples collected at Station BH-9 are almost all $\leq 35\%$ for organic compounds with the exception of a few individual Aroclors. This is also true for the field duplicate below-cap samples collected at Station CS-3. However, the field duplicate surface and sub-surface samples collected at Station CS-3 have RPD percentages > 35%. The lower RPD percentages between the Station BH-9 field split samples can be explained by the differences being primarily a measure of how well sediment was composited or mixed prior to filling individual sample jars. The lower RPD percentages between the Station CS-3 field duplicate below-cap samples can be explained by the relatively homogenous consistency of the sediments underlying the cap. However, as described elsewhere, the cap material consists in many locations of a mix of sand fractions and black silt/clay inclusion layers, and thus is a heterogeneous mixture of sediment types. This can be seen in the core diagrams and photographs of the four cores collected at Station CS-3 (Figures B-4, B-5 and C-7 to C-10), and would explain the higher RPD percentages in Table 7-5 for the surface and sub-surface field replicate samples collected at Station CS-3.

Table 7-5. Relative percent difference (RPD) calculations for field replicate (FR) and field split (FS) samples.

Sample:	Station CS-3 Field Replicates														Station BH-9 Field Split				
	CS-3-SR		CS-3-SR-FR		RPD %	CS-3-SS		CS-3-SS-FR		RPD %	CS-3-BC		CS-3-BC-FR		RPD %	BH-9-SR		BH-9-SR-FS		RPD %
CONVENTIONALS																			
Total Solids (%)	74.4		74.2		0.27	68.4		74		7.87	39.4		47.2		18.01	66.7		66.6		0.15
Total Organic Carbon (%)	2.4		2.4		0.00	3.2		2.9		9.84	6.7		6.5		3.03	2.9		3		3.39
Total Sulfides (mg/kg)	430		730		51.72	2500		3400		30.51	6700		15000		76.50	2700		1800		40.00
METALS (mg/kg, ppm) Dry weight	ppm dry wt.		ppm dry wt.			ppm dry wt.		ppm dry wt.			ppm dry wt.		ppm dry wt.			ppm dry wt.		ppm dry wt.		
Mercury	0.07		0.10		35.29	0.08		0.07		13.33	1.3		1.25		3.92	0.06	U	0.07	U	
ORGANICS (ug/kg, ppb) Dry weight																			
LPAHs	ppb dry wt.		ppb dry wt.			ppb dry wt.		ppb dry wt.			ppb dry wt.		ppb dry wt.			ppb dry wt.		ppb dry wt.		
Total LPAHs	1010		445		77.66	569		38	U		7300		7250		0.69	628		714		12.82
Naphthalene	120	U	39	U		40	U	38	U		590	U	580	U		120		100		18.18
Acenaphthylene	120	U	39	U		40	U	38	U		1000		950		5.13	39	U	41		
Acenaphthene	120		39	U		78		38	U		590	U	580	U		62		68		9.23
Fluorene	130		55		81.08	81		38	U		590	U	580	U		59		69		15.63
Phenanthrene	520		200		88.89	300		38	U		3300		3300		0.00	250		290		14.81
Anthracene	240		190		23.26	110		38	U		3000		3000		0.00	83		100		18.58
2-Methylnaphthalene	120	U	39	U		40	U	38	U		590	U	580	U		54		46		16.00
HPAHs																			
Total HPAHs	4010		2134		61.07	1798		338		136.70	76930		64510		17.56	1852		2186		16.54
Fluoranthene	650		320		68.04	370		64		141.01	9600		9200		4.26	270		360		28.57
Pyrene	780		370		71.30	390		78		133.33	14000		15000		6.90	340		440		25.64
Benzo(a)anthracene	370		180		69.09	140		38	U		8000		5700		33.58	160		170		6.06
Chrysene	550		310		55.81	210		40		136.00	10000		7500		28.57	220		240		8.70
Total Benzofluoranthenes	990		610		47.50	430		111		117.93	22600		17000		28.28	520		580		10.91
Benzo(b)fluoranthene	530		300		55.42	230		58		119.44	13000		9800		28.07	250		270		7.69
Benzo(k)fluoranthene	460		310		38.96	200		53		116.21	9600		7200		28.57	270		310		13.79
Benzo(a)pyrene	440		230		62.69	170		45		116.28	8800		6900		24.20	210		240		13.33
Indeno(1,2,3-cd)pyrene	110	J	55		66.67	45		38	U		1800		1400		25.00	69		87		23.08
Dibenzo(a,h)anthracene	120	U	39	U		40	U	38	U		730		610		17.91	39	U	39	U	
Benzo(g,h,i)perylene	120		59		68.16	43		38	U		1400		1200		15.38	63		69		9.09
PHTHALATES/ESTERS																			
Bis(2-ethylhexyl)phthalate	150		220		37.84	110		62		55.81	990		720		31.58	140		100		33.33
MISCELLANEOUS																			
Dibenzofuran	120	U	39	U		43		38	U		590	U	580	U		42		42		0.00
PCBs																			
Total PCBs	38		20		62.07	24		12.9		60.16	440		538		20.04	51		35.8		35.02
Aroclor 1016	3.8	U	3.9	U		3.9	U	3.8	U		39	U	39	U		3.9	U	3.9	U	
Aroclor 1221	3.8	U	3.9	U		3.9	U	3.8	U		39	U	39	U		3.9	U	3.9	U	
Aroclor 1232	3.8	U	3.9	U		3.9	U	3.8	U		39	U	39	U		3.9	U	3.9	U	
Aroclor 1242	3.8	U	3.9	U		3.9	U	3.8	U		39	U	39	U		3.9	U	3.9	U	
Aroclor 1248	3.8	U	3.9	U		3.9	U	3.8	U		120	P	98		20.18	14		12		15.38
Aroclor 1254	19	P	11		53.33	13		7.6		52.43	180		230		24.39	23		14		48.65
Aroclor 1260	19		9		71.43	11		5.3		69.94	140		210		40.00	14	P	9.8		35.29

U = undetected

7.6.2 Data validation report

A copy of the Saylor Data Solutions Data Validation Report (dated May 12, 2004) can be found in Appendix F. The data validation report concludes that all analytical data for the March 2004 sediment core samples are acceptable for use, as qualified by the report and the laboratory, except in the cases where multiple analysis results are reported for organic compounds. Multiple analysis results exist for samples that required dilution due to particular analytes exceeding the calibration range of the analytical instruments. These data are flagged 'E' in the ARI laboratory reports in Appendix E. The data validation report provides rules for which data in the two sets of results should be selected or rejected for reporting, with a summary list of the rejected and qualified data in Section 8.0 of the report. This summary list was used along with the ARI laboratory reports to compile the sediment chemistry result tables for the March 2004 samples in Appendix D.

The data qualifiers provided by ARI and those applied to the data in the data validation report are shown in the sediment chemistry tables in Appendix D. Reasons for the application of particular data qualifiers are found in the ARI reports and the data validation report, and are also provided in footnotes to the Appendix D tables. Two major reasons for data qualifiers being applied are: 1) all positive mercury results were qualified with a 'J' as estimated due to high matrix spike (MS) recovery and 2) all grain-size analysis results for the gravel, very coarse sand, 9-10 phi clay, and coarse silt fractions were qualified as estimated with a 'J' due to high triplicate relative standard deviation (RSD). These qualifiers are shown in the sediment chemistry and grain-size analysis tables in Appendix D.

8.0 DISCUSSION – COMPARISONS TO OBJECTIVES AND QUESTIONS

8.1 Cap Thickness

8.1.1 Sampling plan objective for cap thickness

Objective 1 in the final sampling plan (Polaris 2004) was to:

> *Obtain additional measurements of the thickness of the Pier 64/65 sediment cap at the original and new sampling stations as per the 2003 Corps letter to supplement measurements presented in the cap thickness monitoring report for the project (Polaris 2003a) to help assess compliance with cap performance criteria.*

The March 2004 sampling program, as described in this supplemental report, has accomplished Objective 1. Cap thickness was measured in sediment cores collected at 14 stations distributed across the sediment cap. Ten of these stations are at or as close as possible to the original rebar measurement stations established in March 1994, as per the July 2003 letter from the Corps to the Port (Figure 5-1; Corps 2003).

8.1.2 Sampling plan question addressing cap thickness

Question 1 in the final sampling plan (Polaris 2004) was:

> *How thick is the Pier 64/65 sediment cap at an adequate number of representative locations distributed over the cap surface?*

As discussed in Section 7.1, the results of the March 2004 sediment investigation indicate that cap thickness meets the planned thickness of 1.0 feet (or greater) at 11 of the 14 sampling stations on the cap. However, cap thickness at three stations falls below 1.0 foot. Station BH-3

has a mean cap thickness of 0.95 feet (29.0 cm) and Station BH-7 has a mean cap thickness of 0.88 feet (26.75 cm) or slightly less than one foot-thick.

However Station BH-12, which is within the planned cap boundaries (as per drawings in the mitigation plan (Parametrix 1994)) in the southeast corner of the cap did not have any cap material present in the two cores collected at that location (Figure 5-1). Overall mean cap thickness for all 14 stations was 1.49 feet (45.35 cm), including Station BH-12. Overall mean cap thickness is 1.60 feet (48.84 cm) without Station BH-12.

8.2 Sediment Chemistry

8.2.1 Sampling plan objectives for sediment chemistry

Objective 2 in the final sampling plan (Polaris 2004) was to:

> *Re-sample PCBs, mercury and PAHs in surface and sub-surface sediments at the original three sampling stations (CS-1, CS-2, and CS-3) to provide additional data to help assess compliance with performance criteria.*

Objective 3 in the final sampling plan (Polaris, 2004) was to:

> *Obtain additional data on the spatial extent of elevated concentrations of contaminants at additional sampling stations located primarily on the sediment cap.*

The March 2004 sampling program, as described in this supplemental report, has accomplished these objectives. PCBs, mercury and PAHs have been analyzed in surface and sub-surface sediments at the three original sampling stations (Stations CS-1, CS-2 and CS-3) on the Pier 64/65 thin-layer sediment cap (Figures 3-2, 5-1). In addition, these contaminants and others have been analyzed in sediments collected at 11 new stations located within the planned

sediment cap boundaries and at three stations located outside of the sediment cap boundaries (Figure 5-1). Analytical results for these stations are presented and discussed in Section 7.0 and are summarized in Tables 7-2 to 7-4 and in Figures 7-2 to 7-9.

As can be seen in the three summary tables (Tables 7-2 to 7-4), SMSs criteria exceedances in the cap samples (surface and sub-surface cap sediments) are limited to Station CS-1. The closest adjacent cap stations to CS-1 (BH2, BH4 and BH3) all had no SMSs (or DMMP) exceedances. In addition, no exceedances were found for samples collected at the other cap stations, with the exception of Station BH-12, which did not have any cap material as noted above. SMSs exceedances were found in samples collected at the off-cap stations BH-13 and SS5-B, and in sediments sampled below the cap interface at Stations CS-1, CS-2 and CS-3 (Table 7-3).

8.2.2 Sampling plan questions regarding PCB distribution and associations

Question 2 in the final sampling plan (Polaris 2004) was:

> *What is the distribution of PCBs and mercury in Pier 64/65 cap sediments?*

Question 3 in the final sampling plan (Polaris 2004) was:

> *How strong is the association between elevated concentrations of PCBs and mercury and black silt/clay inclusions in the cap material?*

The distributions of PCBs and mercury in Pier 64/65 cap sediments are shown in Tables 7-2 and 7-3 and are illustrated in Figures 7-5 and 7-9. In surface and sub-surface samples collected at stations located within the boundaries of the Pier 64/65 sediment cap, PCBs and mercury were detected in low concentrations (below SMSs criteria or DMMP guidance values) with the exception of sediments sampled at Stations CS-1 (discussed separately) and BH-12, where no cap material was present. Exceedances of SMSs criteria seen in sediments sampled at Station

CS-1 appear to be confined to the area of that station. Samples collected at the closest adjacent stations to CS-1 (BH-2, BH-4 and BH-3; Figure 5-1) all had no SMSs (or DMMP) exceedances.

As shown in the results for the three black silt/clay inclusion (INCL) samples collected at Station CS-1, elevated concentrations of PCBs and mercury (as well as PAHs) are associated with these inclusion layers in the cap material. These concentrations in most cases are greater than the corresponding concentrations found in samples CS-1-SR and CS-1-SS, which consist of greater percentages of sand with some black silt/clay inclusion layers present (Figures B-1 and B-2). Thus, these contaminants appear to be preferentially absorbed to the black silt/clay material..

8.2.3 Sampling plan question regarding PAHs distribution

Question 4 in the final sampling plan (Polaris 2004) was:

What is the distribution of PAHs in Pier 64/65 cap surface sediments?

The distribution of PAHs in surface sediments on the cap is shown in Table 7-2 and is illustrated in Figures 7-6 and 7-7. There were no sediment criteria exceedances for total LPAHs or total HPAHs in surface or sub-surface samples collected at any of the cap stations, with the exception of samples collected at Stations CS-1 (discussed above) and BH-12, a cap station that did not have cap material present.

In addition, for PAHs detected below criteria, there is no clear-cut gradient of declining concentrations in March 2004 surface samples (top 10 cm) across the cap away from Pier 62/63 (the presumed source of PAH recontamination due to piling replacement work; Norton 1996) as seen in results for surface samples (top 2 cm) collected on the cap in April 2002 (Polaris 2002). One possible explanation is that PAHs derived from recontamination are primarily confined to the top 2 cm of surface sediments (sampled in April 2002), with the gradient not evident in results for the top 10 cm surface samples collected in March 2004 due to dilution effects. Another explanation for the lack of a clear-cut PAH re-contamination gradient is that it appears no piling replacement work occurred at Pier 62/63 in 2004 prior to core sampling in March 2004

(City of Seattle Finance Department, 2004). In contrast, piling replacement work at Pier 62/63 occurred just prior to sediment sampling in April 2002 (City of Seattle Board of Park Commissioners 2002). However, there does appear to be a declining gradient of BEHP concentrations in surface samples collected on the cap, from the southeast to the northwest (Figure 7-8). The plasticizer BEHP is widespread in the environment, and strongly absorbs to sediment (PTI 1991). Thus, it can be used as a general indicator of recontamination from other off-site sources.

All surface samples collected on the cap have HPAH : LPAH ratios greater than 1.0 (Table 7-2 and Figure 7-7), generally due to higher concentrations of six specific HPAHs (fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzofluoranthenes (b and k), and benzo(a)pyrene). This is consistent with the composition weathered creosote, where total HPAH concentrations are greater than total LPAHs due to the same individual HPAHs (Goyette and Brooks 1998). A definitive identification of weathered creosote in those samples would require additional analyses however. It is also possible PAH concentrations in the March 2004 surface samples (top 10 cm) represent PAHs present in black silt/clay inclusion layers observed at most stations (see figures in Appendix B and C).

The most important consideration however, is that these low concentrations of PAHs in the top 10 cm of surface sediments collected on the Pier 64/65 cap in March 2004 are all below sediment quality criteria. This indicates toxicity risks to sediment-dwelling organisms in the top 10 cm of sediment (considered the biologically active zone) are minimal.

8.2.4 Sampling plan objective and question regarding contaminant migration

Objective 4 in the final sampling plan (Polaris 2004) was to:

> *Analyze core sediments under and in the cap material at selected locations in order to evaluate the potential for vertical contaminant migration up into the cap from contaminated sediments existing at the site prior to cap placement.*

Question 5 in the final sampling plan (Polaris 2004) was:

> *Are elevated concentrations of contaminants in the cap material from outside sources or could they be contaminants migrating up into the cap from contaminated sediments underlying the sediment cap existing at the project site prior to cap placement?*

Based on evaluation of sediment core characteristics and chemistry, elevated concentrations of contaminants in surface and sub-surface samples at Station CS-1 are in the cap material itself which was dredged from the Duwamish turning basin and not the result of vertical migration from underlying contaminated sediment. Surface and sub-surface Samples CS-1-SR and CS-1-SS had grain-size results showing sand fractions characteristic of Pier 64/65 cap material, indicating that these samples consisted of cap material.

Although elevated concentrations of PAHs and dibenzofuran exceeding SMSs (or DMMP) criteria are found in both sediments collected below (sample CS-1-BC) and above (sample CS-1-SS) the cap interface at Station CS-1, elevated concentrations of mercury and PCBs exceeding SMSs criteria are only seen in samples of cap material (SR, SS and INCL samples), but were not detected in the below-cap (BC) sample collected at the same location (Tables 7-2 to 7-4 and D-1, D-2 and D-30). Such findings support the explanation that contaminated cap sediments (with elevated mercury and PCBs) above the sediment cap interface did not originate from existing contaminated pre-cap sediments below the cap. Evidence discussed elsewhere indicates that the most likely source of elevated concentrations of mercury and PCBs in Station CS-1 cap sediments is the Duwamish River turning basin where the cap material was dredged (Polaris 2002a, Polaris 2003).

It is also somewhat possible that subsurface sample CS-1-SS may represent a mix of contaminated cap material and contaminated underlying sediment. This would account for elevated concentrations (exceeding criteria) of both: 1) mercury and PCBs and 2) LPAHs and dibenzofuran in sample CS-1-SS. This would also account for HPAH : LPAH ratios less than

one in both samples CS-1-SS and CS-1-BC. However, evidence for this theory remains inconclusive.

In addition to the results for Station CS-1 samples discussed above, results for surface, sub-surface and below-cap sediments sampled at Stations CS-2 and CS-3 indicate that elevated concentrations of mercury and HPAHs exceeding SMSs criteria in sediments below the cap interface at these stations are not seen in surface and sub-surface sediment above the cap interface where concentrations of mercury and HPAHs are very low (Tables 7-2 to 7-4 and D-5 and D-7). These results provide additional evidence that vertical migration of contaminants from underlying sediments into the cap material is not occurring.

8.2.5 Source of Station CS-1 cap material contaminants

The sediment chemistry report (Polaris 2002), and PCB addendum to that report (Polaris 2003b) present evidence for the potential sources of elevated concentrations of mercury, PCBs and other contaminants at Station CS1. As discussed in these reports, potential sources include: 1) the Duwamish River turning basin, where the cap material was dredged, 2) contaminated existing sediments underlying the cap at the project site, or 3) resuspended contaminants from offsite activities.

Evidence from the March 2004 sediment investigation supports the hypothesis that cap material dredged from Duwamish River turning basin is the most likely source of elevated concentrations of contaminants associated with black silt/clay inclusion layers observed at Station CS-1. The surface and sub-surface samples (CS-1-SR and CS-1-SS) exceed SMSs criteria for mercury, PCBs, and PAHs at Station CS-1 and show characteristic cap sand fractions (Table D-4 and Figure D-1). Thus, indicating that the samples were taken of cap material sediment and supporting the turning basin origin theory. In addition, the cores where the samples were taken show numerous black silt/clay inclusion layers (Figures B-1, B-2 and C-1 to C-4) that have been associated with contaminants: 1) in this study as shown in the results of the inclusion (INCL) samples taken at Station CS-1 (Figure B-2 and Table D-2) and 2) in other cap projects on the Seattle waterfront using turning basin sediments, as discussed in Section 2.0 of this report and in

Polaris (2002). Furthermore, mercury and PCBs were undetected in the Station CS-1 below-cap sample (CS-1-BC) taken from the same core as the surface and sub-surface samples, although PAH and dibenzofuran concentrations that exceed SMSs criteria are present in samples CS-1-SS and CS-1-BC.

In addition, the presence of Aroclors 1254, 1260, and Aroclor 1248 (flagged "Y" which may or may not be present) in the inclusion samples collected at Station CS-1, is consistent with information presented in the PCB Addendum on Aroclors present in the Duwamish River Turning Basin, where the cap material was dredged (Polaris 2003b). The Addendum presented evidence that Aroclors 1254 and 1260 were found in turning basin sediments and that Aroclors 1254 and 1248 were present in sediments just upstream of the turning basin in the vicinity of the Norfolk CSO. These PCB Aroclors would have been present at the time the cap material was dredged from the turning basin in 1994. This is also consistent with information in Blakley and Jack (2003), which presented evidence of PCB recontamination of the Norfolk CSO sediment cap from eroding contaminated sediment.

In contrast, existing contaminated pre-cap sediments at Stations BH-12 and BH-13 (in the southeast corner of the project site) and at Station SS5-B, just offshore of the site, do have mercury and PCB exceedances. However, as discussed in Section 7.0, these stations are not near Station CS-1, and the characteristics of the existing contaminated sediment underlying the cap in the northwest corner (near Station CS-1) differ from those in the southeast corner. In addition, mercury and PCBs present at high concentrations (exceeding SMSs criteria) in cap material samples collected at Station CS-1 were undetected in the below cap sample at that location. This supports the theory that mercury and PCBs in cap material at Station CS-1 have a different origin.

9.0 CONCLUSIONS AND FURTHER ACTIONS

9.1 Conclusions

This study supports the following conclusions:

- Cap thickness measurements were obtained at 14 stations, including 10 stations located at or near the original rebar stations established in 1994, as requested in a letter from the Corps to the Port (Corps 2003).

- Cap thickness meets design thickness ($\geq$ 1.0 foot) at all sampled cap stations with the exception of Stations BH-3 and BH-7, where mean cap thickness is slightly less than 1.0 foot, and Station BH-12, which did not have any cap material present. Overall mean cap thickness for all stations was 1.49 feet (45.35 cm) including Station BH-12 and 1.60 feet (48.84 cm) without Station BH-12.

- No exceedances of SMSs (or DMMP) criteria for any contaminants occurred in surface or sub-surface samples collected at cap stations with the exception of samples at collected at Station CS-1, and at Station BH-12 where no cap material was present (and existing contaminated pre-cap sediments were sampled).

- Surface and sub-surface samples collected at Station CS-1 showed elevated concentrations of mercury, PAHs, dibenzofuran and total PCBs exceeding SMSs criteria.

- Elevated concentrations of contaminants exceeding criteria found at Station CS-1 are limited to that station, as they were not found in surface or sub-surface sediments at the closest adjacent cap stations or elsewhere on the cap.

- Surface samples collected at Station BH-12 appeared to consist of existing contaminated pre-cap sediments with elevated concentrations of mercury and total PCBs exceeding

SMSs criteria, and characteristics similar to samples collected at off-cap Stations BH-13 and SS5-B.

- Black silt/clay inclusion layers observed in the Pier 64/65 cap material are associated with elevated concentrations of mercury, PAHs and PCBs greater than criteria, based on results for inclusion (INCL) samples collected at Station CS-1.

- Based on the differences in contaminants and their concentration levels detected above and below the cap interface in samples collected at Stations CS-1, CS-2 and CS-3, most evidence shows there has not been vertical migration of contaminants from underlying sediments up into the cap. This is consistent with findings presented in Polaris 2002. .

- As discussed in the Addendum on PCB Issues (Polaris 2002b), the Duwamish River turning basin is the most likely source of elevated concentrations of cap material contaminants associated with black silt/clay inclusion layers observed at Station CS-1. The turning basin may also be the source of low concentrations of contaminants below criteria in samples collected at other stations on the cap, as most of these samples contained black silt/clay inclusion layers.

- PAHs detected at low concentrations in surface and sub-surface sediments collected at cap stations may be from off-site recontamination and/or contaminants associated with black silt/clay inclusion layers in the cap material.

9.2 Discussion of Possible Actions

Contaminants at elevated concentrations exceeding SMSs criteria in surface or sub-surface samples were found at cap Stations CS-1 where contaminated cap material is present, and at Station BH-12 where no cap material was present, raising the question of whether remedial action should or could be taken at these two locations.

9.2.1 Station CS-1

Station CS-1 is outside the Bell Harbor Marina wave boards (Figure 5-1), subject to direct exposure to prevailing southwest winds and waves and vessel traffic at the site. Because of the exposed nature of the site, any additional cap material placed at the site to isolate contaminated surface sediments would potentially be unstable over time unless it was armored. However, this could interfere with berthing depths required at Pier 66. Results of grain-size analysis for surface samples collected at the three stations outside the wave boards at this location, Stations BH-2, CS-1 and BH-4, show greater percentages of gravel fractions and lower percentages of fines than at cap stations inside the marina wave boards (Table 7-2), suggesting possible winnowing away of finer material at these stations. An alternative action of removing contaminated cap material at Station CS-1 by dredging risks exposing underlying contaminated sediments, which have higher percentages of LPAHs and dibenzofuran than surface sediments at the same location (Tables D-1 and D-3). Thus, it may not be practical or desirable to add additional cap material or remove contaminated cap material at Station CS-1.

9.2.2 Station BH-12

Macroalgae surveys conducted in September 2002 have documented the presence of *Laminaria* beds at the location of Station BH-12 (Figure 6-12 in Polaris 2002b). *Laminaria* is a brown alga that serves as habitat for fish and invertebrates at the site. The September 2002 macroalgae surveys show a mean density of 4.0 *Laminaria* stipes per square meter for the cap portion of Transect 8MS and for the area between Transects 8 and 8MS (Tables 6-3 and 6-7 in Polaris 2002b), where Station BH-12 is located. In addition, a bull kelp (*Nereocystis*) bed is located near Station BH-12, approximately 100 feet to the southeast at the far corner of the Pier 64/65 sediment cap (Figures 9-1 and 9-2; Figure 6-12 in Polaris 2002b). Thus, adding additional cap material to the area, which includes Station BH-12, would destroy existing macroalgae beds serving as fish and invertebrate habitat on top of the cap.

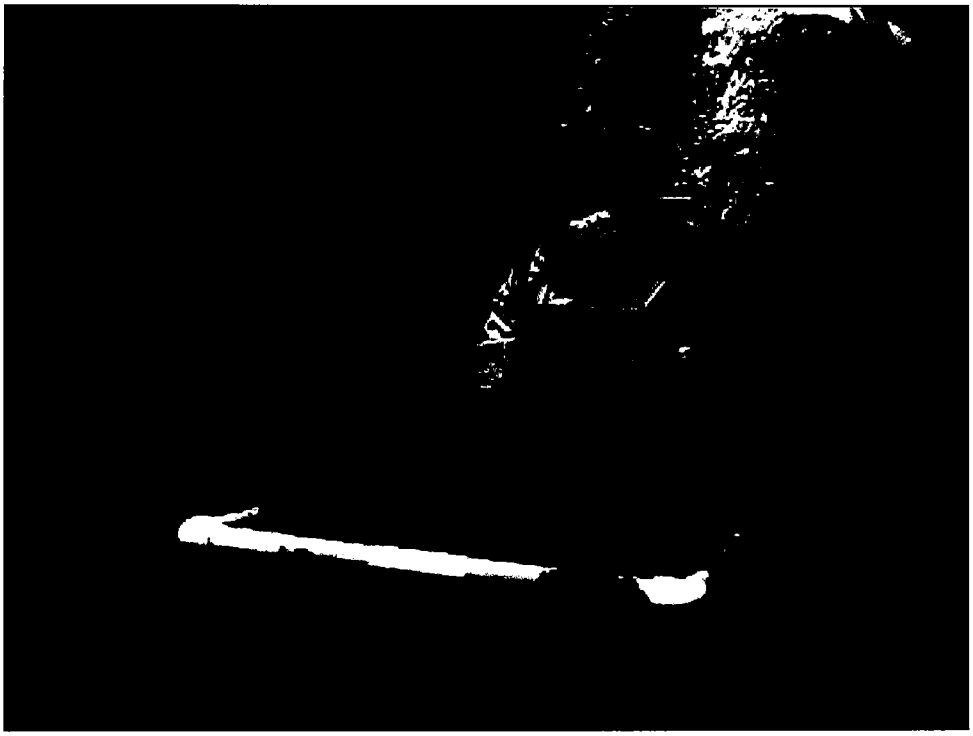


Figure 9.1 Surveying *Laminaria* on gravel, south of Transect 8, (24 Sept 02 survey).

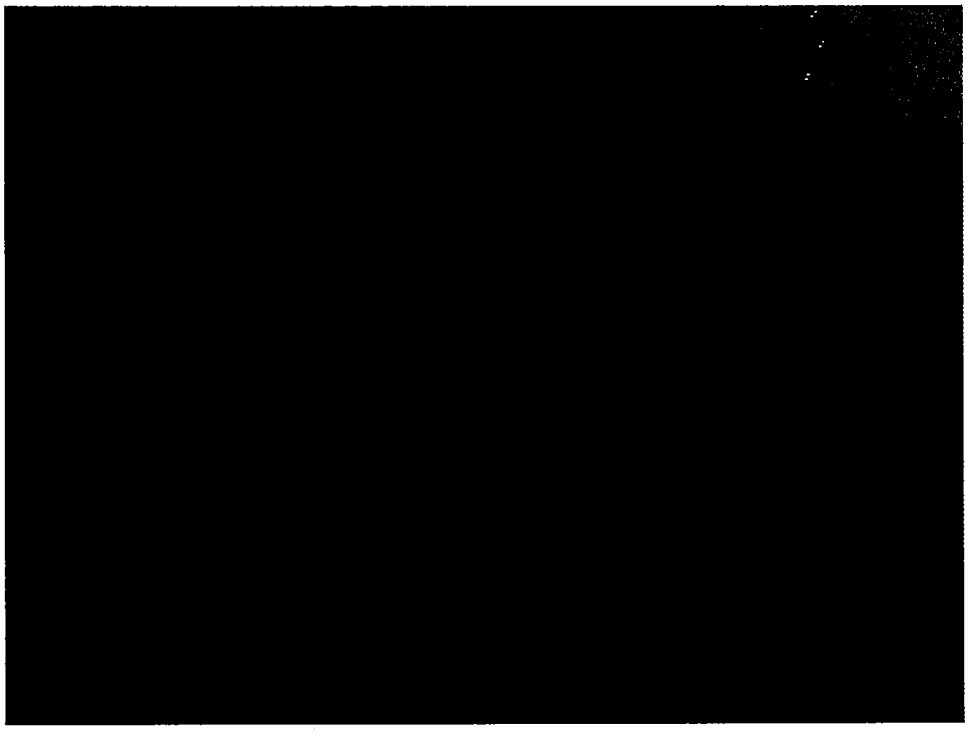


Figure 9-2. *Nereocystis* at SE corner of Marina (24 Sept 02 survey).

9.2.3 Additional considerations

In the context of the known contamination along the Seattle central waterfront, next steps could include analysis of selected archived sub-samples, toxicity analysis, and/or assessment of risk at this site. The Port suggests that the need, timing and scope of future work be considered within the context of an area-wide evaluation of past and ongoing sources, contamination levels, and necessary actions in light of demonstrated recontamination from neighboring properties. It is suggested that further action, if any, be delayed and coordinated until such time that a system-wide approach to source investigation and remedial action can be determined.

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APPENDIX A

FIELD LOG TABLES

Table A-1. Field log for core collection at Station CS-1 Cores A and B.

Date	March 17, 2004	**Data entered by**	G. Erickson
Project	P66 SEDCAP	**Vessel**	NANCY ANN
Location	Bell Harbor Marina	**Operator**	B. Jaworski
Sampler type	Vibra-core	**Field personnel**	D. Dickinson, G. Erickson
			A. Graham
Station ID	CS-1	**Weather**	
Planned Latitude	47 deg 36.619 min N	**Wind speed**	
Planned Longitude	122 deg 20.932 min W	**Air temperature**	
(WGS 84; decimal min.)		**Notes**	Cores taken approx. 20 feet offshore, as in 2002 to avoid gravel substrate
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A		B	
Core ID	CS-1 Core A		CS-1 Core B	
Attempt No.	1		2	
Latitude	47 deg 36.6160 min N		47 deg 36.6162 min N	
Longitude	122 deg 20.9335 min W		122 deg 20.9339 min W	
Northing				
Easting				
Water depth	-50.6 feet MLLW		-50.6 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	9.5 - 10 ft		10 ft	
Recovery length	7 ft 4"		7 ft 9"	
Accepted?	yes		yes	
Time of extrusion	1403 PST		1430 PST	
Notes	**Notes** Two core sections: CS-1 Core A upper CS-1 Core A lower MSS note: easy drive to 9.5 ft acquire 7 ft 4"		**Notes** Two core sections: CS-1 Core B upper CS-1 Core B lower MSS note: debris at 3.5 ft; break through drive to 10 ft	

Attempt No. / Time	**Water depth**	**Latitude**	**Longitude**	**Accepted? / Reason**
1 - 1359 PST	60 ft (uncorrected)			yes
2 - 1425 PST				yes

Table A-2. Field log for core collection at Station CS-1 Cores C and D.

Date	March 17, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Graham
Station ID	CS-1	Weather	
Planned Latitude	47 deg 36.619 min N	Wind speed	
Planned Longitude	122 deg 20.932 min W	Air temperature	
(WGS 84; decimal min.)		Notes	Cores taken approx. 20 feet offshore, as in 2002 to avoid gravel substrate
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	C	D	
Core ID	CS-1 Core C	CS-1 Core D	
Attempt No.	3	4	
Latitude	47 deg 36.6162 min N	47 deg 36.616 min N	
Longitude	122 deg 20.9335 min W	122 deg 20.9342 min W	
Northing			
Easting			
Water depth	-50.6 feet MLLW	-50.6 feet MLLW	depth corrected for tides
Wire angle			
Penetration depth	8 ft	10 ft	
Recovery length	7 ft 4"	8 ft	
Accepted?	yes	yes	
Time of extrusion	1502 PST	1523 PST	
Notes	Notes Two core sections: CS-1 Core C upper CS-1 Core C lower MSS note:	Notes Two core sections: CS-1 Core D upper CS-1 Core D lower MSS note: moderate 3 to 7 ft hard 7 to 8 ft moderate to easy to 10 ft	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
3 - 1459 PST				yes
4 - 1525 PST				yes

Table A-3. Field log for core collection at Station CS-2.

Date	March 18, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Graham
Station ID	CS-2	Weather	
Planned Latitude	47 deg 36.593 min N	Wind speed	
Planned Longitude	122 deg 20.860 min W	Air temperature	
(WGS 84; decimal min.)		Notes	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A	B	
Core ID	CS-2 Core A	CS-2 Core B	
Attempt No.	2	3	
Latitude	47 deg 36.5925 min N	47 deg 36.5927 min N	
Longitude	122 deg 20.859 min W	122 deg 20.8591 min W	
Northing			
Easting			
Water depth	-44.3 feet MLLW	-44.3 feet MLLW	depth corrected for tides
Wire angle			
Penetration depth	9 ft	9 to 10 ft	
Recovery length	8 ft 8"	10 ft 3"	
Accepted?	yes	yes	
Time of extrusion	1442 PST	1457 PST	
Notes	Notes Two core sections: CS-2 Core A upper CS-2 Core A lower MSS note: easy to 9 ft ? core hanging from head line	Notes Three core sections: CS-2 Core B upper CS-2 Core B center CS-2 Core B lower MSS note: easy to 9 ft ? core hanging from head line	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1422 PST	54 ft (uncorrected)			no
2 - 1443 PST				yes
3 - 1459 PST				yes

Table A-4. Field log for core collection at Station CS-3 - Cores A and B.

Date	March 19, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Craig
Station ID	CS-3	Weather	
Planned Latitude	47 deg 36.564 min N	Wind speed	
Planned Longitude	122 deg 20.785 min W	Air temperature	
(WGS 84; decimal min.)		Notes	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A	B	
Core ID	CS-3 Core A	CS-3 Core B	
Attempt No.	1	2	
Latitude	47 deg 36.5637 min N	47 deg 36.5631 min N	
Longitude	122 deg 20.7851 min W	122 deg 20.786 min W	
Northing			
Easting			
Water depth	-29.9 feet MLLW	-29.9 feet MLLW	depth corrected for tides
Wire angle			
Penetration depth	11 ft	7 ft	
Recovery length	6 ft 6"	6 ft 3"	
Accepted?	yes	yes	
Time of extrusion	1308 PST	1336 PST	
Notes	Notes Two core sections: CS-3 Core A upper CS-3 Core A lower MSS note:	Notes Two core sections: CS-3 Core B upper CS-3 Core B lower MSS note: debris at 7 ft wood debris in cutter	black-grey sandy shell / wood strong sulfur odor wood chips

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1315 PST	37 ft 6" (uncorrected)			yes
2 - 1336 PST				yes

Table A-5. Field log for core collection at Station CS-3 - Cores C and D.

Date	March 19, 2004	**Data entered by**	G. Erickson
Project	P66 SEDCAP	**Vessel**	NANCY ANN
Location	Bell Harbor Marina	**Operator**	B. Jaworski
Sampler type	Vibra-core	**Field personnel**	D. Dickinson, G. Erickson
			A. Craig
Station ID	CS-3	**Weather**	
Planned Latitude	47 deg 36.564 min N	**Wind speed**	
Planned Longitude	122 deg 20.785 min W	**Air temperature**	
(WGS 84; decimal min.)		**Notes**	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	C		D	
Core ID	CS-3 Core C		CS-3 Core D	
Attempt No.	1		2	
Latitude	47 deg 36.5639 min N		47 deg 36.5643 min N	
Longitude	122 deg 20.7843 min W		122 deg 20.7855 min W	
Northing				
Easting				
Water depth	-29.9 feet MLLW		-29.9 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	9.5 ft		9.5 ft	
Recovery length	9 ft 3"		7 ft 9"	
Accepted?	yes		yes	
Time of extrusion	1410 PST		1444 PST	
Notes	**Notes** Three core sections: CS-3 Core C upper CS-3 Core C center CS-3 Core C lower strong sulfur odor wood debris black-grey sand		**Notes** Two core sections: CS-3 Core D upper CS-3 Core D lower gray silt slight sulfur odor	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1410 PST	37 ft 6" (uncorrected)			yes
2 - 1444 PST				yes

Table A-6. Field log for core collection at Station BH-1 - Core A.

Date	March 17, 2004		Data entered by	G. Erickson	
Project	P66 SEDCAP		Vessel	NANCY ANN	
Location	Bell Harbor Marina		Operator	B. Jaworski	
Sampler type	Vibra-core		Field personnel	D. Dickinson, G. Erickson	
				A. Graham	
Station ID	BH-1		Weather		
Planned Latitude	47 deg 36.641 min N		Wind speed		
Planned Longitude	122 deg 20.969 min W		Air temperature		
(WGS 84; decimal min.)		Notes	station moved approx. 20 to 25 ft SE of planned location - to avoid gravel on bottom		
Planned Northing					
Planned Easting					
(WA state plane coord.)					

	A		B	
Core ID	BH-1 Core A			
Attempt No.	2			
Latitude	47 deg 36.6387 min N			
Longitude	122 deg 20.9649 min W			
Northing				
Easting				
Water depth	-37.1 feet MLLW	depth corrected		
Wire angle		for tides		
Penetration depth	8 ft			
Recovery length	2.5 ft			
Accepted?	yes			
Time of extrusion	1022			
Notes	Notes		Notes	
	One core section only: BH-1 Core A upper MSS note: hard drive to about 8 ft core tube bent when pulled out	gravel / silt broken glass may not be able to analyze (too much gravel)		

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 0952 PST	44 ft (uncorrected)			no
2 - 1022 PST				yes

Table A-7. Field log for core collection at Station BH-2.

Date	March 17, 2004	**Data entered by**	G. Erickson
Project	P66 SEDCAP	**Vessel**	NANCY ANN
Location	Bell Harbor Marina	**Operator**	B. Jaworski
Sampler type	Vibra-core	**Field personnel**	D. Dickinson, G. Erickson
			A. Graham
Station ID	BH-2	**Weather**	
Planned Latitude	47 deg 36.625 min N	**Wind speed**	
Planned Longitude	122 deg 20.941 min W	**Air temperature**	
(WGS 84; decimal min.)		**Notes**	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A		B	
Core ID	BH-2 Core A		BH-2 Core B	
Attempt No.	1		4	
Latitude	47 deg 36.6241 min N		47 deg 36.6251 min N	
Longitude	122 deg 20.9423 min W		122 deg 20.9431 min W	
Northing				
Easting				
Water depth	-38.9 feet MLLW		-38.9 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	4 ft		5.5 ft	
Recovery length	3 ft		3 ft 7"	
Accepted?	yes		yes	
Time of extrusion	1058 PST		1238 PST	
Notes	**Notes** One core section: BH-2 Core A upper MSS note: very hard at 4' - stop acquire 3'		**Notes** One core section: BH-2 Core B upper MSS note: moderate 0 to 5.5'	

Attempt No. / Time	**Water depth**	**Latitude**	**Longitude**	**Accepted? / Reason**
1 - 1058 PST	46 ft 10" (uncorrected)			yes
2 - 1132 PST				no - only 2' of sediment
3 - 1157 PST				no - not enough sediment
4 - 1233 PST				yes

Table A-8. Field log for core collection at Station BH-3.

Date	March 16, 2004	**Data entered by**	G. Erickson
Project	P66 SEDCAP	**Vessel**	NANCY ANN
Location	Bell Harbor Marina	**Operator**	B. Jaworski
Sampler type	Vibra-core	**Field personnel**	D. Dickinson, G. Erickson
			A. Graham
Station ID	BH-3	**Weather**	
Planned Latitude	47 deg 36.623 min N	**Wind speed**	
Planned Longitude	122 deg 20.918 min W	**Air temperature**	
(WGS 84; decimal min.)		**Notes**	
Planned Northing		Station sampled by crane from Pier 66	
Planned Easting		Station moved to E avoid diagonal pilings supporting wave boards	
(WA state plane coord.)			

	A		B	
Core ID	BH-3 Core A		BH-3 Core B	
Attempt No.	2		4	
Latitude	47 deg 36.62621 min N		47 deg 36.62332 min N	coordinate locations from
Longitude	122 deg 20.9151 min W		122 deg 20.91362 min W	photos and CAD drawings
Northing				
Easting				
Water depth	-33 feet MLLW		-32 feet MLLW	depths from CAD bathym.
Wire angle				
Penetration depth	7 ft		8 to 9 ft	
Recovery length	3 ft 3"		5 ft 8"	
Accepted?	yes		yes	
Time of extrusion	1120 PST		1226 PST	
Notes	**Notes**		**Notes**	
	One core section: BH-3 Core A upper native sediment at core catcher - black w/ bit of sheen		Two core sections: BH-3 Core B upper BH-3 Core B lower much easier penetration sand at core catcher	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1020 PST	approx. 30 ft			no - debris (?)
2 - 1108 PST	approx. 30 ft			yes
3 - 1146 PST	approx. 30 ft			no
4 - 1219 PST	approx. 30 ft			yes

Table A-9. Field log for core collection at Station BH-4.

Date	March 17, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Graham
Station ID	BH-4	Weather	
Planned Latitude	47 deg 36.614 min N	Wind speed	
Planned Longitude	122 deg 20.923 min W	Air temperature	
(WGS 84; decimal min.)		Notes	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A		B	
Core ID	BH-4 Core A		BH-4 Core B	
Attempt No.	1		2	
Latitude	47 deg 36.6136 min N		47 deg 36.6136 min N	
Longitude	122 deg 20.9243 min W		122 deg 20.924 min W	
Northing				
Easting				
Water depth	-48.8 feet MLLW		-48.8 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	10 ft		10 ft	
Recovery length	9 ft 8"		5 ft 9"	
Accepted?	yes		yes	
Time of extrusion	1558 PST		1649 PST	
Notes	Notes Three core sections: BH-4 Core A upper BH-4 Core A center BH-4 Core A lower		Notes Two core sections: BH-4 Core B upper BH-4 Core B lower	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1559 PST	56 ft (uncorrected)			yes
2 - 1634 PST				yes

Table A-10. Field log for core collection at Station BH-5 - Cores A and B.

Date	March 19, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Craig
Station ID	BH-5	Weather	
Planned Latitude	47 deg 36.615 min N	Wind speed	
Planned Longitude	122 deg 20.891 min W	Air temperature	
(WGS 84; decimal min.)		Notes	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A		B	
Core ID	BH-5 Core A		BH-5 Core B	
Attempt No.	1		2	
Latitude	47 deg 36.6136 min N		47 deg 36.6136 min N	
Longitude	122 deg 20.8887 min W		122 deg 20.8883 min W	
Northing				
Easting				
Water depth	-42.4 feet MLLW		-42.4 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	8.0 ft		8.0 ft	
Recovery length	7 ft 4"		5 ft 9"	
Accepted?	yes		yes	
Time of extrusion	0850 PST		0924 PST	
Notes	Notes Two core sections: BH-5 Core A upper BH-5 Core A lower MSS note: move locations - rocks easy to 9 ft minor debris at 4 ft		Notes Two core sections: BH-5 Core B upper BH-5 Core B lower MSS note: Minor debris at 4 ft	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 0851 PST	48 ft (uncorrected)			yes
2 - 0924 PST				yes

Table A-11. Field log for core collection at Station BH-5 - Cores MSD A and MSD B.

Date	March 19, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Craig
Station ID	BH-5	Weather	
Planned Latitude	47 deg 36.615 min N	Wind speed	
Planned Longitude	122 deg 20.891 min W	Air temperature	
(WGS 84; decimal min.)		Notes	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	MSD A		MSD B	
Core ID	BH-5 Core MSD A		BH-5 Core MSD B	
Attempt No.	1		2	
Latitude	47 deg 36.6141 min N		47 deg 36.6138 min N	
Longitude	122 deg 20.8884 min W		122 deg 20.8884 min W	
Northing				
Easting				
Water depth	-42.4 feet MLLW		-42.4 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	9 ft 6"		9 ft	
Recovery length	9 ft 3"		7 ft 2"	
Accepted?	yes		yes	
Time of extrusion	0955 PST		1027 PST	
Notes	Notes Three core sections: BH-5 Core MSD A upper BH-5 Core MSD A center BH-5 Core MSD A lower MSS Note: Debris at 4 ft vibrate 10 sec to break through		Notes Two core sections: BH-5 Core MSD B upper BH-5 Core MSD B lower MSS Note: Debris at 4.5 ft Drive 30 sec to break through outside of core tube badly gouged; 9 ft penetration	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 0955 PST	47 ft (uncorrected)			yes
2 - 1027 PST				yes

Table A-12. Field log for core collection at Station BH-5 - Cores MST A and MST B.

Date	March 19, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Craig
Station ID	BH-5	Weather	
Planned Latitude	47 deg 36.615 min N	Wind speed	
Planned Longitude	122 deg 20.891 min W	Air temperature	
(WGS 84; decimal min.)		Notes	rocks on bottom
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	MST A	MST B	
Core ID	BH-5 Core MST A	BH-5 Core MST B	
Attempt No.	1	3	
Latitude	47 deg 36.6135 min N	47 deg 36.6133 min N	
Longitude	122 deg 20.8879 min W	122 deg 20.8881 min W	
Northing			
Easting			
Water depth	-42.4 feet MLLW	-42.4 feet MLLW	depth corrected for tides
Wire angle			
Penetration depth	9 ft	9 ft	
Recovery length	5 ft 7"	9 ft 5"	
Accepted?	yes	yes	
Time of extrusion	1100 PST	1145 PST	
Notes	Notes Two core sections: BH-5 Core MST A upper BH-5 Core MST A lower MSS Note: Debris at 4 ft vibrate 20 sec to break through	Notes Three core sections: BH-5 Core MST B upper BH-5 Core MST B center BH-5 Core MST B lower	
top part of core MST A sediment collected in zip lock bag (core cut too low)			

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1055 PST	46 ft 9" (uncorrected)			yes
2 - 1128 PST				no - hit debris at 4 ft
3 - 1147 PST				yes

Table A-13. Field log for core collection at Station BH-6.

Date	March 16, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Graham
Station ID	BH-6	Weather	
Planned Latitude	47 deg 36.61 min N	Wind speed	
Planned Longitude	122 deg 20.857 min W	Air temperature	
(WGS 84; decimal min.)		Notes	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A		B	
Core ID	BH-6 Core A		BH-6 Core B	
Attempt No.	1		2	
Latitude	47 deg 36.6092 min N		47 deg 36.6098 min N	
Longitude	122 deg 20.8579 min W		122 deg 20.8573 min W	
Northing				
Easting				
Water depth	-33.3 feet MLLW		-33.3 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	10 ft		10 ft	
Recovery length	7 ft 7"		8 ft 8"	
Accepted?	yes		yes	
Time of extrusion	1628 PST		1656 PST	
Notes	Notes Two core sections: BH-6 Core A upper BH-6 Core A lower		Notes Two core sections: BH-6 Core B upper BH-6 Core B lower	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1624 PST	37 ft (uncorrected)			yes
2 - 1656 PST	36 ft (uncorrected)			yes

Table A-14. Field log for core collection at Station BH-7.

Date	March 16, 2004	**Data entered by**	G. Erickson
Project	P66 SEDCAP	**Vessel**	NANCY ANN
Location	Bell Harbor Marina	**Operator**	B. Jaworski
Sampler type	Vibra-core	**Field personnel**	D. Dickinson, G. Erickson
			A. Graham
Station ID	BH-7	**Weather**	
Planned Latitude	47 deg 36.602 min N	**Wind speed**	
Planned Longitude	122 deg 20.844 min W	**Air temperature**	
(WGS 84; decimal min.)		**Notes**	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A	B	
Core ID	BH-7 Core A	BH-7 Core B	
Attempt No.	1	3	
Latitude	47 deg 36.6025 min N	47 deg 36.6029 min N	
Longitude	122 deg 20.8433 min W	122 deg 20.8443 min W	
Northing			
Easting			
Water depth	-33.6 feet MLLW	-33.6 feet MLLW	depth corrected for tides
Wire angle			
Penetration depth	10 ft	13 ft	
Recovery length	6 ft 6"	8 ft 9"	
Accepted?	yes	yes	
Time of extrusion	1500 PST	1554 PST	
Notes	**Notes** Two core sections: BH-7 Core A upper BH-7 Core A lower sand at core catcher and section split	**Notes** Two core sections: BH-7 Core B upper BH-7 Core B lower sand at core catcher and section split	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1458 PST	40.4 ft (uncorrected)			yes
2 - 1530 PST				no - stopped at 3'
3 - 1551 PST				yes

Table A-15. Field log for core collection at Station BH-8.

Date	March 18, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Graham
Station ID	BH-8	Weather	
Planned Latitude	47 deg 36.582 min N	Wind speed	
Planned Longitude	122 deg 20.842 min W	Air temperature	
(WGS 84; decimal min.)		Notes	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A		B	
Core ID	BH-8 Core A		BH-8 Core B	
Attempt No.	1		2	
Latitude	47 deg 36.5812 min N		47 deg 36.5811 min N	
Longitude	122 deg 20.8423 min W		122 deg 20.8421 min W	
Northing				
Easting				
Water depth	-42.7 feet MLLW		-42.7 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	8.5 ft		8 ft	
Recovery length	8 ft		5 ft	
Accepted?	yes		yes	
Time of extrusion	1057 PST		1123 PST	
Notes	Notes Two core sections: BH-8 Core A upper BH-8 Core A lower MSS note: minor debris at 1'; debris at 3' drive 40 sec, break through easy to 8.5'		Notes Two core sections: BH-8 Core B upper BH-8 Core B lower	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1057 PST	49 ft (uncorrected)			yes
2 - 1124 PST				yes

Table A-16. Field log for core collection at Station BH-9 Cores A and B.

Date	March 18, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Graham
Station ID	BH-9	Weather	
Planned Latitude	47 deg 36.587 min N	Wind speed	
Planned Longitude	122 deg 20.82 min W	Air temperature	
(WGS 84; decimal min.)		Notes	cores taken in location more centered between rock corridors - about 4 ft to SW of planned station
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A	B	
Core ID	BH-9 Core A	BH-9 Core B	
Attempt No.	2	3	
Latitude	47 deg 36.5863 min N	47 deg 36.5865 min N	
Longitude	122 deg 20.8180 min W	122 deg 20.8175 min W	
Northing			
Easting			
Water depth	-29.9 feet MLLW	-29.9 feet MLLW	depth corrected for tides
Wire angle			
Penetration depth	10 ft	9 ft	
Recovery length	6 ft 11"	4 ft	
Accepted?	yes	yes	
Time of extrusion	0912 PST	0937 PST	
Notes	Notes Two core sections: BH-9 Core A upper BH-9 Core A lower MSS note: Debris at 2.3'; very hard drive 1.5 min to break through soft to 10'	Notes One core section: BH-9 Core B upper MSS note: Debris minor at 5' Debris at 7'; drive to 9'	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 0838 PST	36 ft (uncorrected)			no - not enough sediment
2 - 0907 PST				yes
3 - 0938 PST				yes

Table A-17. Field log for core collection at Station BH-9 Cores C and D.

Date	March 18, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Graham
Station ID	BH-9	Weather	
Planned Latitude	47 deg 36.587 min N	Wind speed	
Planned Longitude	122 deg 20.82 min W	Air temperature	
(WGS 84; decimal min.)		Notes	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	C		D	
Core ID	BH-9 Core C		BH-9 Core D	
Attempt No.	4		5	
Latitude	47 deg 36.5871 min N		47 deg 36.5868 min N	
Longitude	122 deg 20.8182 min W		122 deg 20.8179 min W	
Northing				
Easting				
Water depth	-29.9 feet MLLW		-29.9 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	9.5 ft		5 - 6 ft	
Recovery length	4 ft		6 ft 7"	
Accepted?	yes		yes	
Time of extrusion	1002 PST		1026 PST	
Notes	Notes One core section: BH-9 Core C upper MSS note: rotted log in cutter		Notes Two core sections: BH-9 Core D upper BH-9 Core D lower MSS note: hit debris at 5' vibrate 2 min on debris	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
4 - 0959 PST				yes
5 - 1022 PST				yes

Table A-18. Field log for core collection at Station BH-10.

Date	March 18, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Graham
Station ID	BH-10	Weather	
Planned Latitude	47 deg 36.574 min N	Wind speed	
Planned Longitude	122 deg 20.802 min W	Air temperature	
(WGS 84; decimal min.)		Notes	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A		B	
Core ID	BH-10 Core A		BH-10 Core B	
Attempt No.	2		4	
Latitude	47 deg 36.574 min N		47 deg 36.5752 min N	
Longitude	122 deg 20.8012 min W		122 deg 20.8020 min W	
Northing				
Easting				
Water depth	-30.9 feet MLLW		-30.9 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	8 ft		10 ft	
Recovery length	8 ft 4"		8 ft 2"	
Accepted?	yes		yes	
Time of extrusion	1218 PST		1341 PST	
Notes	Notes Two core sections: BH-10 Core A upper BH-10 Core A lower MSS note: minor debris 4.5 ft easy to 8 ft		Notes Two core sections: BH-10 Core B upper BH-10 Core B lower MSS note: soft to 10 ft	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1155 PST	38.3 ft (uncorrected)			no - not enough sediment
2 - 1219 PST				yes
3 - 1314 PST				no - debris/not enough sed.
4 - 1340 PST				yes

Table A-19. Field log for core collection at Station BH-11.

Date	March 18, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Graham
Station ID	BH-11	Weather	
Planned Latitude	47 deg 36.564 min N	Wind speed	
Planned Longitude	122 deg 20.812 min W	Air temperature	
(WGS 84; decimal min.)		Notes	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A		B	
Core ID	BH-11 Core A		BH-11 Core B	
Attempt No.	2		3	
Latitude	47 deg 36.5645 min N		47 deg 36.5642 min N	
Longitude	122 deg 20.8136 min W		122 deg 20.8137 min W	
Northing				
Easting				
Water depth	-45.7 feet MLLW		-45.7 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	7 ft 6"		10 ft	
Recovery length	5 ft 2"		5 ft 6"	
Accepted?	yes		yes	
Time of extrusion	1605 PST		1626 PST	
Notes	Notes Two core sections: BH-11 Core A upper BH-11 Core A lower MSS note: debris at 4 ft vibrate 1 min easy to 7.5 ft		Notes Two core sections: BH-11 Core B upper BH-11 Core B lower MSS note: minor debris at 7 ft easy to 10.5 ft	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1543 PST	55 ft (uncorrected)			no - core went in twice
2 - 1605 PST				yes
3 - 1627 PST				yes

Table A-20. Field log for core collection at Station BH-12 - Cores A and B.

Date	March 19, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Craig
Station ID	BH-12	Weather	
Planned Latitude	47 deg 36.560 min N	Wind speed	
Planned Longitude	122 deg 20.775 min W	Air temperature	
(WGS 84; decimal min.)		Notes	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A		B	
Core ID	BH-12 Core A		BH-12 Core B	
Attempt No.	2		3	
Latitude	47 deg 36.5607 min N		47 deg 36.5611 min N	
Longitude	122 deg 20.7753 min W		122 deg 20.775 min W	
Northing				
Easting				
Water depth	-30.0 feet MLLW		-30.0 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	9 ft		9 ft	
Recovery length	9.5 ft		6 ft 4"	
Accepted?	yes		yes	
Time of extrusion	1545 PST		1612 PST	
Notes	Notes		Notes	
	Three core sections:	black/silty	Two core sections:	very black / watery
	BH-12 Core A upper	strong odor -	BH-12 Core B upper	strong odor / oily sheen
	BH-12 Core A center	creosote?	BH-12 Core B lower	
	BH-12 Core A lower	oily sheen		
			MSS note:	
	MSS note:		very soft to 7 ft	
	minor debris at 4 ft and 7.5 ft		minor debris at 8 ft	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1525 PST	40 ft (uncorrected)			no - stuck at 3 ft
2 - 1545 PST				yes
3 - 1612 PST				yes

Table A-21. Field log for core collection at Station BH-13 - Cores A and B.

Date	March 19, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Craig
Station ID	BH-13	Weather	
Planned Latitude	47 deg 36.538 min N	Wind speed	
Planned Longitude	122 deg 20.737 min W	Air temperature	
(WGS 84; decimal min.)		Notes	station moved to NW from planned location to to avoid debris below dock
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A		B	
Core ID	BH-13 Core A		BH-13 Core B	
Attempt No.	2		3	
Latitude	47 deg 36.5395 min N		47 deg 36.5401 min N	
Longitude	122 deg 20.7400 min W		122 deg 20.7400 min W	
Northing				
Easting				
Water depth	-31.8 feet MLLW		-31.8 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	8 ft		7 ft	
Recovery length	5 ft 10"		6 ft 7"	
Accepted?	yes		yes	
Time of extrusion	1700 PST		1730 PST	
Notes	Notes Two core sections: BH-13 Core A upper BH-13 Core A lower MSS note: very soft to 8 ft		Notes Two core sections: BH-13 Core B upper BH-13 Core B lower MSS note: easy to 4 ft roll off to very hard at 8.5 ft	very soft sediment gray sand no odor

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 1645 PST				no - stuck at 9"
2 - 1655 PST	41 ft (uncorrected)			yes
3 - 1725 PST				yes

Table A-22. Field log for core collection at Station SS5-B.

Date	March 17, 2004	Data entered by	G. Erickson
Project	P66 SEDCAP	Vessel	NANCY ANN
Location	Bell Harbor Marina	Operator	B. Jaworski
Sampler type	Vibra-core	Field personnel	D. Dickinson, G. Erickson
			A. Graham
Station ID	SS5-B	Weather	overcast, drizzling
Planned Latitude	47 deg 36.556 min N	Wind speed	low
Planned Longitude	122 deg 20.906 min W	Air temperature	
(WGS 84; decimal min.)		Notes	
Planned Northing			
Planned Easting			
(WA state plane coord.)			

	A		B	
Core ID	SS5-B Core A		SS5-B Core B	
Attempt No.	1		2	
Latitude	47 deg 36.5563 min N		47 deg 36.5564 min N	
Longitude	122 deg 20.9067 min W		122 deg 20.9054 min W	
Northing				
Easting				
Water depth	-83.3 feet MLLW		-83.3 feet MLLW	depth corrected for tides
Wire angle				
Penetration depth	13 ft		8 ft	
Recovery length	11 ft 4"		5 ft 10"	
Accepted?	yes		yes	
Time of extrusion	0852 PST		0927 PST	
Notes	Notes Three core sections: SS5-B Core A upper SS5-B Core A center SS5-B Core A lower soft sediment - free fall in 10 ft		Notes Two core sections: SS5-B Core B upper SS5-B Core B lower	

Attempt No. / Time	Water depth	Latitude	Longitude	Accepted? / Reason
1 - 0848 PST	90 ft (uncorrected)			yes
2 - 0921 PST				yes

APPENDIX B

CORE DIAGRAM FIGURES

Figure B-1. Diagrams of Sediment Cores A and B collected at Station No. CS-1 on March 17, 2004. Core layer sub-samples composited from Cores A and B for analysis.

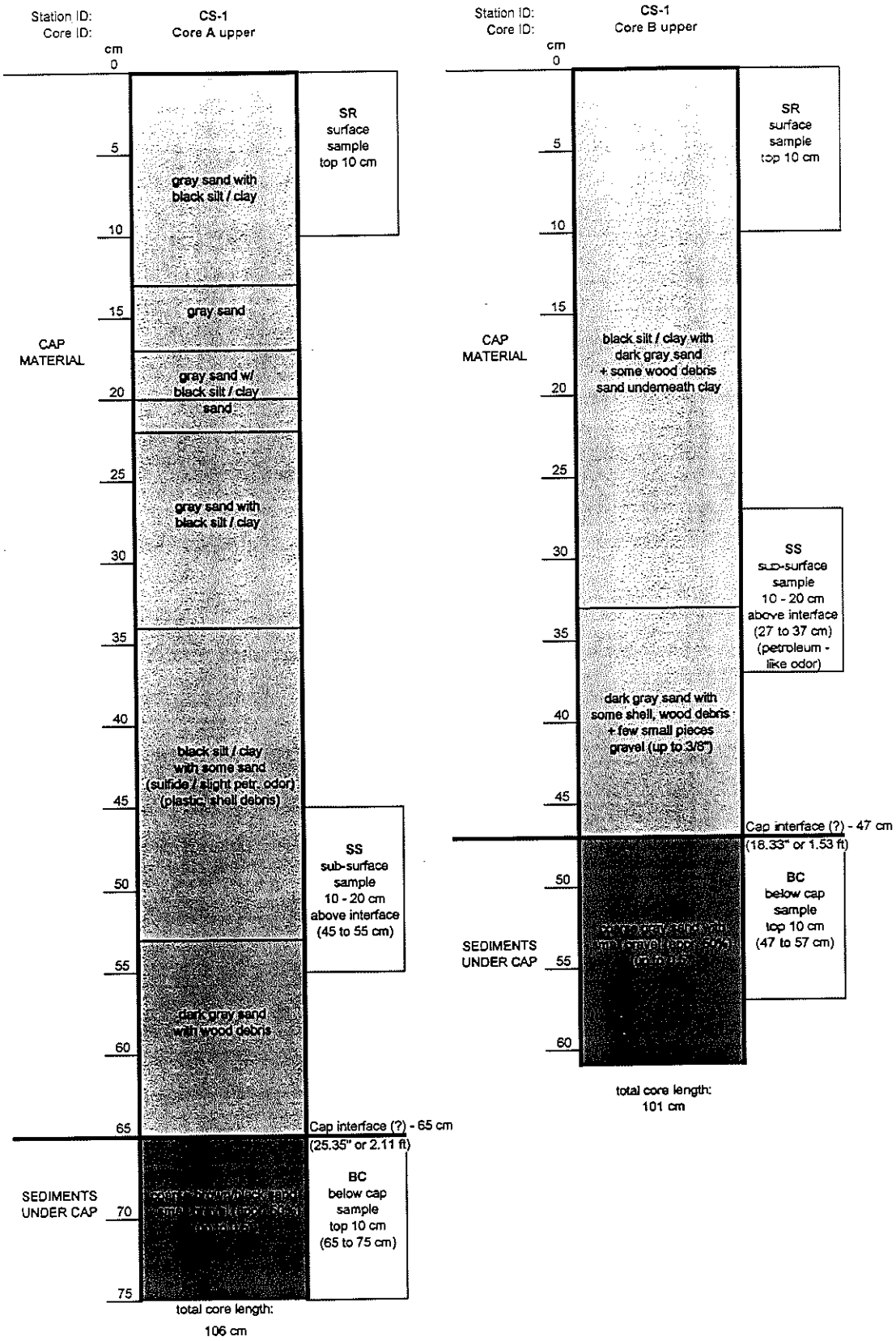


Figure B-2. **Diagrams of Sediment Cores C and D collected at Station No. CS-1 on March 17, 2004. Black silt / clay inclusion (INCL) sub-samples collected from Cores C and D for analysis.**

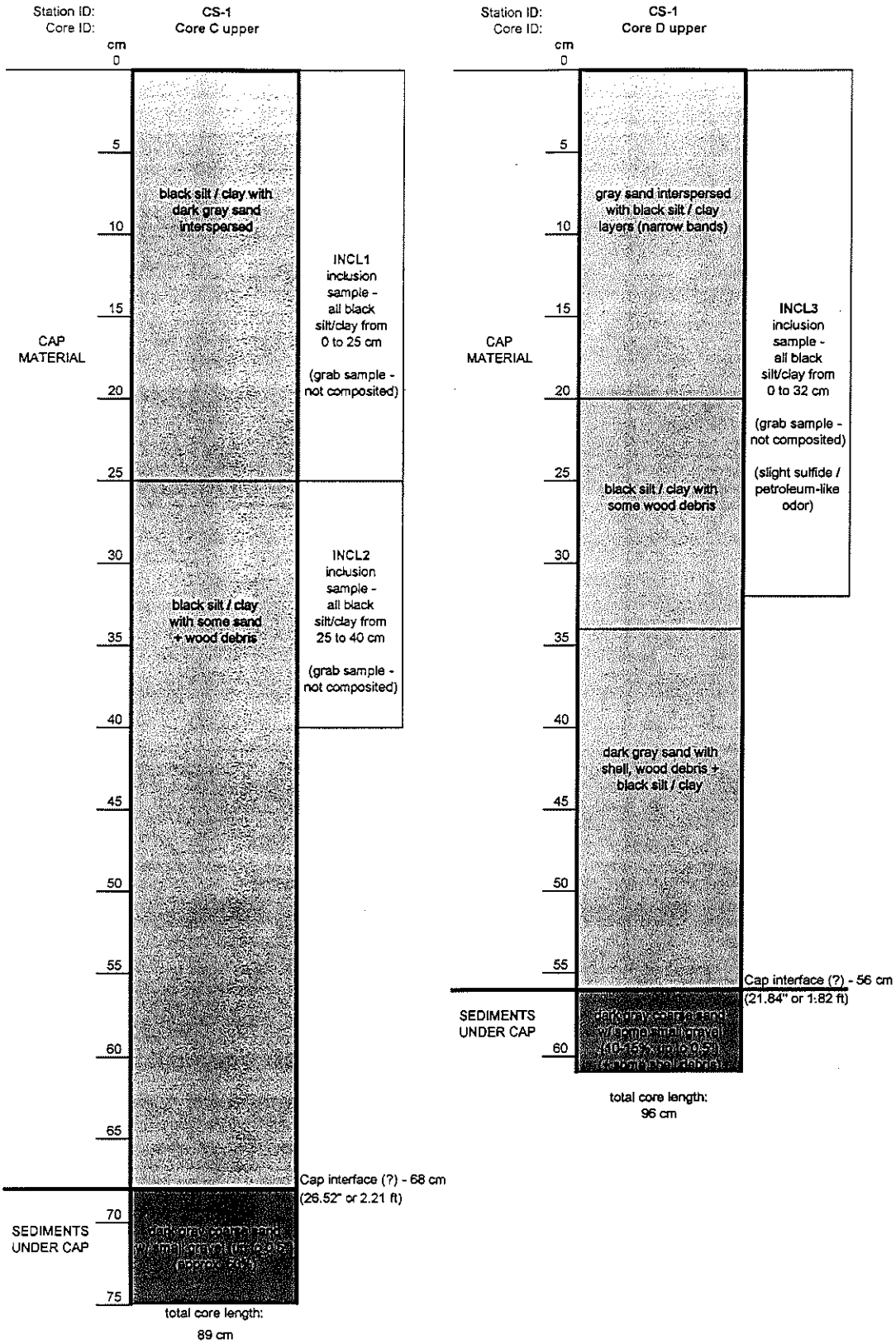


Figure B-3. Diagrams of Sediment Cores A and B collected at Station No. CS-2 on March 18, 2004. Core layer sub-samples composited from Cores A and B for analysis.

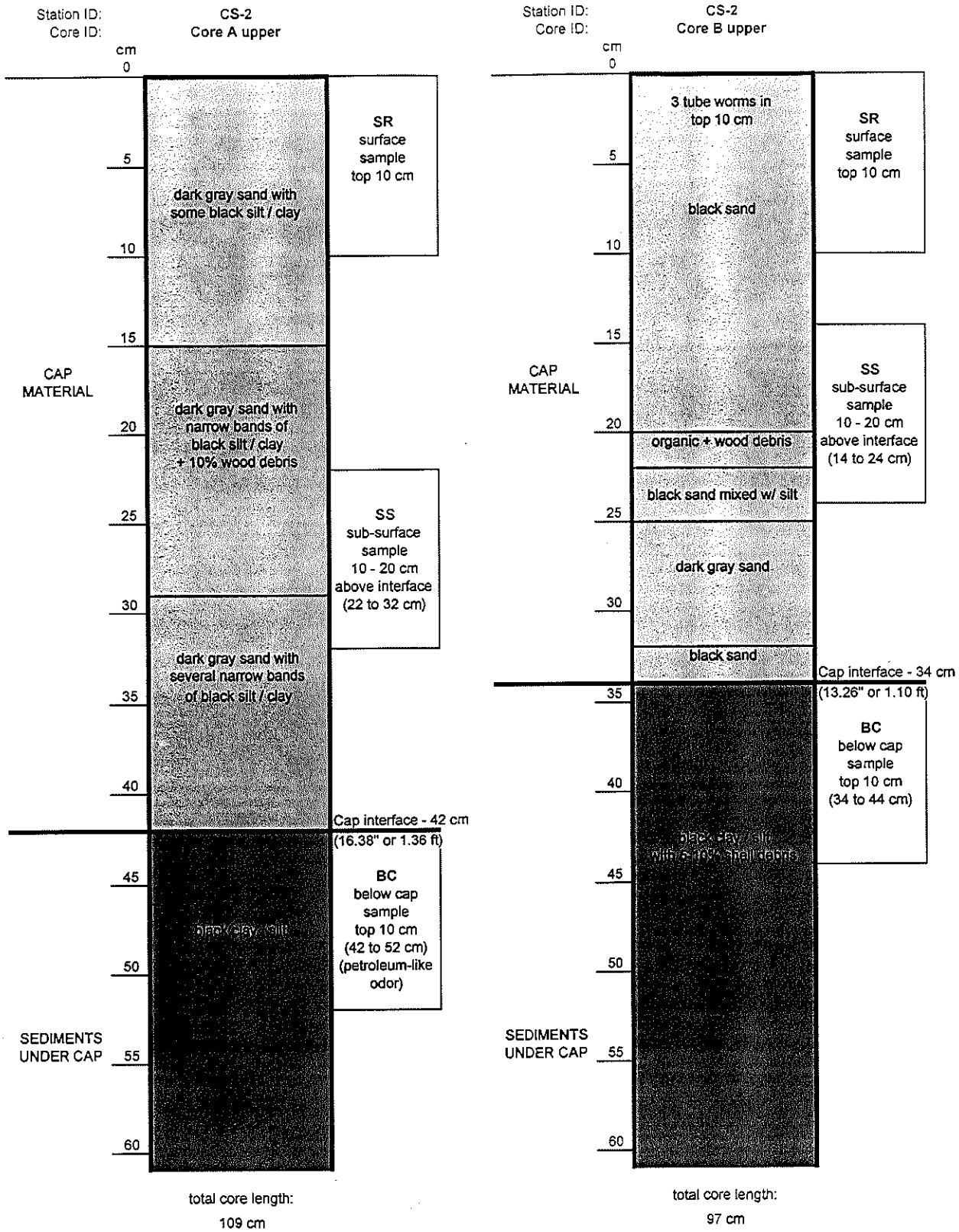


Figure B-4. Diagrams of Sediment Cores A and B collected at Station No. CS-3 on March 19, 2004.
Core layer sub-samples composited from Cores A and B for analysis. Core A stored upside down (up arrow labeled wrong).

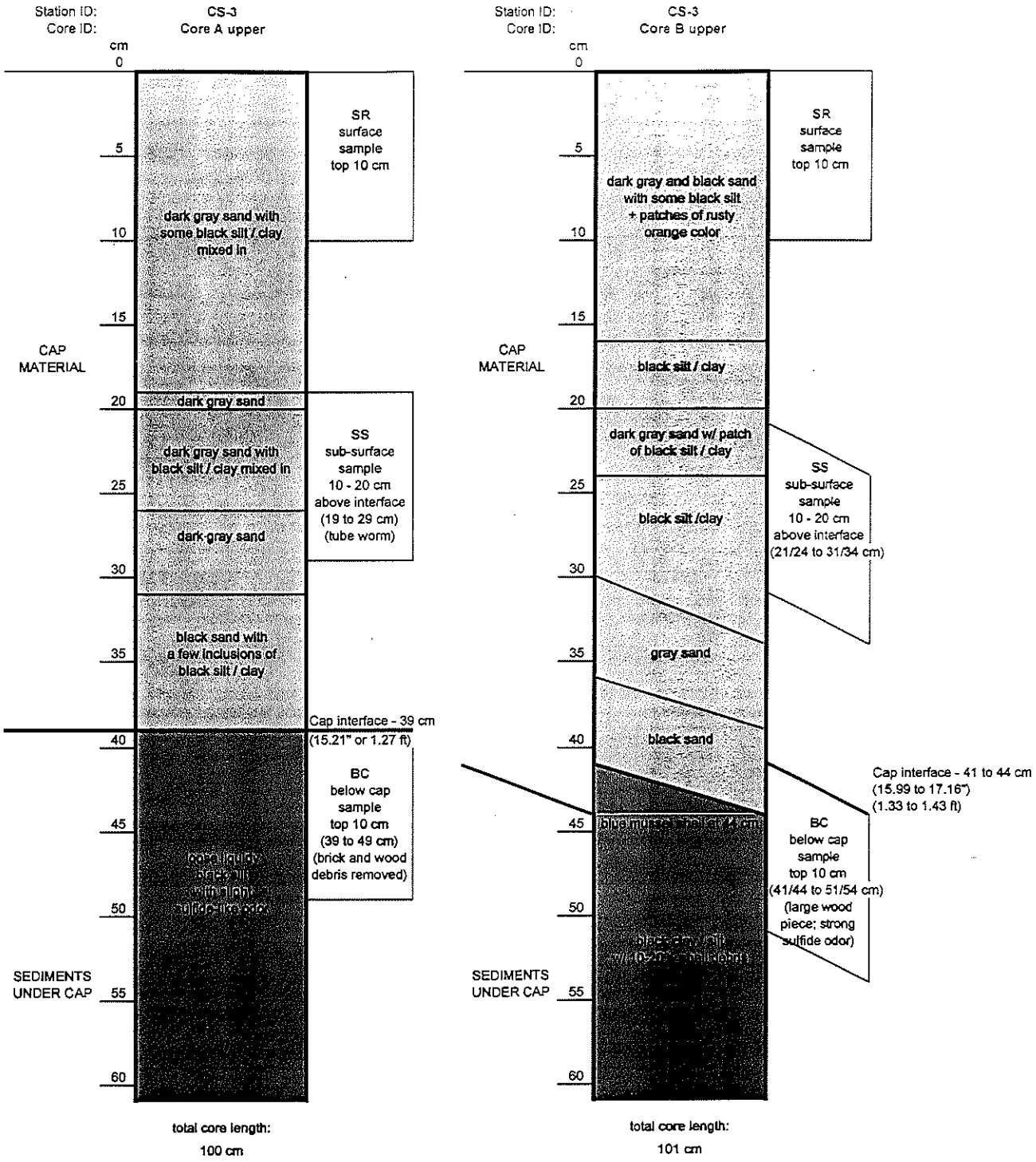


Figure B-5. Diagrams of Sediment Cores C and D collected at Station No. CS-3 on March 19, 2004. Core layer sub-samples composited from Cores C and D for analysis of CS-3-FR samples.

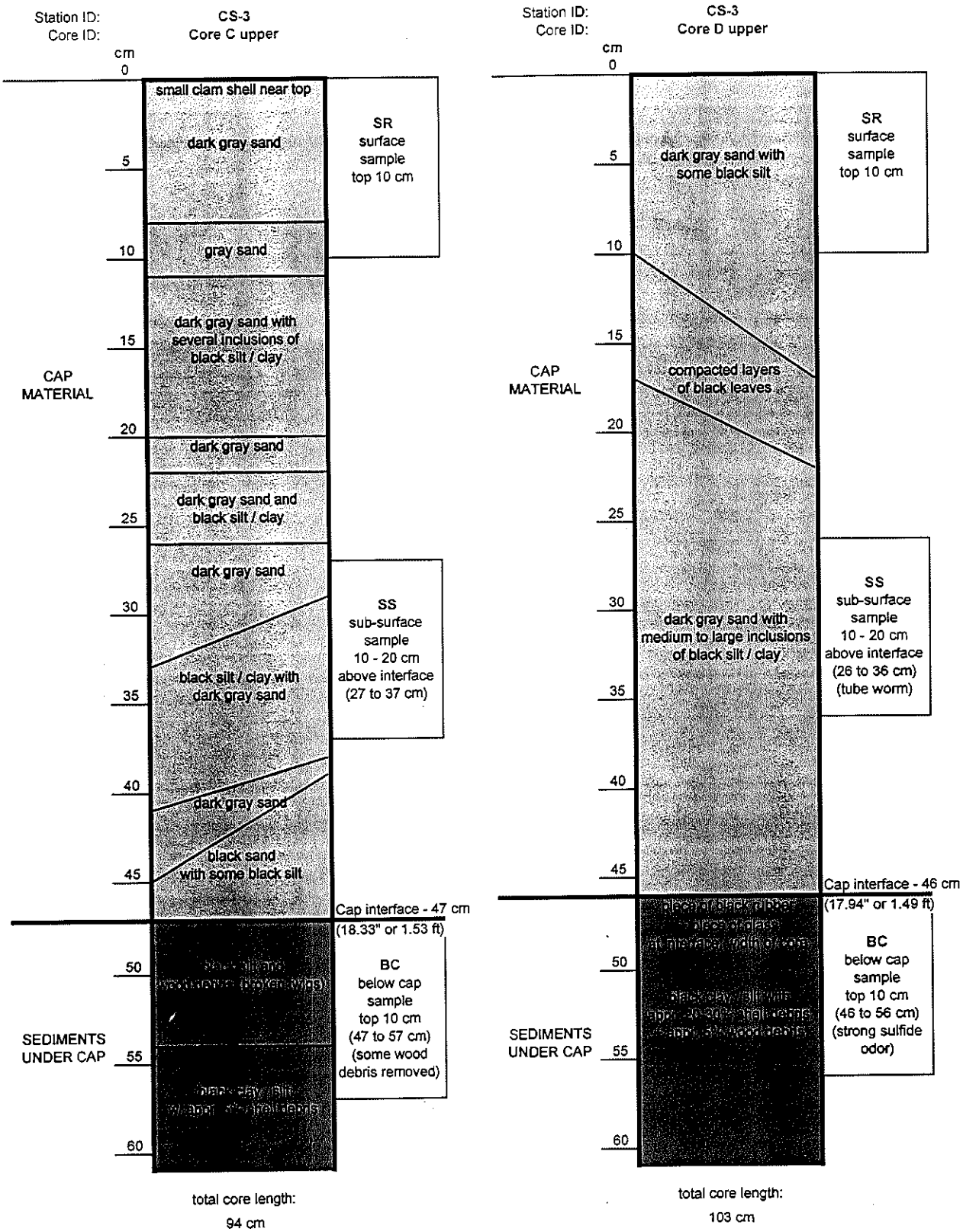


Figure B-6. Diagrams of Sediment Core A collected at Station No. BH-1 on March 17, 2004.
Sediment present primarily gravel - not enough fine fractions for analysis.
No cap material present. Second core not collected due to gravel preventing core penetration.

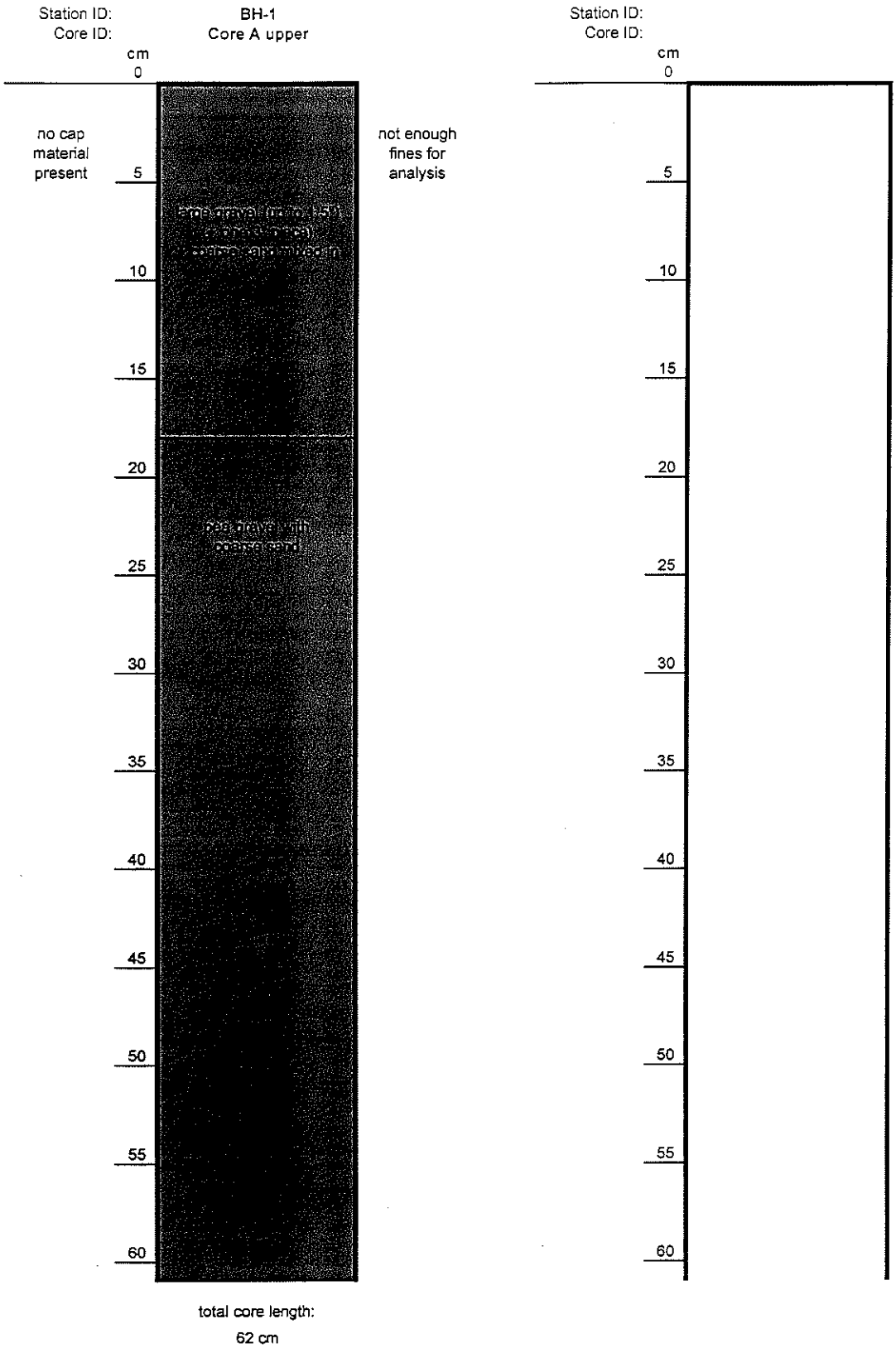


Figure B-7. Diagrams of Sediment Cores A and B collected at Station No. BH-2 on March 17, 2004. Core layer sub-samples composited from Cores A and B for analysis.

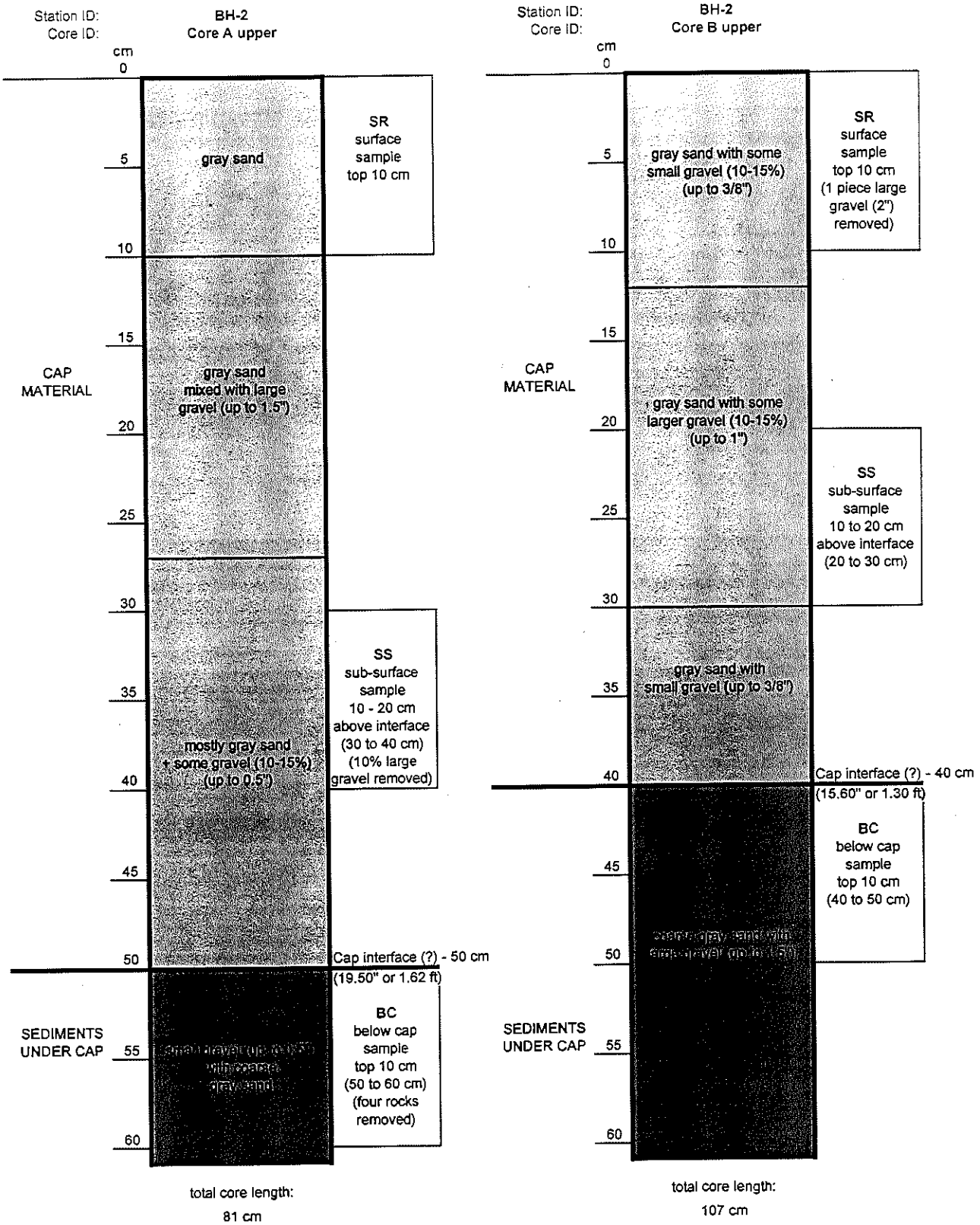


Figure B-8. Diagrams of Sediment Cores A and B collected at Station No. BH-3 on March 16, 2004. Core layer sub-samples composited from Cores A and B for analysis.

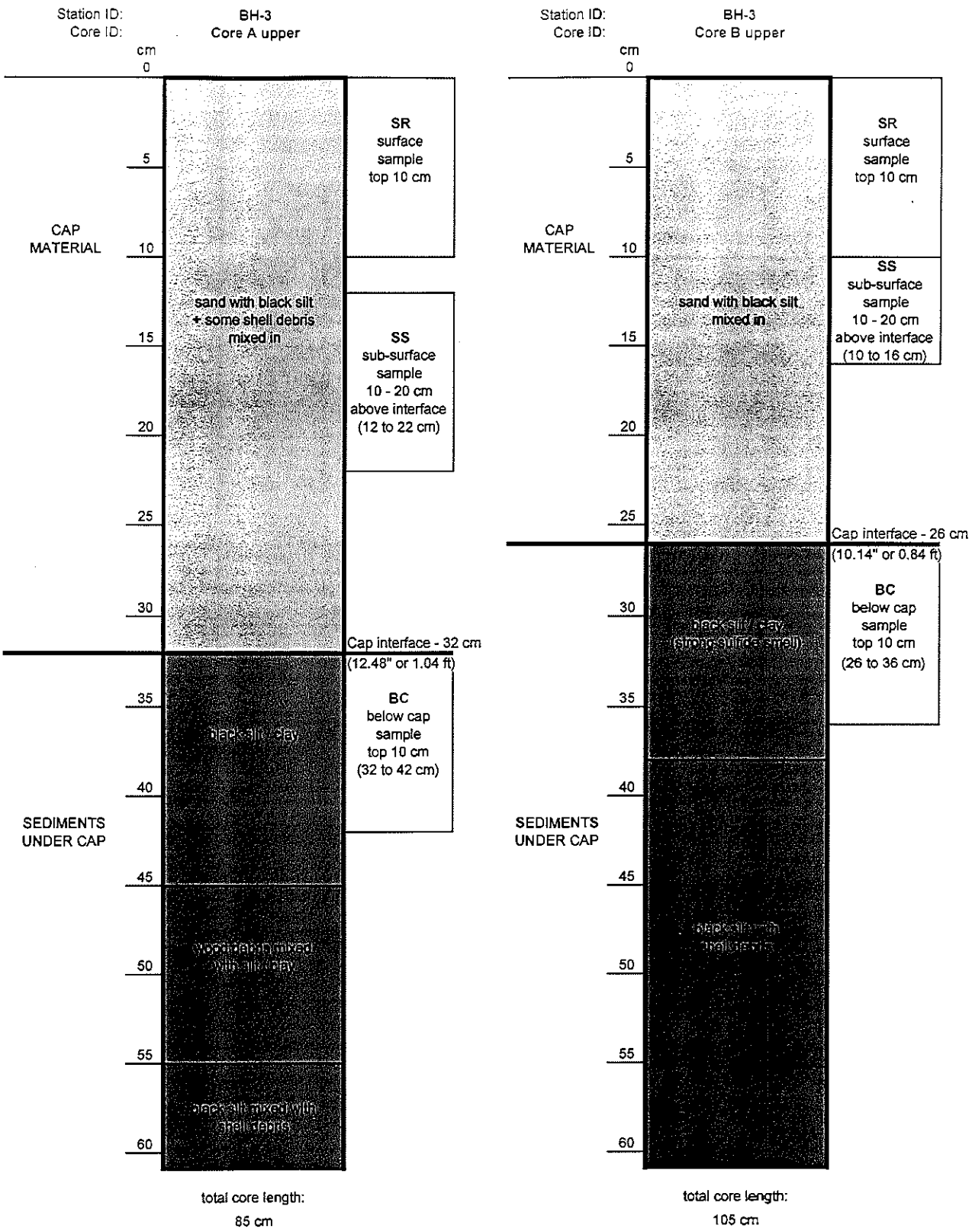


Figure B-9. Diagrams of Sediment Cores A and B collected at Station No. BH-4 on March 17, 2004. Core layer sub-samples composited from Cores A and B for analysis.

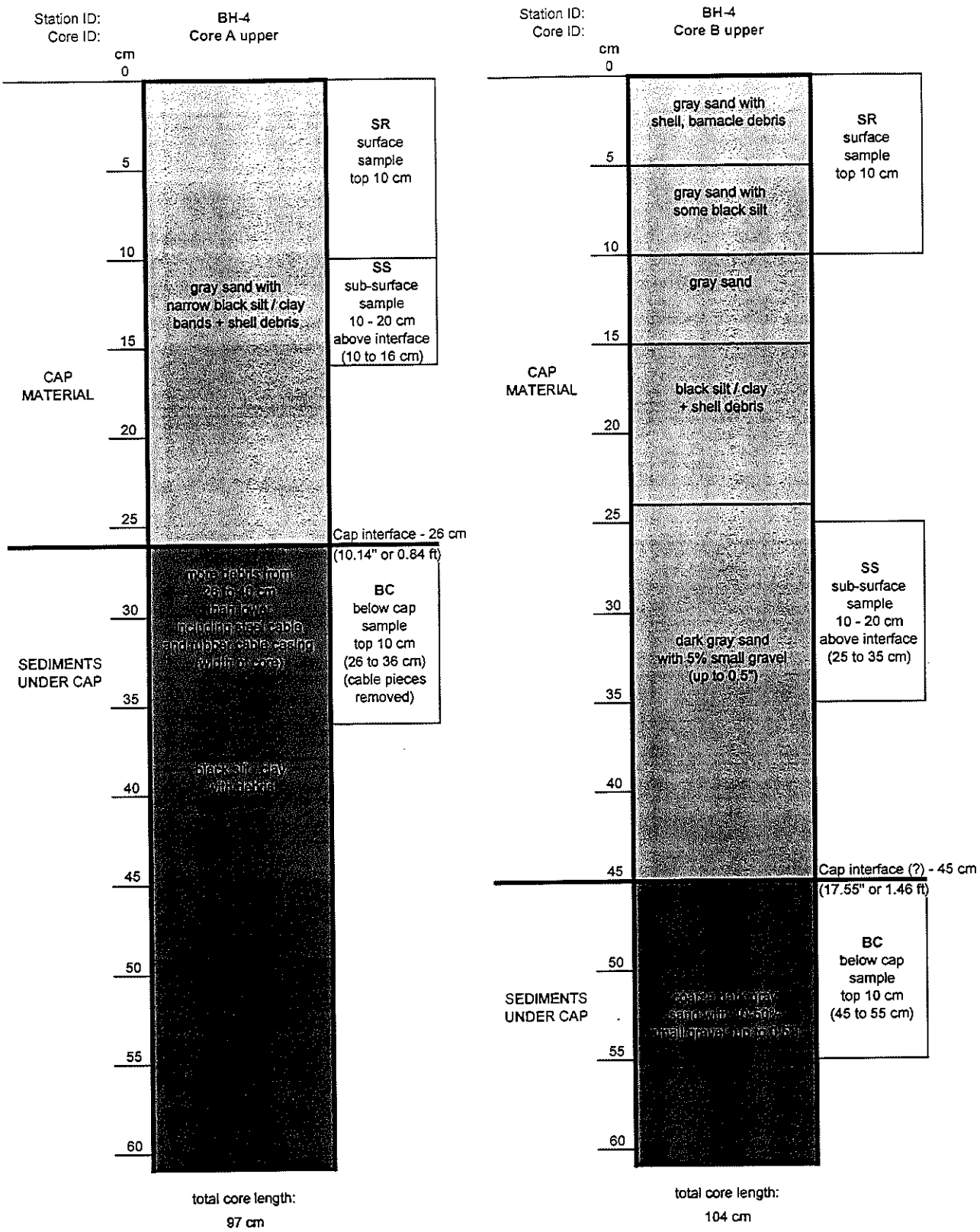


Figure B-10. Diagrams of Sediment Cores A and B collected at Station No. BH-5 on March 19, 2004. Core layer sub-samples composited from Cores A and B for analysis.

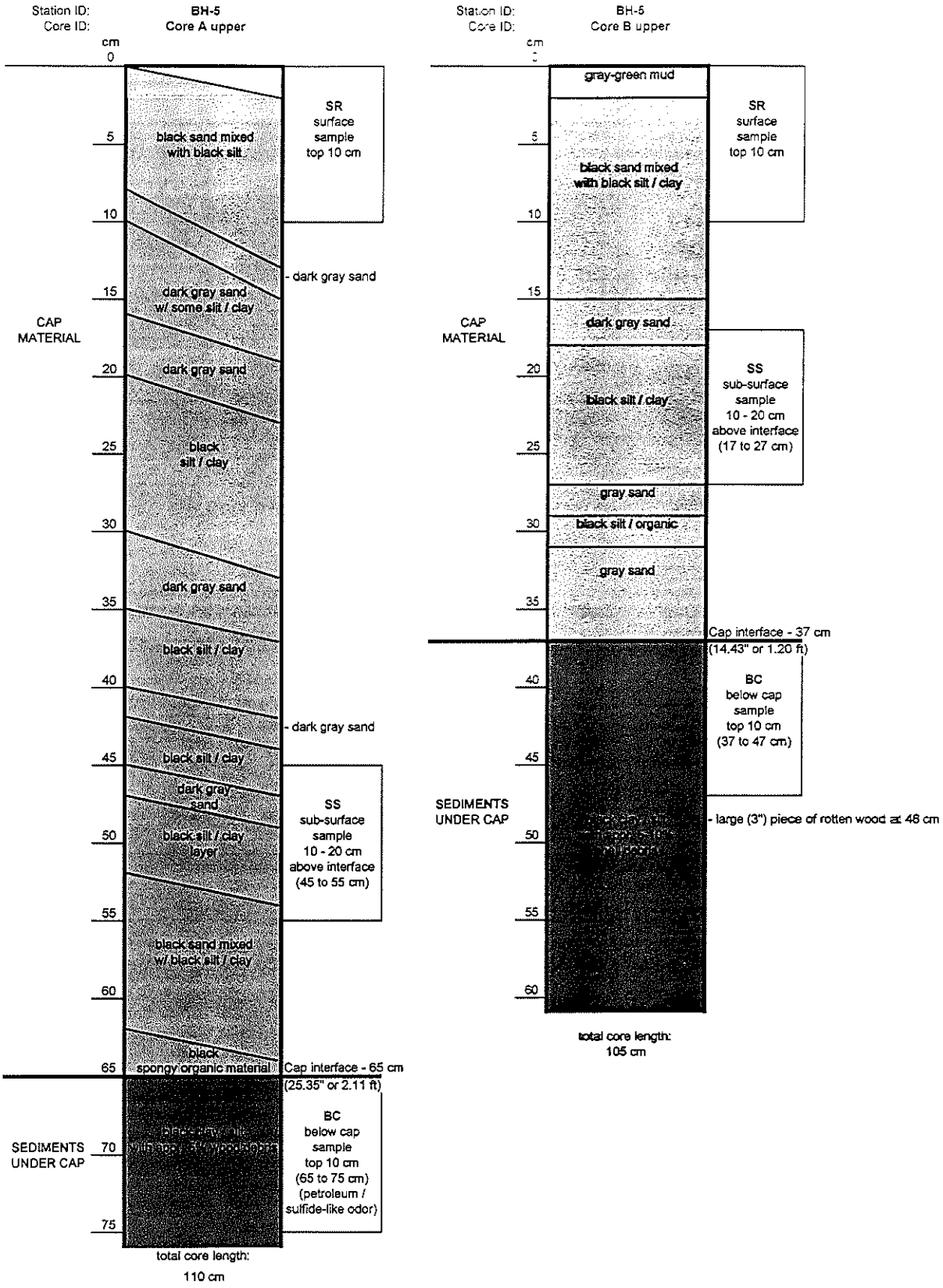


Figure B-11. Diagrams of Sediment Cores MSD A and MSD B collected at Station No. BH-5 on March 19, 2004. Core layer sub-samples composited from Cores MSD A and MSD B for analysis. MSD = matrix spike duplicate.

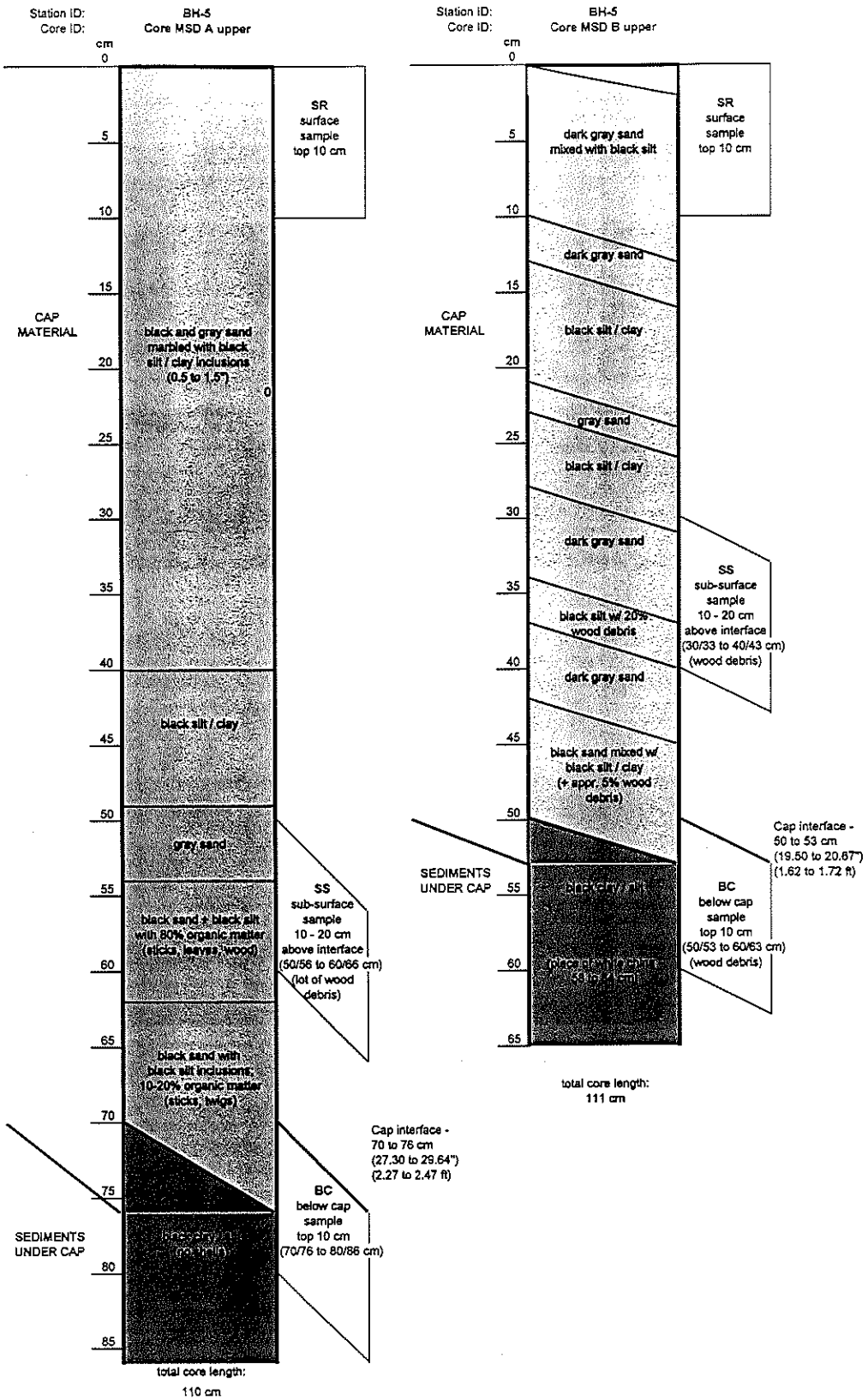


Figure B-12. Diagrams of Sediment Cores MST A and MST B collected at Station No. BH-5 on March 19, 2004. Core layer sub-samples composited from Cores MST A and MST B for analysis. MST = matrix spike triplicate.

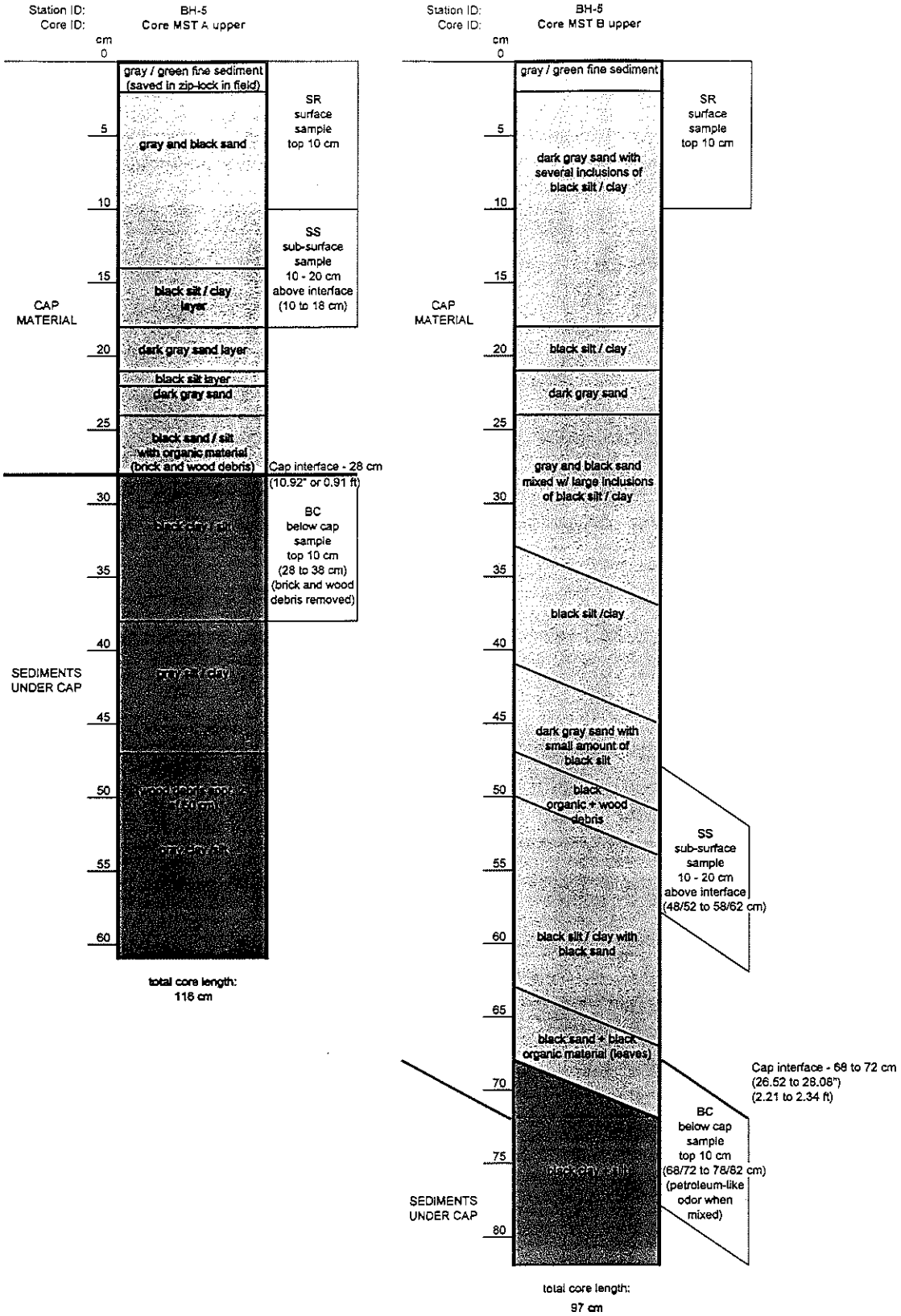


Figure B-13. Diagrams of Sediment Cores A and B collected at Station No. BH-6 on March 16, 2004. Core layer sub-samples composited from Cores A and B for analysis.

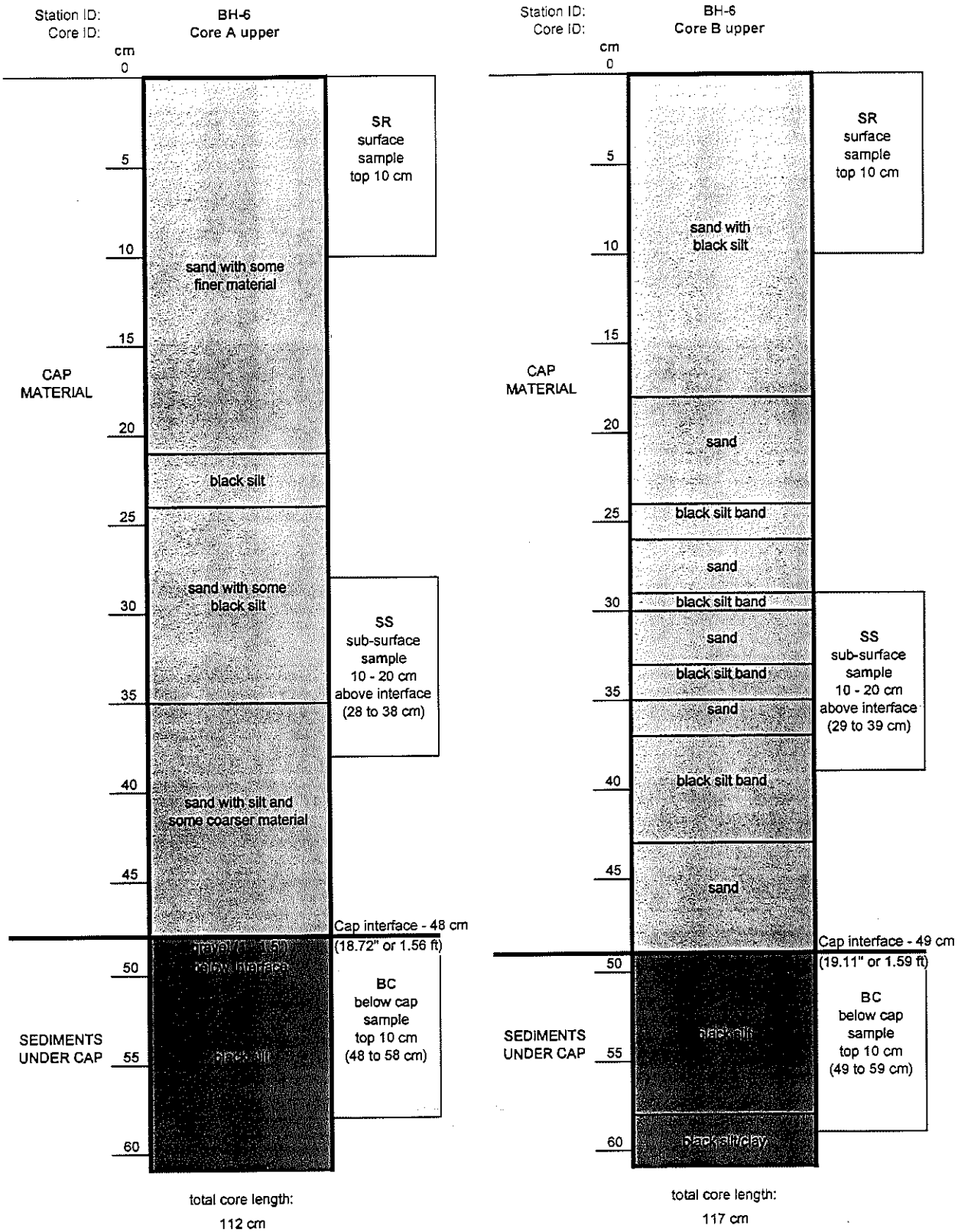


Figure B-14. **Diagrams of Sediment Cores A and B collected at Station No. BH-7 on March 16, 2004. Core layer sub-samples composited from Cores A and B for analysis.**

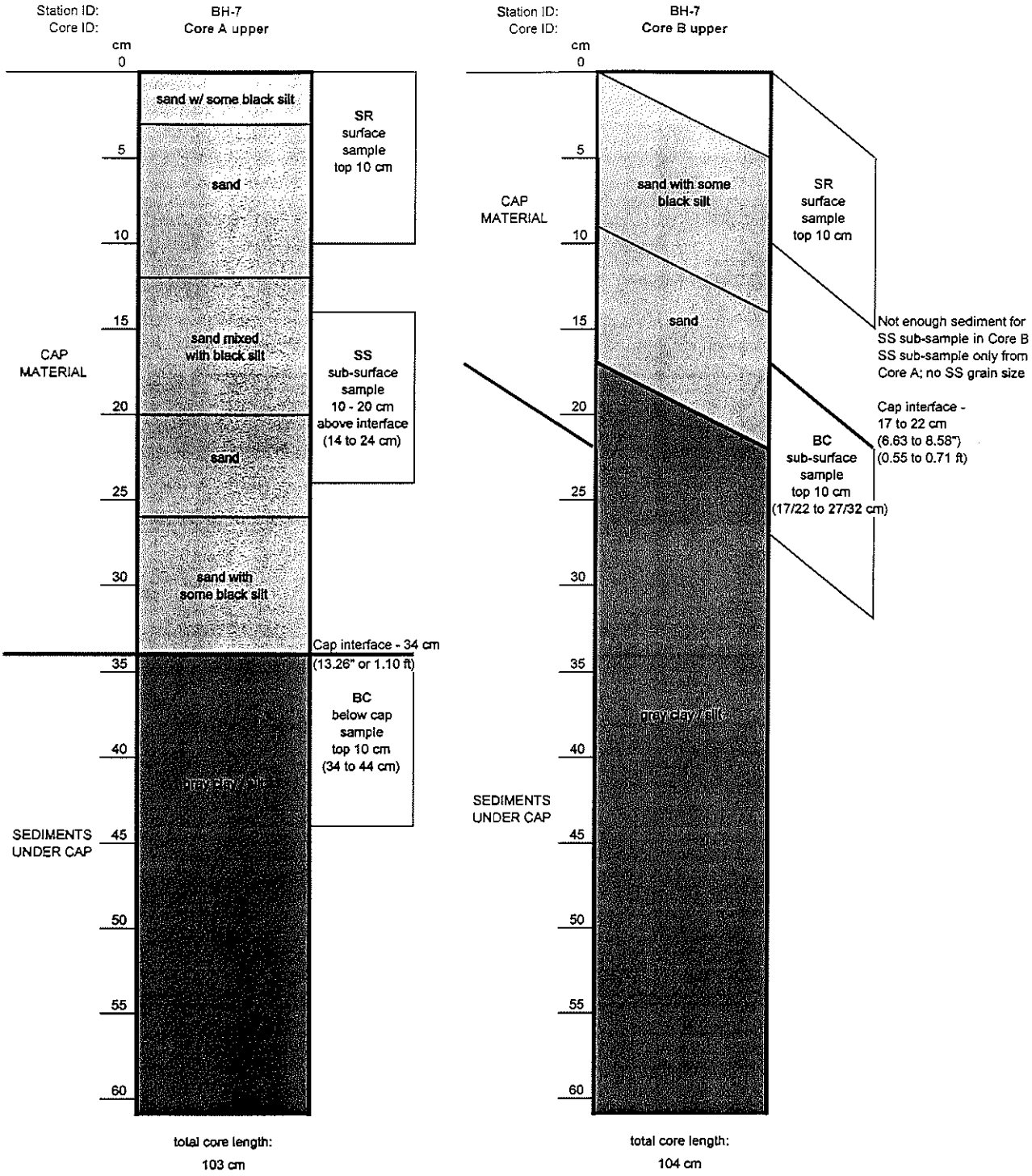


Figure B-15. Diagrams of Sediment Cores A and B collected at Station No. BH-8 on March 18, 2004. Core layer sub-samples composited from Cores A and B for analysis.

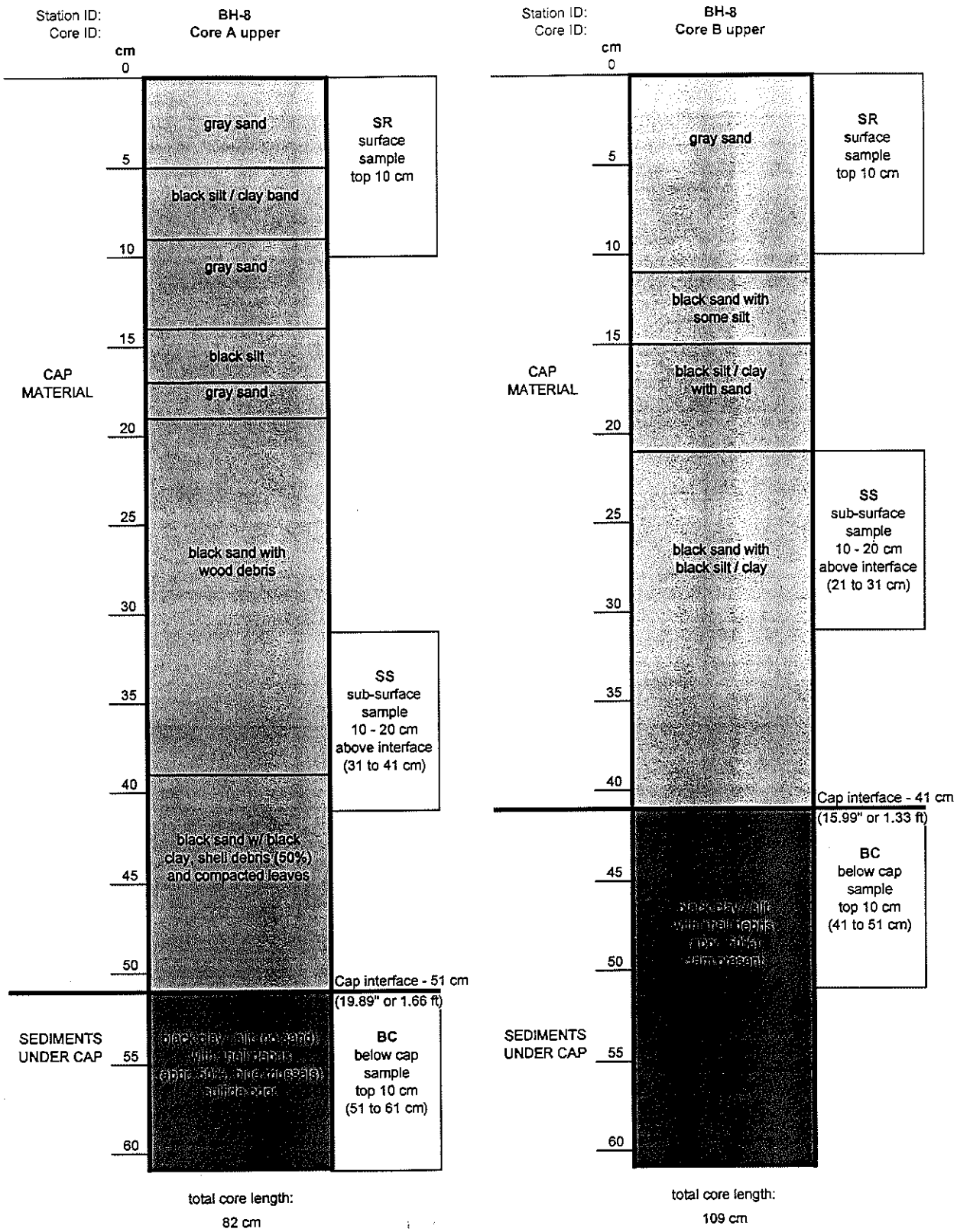


Figure B-16. Diagrams of Sediment Cores A and B collected at Station No. BH-9 on March 18, 2004.
Core layer sub-samples composited from Cores A, B, C and D for analysis in BH-9 and BH-9-FS samples.
FS = field split.

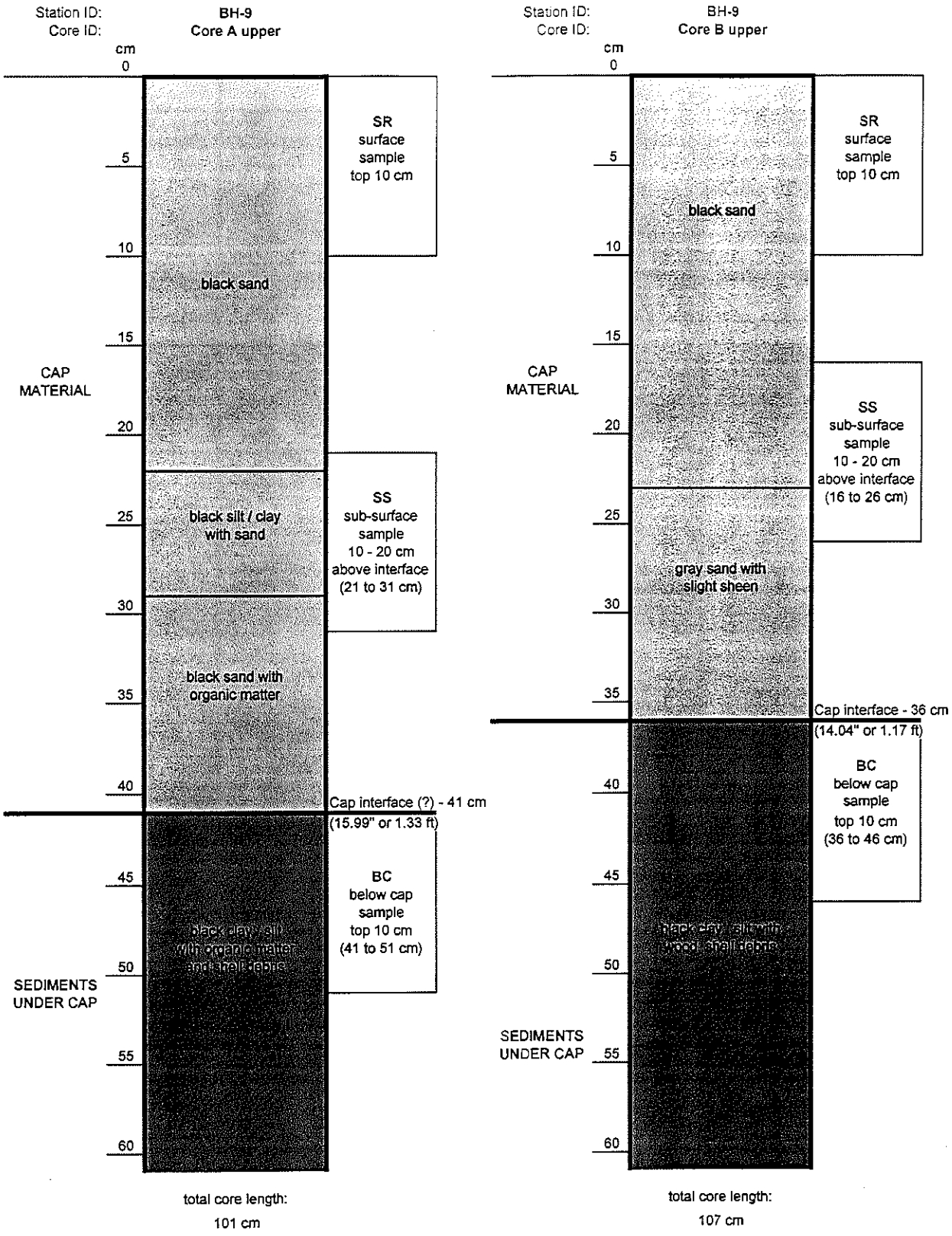


Figure B-17. Diagrams of Sediment Cores C and D collected at Station No. BH-9 on March 18, 2004. Core layer sub-samples composited from Cores A, B, C and D for analysis in BH-9 and BH-9-FS samples. FS = field split.

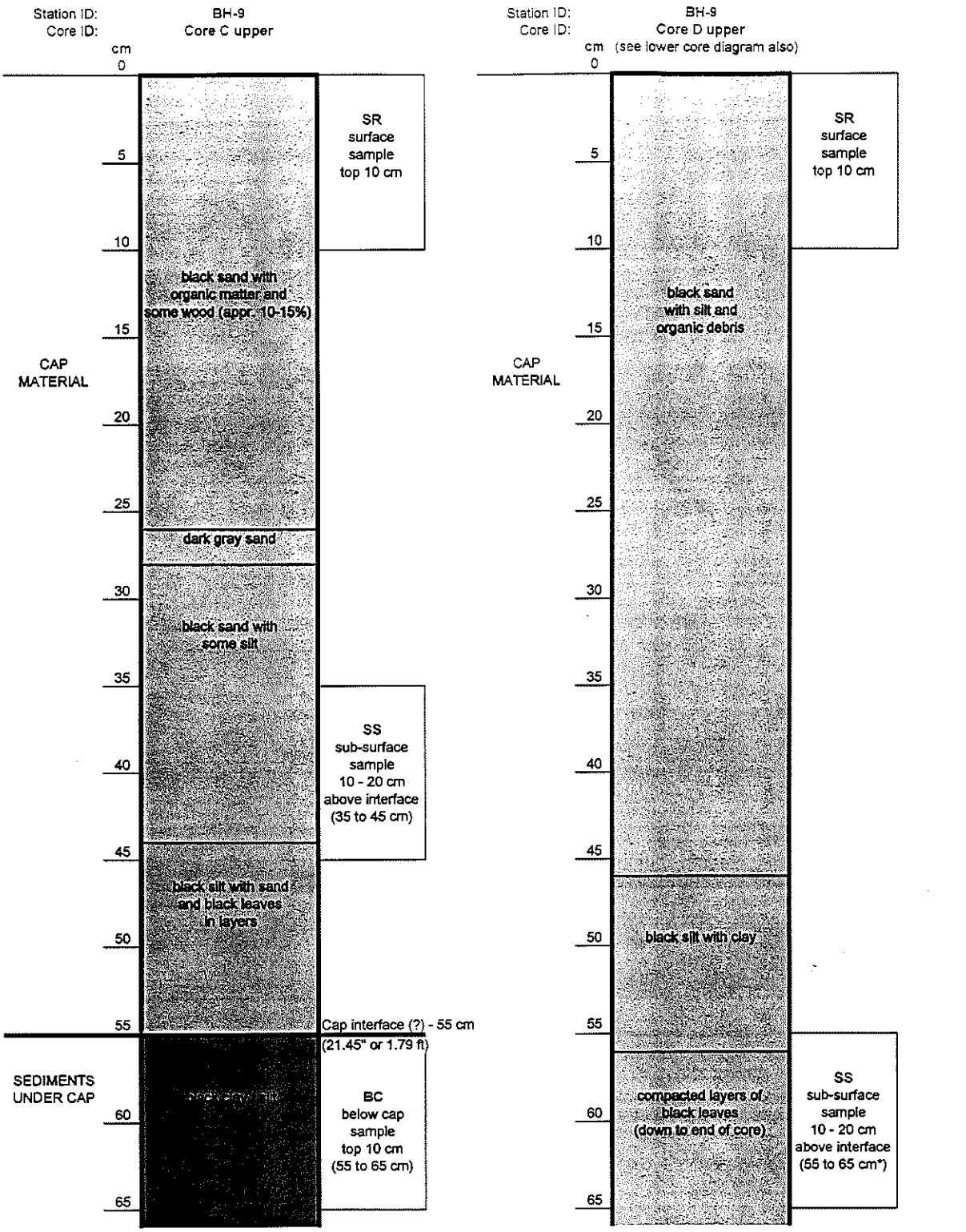


Figure B-18. Diagram of Sediment Core D lower collected at Station No. BH-9 on March 18, 2004.
Core layer sub-samples composited from Cores A, B, C and D for analysis in BH-9 and BH-9-FS samples.
FS = field split.

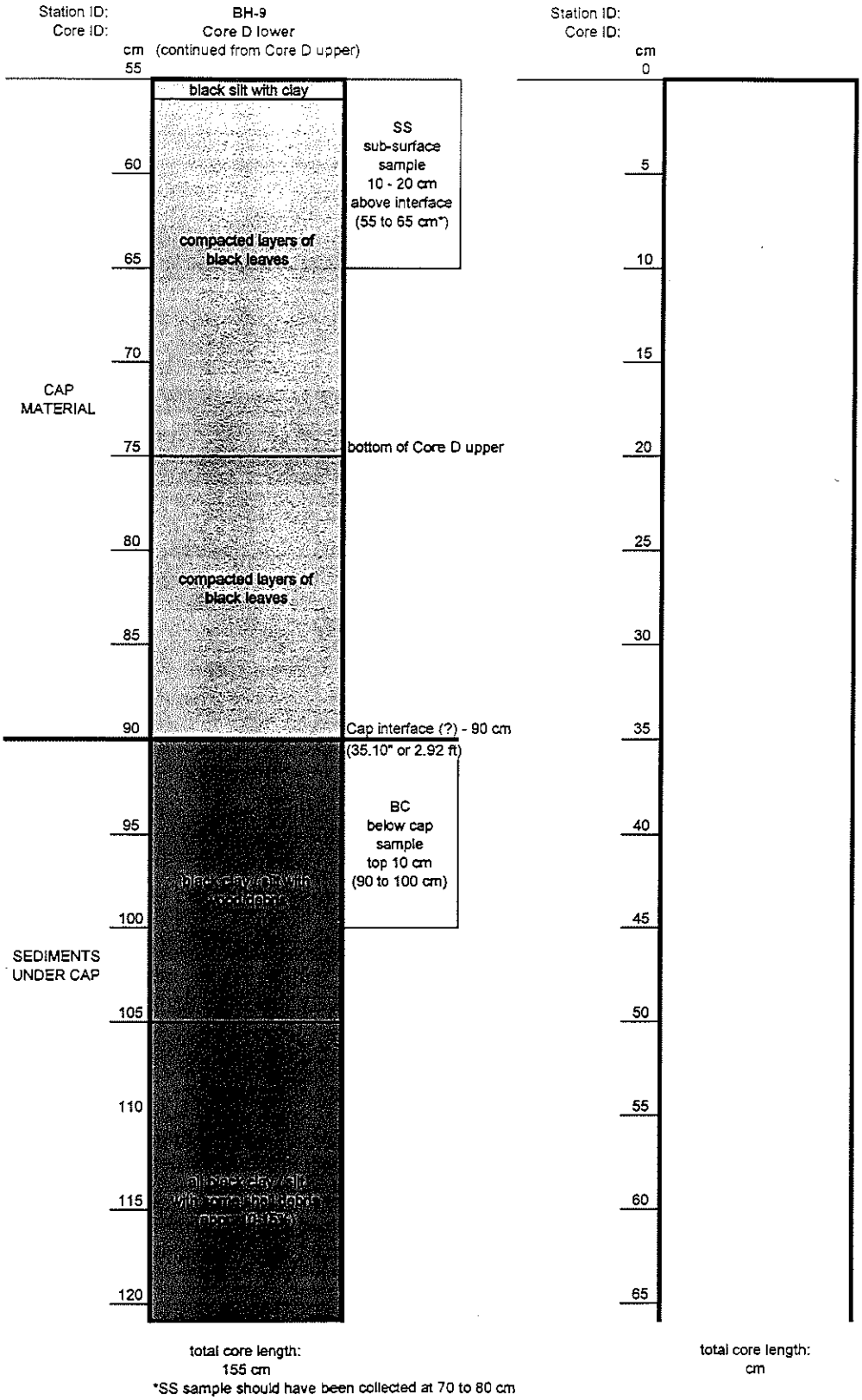


Figure B-19. Diagrams of Sediment Cores A and B collected at Station No. BH-10 on March 18, 2004. Core layer sub-samples composited from Cores A and B for analysis.

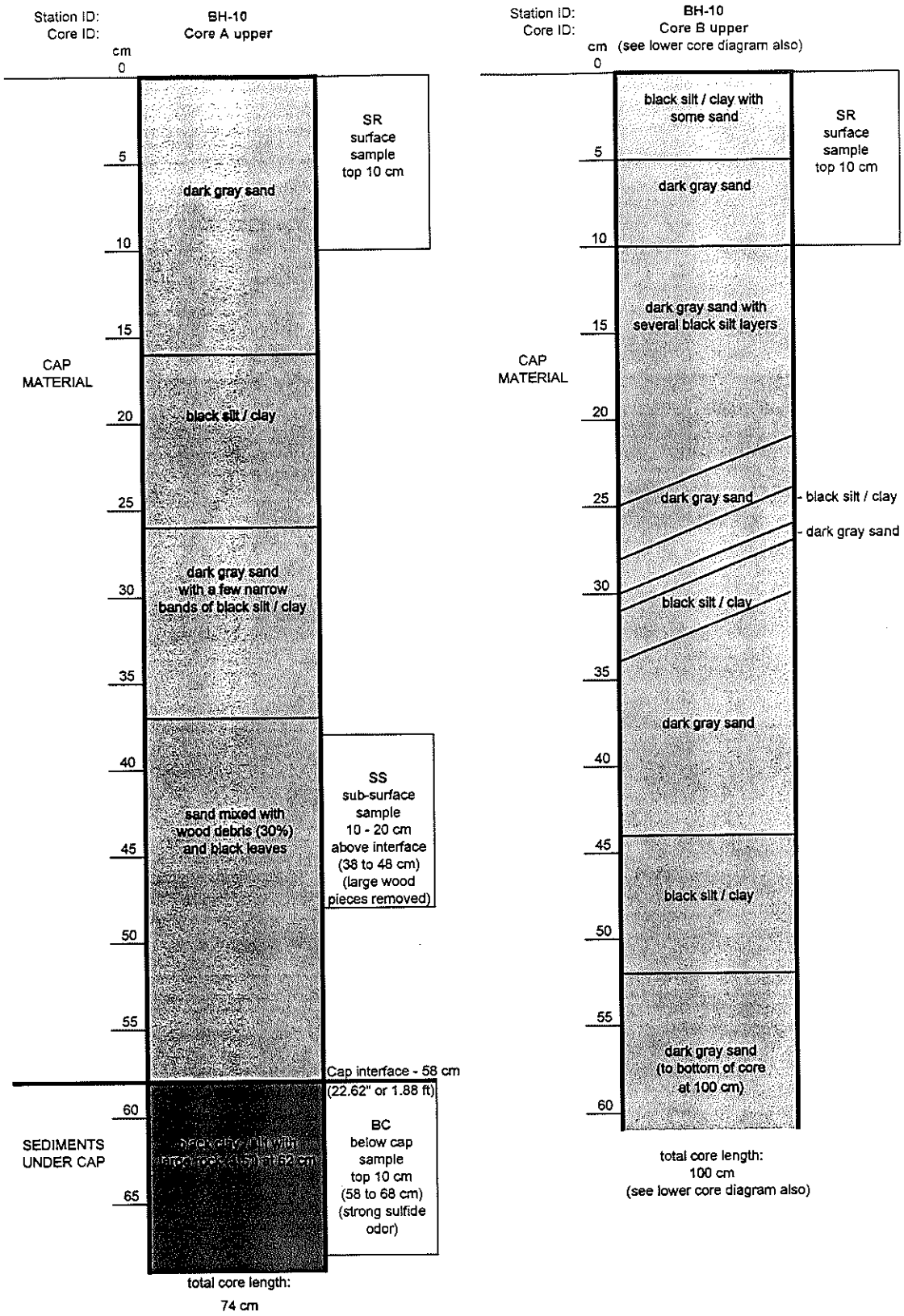


Figure B-20. Diagrams of Sediment Core B lower collected at Station No. BH-10 on March 18, 2004. Core layer sub-samples composited from Cores A and B for analysis.

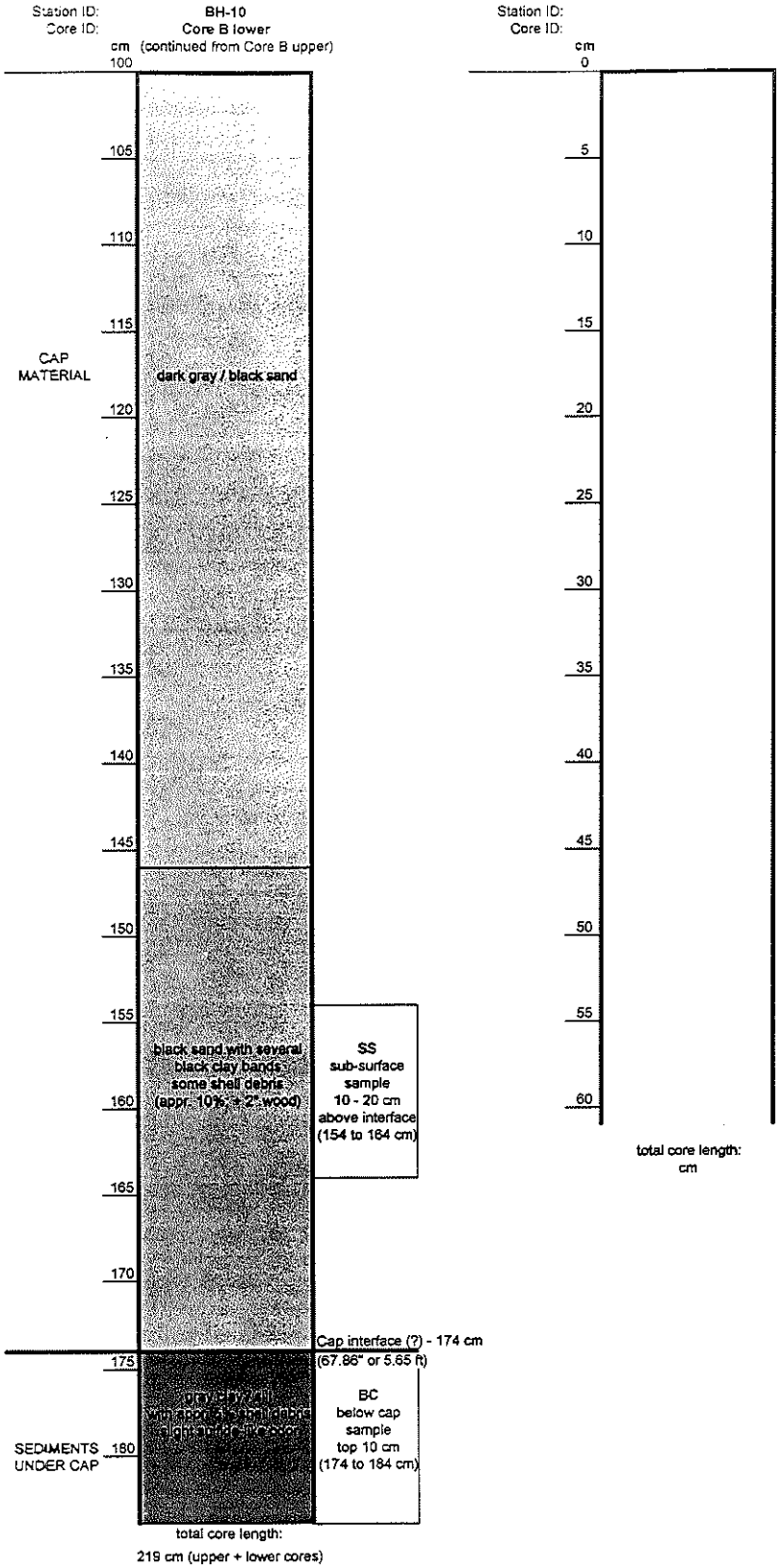


Figure B-21. Diagrams of Sediment Cores A and B collected at Station No. BH-11 on March 18, 2004. Core layer sub-samples composited from Cores A and B for analysis.

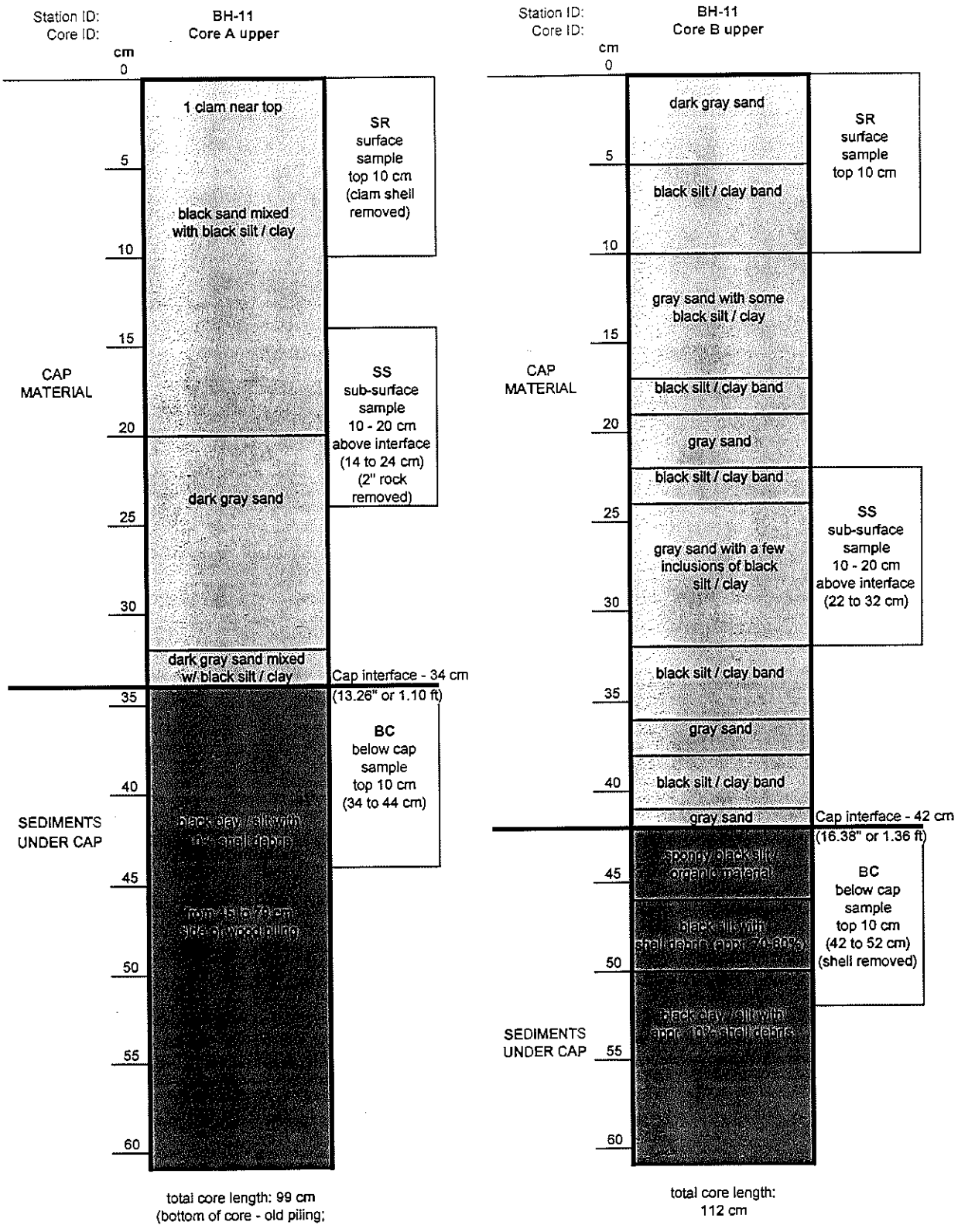


Figure B-22. Diagrams of Sediment Cores A and B collected at Station No. BH-12 on March 19, 2004. Core layer sub-samples composited from Cores A and B for analysis.

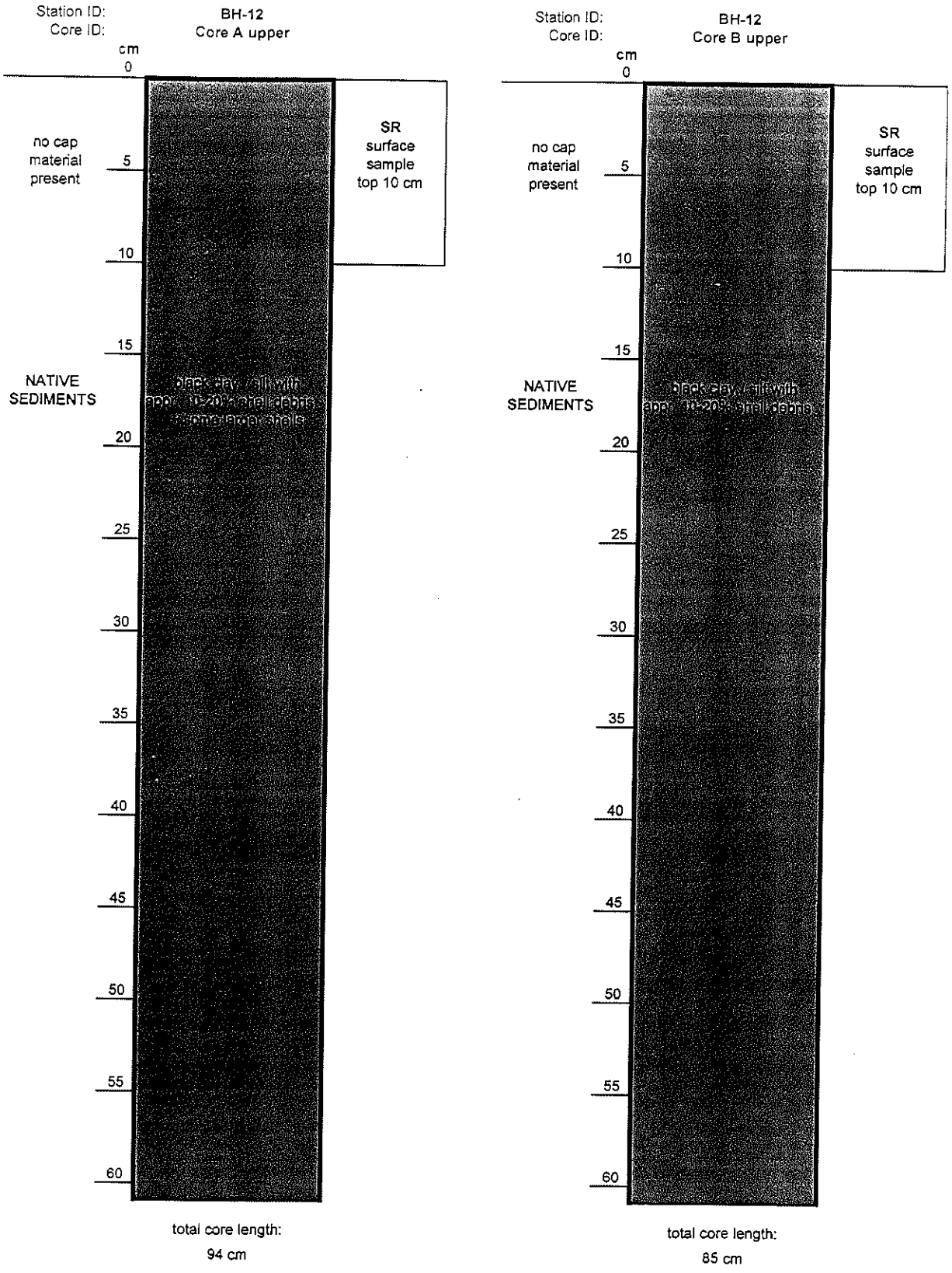


Figure B-23. Diagrams of Sediment Cores A and B collected at Station No. BH-13 on March 19, 2004. Core layer sub-samples composited from Cores A and B for analysis.

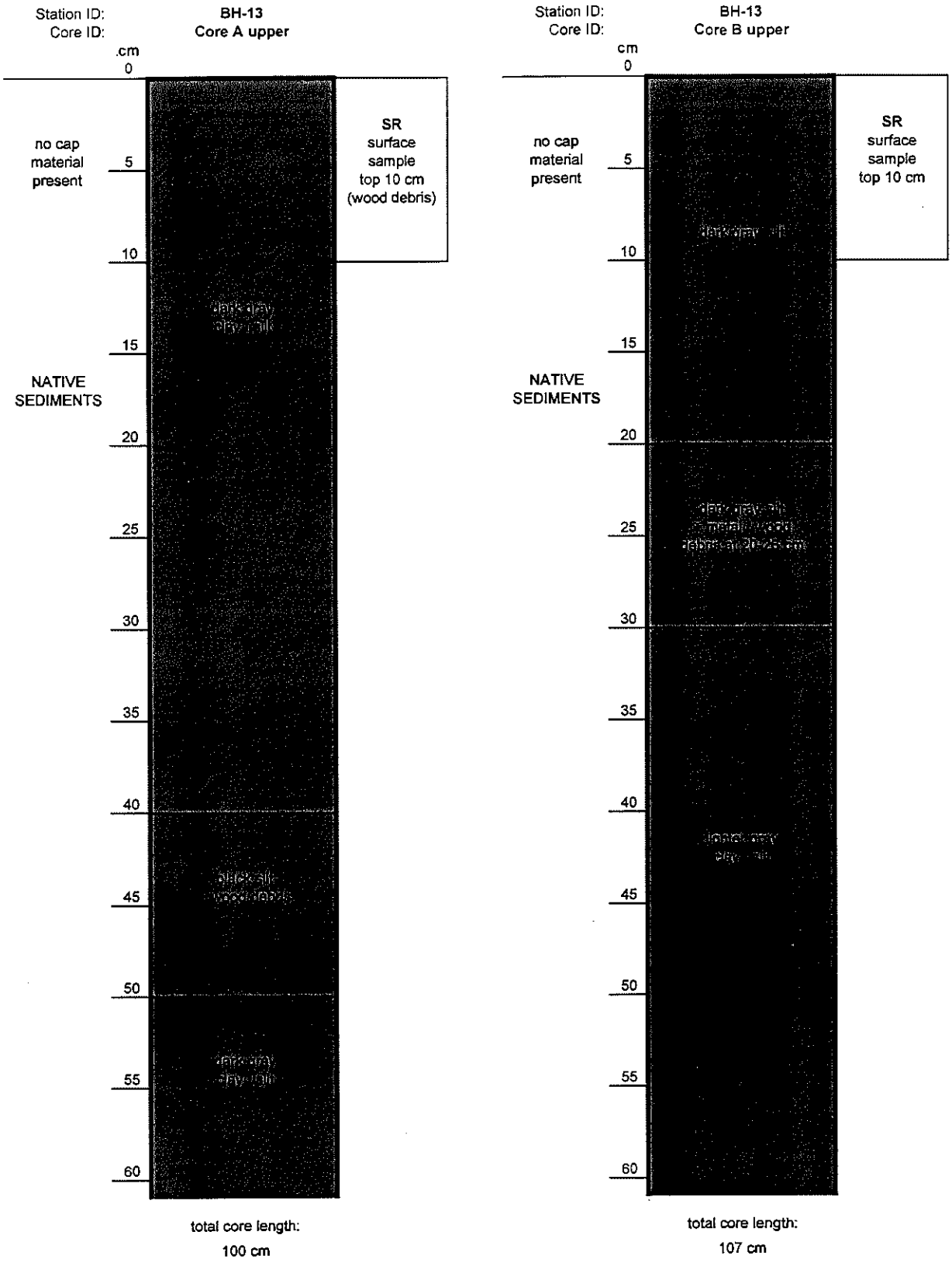
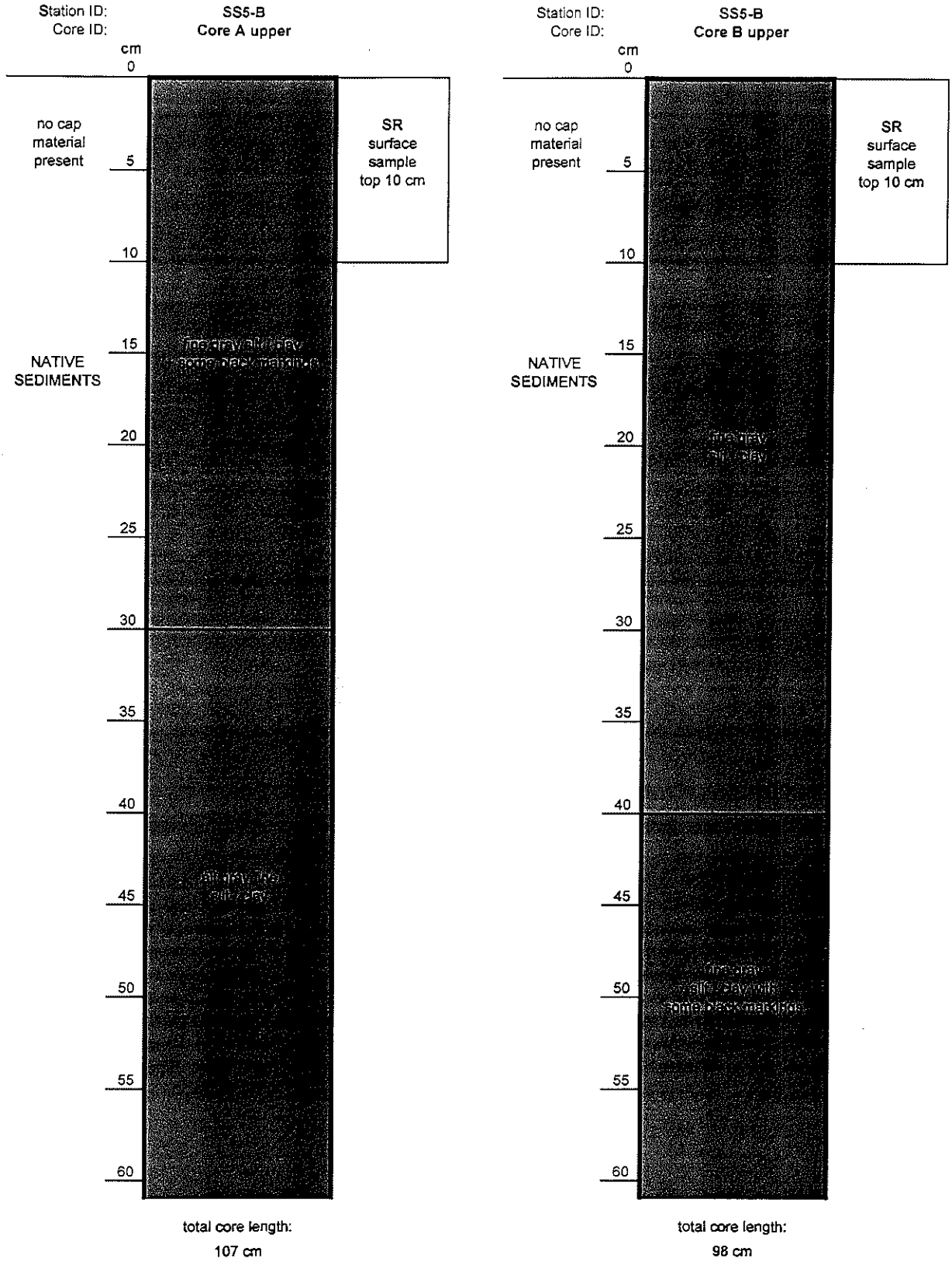


Figure B-24. Diagrams of Sediment Cores A and B collected at Station No. SS5-B on March 17, 2004. Core layer sub-samples composited from Cores A and B for analysis.



APPENDIX C

PHOTO FIGURES

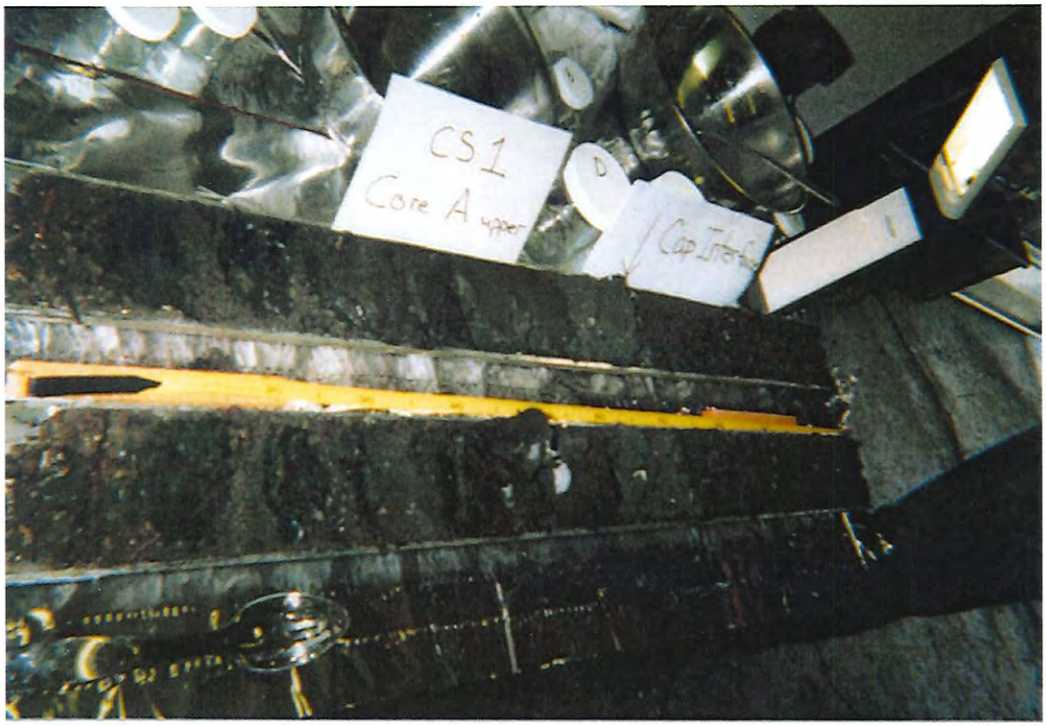


Figure C-1. Photograph of Station CS1 Core A upper section. Top is to the left.



Figure C-2. Photograph of Station CS1 Core B upper section. Top is to the left.



Figure C-3. Photograph of Station CS1 Core C upper section. Cap interface sign forgotten. Top is to the left.

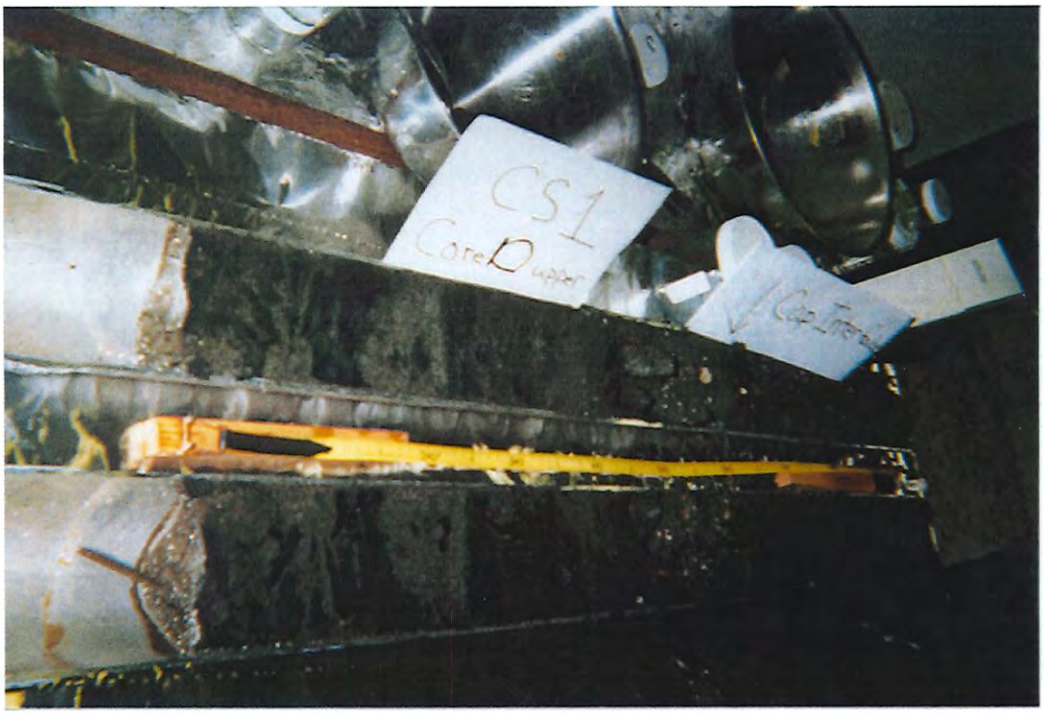


Figure C-4. Photograph of Station CS1 Core D upper section. Top is to the left.

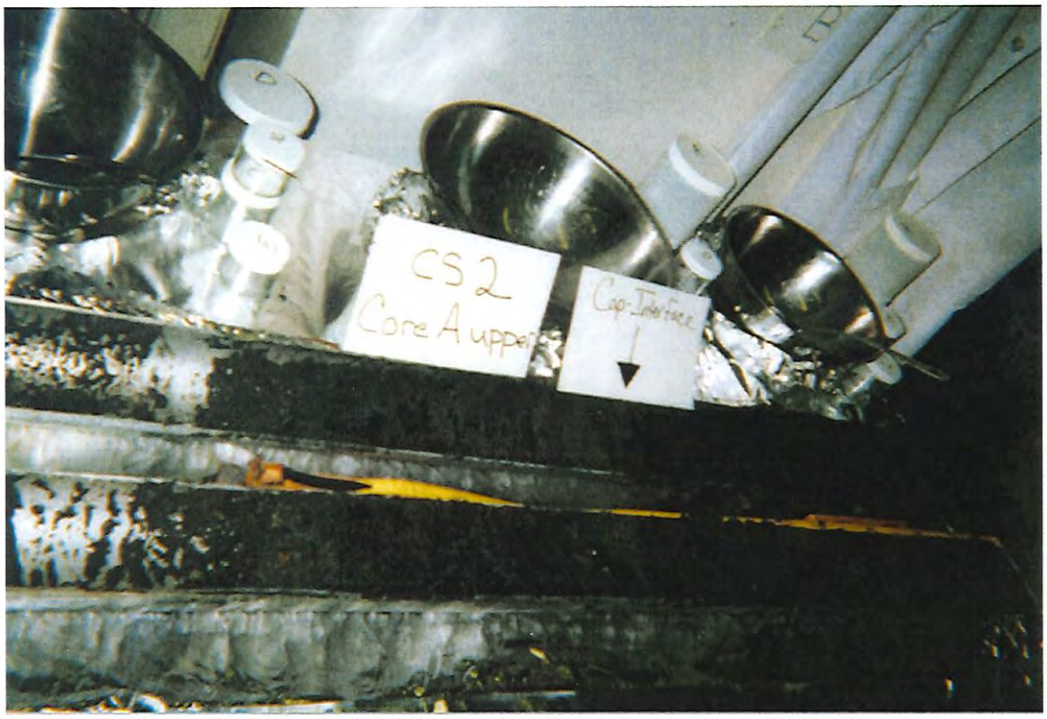


Figure C-5. Photograph of Station CS2 Core A upper section. Top is to the left.

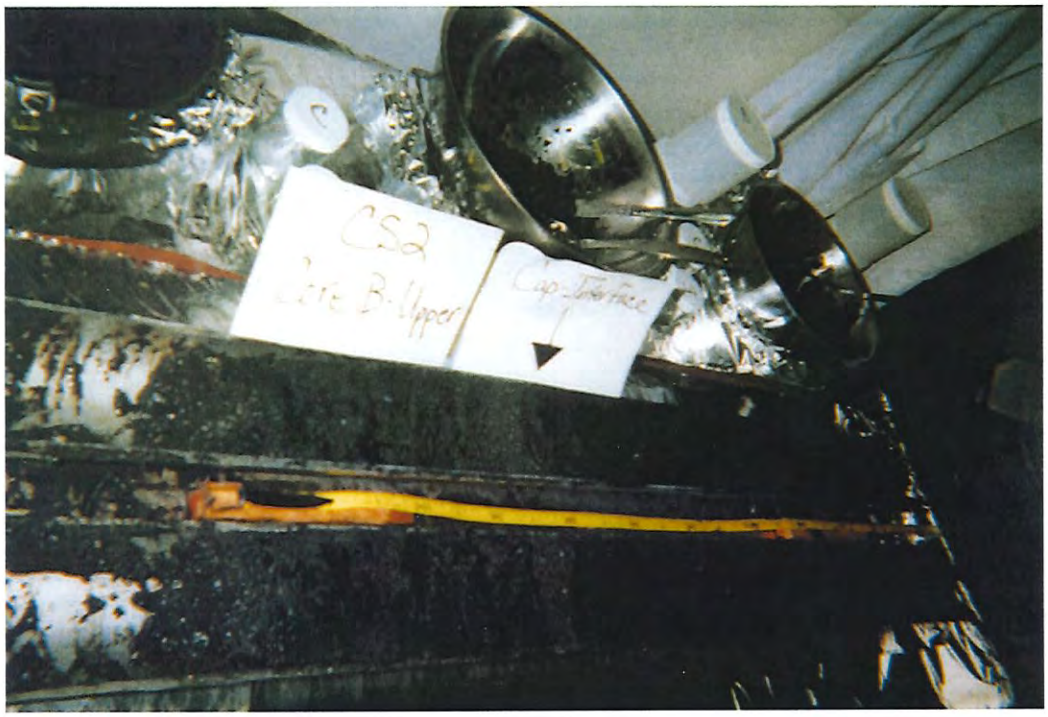


Figure C-6. Photograph of Station CS2 Core B upper section. Top is to the left.

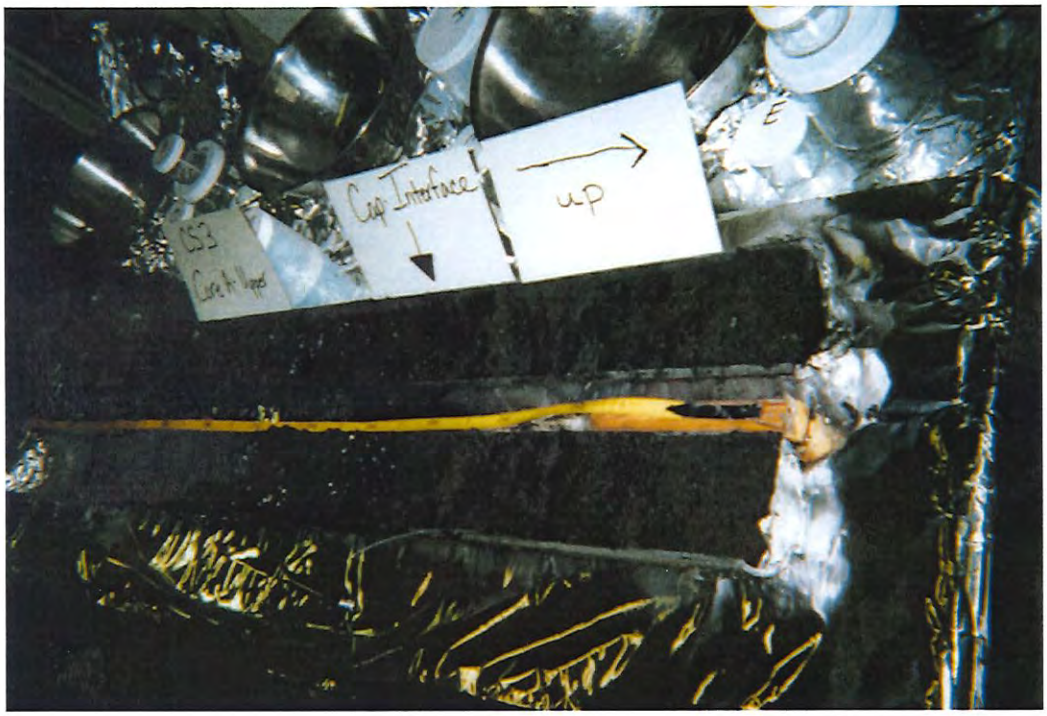


Figure C-7. Photograph of Station CS3 Core A upper section. This core was stored upside down. Top is to the right.

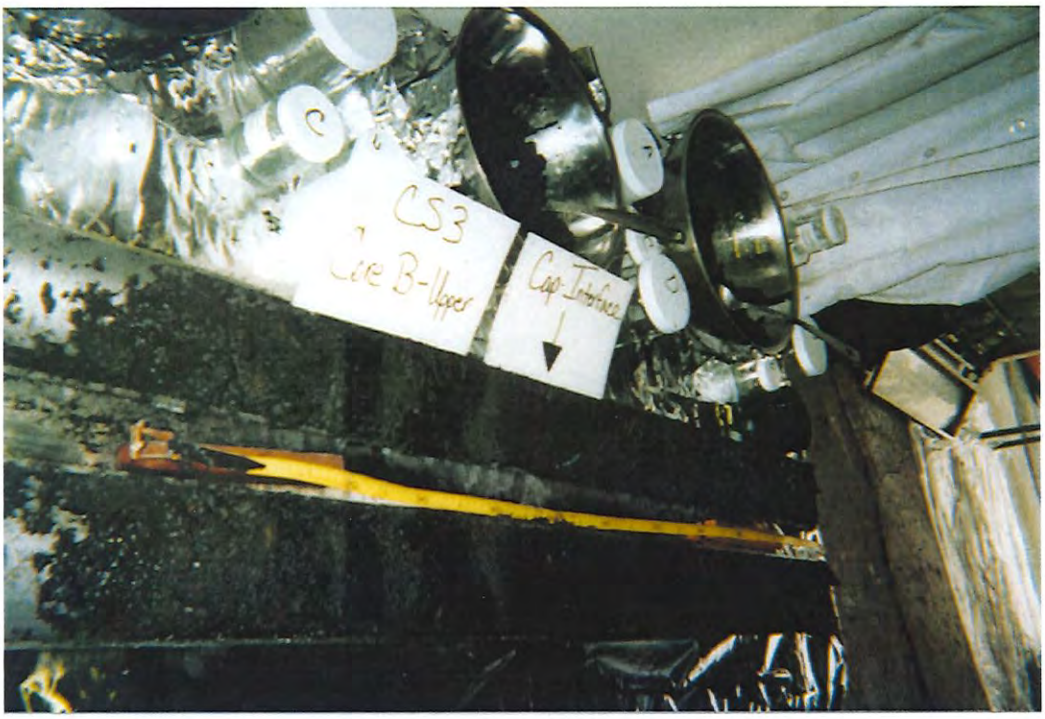


Figure C-8. Photograph of Station CS3 Core B upper section. Top is to the left.

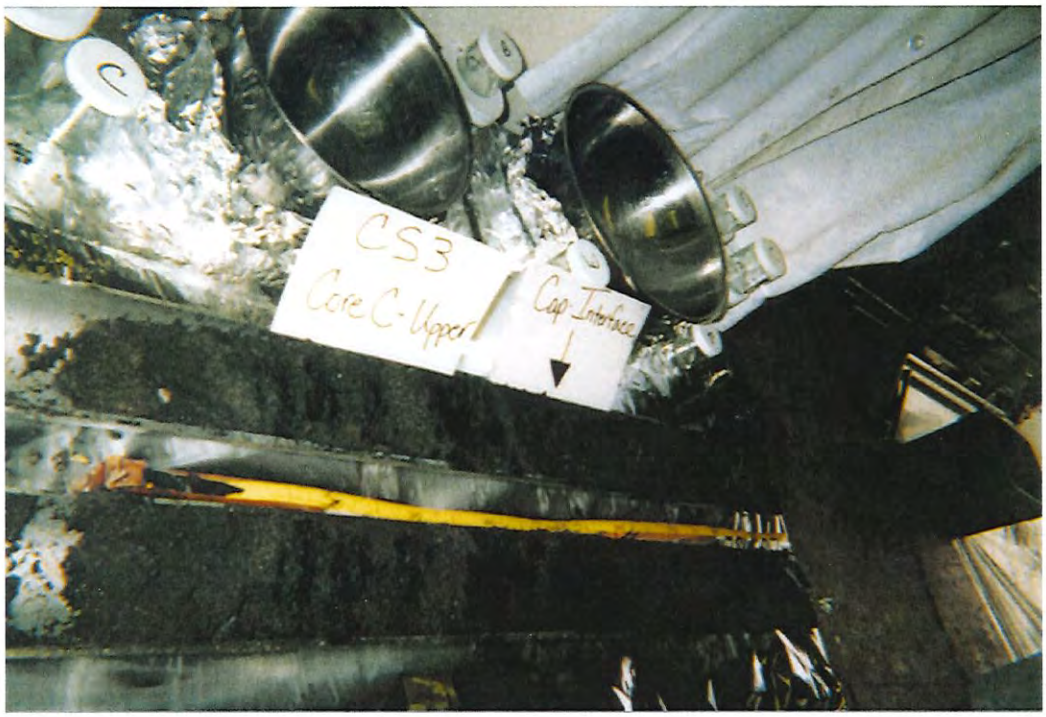


Figure C-9. Photograph of Station CS3 Core C upper section. Top is to the left.

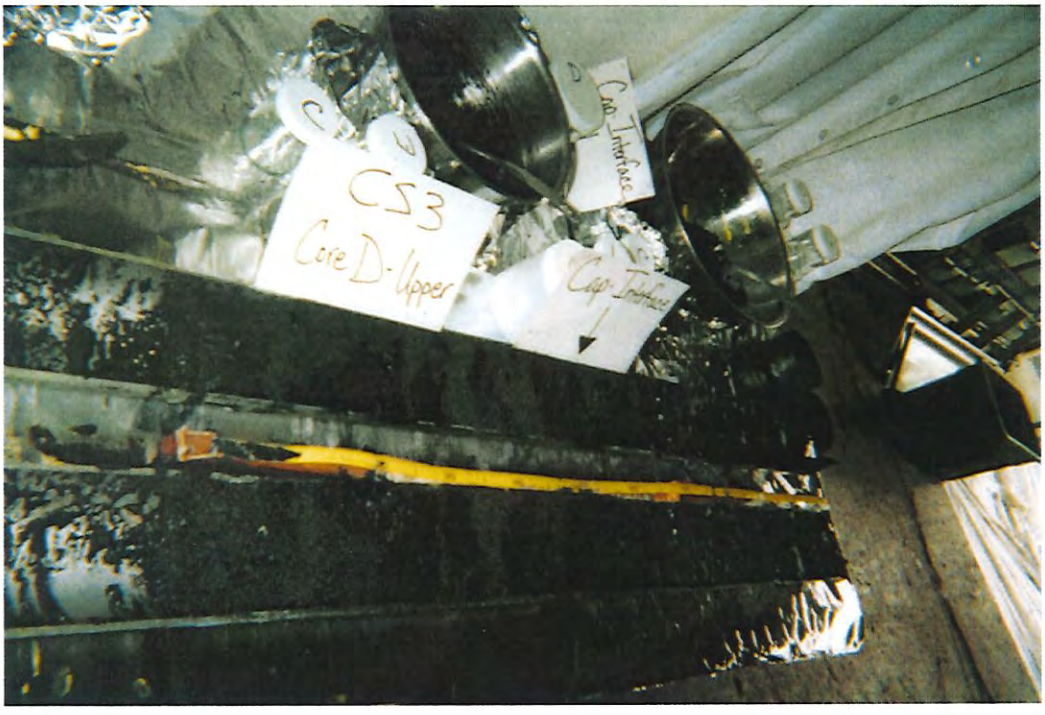


Figure C-10. Photograph of Station CS3 Core D upper section. Top is to the left.



Figure C-11. Photograph of Station BH1 Core A upper section. No interface visible (no cap material – off cap station). Top is to the left.

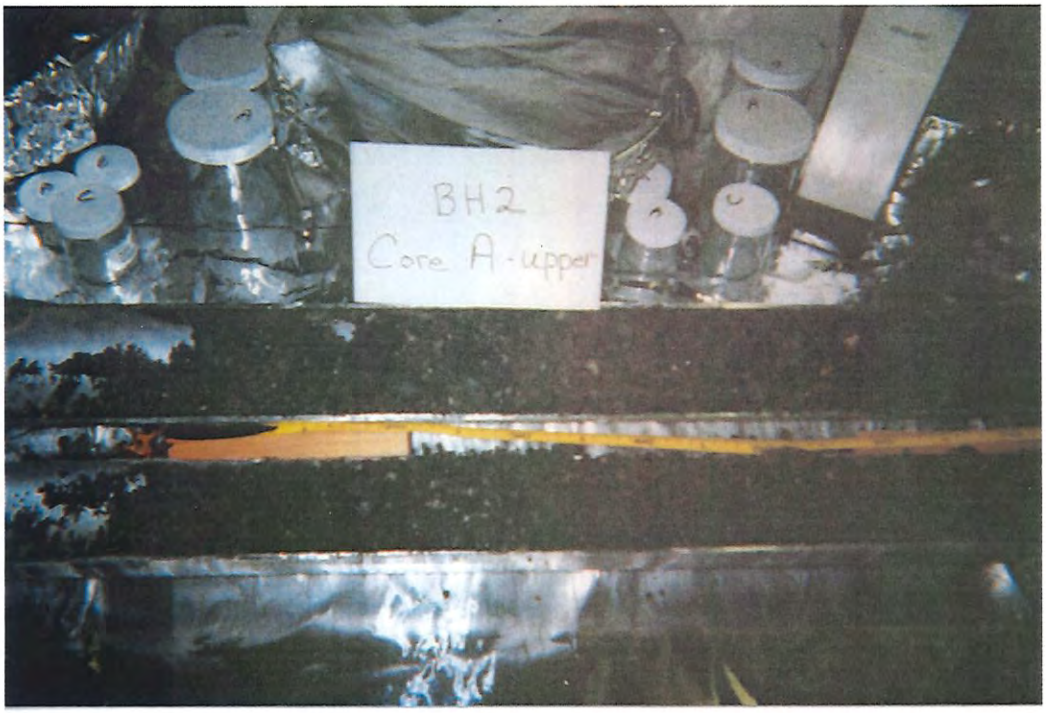


Figure C-12. Photograph of Station BH2 Core A upper section. Cap interface sign forgotten. Top is to the left.



Figure C-13. Photograph of Station BH2 Core B upper section. Cap interface sign forgotten. Top is to the left.



Figure C-14. Photograph of Station BH3 Core A upper section. Top is to the left.

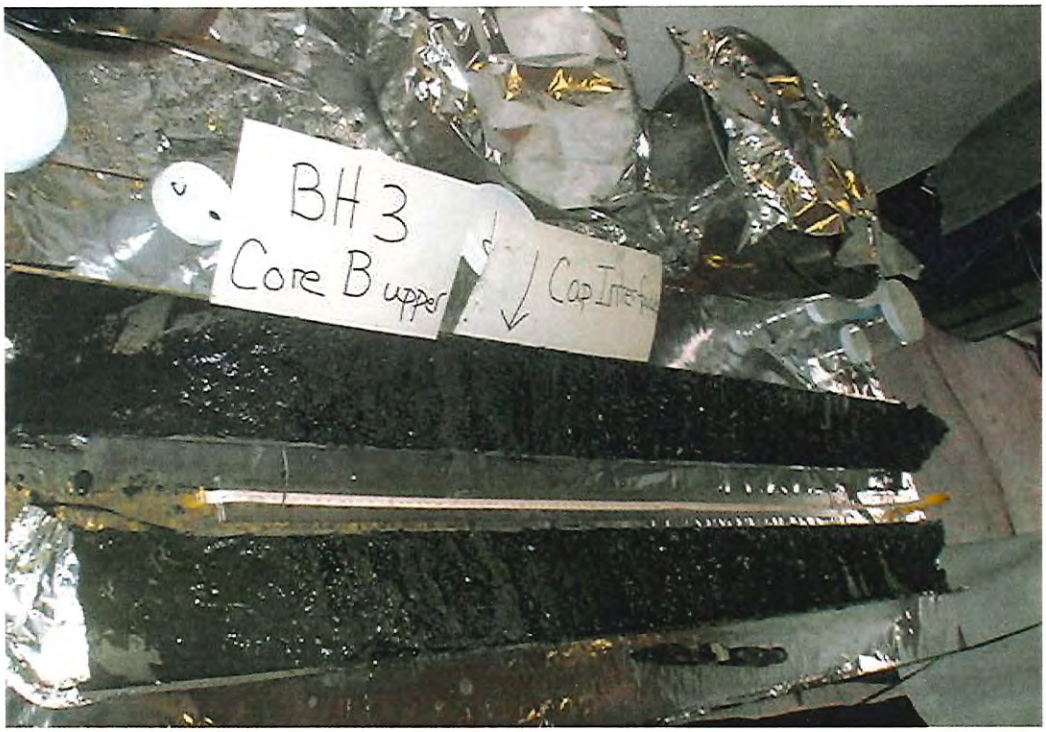


Figure C-15. Photograph of Station BH3 Core B upper section. Top is to the left.



Figure C-16. Photograph of Station BH4 Core A upper section. Top is to the left.

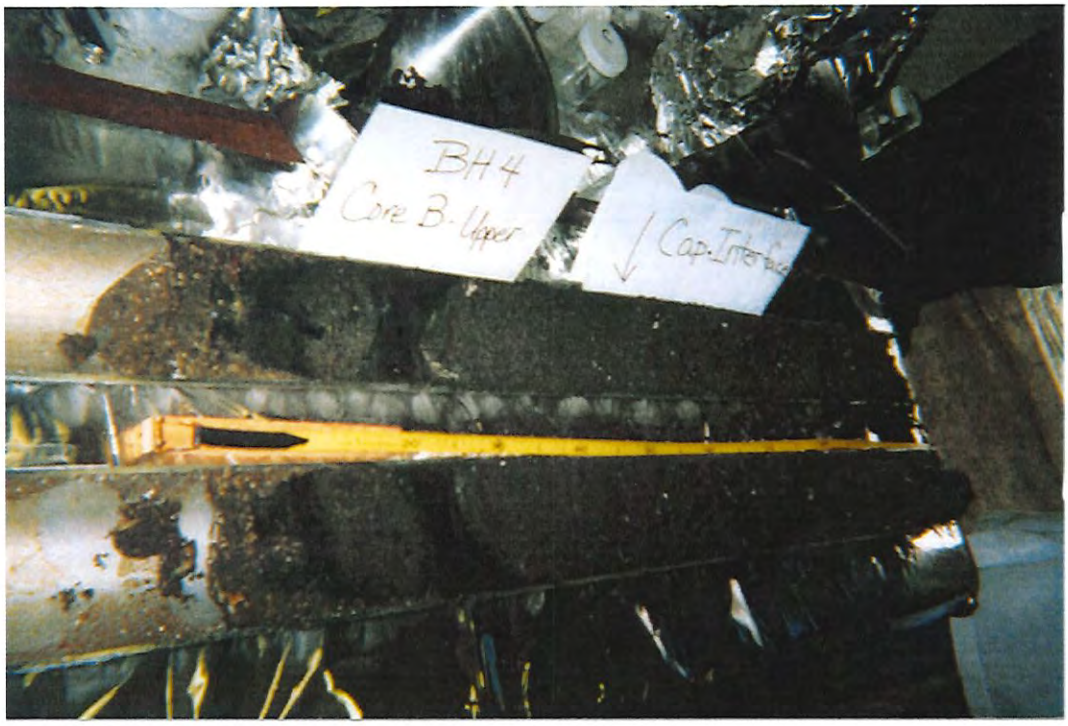


Figure C-17. Photograph of Station BH4 Core B upper section. Top is to the left.



Figure C-18. Photograph of Station BH5 Core A upper section. Top is to the left.

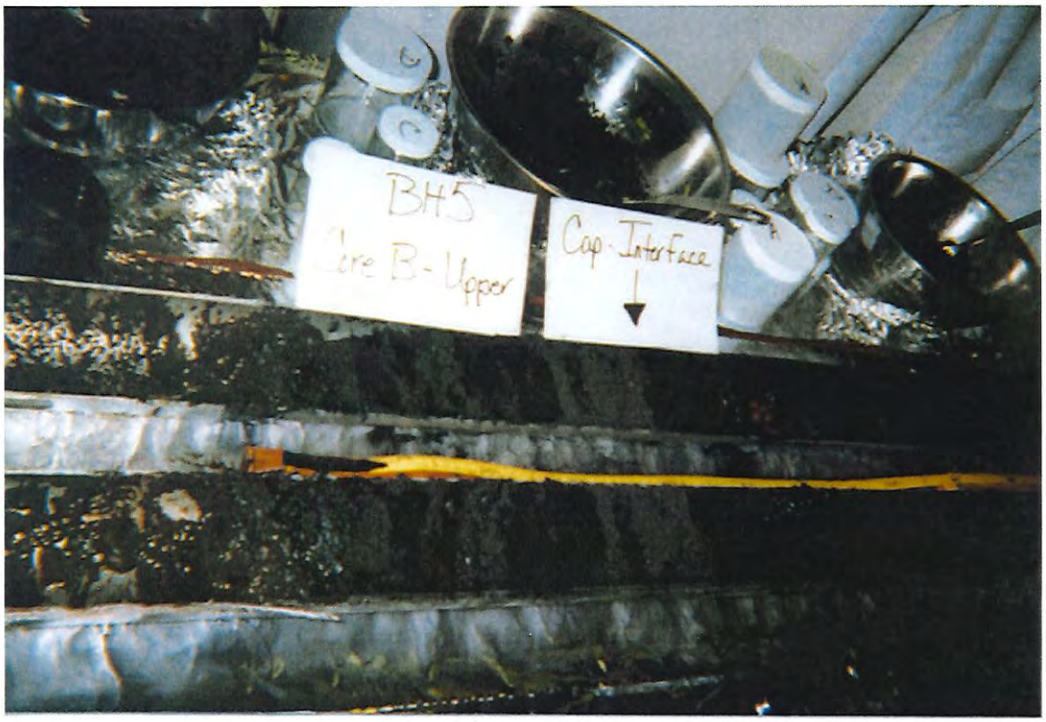


Figure C-19. Photograph of Station BH5 Core B upper section. Top is to the left.

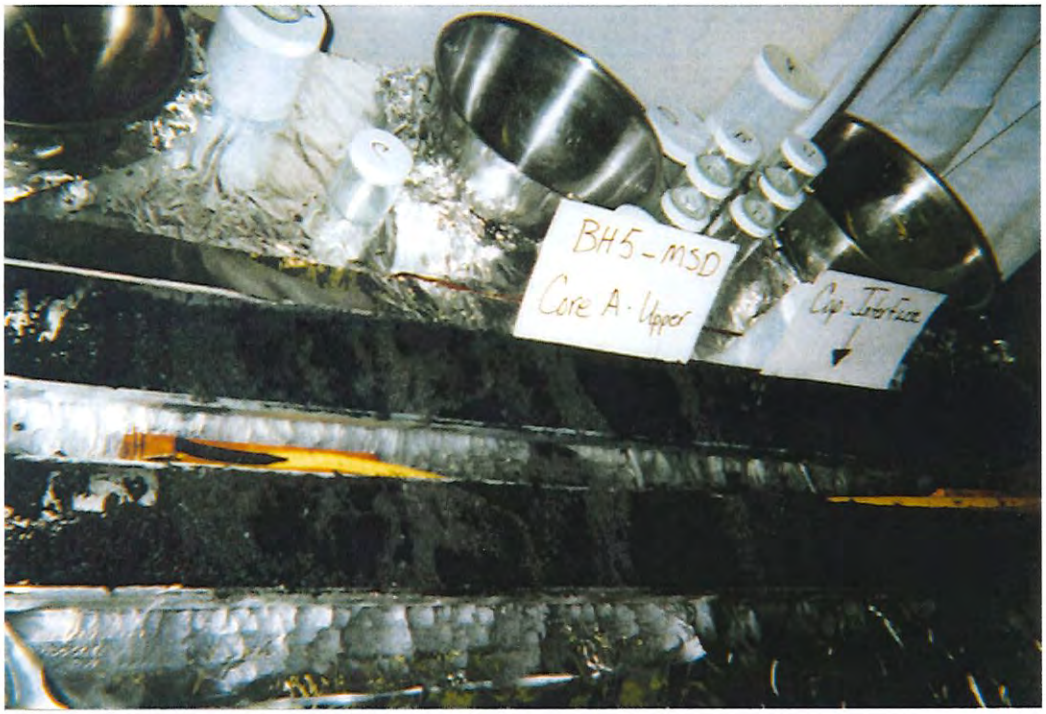


Figure C-20. Photograph of Station BH5 Core A MSD upper section. Top is to the left.

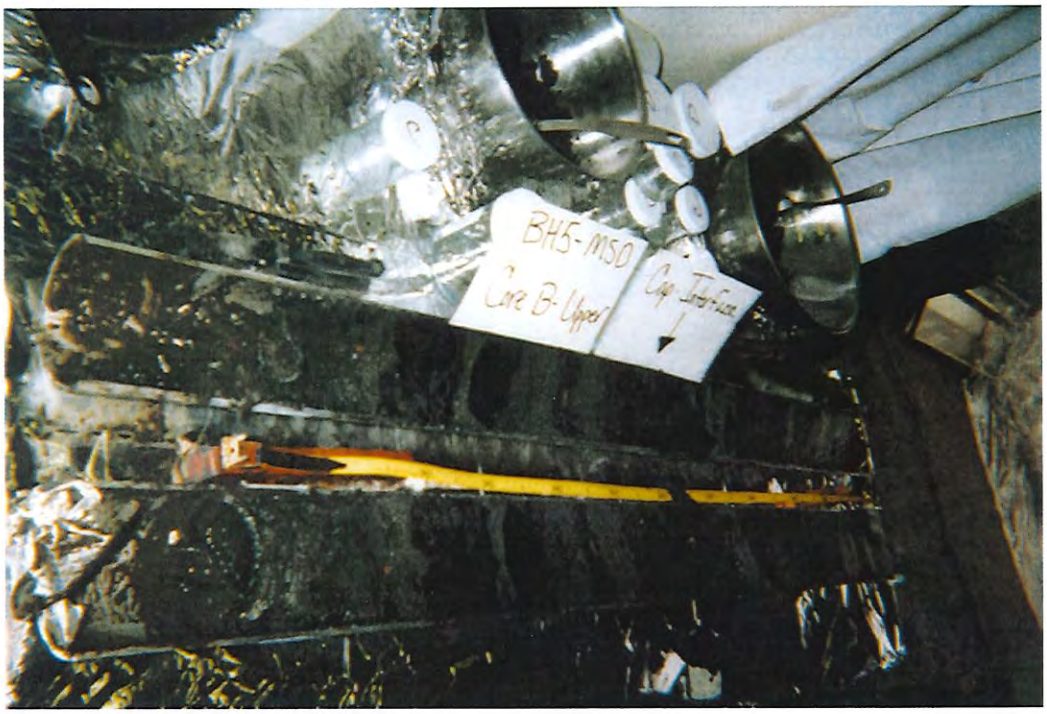


Figure C-21. Photograph of Station BH5 Core B MSD upper section. Top is to the left.



Figure C-22. Photograph of Station BH5 Core A MST upper section. Top is to the left.

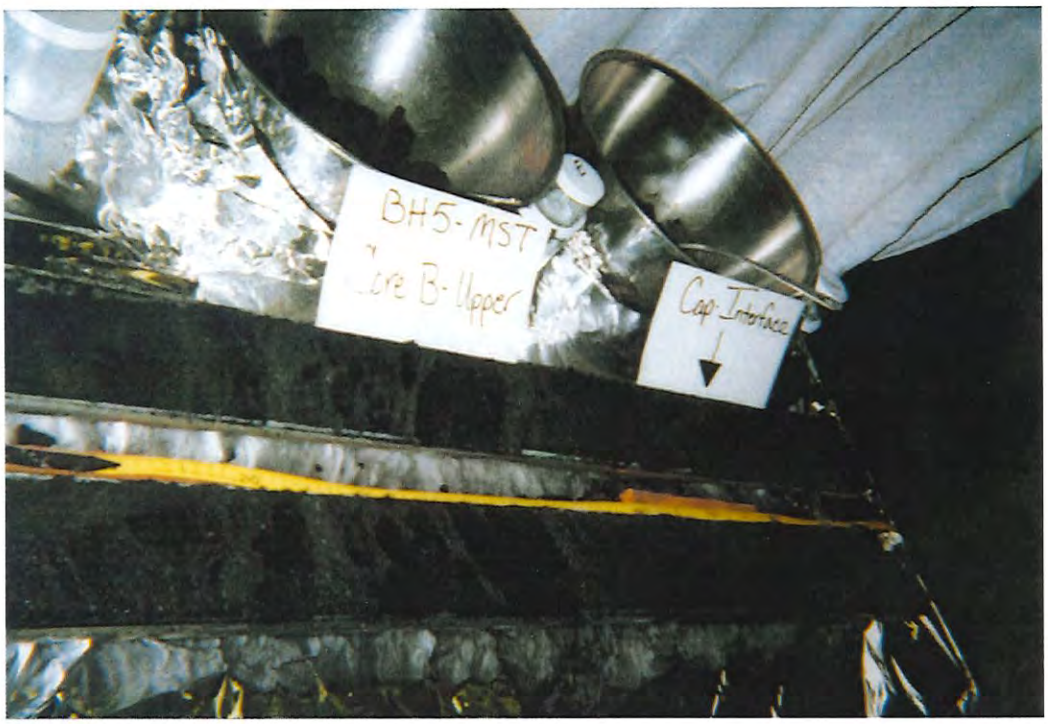


Figure C-23. Photograph of Station BH5 Core B MST upper section. Top is to the left.



Figure C-24. Photograph of Station BH6 Core A upper section. Top is to the left.



Figure C-25. Photograph of Station BH6 Core B upper section. Top is to the left.



Figure C-26. Photograph of Station BH7 Core A upper section. Top is to the left.

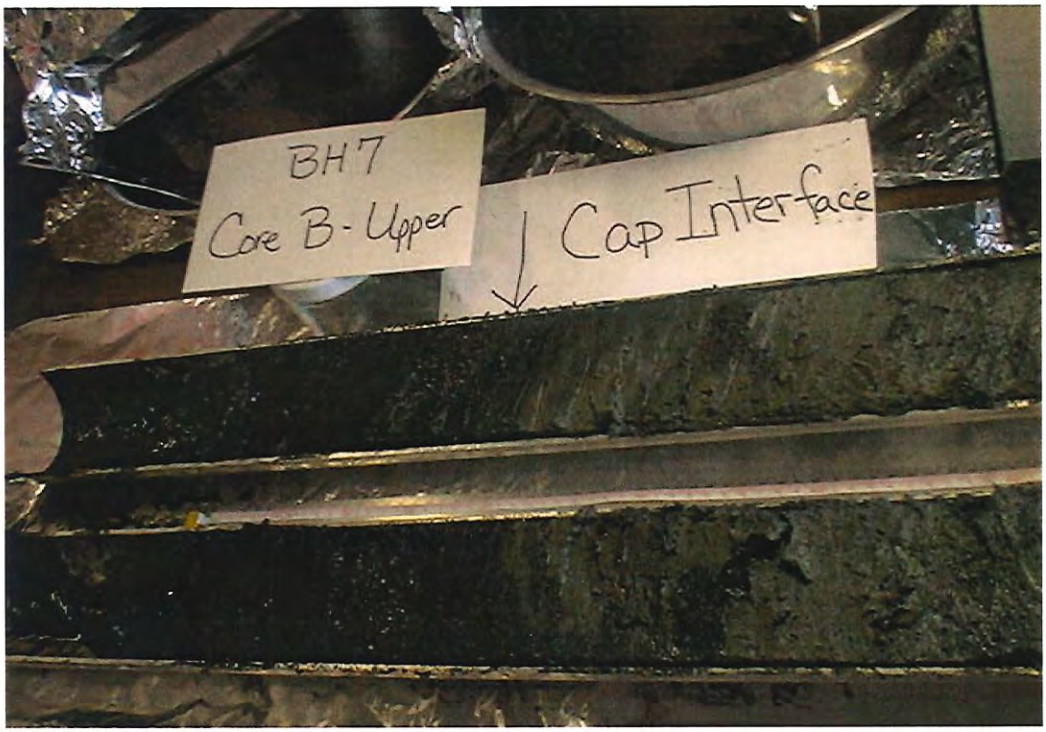


Figure C-27. Photograph of Station BH7 Core B upper section. Top is to the left.



Figure C-28. Photograph of Station BH8 Core A upper section. Top is to the left.

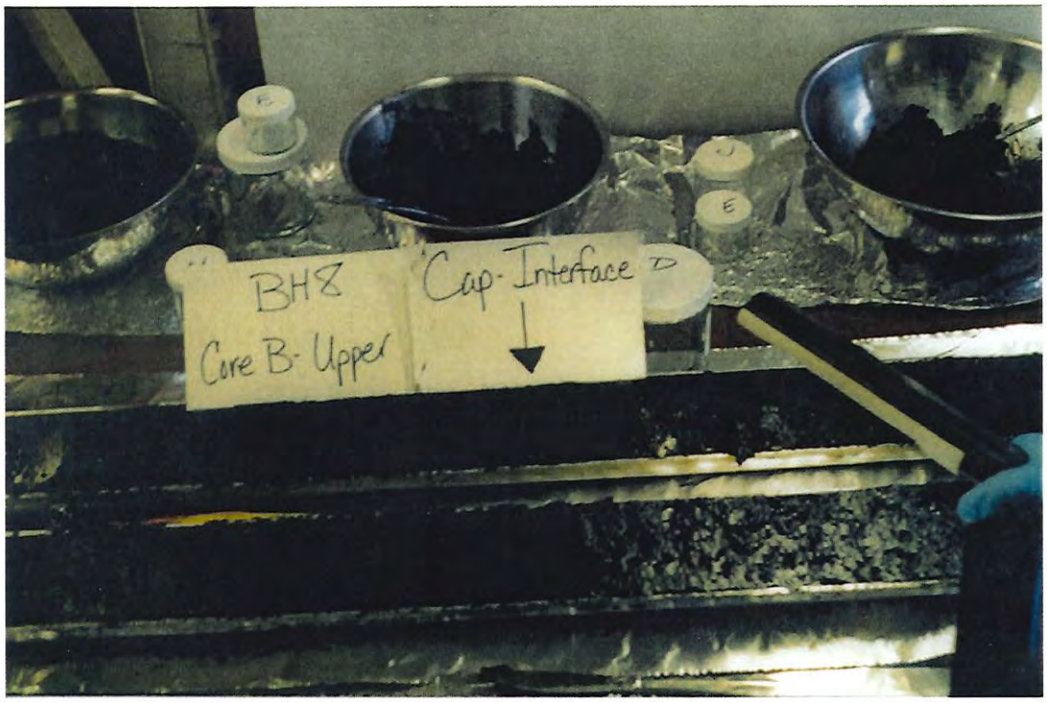


Figure C-29. Photograph of Station BH8 Core B upper section. Top is to the left.



Figure C-30. Photograph of Station BH9 Core A upper section. Top is to the left.

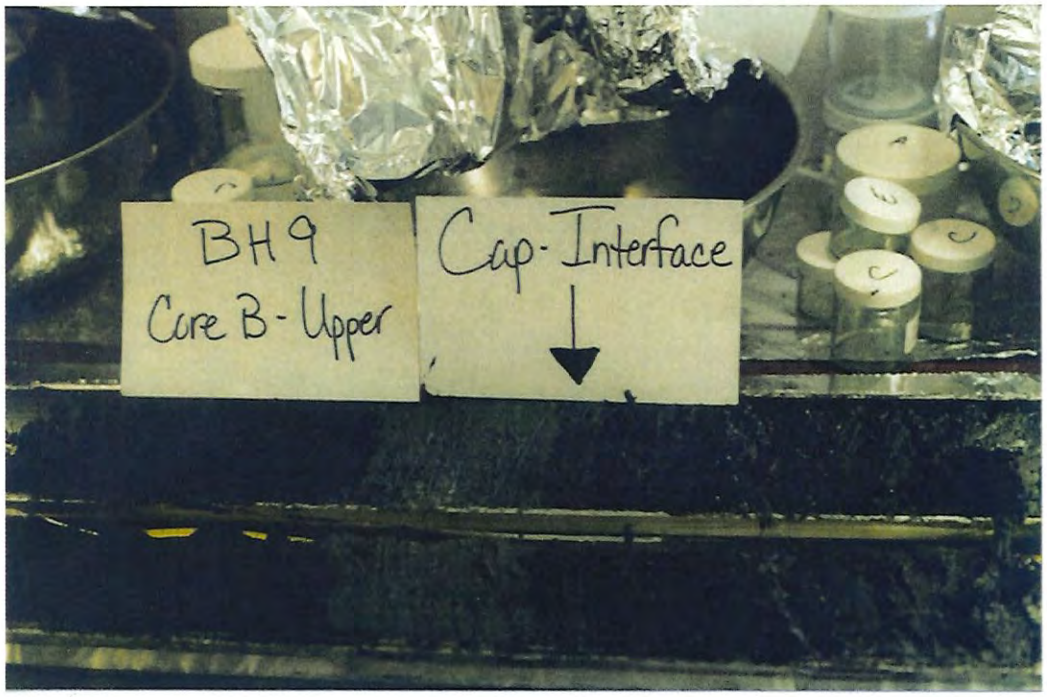


Figure C-31. Photograph of Station BH9 Core B upper section. Top is to the left.

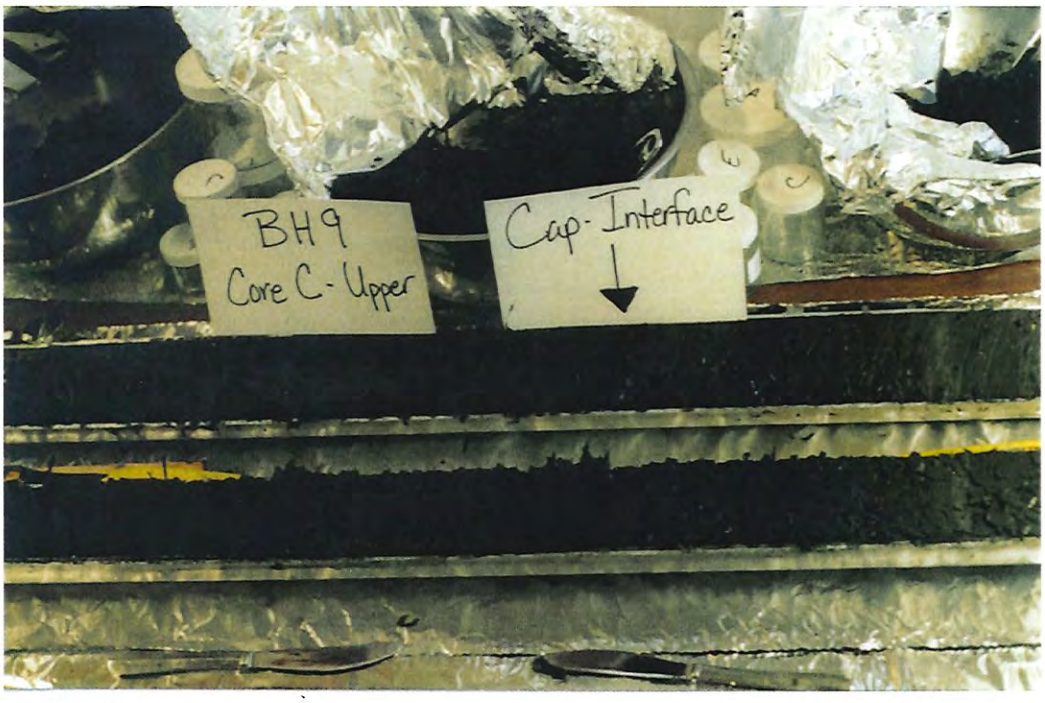


Figure C-32. Photograph of Station BH9 Core C upper section. Top is to the left.

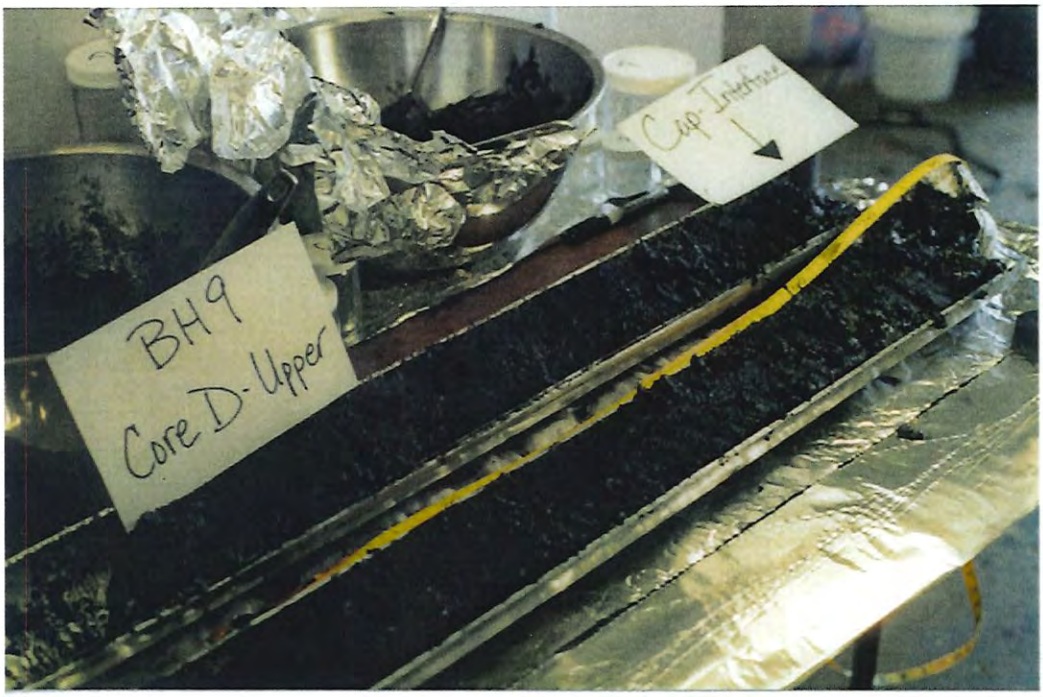


Figure C-33. Photograph of Station BH9 Core D upper section. Interface actually deeper than end of core tube (sign). Top is to the left.

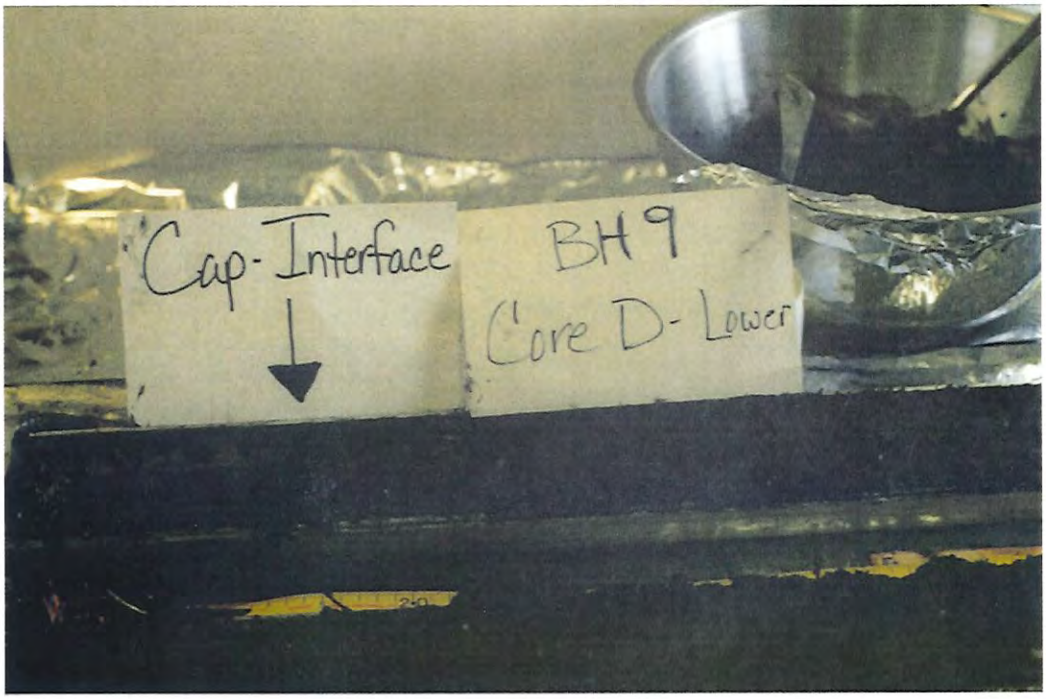


Figure C-34. Photograph of Station BH9 Core D lower section. Actual interface in this core. Top is to the left.



Figure C-35. Photograph of Station BH10 Core A upper section. Top is to the left.

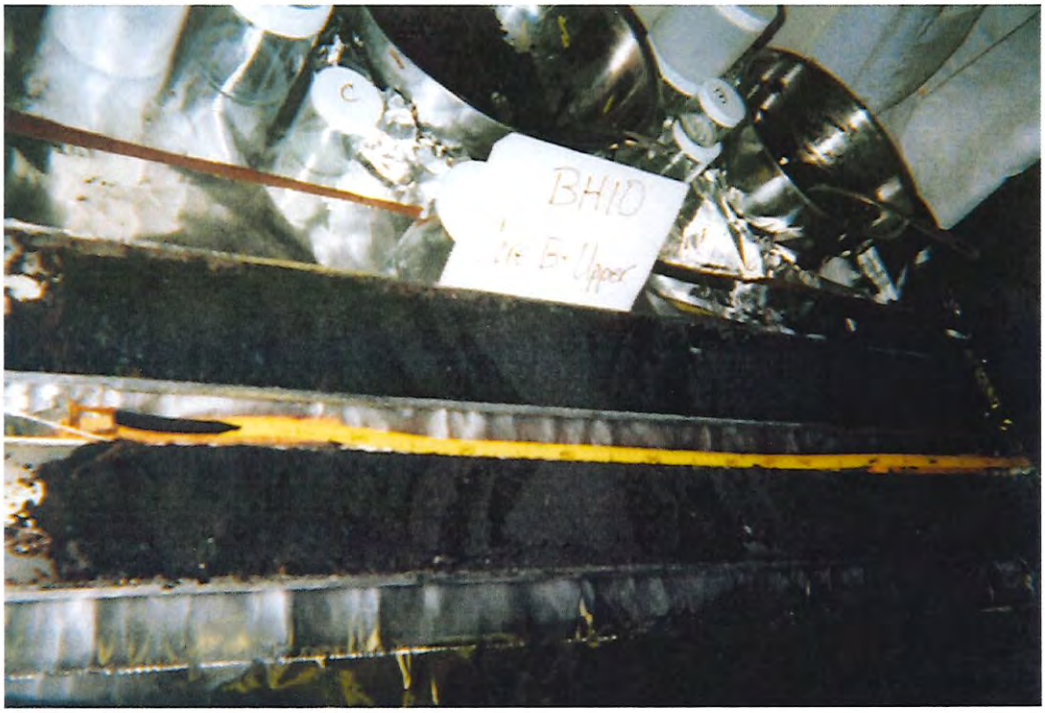


Figure C-36. Photograph of Station BH10 Core B upper section. No interface. Top is to the left.

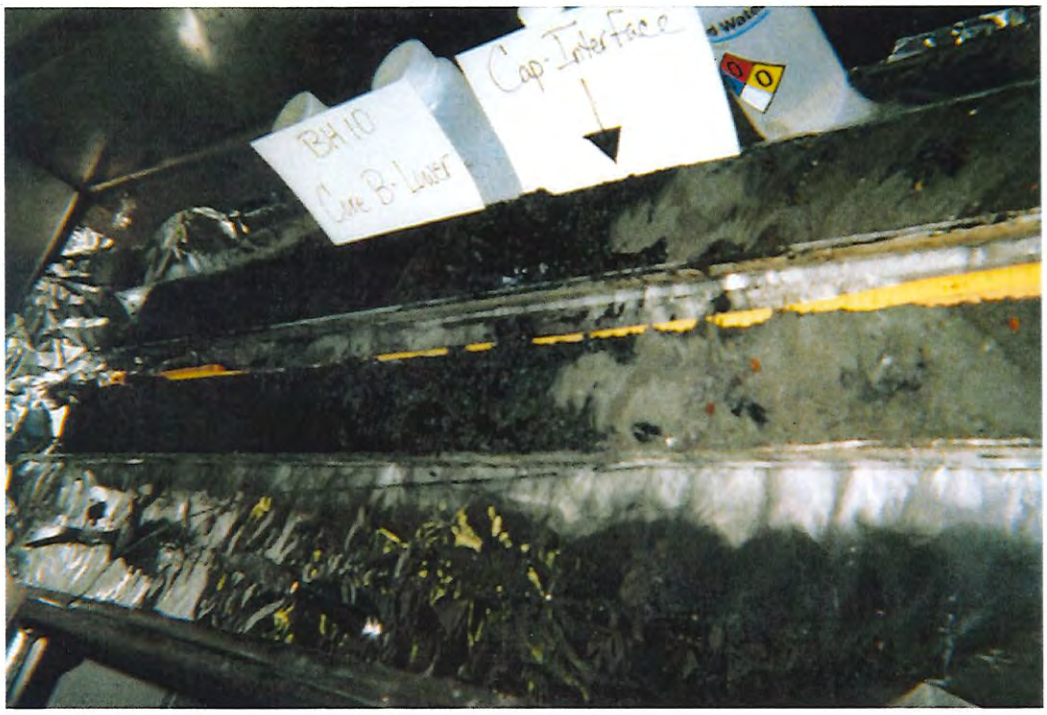


Figure C-37. Photograph of Station BH10 Core B lower section. Cap interface is in this core. Top is to the left.

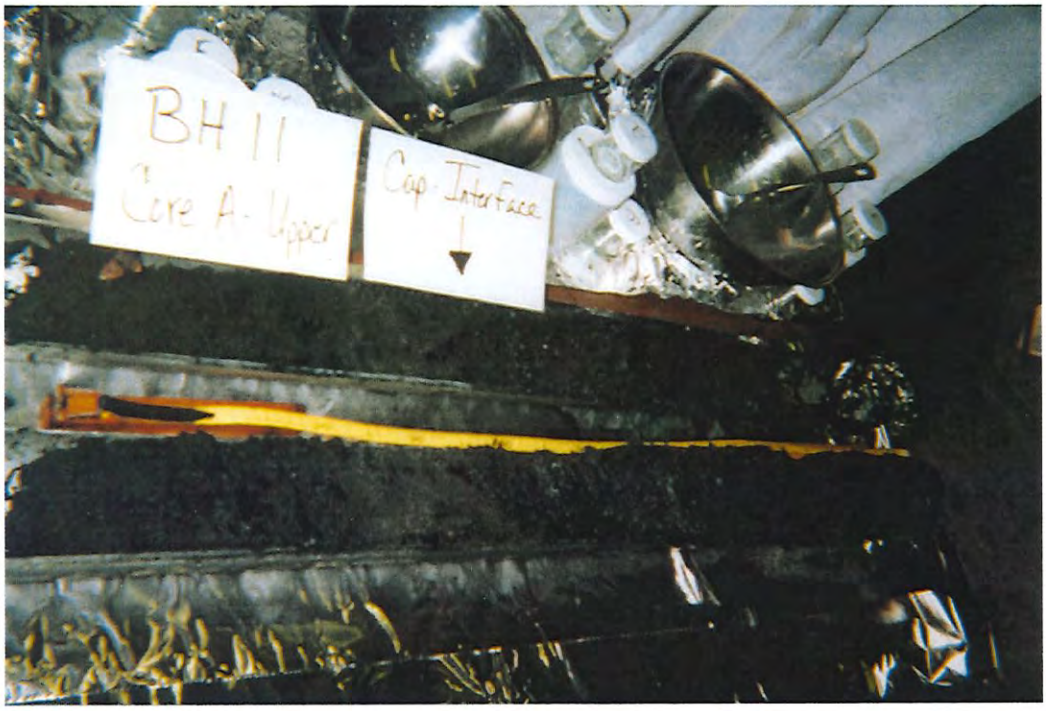


Figure C-38. Photograph of Station BH11 Core A upper section. Top is to the left.

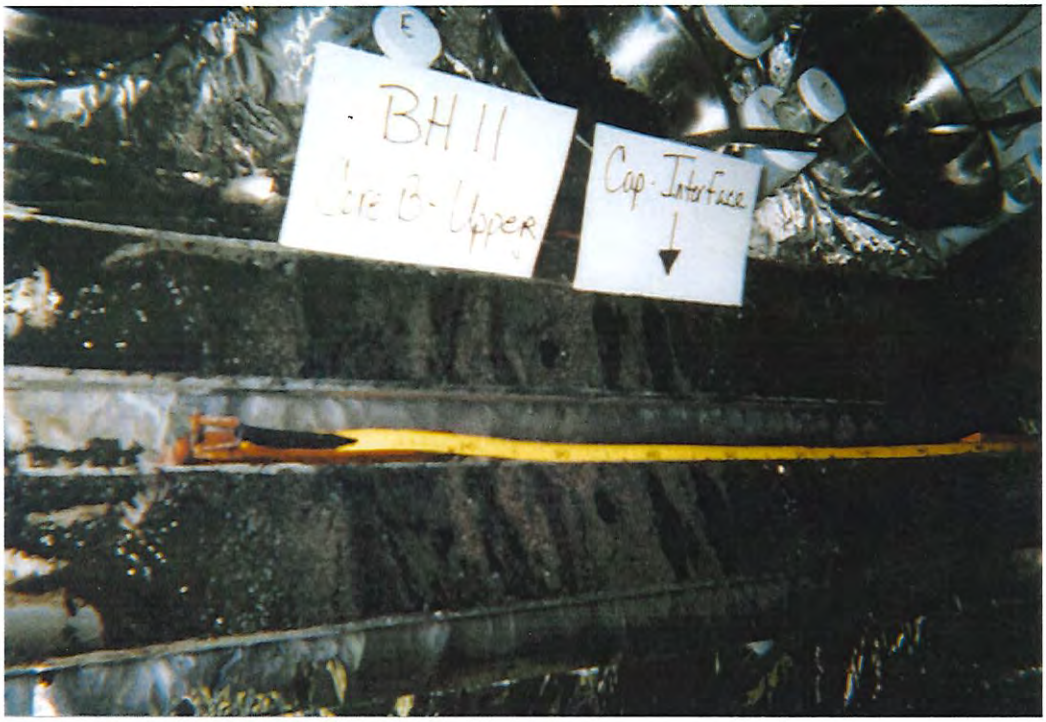


Figure C-39. Photograph of Station BH11 Core B upper section. Top is to the left.

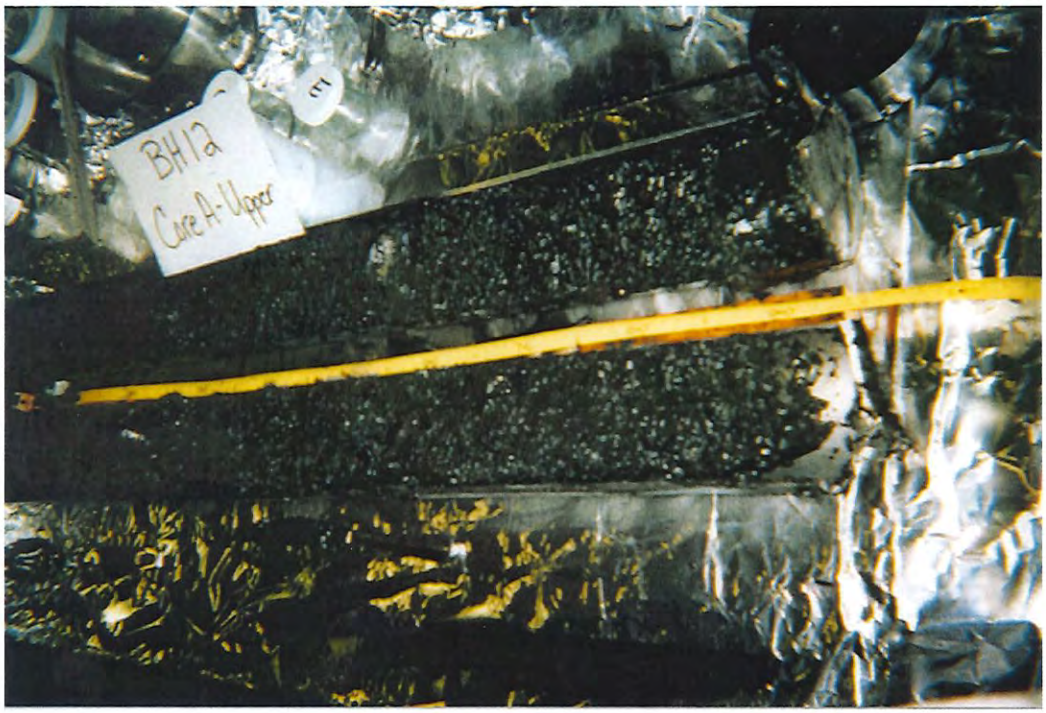


Figure C-40. Photograph of Station BH12 Core A upper section. No interface (no cap material). Top is to the left.



Figure C-41. Photograph of Station BH12 Core B upper section. No interface (no cap material). Top is to the left.



Figure C-42. Photograph of Station BH13 Core A upper section. No interface (no cap material – off cap station). Top is to the left.



Figure C-43. Photograph of Station BH13 Core B upper section. No interface (no cap material – off cap station). Top is to the left.



Figure C-44. Photograph of Station SS5-B Core A upper section. No interface (no cap material – off cap station). Top is to the left.



Figure C-45. Photograph of Station SS5-B Core B upper section. No interface (no cap material – off cap station). Top is to the left.

APPENDIX D

SEDIMENT CHEMISTRY, GRAIN SIZE TABLES AND FIGURES

Table D-1. Pier 64/65 March 2004 sediment chemistry - Station CS-1.
Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	CS-1-SR [surface*] GL75P		CS-1-SS [sub-surface*] GL75Q		CS-1-BC [below cap*] GL75R		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	67.2		68.6		87.2			
Total Organic Carbon (%)	4.1		4.3		0.13 *			
Total Sulfides (mg/kg)	980		780		39.0			
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	1.28 JDV		6.12 JDV		0.05 U		0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	125.1	5130	1622.8	69780	8958.5	11646	370	780
Naphthalene	3.9	160	8.1 JDV	350 JDV	74.6	97	99	170
Acenaphthylene	4.9	200	7.7 JDV	330 JDV	30.0	39	66	66
Acenaphthene	12.9	530	220.9 DL	9500 DL	1000.0 dl	1300 dl	16	57
Fluorene	13.7	560	279.1 DL	12000 DL	1307.7 DL	1700 DL	23	79
Phenanthrene	63.4	2600	953.5 DL	41000 DL	5769.2 DL	7500 DL	100	480
Anthracene	23.2	950	127.9 JDV	5500 JDV	584.6 dl	760 dl	220	1200
2-Methylnaphthalene	3.2	130	25.6 JDV	1100 JDV	192.3	250	38	64
HPAHs								
Total HPAHs	487.8	20000	1165.8	50130	8547.7	11112	960	5300
Fluoranthene	97.6	4000	465.1 DL	20000 DL	4153.8 DL	5400 DL	160	1200
Pyrene	134.1	5500	348.8 DL	15000 DL	2307.7 DL	3000 DL	1000	1400
Benzo(a)anthracene	43.9	1800	79.1 JDV	3400 JDV	761.5	990	110	270
Chrysene	48.8	2000	79.1 JDV	3400 JDV	607.7	790	110	460
Total Benzofluoranthenes	102.4	4200	120.9	5200	530.8	690	230	450
Benzo(b)fluoranthene	53.7	2200	60.5 JDV	2600 JDV	269.2	350		
Benzo(k)fluoranthene	48.8	2000	60.5 JDV	2600 JDV	261.5	340		
Benzo(a)pyrene	41.5	1700	51.2 JDV	2200 JDV	146.2	190	99	210
Indeno(1,2,3-cd)pyrene	8.3	340	9.3 JDV	400 JDV	23.8	31	34	88
Dibenzo(a,h)anthracene	3.7	150	4.0 JDV	170 JDV	15.4 U	20 U	12	33
Benzo(g,h,i)perylene	7.8	320	8.4 JDV	360 JDV	16.2	21	31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	8.8	360	3.3 JDV	140 JDV	15.4 U	20 U	47	78
MISCELLANEOUS								
Dibenzofuran	8.8	360	179.1 DL	7700 DL	769.2	1000	15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	10.9	445	8.1	350	3.0 U	3.9 U	12	65
Aroclor 1016	1.0 U	40 U	0.1 U	3.9 U	3.0 U	3.9 U		
Aroclor 1221	1.0 U	40 U	0.1 U	3.9 U	3.0 U	3.9 U		
Aroclor 1232	1.0 U	40 U	0.1 U	3.9 U	3.0 U	3.9 U		
Aroclor 1242	1.0 U	40 U	0.1 U	3.9 U	3.0 U	3.9 U		
Aroclor 1248	1.8	75	0.5 U	20 U	3.0 U	3.9 U		
Aroclor 1254	5.1 P	210 P	4.0 PDL	170 PDL	3.0 U	3.9 U		
Aroclor 1260	3.9	160	4.2 PDL	180 PDL	3.0 U	3.9 U		

* very low TOC

NOTES:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm)
core sample
SS = sub-surface core sample
10 to 20 cm above cap interface
BC = below cap core sample
top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference; also flagged 'J' in DV report
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery; for PAHs: Low IS area
dl = higher concentration from diluted sample results (not flagged 'E' in initial analysis) - DV

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-2. Pier 64/65 March 2004 sediment chemistry - Station CS-1 INCL (inclusion) samples. Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	CS-1-INCL1 GL75S		CS-1-INCL2 GL75T		CS-1-INCL3 GL75U		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	70.2		60.0		63.4			
Total Organic Carbon (%)	3.3		3.6		3.3			
Total Sulfides (mg/kg)	2200		1800		2100			
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	0.68 JDV		3.58 JDV		2.01 JDV		0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	149.4	4930	127.2	4580	104.2	3440	370	780
Naphthalene	7.6	250	6.7	240	7.0	230	99	170
Acenaphthylene	11.2	370	10.6	380	5.8	190	66	66
Acenaphthene	12.4 dl	410 dl	8.9	320	7.9	260	16	57
Fluorene	9.1	300	9.4	340	8.8	290	23	79
Phenanthrene	63.6 dl	2100 dl	55.6	2000	48.5	1600	100	480
Anthracene	45.5	1500	36.1	1300	23.0	760	220	1200
2-Methylnaphthalene	3.6 U	120 U	3.3 U	120 U	3.3 J	110 J	38	64
HPAHs								
Total HPAHs	1646.1	54320	866.4	31190	538.2	17760	960	5300
Fluoranthene	454.5 DL	15000 DL	100.0	3600	60.6	2000	160	1200
Pyrene	393.9 DL	13000 DL	272.2 DL	9800 DL	187.9	6200	1000	1400
Benzo(a)anthracene	121.2 dl	4000 dl	55.6	2000	36.4	1200	110	270
Chrysene	175.8 dl	5800 dl	69.4	2500	45.5	1500	110	460
Total Benzofluoranthenes	303.0	10000	222.2	8000	133.3	4400	230	450
Benzo(b)fluoranthene	166.7	5500	108.3	3900	69.7	2300		
Benzo(k)fluoranthene	136.4	4500	113.9	4100	63.6	2100		
Benzo(a)pyrene	103.0	3400	83.3	3000	51.5	1700	99	210
Indeno(1,2,3-cd)pyrene	39.4 dl	1300 dl	26.7 dl	960 dl	9.7	320	34	88
Dibenzo(a,h)anthracene	15.8 dl	520 dl	11.1 dl	400 dl	4.2	140	12	33
Benzo(g,h,i)perylene	39.4 dl	1300 dl	25.8 dl	930 dl	9.1	300	31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	6.1	200	8.9	320	5.8	190	47	78
MISCELLANEOUS								
Dibenzofuran	4.5	150	5.6	200	5.5	180	15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	10.6	350	20.3	730	13.6	450	12	65
Aroclor 1016	1.2 U	39 U	2.2 U	79 U	1.2 U	39 U		
Aroclor 1221	1.2 U	39 U	2.2 U	79 U	1.2 U	39 U		
Aroclor 1232	1.2 U	39 U	2.2 U	79 U	1.2 U	39 U		
Aroclor 1242	1.2 U	39 U	2.2 U	79 U	1.2 U	39 U		
Aroclor 1248	2.4 Y	78 Y	4.4 Y	160 Y	2.4 Y	79 Y		
Aroclor 1254	6.7	220	10.8	390	6.7	220		
Aroclor 1260	3.9	130	9.4	340	7.0	230		

NOTES:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm) core sample
SS = sub-surface core sample 10 to 20 cm above cap interface
BC = below cap core sample top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery
dl = higher concentration from diluted sample results (not flagged 'E' in initial analysis) - DV

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-3.	Pier 64/65 March 2004 sediment chemistry - Station CS-1. Dredged Material Management Program (DMMP) data summary. DMMP SL, BT and ML guidelines from US Army Corps (2004).								
Sampling Station ID.					CS-1-BC [below cap*]		SL	BT	ML
Laboratory Sample ID.					GL75R		Dry wt.	Dry wt.	Dry wt.
CONVENTIONALS									
Total Solids (%)					87.2				
Total Organic Carbon (%)					0.13 *				
Total Sulfides (mg/kg)					39.0				
METALS (mg/kg) Dry weight		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.	ppm dry wt.	ppm dry wt.
Mercury						0.05 U	0.41	1.5	2.3
ORGANICS (ug/kg (ppb) dry weight)									
LPAHs		ppb dry wt.		ppb dry wt.		ppb dry wt.	ppb dry wt.	ppb dry wt.	ppb dry wt.
Total LPAHs						11646	5200		29000
Naphthalene						97	2100		2400
Acenaphthylene						39	560		1300
Acenaphthene						1300 dl	500		2000
Fluorene						1700 DL	540		3600
Phenanthrene						7500 DL	1500		21000
Anthracene						760 dl	960		13000
2-Methylnaphthalene						250	670		1900
HPAHs									
Total HPAHs						11112	12000		69000
Fluoranthene						5400 DL	1700	4600	30000
Pyrene						3000 DL	2600		16000
Benzo(a)anthracene						990	1300		5100
Chrysene						790	1400		21000
Total Benzofluoranthenes						690	3200		9900
Benzo(b)fluoranthene						350			
Benzo(k)fluoranthene						340			
Benzo(a)pyrene						190	1600	3600	3600
Indeno(1,2,3-cd)pyrene						31	600		4400
Dibenzo(a,h)anthracene						20 U	230		1900
Benzo(g,h,i)perylene						21	670		3200
PHTHALATES ESTERS									
Bis(2-ethylhexyl)phthalate						20 U	8300	13870	--
MISCELLANEOUS									
Dibenzofuran						1000	540		1700
PCBs (ug/kg (ppb) dry weight)	ppm OC	ppb dry wt.	ppm OC	ppb dry wt.	ppm OC	ppb dry wt.	ppb dry wt.	ppm OC	ppb dry wt.
Total PCBs			8.1		3.0 U	3.9 U	130	38 (**)	3100
Aroclor 1016						3.9 U			
Aroclor 1221						3.9 U			
Aroclor 1232						3.9 U			
Aroclor 1242						3.9 U			
Aroclor 1248						3.9 U			
Aroclor 1254						3.9 U			
Aroclor 1260						3.9 U			

* very low TOC

NOTES:

DMMP = Dredged Material Management Program
SL = DY02/DY03 DMMP Screening Level guideline value
BT = DY02/DY03 DMMP Bioaccumulation Trigger guideline value
ML = DY02/DY03 DMMP Maximum Level guideline value
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report

(*) Sediment sample types:
SR = surface sediment (top 10 cm)
core sample
SS = sub-surface core sample
10 to 20 cm above cap interface
BC = below cap core sample
top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

** mg/kg TOC normalized
U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
dl = higher concentration from diluted sample results (not flagged 'E' in initial analysis) - DV

Analyte concentration exceeds ML guideline value
Analyte concentration exceeds BT guideline value
Analyte concentration exceeds SL guideline value
Analyte undetected, but Detection Limit greater than or equal to ML guideline value
Analyte undetected, but Detection Limit greater than or equal to SL guideline value

Table D-4. Sediment grain size analysis results - March 2004 sediment sampling - CS-1 and CS-1-INCL (inclusion) samples.

Grain Size Classification	Grain Size Phi	Grain Size Opening (mm)	Sample ID:					
			CS-1-SR	CS-1-SS	CS-1-BC (J)	CS-1-INCL1	CS-1-INCL2	CS-1-INCL3
			Percent retained on sieve:					
GRAVEL		4.75						
GRAVEL	-2	4						
GRAVEL (J)	-1	2	5.4	6.5	38.9	5.9	14.8	4.5
VERY COARSE SAND (J)	0	1	3.1	3.3	7.9	3.4	2.2	2.7
COARSE SAND	1	0.5	12.4	9.7	8.3	14.8	6.0	8.5
MEDIUM SAND	2	0.25	27.4	21.5	21.1	29.2	13.8	16.3
FINE SAND	3	0.125	14.9	15.5	19.6	12.6	10.8	11.9
VERY FINE SAND	4	0.063	4.8	5.4	2.8	4.9	6.2	7.3
COARSE SILT (J)	5	0.032	2.8	4.1	1.4	2.6	3.2	3.3
MEDIUM SILT	6	0.016	5.3	6.8	0.0	4.0	8.3	10.5
FINE SILT	7	0.008	5.3	5.6	0.0	4.6	8.8	9.2
VERY FINE SILT	8	0.04	4.8	6.4	0.0	4.5	7.8	5.2
CLAY	9	0.002	4.8	5.3	0.0	4.1	6.2	6.2
CLAY (J)	10	0.001	3.9	3.9	0.0	3.7	5.1	5.4
CLAY	>+10	<0.001	5.2	6.0	0.0	5.8	6.8	9.0
		Percent gravel:	5.4	6.5	38.9	5.9	14.8	4.5
		Percent sand:	62.6	55.4	59.7	64.9	39.0	46.7
		Percent silt:	18.2	22.9	1.4	15.7	28.1	28.2
		Percent clay:	13.9	15.2	0.0	13.6	18.1	20.6
		Percent fines:	32.1	38.1	1.4	29.3	46.2	48.8
		(silt + clay)						
		Total solids* (%):	68.7	63.0	87.8	68.9	62.2	59.6

(*) Total Solids data from grain size analysis

J = results qualified as estimated in Data Validation report - High triplicate RSD

CS-1-BC silt and clay results qualified as estimated in Data Validation report for low pipette fraction weight

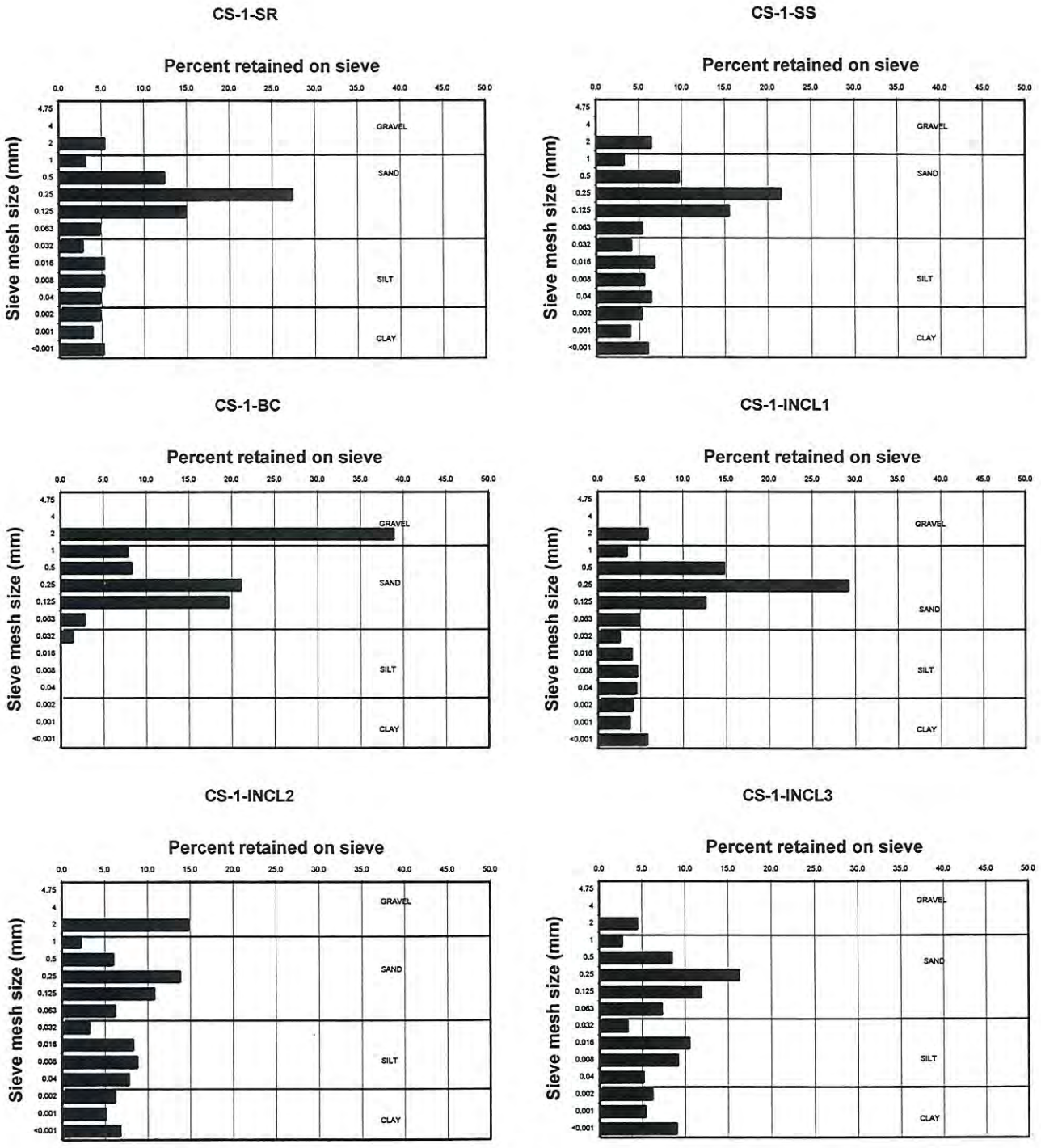


Figure D-1. March 2004 sediment grain size analysis - CS-1 and CS-1-INCL (inclusion) samples.

Table D-5. Pier 64/65 March 2004 sediment chemistry - Station CS-2.
Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	CS-2-SR [surface*] GL76J		CS-2-SS [sub-surface*] GL76K		CS-2-BC [below cap*] GL76L		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	68.8		66.1		53.7			
Total Organic Carbon (%)	2.9		5.0		4.9			
Total Sulfides (mg/kg)	860		2400		8200			
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	0.09 JDV		0.07 U		0.53 JDV		0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	9.0	260	0.8 U	39 U	141.0	6910	370	780
Naphthalene	1.3 U	39 U	0.8 U	39 U	5.7	280	99	170
Acenaphthylene	1.3 U	39 U	0.8 U	39 U	11.4	560	66	66
Acenaphthene	1.3 U	39 U	0.8 U	39 U	7.1	350	16	57
Fluorene	1.3 U	39 U	0.8 U	39 U	10.2 dl	500 dl	23	79
Phenanthrene	4.5	130	0.8 U	39 U	32.7	1600	100	480
Anthracene	4.5	130	0.8 U	39 U	71.4 dl	3500 dl	220	1200
2-Methylnaphthalene	1.3 U	39 U	0.8 U	39 U	2.4	120	38	64
HPAHs								
Total HPAHs	79.4	2303	1.9	97	1254.1	61450	960	5300
Fluoranthene	8.3	240	0.8 J	38 J	157.1 dl	7700 dl	160	1200
Pyrene	12.4	360	1.2	59	265.3 DL	13000 DL	1000	1400
Benzo(a)anthracene	6.2	180	0.8 U	39 U	100.0 dl	4900 dl	110	270
Chrysene	11.0	320	0.8 U	39 U	187.8 dl	9200 dl	110	460
Total Benzofluoranthenes	24.8	720	0.8 U	39 U	318.4	15600	230	450
Benzo(b)fluoranthene	11.0	320	0.8 U	39 U	181.6	8900		
Benzo(k)fluoranthene	13.8	400	0.8 U	39 U	136.7 dl	6700 dl		
Benzo(a)pyrene	10.7	310	0.8 U	39 U	122.4 dl	6000 dl	99	210
Indeno(1,2,3-cd)pyrene	3.2	93	0.8 U	39 U	42.9 dl	2100 dl	34	88
Dibenzo(a,h)anthracene	1.3 U	39 U	0.8 U	39 U	17.3 dl	850 dl	12	33
Benzo(g,h,i)perylene	2.8	80	0.8 U	39 U	42.9 dl	2100 dl	31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	4.8	140	0.8 U	39 U	3.9	190	47	78
MISCELLANEOUS								
Dibenzofuran	1.3 U	39 U	0.8 U	39 U	4.3	210	15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	1.4	40.9	0.4	21.4	6.4	314	12	65
Aroclor 1016	0.1 U	4.0 U	0.1 U	3.9 U	0.1 U	3.9 U		
Aroclor 1221	0.1 U	4.0 U	0.1 U	3.9 U	0.1 U	3.9 U		
Aroclor 1232	0.1 U	4.0 U	0.1 U	3.9 U	0.1 U	3.9 U		
Aroclor 1242	0.1 U	4.0 U	0.1 U	3.9 U	0.1 U	3.9 U		
Aroclor 1248	0.3	7.9	0.2	11	1.1	54		
Aroclor 1254	0.6	17	0.1	6.3	3.1 PDL	150 PDL		
Aroclor 1260	0.6	16	0.1 J	4.1 J	2.2 DL	110 DL		

NOTES:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm) core sample
SS = sub-surface core sample 10 to 20 cm above cap interface
BC = below cap core sample top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference; also flagged 'J' in DV report
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery
dl = higher concentration from diluted sample results (not flagged 'E' in initial analysis) - DV

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-6. Sediment grain size analysis results - March 2004 sediment sampling - CS-2 samples.

Grain Size Classification	Grain Size Phi	Grain Size Opening (mm)	Sample ID: CS-2-SR	CS-2-SS	CS-2-BC			
			Percent retained on sieve:					
GRAVEL		4.75						
GRAVEL	-2	4						
GRAVEL (J)	-1	2	1.4	3.1	17.0			
VERY COARSE SAND (J)	0	1	3.0	7.3	8.3			
COARSE SAND	1	0.5	20.7	27.7	14.7			
MEDIUM SAND	2	0.25	37.7	37.9	17.0			
FINE SAND	3	0.125	12.0	14.4	8.5			
VERY FINE SAND	4	0.063	3.2	2.5	2.8			
COARSE SILT (J)	5	0.032	5.4	1.4	4.6			
MEDIUM SILT	6	0.016	3.7	2.1	8.8			
FINE SILT	7	0.008	3.6	1.7	7.8			
VERY FINE SILT	8	0.04	2.5	0.3	3.1			
CLAY	9	0.002	2.0	0.1	2.5			
CLAY (J)	10	0.001	1.5	0.2	1.4			
CLAY	>+10	<0.001	3.3	1.5	3.3			
		Percent gravel:	1.4	3.1	17.0			
		Percent sand:	76.6	89.8	51.3			
		Percent silt:	15.2	5.5	24.3			
		Percent clay:	6.8	1.8	7.2			
		Percent fines:	22.0	7.3	31.5			
		(silt + clay)						
		Total solids* (%):	70.6	68.7	55.1			

(*) Total Solids data from grain size analysis

J = results qualified as estimated in Data Validation report - High triplicate RSD

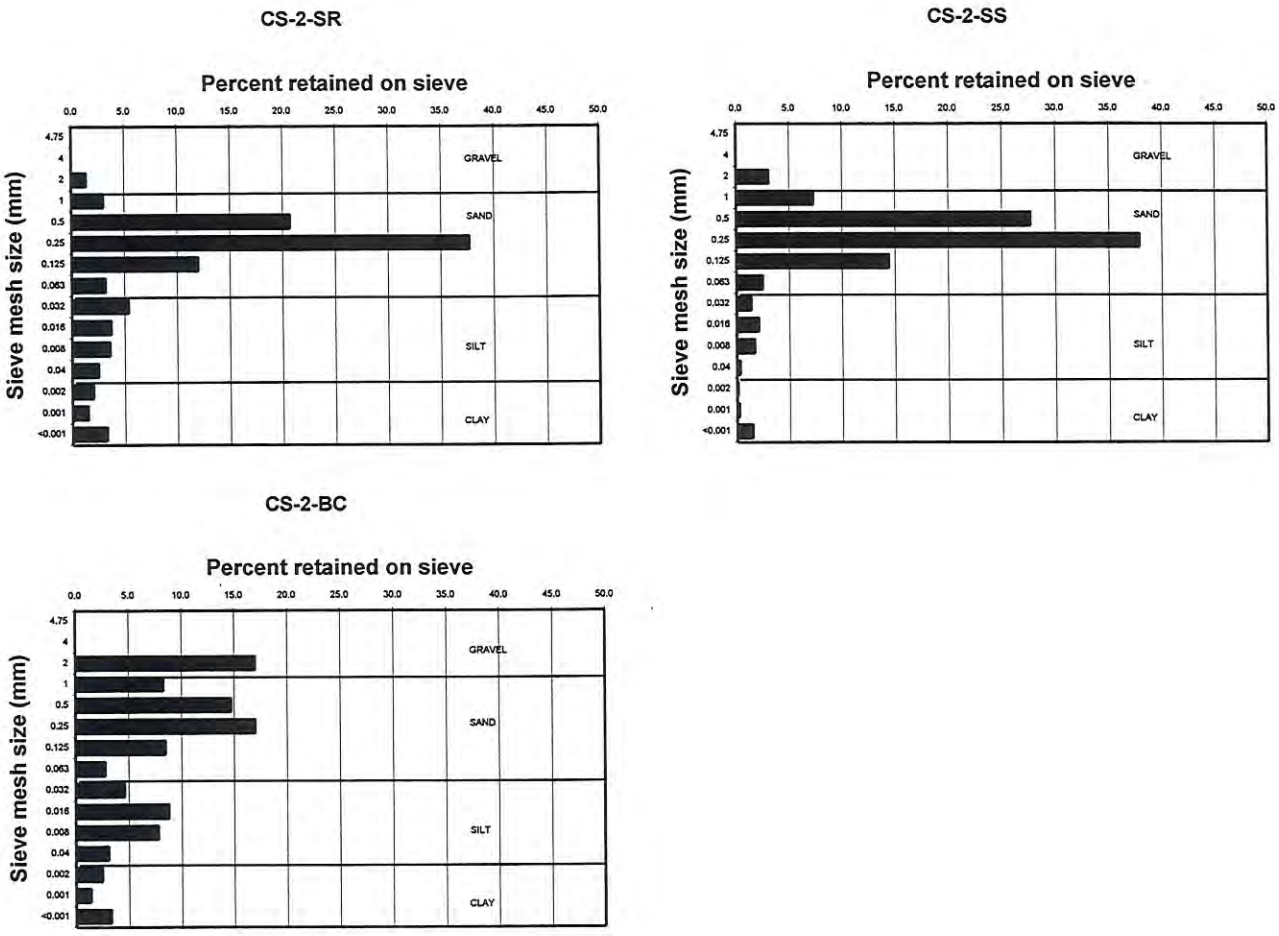


Figure D-2. March 2004 sediment grain size analysis - CS-2 samples.

Table D-7. Pier 64/65 March 2004 sediment chemistry - Station CS-3.
Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	CS-3-SR [surface*] GL88A		CS-3-SS [sub-surface*] GL88B		CS-3-BC [below cap*] GL88C		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	74.4		68.4		39.4			
Total Organic Carbon (%)	2.4		3.2		6.7			
Total Sulfides (mg/kg)	430		2500		6700			
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	0.07 JDV		0.08 JDV		1.3 JDV		0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	42.1	1010	17.8	569	109.0	7300	370	780
Naphthalene	5.0 U	120 U	1.3 U	40 U	8.8 U	590 U	99	170
Acenaphthylene	5.0 U	120 U	1.3 U	40 U	14.9	1000	66	66
Acenaphthene	5.0	120	2.4	78	8.8 U	590 U	16	57
Fluorene	5.4	130	2.5	81	8.8 U	590 U	23	79
Phenanthrene	21.7	520	9.4	300	49.3	3300	100	480
Anthracene	10.0	240	3.4	110	44.8	3000	220	1200
2-Methylnaphthalene	5.0 U	120 U	1.3 U	40 U	8.8 U	590 U	38	64
HPAHs								
Total HPAHs	167.1	4010	56.2	1798	1148.2	76930	960	5300
Fluoranthene	27.1	650	11.6	370	143.3	9600	160	1200
Pyrene	32.5	780	12.2	390	209.0	14000	1000	1400
Benzo(a)anthracene	15.4	370	4.4	140	119.4	8000	110	270
Chrysene	22.9	550	6.6	210	149.3	10000	110	460
Total Benzofluoranthenes	41.3	990	13.4	430	337.3	22600	230	450
Benzo(b)fluoranthene	22.1	530	7.2	230	194.0	13000		
Benzo(k)fluoranthene	19.2	460	6.3	200	143.3	9600		
Benzo(a)pyrene	18.3	440	5.3	170	131.3	8800	99	210
Indeno(1,2,3-cd)pyrene	4.6 J	110 J	1.4	45	26.9	1800	34	88
Dibenzo(a,h)anthracene	5.0 U	120 U	1.3 U	40 U	10.9	730	12	33
Benzo(g,h,i)perylene	5.0	120	1.3	43	20.9	1400	31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	6.3	150	3.4	110	14.8	990	47	78
MISCELLANEOUS								
Dibenzofuran	5.0 U	120 U	1.3	43	8.8	590 U	15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	1.6	38	0.8	24	6.6	440	12	65
Aroclor 1016	0.2 U	3.8 U	0.1 U	3.9 U	0.6 U	39 U		
Aroclor 1221	0.2 U	3.8 U	0.1 U	3.9 U	0.6 U	39 U		
Aroclor 1232	0.2 U	3.8 U	0.1 U	3.9 U	0.6 U	39 U		
Aroclor 1242	0.2 U	3.8 U	0.1 U	3.9 U	0.6 U	39 U		
Aroclor 1248	0.2 U	3.8 U	0.1 U	3.9 U	1.8 P	120 P		
Aroclor 1254	0.8 P	19 P	0.4	13	2.7	180		
Aroclor 1260	0.8	19	0.3	11	2.1	140		

NOTES:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm) core sample
SS = sub-surface core sample 10 to 20 cm above cap interface
BC = below cap core sample top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference; also flagged 'J' in DV report
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-8. Pier 64/65 March 2004 sediment chemistry - Station CS-3 - field replicate (FR) samples. Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	CS-3-SR-FR [surface*] GL88D		CS-3-SS-FR [sub-surface*] GL88E		CS-3-BC-FR [below cap*] GL88F		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	74.2		74.0		47.2			
Total Organic Carbon (%)	2.4		2.9		6.5			
Total Sulfides (mg/kg)	730		3400		15000			
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	0.10 JDV		0.07 JDV		1.25 JDV		0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	18.5	445	1.3 U	38 U	111.5	7250	370	780
Naphthalene	1.6 U	39 U	1.3 U	38 U	8.9 U	580 U	99	170
Acenaphthylene	1.6 U	39 U	1.3 U	38 U	14.6	950	66	66
Acenaphthene	1.6 U	39 U	1.3 U	38 U	8.9 U	580 U	16	57
Fluorene	2.3	55	1.3 U	38 U	8.9 U	580 U	23	79
Phenanthrene	8.3	200	1.3 U	38 U	50.8	3300	100	480
Anthracene	7.9	190	1.3 U	38 U	46.2	3000	220	1200
2-Methylnaphthalene	1.6 U	39 U	1.3 U	38 U	8.9 U	580 U	38	64
HPAHs								
Total HPAHs	88.9	2134	11.7	338	992.5	64510	960	5300
Fluoranthene	13.3	320	2.2	64	141.5	9200	160	1200
Pyrene	15.4	370	2.7	78	230.8	15000	1000	1400
Benzo(a)anthracene	7.5	180	1.3 U	38 U	87.7	5700	110	270
Chrysene	12.9	310	1.4	40	115.4	7500	110	460
Total Benzofluoranthenes	25.4	610	3.8	111	261.5	17000	230	450
Benzo(b)fluoranthene	12.5	300	2.0	58	150.8	9800		
Benzo(k)fluoranthene	12.9	310	1.8	53	110.8	7200		
Benzo(a)pyrene	9.6	230	1.6	45	106.2	6900	99	210
Indeno(1,2,3-cd)pyrene	2.3	55	1.3 U	38 U	21.5	1400	34	88
Dibenzo(a,h)anthracene	1.6 U	39 U	1.3 U	38 U	9.4	610	12	33
Benzo(g,h,i)perylene	2.5	59	1.3 U	38 U	18.5	1200	31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	9.2	220	2.1	62	11.1	720	47	78
MISCELLANEOUS								
Dibenzofuran	1.6 U	39 U	1.3 U	38 U	8.9 U	580 U	15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	0.8	20	0.4	12.9	8.3	538	12	65
Aroclor 1016	0.2 U	3.9 U	0.1 U	3.8 U	0.6 U	39 U		
Aroclor 1221	0.2 U	3.9 U	0.1 U	3.8 U	0.6 U	39 U		
Aroclor 1232	0.2 U	3.9 U	0.1 U	3.8 U	0.6 U	39 U		
Aroclor 1242	0.2 U	3.9 U	0.1 U	3.8 U	0.6 U	39 U		
Aroclor 1248	0.2 U	3.9 U	0.1 U	3.8 U	1.5	98		
Aroclor 1254	0.5	11	0.3	7.6	3.5	230		
Aroclor 1260	0.4	9.0	0.2	5.3	3.2	210		

NOTES:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report

(*) Sediment sample types:
SR = surface sediment (top 10 cm) core sample
SS = sub-surface core sample 10 to 20 cm above cap interface
BC = below cap core sample top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-9. Sediment grain size analysis results - March 2004 sediment sampling - CS-3 and CS-3-FR (field replicate) samples.

Grain Size Classification	Grain Size Phi	Grain Size Opening (mm)	Sample ID:					
			CS-3-SR	CS-3-SS	CS-3-BC	CS3-SR-FR (J)	CS3-SS-FR (J)	CS3-BC-FR
			Percent retained on sieve:					
GRAVEL		4.75						
GRAVEL	-2	4						
GRAVEL (J)	-1	2	1.8	3.1	0.5	0.4	2.5	16.8
VERY COARSE SAND (J)	0	1	4.4	3.6	17.0	3.9	5.6	8.0
COARSE SAND	1	0.5	25.1	24.5	8.2	24.3	28.4	9.7
MEDIUM SAND	2	0.25	46.2	36.5	10.3	45.5	38.7	12.1
FINE SAND	3	0.125	11.0	9.2	5.8	13.3	8.3	6.4
VERY FINE SAND	4	0.063	2.3	3.9	3.1	2.9	2.7	3.9
COARSE SILT (J)	5	0.032	2.0	3.3	3.4	1.9	2.6	1.8
MEDIUM SILT	6	0.016	1.1	3.9	6.9	1.4	2.3	5.8
FINE SILT	7	0.008	1.2	5.8	11.7	1.5	3.9	10.6
VERY FINE SILT	8	0.04	1.0	2.0	9.1	1.1	1.9	6.7
CLAY	9	0.002	1.1	1.2	7.0	1.1	0.9	5.2
CLAY (J)	10	0.001	0.9	0.6	6.5	0.8	0.3	4.7
CLAY	>+10	<0.001	1.8	2.3	10.5	1.8	1.8	8.2
		Percent gravel:	1.8	3.1	0.5	0.4	2.5	16.8
		Percent sand:	89.0	77.7	44.4	89.9	83.7	40.1
		Percent silt:	5.3	15.0	31.1	5.9	10.7	24.9
		Percent clay:	3.8	4.1	24.0	3.7	3.0	18.1
		Percent fines:	9.1	19.1	55.1	9.6	13.7	43.0
		(silt + clay)						
		Total solids* (%):	75.5	69.1	41.5	74.5	68.2	47.4

(*) Total Solids data from grain size analysis

J = results qualified as estimated in Data Validation report - High triplicate RSD

CS-3-SR-FR and CS-3-SS-FR silt and clay results qualified as estimated in Data Validation report for low pipette fraction weight

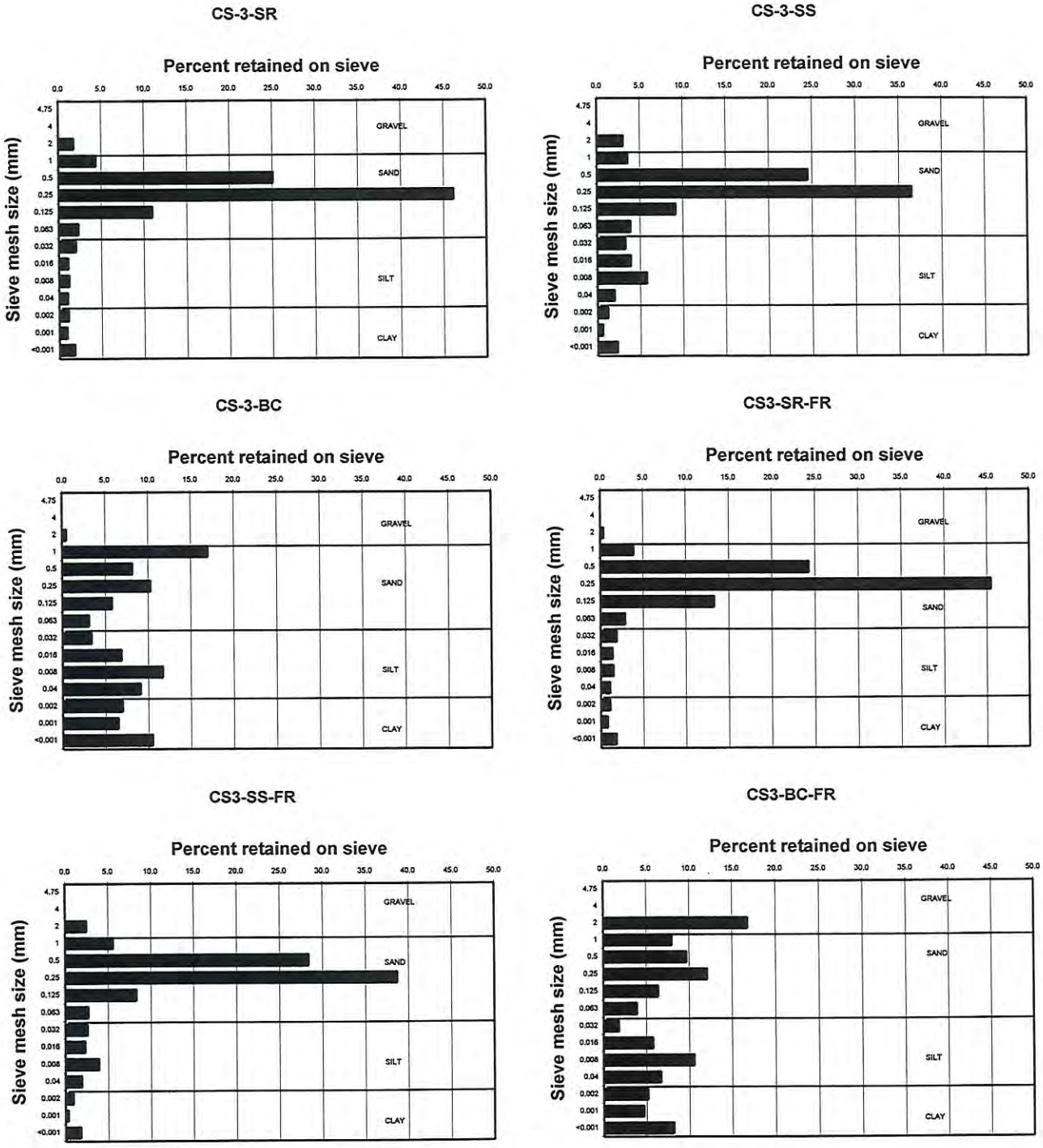


Figure D-3. March 2004 sediment grain size analysis - CS-3 and CS-3-FR (field replicate) samples.

Table D-10. Pier 64/65 March 2004 sediment chemistry - Station BH-2.
Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	BH-2-SR [surface*] GL75J		BH-2-SS [sub-surface*] GL75K		BH-2-BC [below cap*] (Archived)		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	95.9		96.6					
Total Organic Carbon (%)	0.12 *		0.080 *					
Total Sulfides (mg/kg)	23.0		1.10 U					
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	0.05 U		0.05 U				0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	216.7	260	23.8 U	19 U			370	780
Naphthalene	47.5 U	57 U	23.8 U	19 U			99	170
Acenaphthylene	47.5 U	57 U	23.8 U	19 U			66	66
Acenaphthene	47.5 U	57 U	23.8 U	19 U			16	57
Fluorene	47.5 U	57 U	23.8 U	19 U			23	79
Phenanthrene	91.7	110	23.8 U	19 U			100	480
Anthracene	125.0	150	23.8 U	19 U			220	1200
2-Methylnaphthalene	47.5 U	57 U	23.8 U	19 U			38	64
HPAHs								
Total HPAHs	2090.0	2508	23.8 U	19 U			960	5300
Fluoranthene	225.0	270	23.8 U	19 U			160	1200
Pyrene	308.3	370	23.8 U	19 U			1000	1400
Benzo(a)anthracene	216.7	260	23.8 U	19 U			110	270
Chrysene	308.3	370	23.8 U	19 U			110	460
Total Benzofluoranthenes	633.3	760	23.8 U	19 U			230	450
Benzo(b)fluoranthene	316.7	380	23.8 U	19 U				
Benzo(k)fluoranthene	316.7	380	23.8 U	19 U				
Benzo(a)pyrene	258.3	310	23.8 U	19 U			99	210
Indeno(1,2,3-cd)pyrene	75.8	91	23.8 U	19 U			34	88
Dibenzo(a,h)anthracene	47.5 U	57 U	23.8 U	19 U			12	33
Benzo(g,h,i)perylene	64.2	77	23.8 U	19 U			31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	51.7	62	23.8 U	19 U			47	78
MISCELLANEOUS								
Dibenzofuran	47.5 U	57 U	23.8 U	19 U			15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	4.7	5.6	4.8 U	3.8 U			12	65
Aroclor 1016	3.2 U	3.8 U	4.8 U	3.8 U				
Aroclor 1221	3.2 U	3.8 U	4.8 U	3.8 U				
Aroclor 1232	3.2 U	3.8 U	4.8 U	3.8 U				
Aroclor 1242	3.2 U	3.8 U	4.8 U	3.8 U				
Aroclor 1248	3.2 U	3.8 U	4.8 U	3.8 U				
Aroclor 1254	4.7	5.6	4.8 U	3.8 U				
Aroclor 1260	3.2 U	3.8 U	4.8 U	3.8 U				
	* very low TOC		* very low TOC					

NOTES:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls

U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required

(*) Sediment sample types:
SR = surface sediment (top 10 cm) core sample
SS = sub-surface core sample 10 to 20 cm above cap interface
BC = below cap core sample top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-11. Pier 64/65 March 2004 sediment chemistry - Station BH-3.
Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	BH-3-SR [surface*] GL44A		BH-3-SS [sub-surface*] GL44B		BH-3-BC [below cap*] (Archived)		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	63.0		70.9					
Total Organic Carbon (%)	2.6		1.4					
Total Sulfides (mg/kg)	1200		1400					
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	0.19 JDV		0.09 JDV				0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	86.5	2250	43.6	610			370	780
Naphthalene	4.6 U	120 U	8.6 U	120 U			99	170
Acenaphthylene	4.6 U	120 U	8.6 U	120 U			66	66
Acenaphthene	6.2	160	8.6 U	120 U			16	57
Fluorene	6.9	180	8.6 UJ	120 UJ			23	79
Phenanthrene	35.0	910	27.1	380			100	480
Anthracene	38.5	1000	16.4	230			220	1200
2-Methylnaphthalene	4.6 U	120 U	8.6 U	120 U			38	64
HPAHs								
Total HPAHs	275.4	7160	323.6	4530			960	5300
Fluoranthene	46.2	1200	39.3	550			160	1200
Pyrene	50.0	1300	92.9	1300			1000	1400
Benzo(a)anthracene	25.8	670	27.1	380			110	270
Chrysene	35.4	920	35.0	490			110	460
Total Benzofluoranthenes	58.8	1530	72.9	1020			230	450
Benzo(b)fluoranthene	29.2	760	34.3	480				
Benzo(k)fluoranthene	29.6	770	38.6	540				
Benzo(a)pyrene	28.8	750	32.1	450			99	210
Indeno(1,2,3-cd)pyrene	13.1	340	12.1	170			34	88
Dibenzo(a,h)anthracene	5.0	130	8.6 U	120 U			12	33
Benzo(g,h,i)perylene	12.3	320	12.1	170			31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	5.0	130	8.6 U	120 U			47	78
MISCELLANEOUS								
Dibenzofuran	4.6 U	120 U	8.6 U	120 U			15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	6.4	166	6.6	92			12	65
Aroclor 1016	0.2 U	3.9 U	0.3 U	3.8 U				
Aroclor 1221	0.2 U	3.9 U	0.3 U	3.8 U				
Aroclor 1232	0.2 U	3.9 U	0.3 U	3.8 U				
Aroclor 1242	0.2 U	3.9 U	0.3 U	3.8 U				
Aroclor 1248	1.2 dl	31 dl	1.1	16				
Aroclor 1254	3.5 DL	91 DL	3.9	54				
Aroclor 1260	1.7 dl	44 dl	1.6	22				

NOTES:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm) core sample
SS = sub-surface core sample 10 to 20 cm above cap interface
BC = below cap core sample top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration UJ = low MS recovery; DV report
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery
dl = higher concentration from diluted sample results (not flagged 'E' in initial analysis) - DV

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-12. Pier 64/65 March 2004 sediment chemistry - Station BH-4.
Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	BH-4-SR [surface*] GL75M		BH-4-SS [sub-surface*] GL75N		BH-4-BC [below cap*] (Archived)		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	77.2		89.5					
Total Organic Carbon (%)	2.4		0.51 *					
Total Sulfides (mg/kg)	240		570					
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	0.14 JDV		0.08 JDV				0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	20.8	500	14.9	76			370	780
Naphthalene	4.6 U	110 U	3.9 U	20 U			99	170
Acenaphthylene	4.6 U	110 U	3.9 U	20 U			66	66
Acenaphthene	4.6 U	110 U	3.9 U	20 U			16	57
Fluorene	4.6 U	110 U	3.9 U	20 U			23	79
Phenanthrene	20.8	500	9.2	47			100	480
Anthracene	4.6 U	110 U	5.7	29			220	1200
2-Methylnaphthalene	4.6 U	110 U	3.9 U	20 U			38	64
HPAHs								
Total HPAHs	137.1	3290	121.2	618			960	5300
Fluoranthene	26.3	630	14.9	76			160	1200
Pyrene	27.5	660	27.5	140			1000	1400
Benzo(a)anthracene	10.8	260	8.8	45			110	270
Chrysene	17.5	420	13.1	67			110	460
Total Benzofluoranthenes	35.8	860	35.1	179			230	450
Benzo(b)fluoranthene	16.3	390	17.6	90				
Benzo(k)fluoranthene	19.6	470	17.5	89				
Benzo(a)pyrene	14.2	340	13.5	69			99	210
Indeno(1,2,3-cd)pyrene	5.0	120	4.5	23			34	88
Dibenzo(a,h)anthracene	4.6 U	110 U	3.9 U	20 U			12	33
Benzo(g,h,i)perylene	4.6 U	110 U	3.7 J	19 J			31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	4.6 U	110 U	7.6	39			47	78
MISCELLANEOUS								
Dibenzofuran	4.6 U	110 U	3.9 U	20 U			15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	2.6	62	7.3	37			12	65
Aroclor 1016	0.2 U	3.8 U	0.8 U	4.0 U				
Aroclor 1221	0.2 U	3.8 U	0.8 U	4.0 U				
Aroclor 1232	0.2 U	3.8 U	0.8 U	4.0 U				
Aroclor 1242	0.2 U	3.8 U	0.8 U	4.0 U				
Aroclor 1248	0.6 Y	15 Y	0.8 U	4.0 U				
Aroclor 1254	1.4	34	2.2	11				
Aroclor 1260	1.2 P	28 P	5.1	26				

* low TOC

NOTES:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm)
core sample
SS = sub-surface core sample
10 to 20 cm above cap interface
BC = below cap core sample
top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference; also flagged 'J' in DV report
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-13.	Pier 64/65 March 2004 sediment chemistry - Stations BH-2, BH-4. Dredged Material Management Program (DMMP) data summary. DMMP SL, BT and ML guidelines from US Army Corps (2004).								
Sampling Station ID.	BH-2-SR [surface*]		BH-2-SS [sub-surface*]		BH-4-SS [sub-surface*]		SL	BT	ML
Laboratory Sample ID.	GL75J		GL75K		GL75N		Dry wt.	Dry wt.	Dry wt.
CONVENTIONALS									
Total Solids (%)	95.9		96.6		89.5				
Total Organic Carbon (%)	0.12 *		0.080 *		0.51 *				
Total Sulfides (mg/kg)	23.0		1.10 U		570				
METALS (mg/kg) Dry weight		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.	ppm dry wt	ppm dry wt.
Mercury		0.05 U		0.05 U		0.08 JDV	0.41	1.5	2.3
ORGANICS (ug/kg (ppb) dry weight)									
LPAHs		ppb dry wt.		ppb dry wt.		ppb dry wt.	ppb dry wt.	ppb dry wt.	ppb dry wt.
Total LPAHs		260		19 U		76	5200		29000
Naphthalene		57 U		19 U		20 U	2100		2400
Acenaphthylene		57 U		19 U		20 U	560		1300
Acenaphthene		57 U		19 U		20 U	500		2000
Fluorene		57 U		19 U		20 U	540		3600
Phenanthrene		110		19 U		47	1500		21000
Anthracene		150		19 U		29	960		13000
2-Methylnaphthalene		57 U		19 U		20 U	670		1900
HPAHs									
Total HPAHs		2508		19 U		618	12000		69000
Fluoranthene		270		19 U		76	1700	4600	30000
Pyrene		370		19 U		140	2600		16000
Benzo(a)anthracene		260		19 U		45	1300		5100
Chrysene		370		19 U		67	1400		21000
Total Benzofluoranthenes		760		19 U		179	3200		9900
Benzo(b)fluoranthene		380		19 U		90			
Benzo(k)fluoranthene		380		19 U		89			
Benzo(a)pyrene		310		19 U		69	1600	3600	3600
Indeno(1,2,3-cd)pyrene		91		19 U		23	600		4400
Dibenzo(a,h)anthracene		57 U		19 U		20 U	230		1900
Benzo(g,h,i)perylene		77		19 U		19 J	670		3200
PHTHALATES ESTERS									
Bis(2-ethylhexyl)phthalate		62		19 U		39	8300	13870	--
MISCELLANEOUS									
Dibenzofuran		57 U		19 U		20 U	540		1700
PCBs (ug/kg (ppb) dry weight)	ppm OC	ppb dry wt.	ppm OC	ppb dry wt.	ppm OC	ppb dry wt.	ppb dry wt.	ppm OC	ppb dry wt.
Total PCBs	4.7	5.6	4.8 U	3.8 U	7.3	37	130	38 (**)	3100
Aroclor 1016		3.8 U		3.8 U		4.0 U			
Aroclor 1221		3.8 U		3.8 U		4.0 U			
Aroclor 1232		3.8 U		3.8 U		4.0 U			
Aroclor 1242		3.8 U		3.8 U		4.0 U			
Aroclor 1248		3.8 U		3.8 U		4.0 U			
Aroclor 1254		5.6		3.8 U		11			
Aroclor 1260		3.8 U		3.8 U		26			
	* very low TOC		* very low TOC		* low TOC				

NOTES:

DMMP = Dredged Material Management Program
SL = DY02/DY03 DMMP Screening Level guideline value
BT = DY02/DY03 DMMP Bioaccumulation Trigger guideline value
ML = DY02/DY03 DMMP Maximum Level guideline value
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm) core sample
SS = sub-surface core sample 10 to 20 cm above cap interface
BC = below cap core sample top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

** mg/kg TOC normalized
U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery

Analyte concentration exceeds ML guideline value
Analyte concentration exceeds BT guideline value
Analyte concentration exceeds SL guideline value

Analyte undetected, but Detection Limit greater than or equal to ML guideline value

Analyte undetected, but Detection Limit greater than or equal to SL guideline value

Table D-14. Sediment grain size analysis results - March 2004 sediment sampling - BH-2, BH-3, and BH-4 samples.

Grain Size Classification	Grain Size Phi	Grain Size Opening (mm)	Sample ID:					
			BH-2-SR	BH-2-SS (J)	BH-3-SR	BH-3-SS	BH-4-SR	BH-4-SS
			Percent retained on sieve:					
GRAVEL		4.75						
GRAVEL	-2	4						
GRAVEL (J)	-1	2	39.6	61.1	16.9	2.9	7.2	31.3
VERY COARSE SAND (J)	0	1	8.8	7.0	4.5	4.2	4.9	7.8
COARSE SAND	1	0.5	20.0	13.3	13.6	18.1	17.4	12.2
MEDIUM SAND	2	0.25	22.7	14.2	28.4	38.8	36.7	27.4
FINE SAND	3	0.125	4.2	2.3	12.5	15.5	18.2	15.1
VERY FINE SAND	4	0.063	0.8	0.5	4.3	4.4	5.3	2.1
COARSE SILT (J)	5	0.032	1.4	0.4	1.3	3.9	2.3	0.7
MEDIUM SILT	6	0.016	0.5	0.3	4.2	4.2	1.7	0.6
FINE SILT	7	0.008	0.4	0.2	3.3	3.4	1.3	0.6
VERY FINE SILT	8	0.04	0.3	0.2	2.7	1.4	1.5	0.6
CLAY	9	0.002	0.3	0.1	2.3	0.6	1.3	0.6
CLAY (J)	10	0.001	0.2	0.1	2.3	0.9	0.9	0.4
CLAY	>+10	<0.001	0.7	0.3	3.7	1.8	1.3	0.7
		Percent gravel:	39.6	61.1	16.9	2.9	7.2	31.3
		Percent sand:	56.5	37.3	63.3	81.0	82.5	64.6
		Percent silt:	2.6	1.1	11.5	12.9	6.8	2.5
		Percent clay:	1.2	0.5	8.3	3.3	3.5	1.7
		Percent fines:	3.8	1.6	19.8	16.2	10.3	4.2
		(silt + clay)						
		Total solids* (%):	94.9	96.3	62.9	72.2	80.3	88.3

(*) Total Solids data from grain size analysis

J = results qualified as estimated in Data Validation report - High triplicate RSD

BH-2-SS silt and clay results qualified as estimated in Data Validation report for low pipette fraction weight

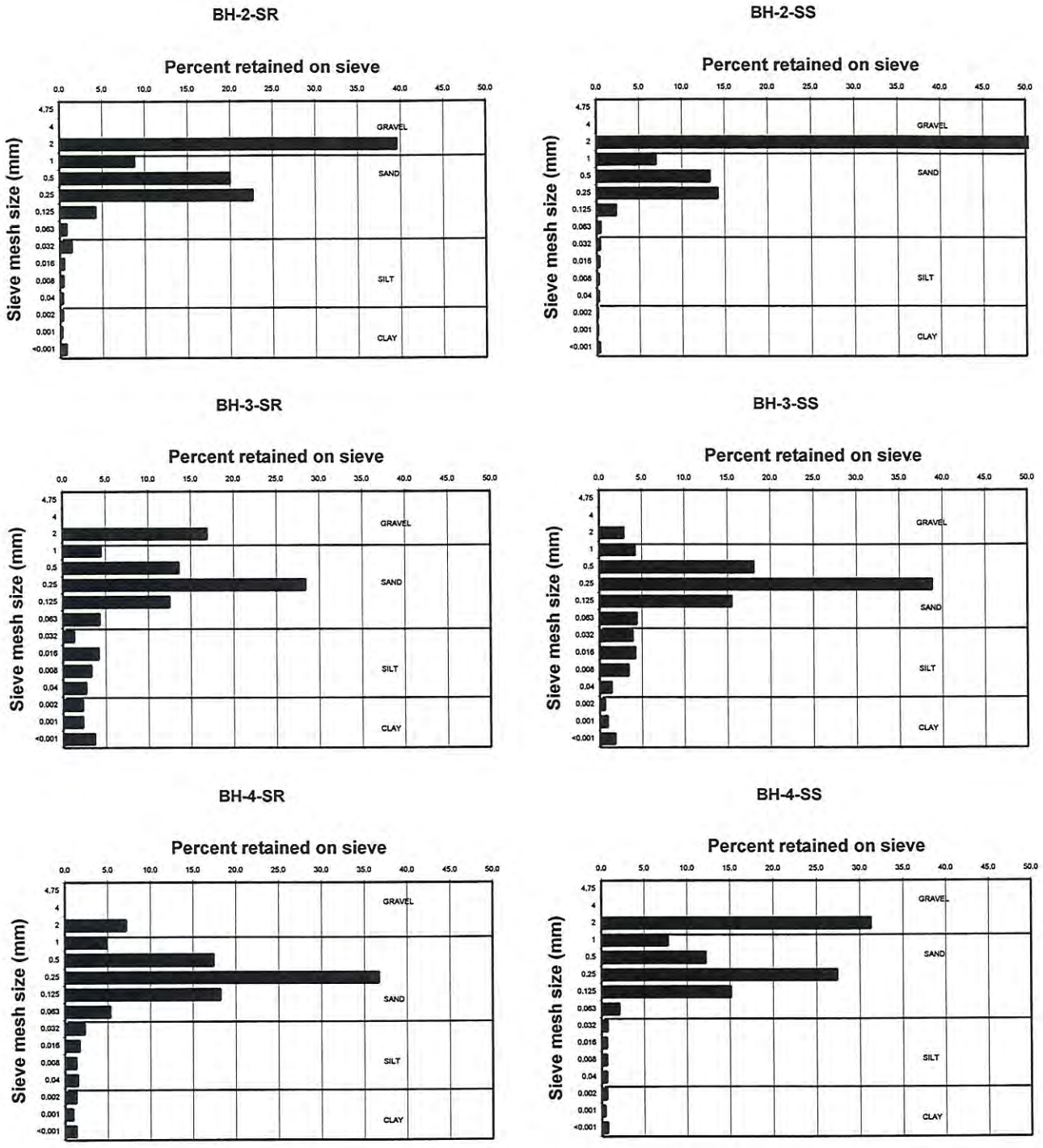


Figure D-4. March 2004 sediment grain size analysis - BH-2, BH-3, and BH-4 samples.

Table D-15. Pier 64/65 March 2004 sediment chemistry - Station BH-5.
Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	BH-5-SR [surface*] GL76D		BH-5-SS [sub-surface*] GL76E		BH-5-BC [below cap*] [Archived]		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	57.4		61.4					
Total Organic Carbon (%)	3.0		2.9					
Total Sulfides (mg/kg)	1600		1800					
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	0.22 JDV		0.07 JDV				0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	15.2	457	1.7	50			370	780
Naphthalene	1.2 J	37 J	1.3 U	39 U			99	170
Acenaphthylene	1.3 U	39 U	1.3 U	39 U			66	66
Acenaphthene	1.3 U	39 U	1.3 U	39 U			16	57
Fluorene	1.3 U	39 U	1.3 U	39 U			23	79
Phenanthrene	9.0	270	1.7	50			100	480
Anthracene	5.0	150	1.3 U	39 U			220	1200
2-Methylnaphthalene	1.3 U	39 U	1.3 U	39 U			38	64
HPAHs								
Total HPAHs	94.4	2833	19.8	573			960	5300
Fluoranthene	13.7	410	3.8	110			160	1200
Pyrene	18.3	550	4.8	140			1000	1400
Benzo(a)anthracene	7.7	230	1.4	42			110	270
Chrysene	11.7	350	2.1	62			110	460
Total Benzofluoranthenes	24.0	720	5.4	158			230	450
Benzo(b)fluoranthene	11.3	340	3.0	86				
Benzo(k)fluoranthene	12.7	380	2.5	72				
Benzo(a)pyrene	10.7	320	2.1	61			99	210
Indeno(1,2,3-cd)pyrene	3.7	110	1.3 U	39 U			34	88
Dibenzo(a,h)anthracene	1.4	43	1.3 U	39 U			12	33
Benzo(g,h,i)perylene	3.3	100	1.3 U	39 U			31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	3.0	89	2.7 JDV	79 JDV			47	78
MISCELLANEOUS								
Dibenzofuran	1.3 U	39 U	1.3 U	39 U			15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	2.5	76	1.2	35.5			12	65
Aroclor 1016	0.1 U	4.0 U	0.1 UJ	3.9 UJ				
Aroclor 1221	0.1 U	4.0 U	0.1 UJ	3.9 UJ				
Aroclor 1232	0.1 U	4.0 U	0.1 UJ	3.9 UJ				
Aroclor 1242	0.1 U	4.0 U	0.1 UJ	3.9 UJ				
Aroclor 1248	0.4	12	0.4 JDV	11 JDV				
Aroclor 1254	1.2	36	0.5 JDV	15 JDV				
Aroclor 1260	0.9	28	0.3 JDV	9.5 JDV				

NOTES:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm) core sample
SS = sub-surface core sample 10 to 20 cm above cap interface
BC = below cap core sample top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration UJ = Low surrogate recovery - DV report
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery; for BEHP: High MS/MSD RPD; for PCBs: Low surrogate recovery

Analyte concentration exceeds MCUL criterion
Analyte concentration exceeds SQS criterion
Analyte undetected, but Detection Limit greater than or equal to MCUL criterion
Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-16. Pier 64/65 March 2004 sediment chemistry - Station BH-6.
Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	BH-6-SR [surface*] GL44G		BH-6-SS [sub-surface*] GL44H		BH-6-BC [below cap*] (Archived)		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	72.4		73.0					
Total Organic Carbon (%)	2.1		2.6					
Total Sulfides (mg/kg)	2700		3700					
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	0.17 JDV		0.09 JDV				0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	12.4	260	15.4	400			370	780
Naphthalene	1.8 U	38 U	4.6 U	120 U			99	170
Acenaphthylene	1.8 U	38 U	4.6 U	120 U			66	66
Acenaphthene	1.8 U	38 U	4.6 U	120 U			16	57
Fluorene	1.8 U	38 U	4.6 U	120 U			23	79
Phenanthrene	7.6	160	8.5	220			100	480
Anthracene	4.8	100	6.9	180			220	1200
2-Methylnaphthalene	1.8 U	38 U	4.6 U	120 U			38	64
HPAHs								
Total HPAHs	103.6	2176	163.1	4240			960	5300
Fluoranthene	13.3	280	15.0	390			160	1200
Pyrene	17.1	360	22.3	580			1000	1400
Benzo(a)anthracene	8.6	180	13.1	340			110	270
Chrysene	12.9	270	23.8	620			110	460
Total Benzofluoranthenes	30.0	630	53.5	1390			230	450
Benzo(b)fluoranthene	13.8	290	23.5	610				
Benzo(k)fluoranthene	16.2	340	30.0	780				
Benzo(a)pyrene	12.9	270	23.5	610			99	210
Indeno(1,2,3-cd)pyrene	4.6	97	6.5	170			34	88
Dibenzo(a,h)anthracene	1.8 U	38 U	4.6 U	120 U			12	33
Benzo(g,h,i)perylene	4.2	89	5.4	140			31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	4.6	96	4.6 U	120 U			47	78
MISCELLANEOUS								
Dibenzofuran	1.8 U	38 U	4.6 U	120 U			15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	1.9	39	2.8	72			12	65
Aroclor 1016	0.2 U	3.9 U	0.2 U	3.9 U				
Aroclor 1221	0.2 U	3.9 U	0.2 U	3.9 U				
Aroclor 1232	0.2 U	3.9 U	0.2 U	3.9 U				
Aroclor 1242	0.2 U	3.9 U	0.2 U	3.9 U				
Aroclor 1248	0.4 Y	7.7 Y	0.4	10				
Aroclor 1254	1.0	21	1.3	33				
Aroclor 1260	0.9	18	1.1	29				

NOTES:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm)
core sample
SS = sub-surface core sample
10 to 20 cm above cap interface
BC = below cap core sample
top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-17. Pier 64/65 March 2004 sediment chemistry - Station BH-7.
Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	BH-7-SR [surface*] GL44D		BH-7-SS [sub-surface*] GL44E		BH-7-BC [below cap*] (Archived)		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	65.7		64.4					
Total Organic Carbon (%)	3.3		2.7					
Total Sulfides (mg/kg)	1300		880					
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	0.11 JDV		0.05 U				0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	12.1	400	3.7	100			370	780
Naphthalene	3.6 U	120 U	1.4 U	39 U			99	170
Acenaphthylene	3.6 U	120 U	1.4 U	39 U			66	66
Acenaphthene	3.6 U	120 U	1.4 U	39 U			16	57
Fluorene	3.6 U	120 U	1.4 U	39 U			23	79
Phenanthrene	7.0	230	3.7	100			100	480
Anthracene	5.2	170	1.4 U	39 U			220	1200
2-Methylnaphthalene	3.6 U	120 U	1.4 U	39 U			38	64
HPAHs								
Total HPAHs	112.4	3710	48.9	1320			960	5300
Fluoranthene	13.0	430	7.8	210			160	1200
Pyrene	18.2	600	9.3	250			1000	1400
Benzo(a)anthracene	9.1	300	4.4	120			110	270
Chrysene	15.5	510	5.9	160			110	460
Total Benzofluoranthenes	32.4	1070	11.9	320			230	450
Benzo(b)fluoranthene	14.2	470	6.3	170				
Benzo(k)fluoranthene	18.2	600	5.6	150				
Benzo(a)pyrene	14.8	490	5.2	140			99	210
Indeno(1,2,3-cd)pyrene	4.8	160	2.0	55			34	88
Dibenzo(a,h)anthracene	3.6 U	120 U	1.4 U	39 U			12	33
Benzo(g,h,i)perylene	4.5	150	2.4	65			31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	4.8	160	3.3	89			47	78
MISCELLANEOUS								
Dibenzofuran	3.6 U	120 U	1.4 U	39 U			15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	1.3	42.4	0.7	19.0			12	65
Aroclor 1016	0.1 U	3.9 U	0.1 U	3.9 U				
Aroclor 1221	0.1 U	3.9 U	0.1 U	3.9 U				
Aroclor 1232	0.1 U	3.9 U	0.1 U	3.9 U				
Aroclor 1242	0.1 U	3.9 U	0.1 U	3.9 U				
Aroclor 1248	0.2	7.4	0.3 Y	7.8 Y				
Aroclor 1254	0.5	18	0.4	12				
Aroclor 1260	0.5	17	0.3	7.0				

NOTES:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm)
core sample
SS = sub-surface core sample
10 to 20 cm above cap interface
BC = below cap core sample
top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-18. Sediment grain size analysis results - March 2004 sediment sampling - BH-5, BH-6, and BH-7 samples.

Grain Size Classification	Grain Size Phi	Grain Size Opening (mm)	Sample ID:					
			BH-5-SR	BH-5-SS	BH-6-SR	BH-6-SS	BH-7-SR*	
			Percent retained on sieve:					
GRAVEL		4.75						
GRAVEL	-2	4						
GRAVEL (J)	-1	2	0.9	1.2	1.4	6.3	1.6	
VERY COARSE SAND (J)	0	1	2.3	3.3	3.7	9.0	6.2	
COARSE SAND	1	0.5	11.8	12.9	22.4	28.0	24.4	
MEDIUM SAND	2	0.25	29.7	21.3	40.6	33.4	34.5	
FINE SAND	3	0.125	19.2	10.9	14.6	9.8	12.6	
VERY FINE SAND	4	0.063	7.6	8.4	3.9	2.1	3.4	
COARSE SILT (J)	5	0.032	6.1	9.1	1.7	1.6	2.3	
MEDIUM SILT	6	0.016	6.8	13.1	3.1	3.1	2.8	
FINE SILT	7	0.008	5.1	8.1	1.3	2.3	2.7	
VERY FINE SILT	8	0.04	3.3	4.7	1.8	1.0	2.4	
CLAY	9	0.002	2.0	2.2	1.7	0.8	2.4	
CLAY (J)	10	0.001	1.5	1.2	1.4	0.8	1.4	
CLAY	>+10	<0.001	3.9	3.7	2.4	1.8	3.2	
		Percent gravel:	0.9	1.2	1.4	6.3	1.6	
		Percent sand:	70.6	56.8	85.2	82.3	81.1	
		Percent silt:	21.3	35.0	7.9	8.0	10.2	
		Percent clay:	7.4	7.1	5.5	3.4	7.0	
		Percent fines:	28.7	42.1	13.4	11.4	17.2	
		(silt + clay)						
		Total solids (%):**	65.5	56.9	71.6	70.3	65.5	

(*) No grain size sample for Sample BH-7-SS - not enough sediment volume

(**) Total Solids data from grain size analysis

J = results qualified as estimated in Data Validation report - High triplicate RSD

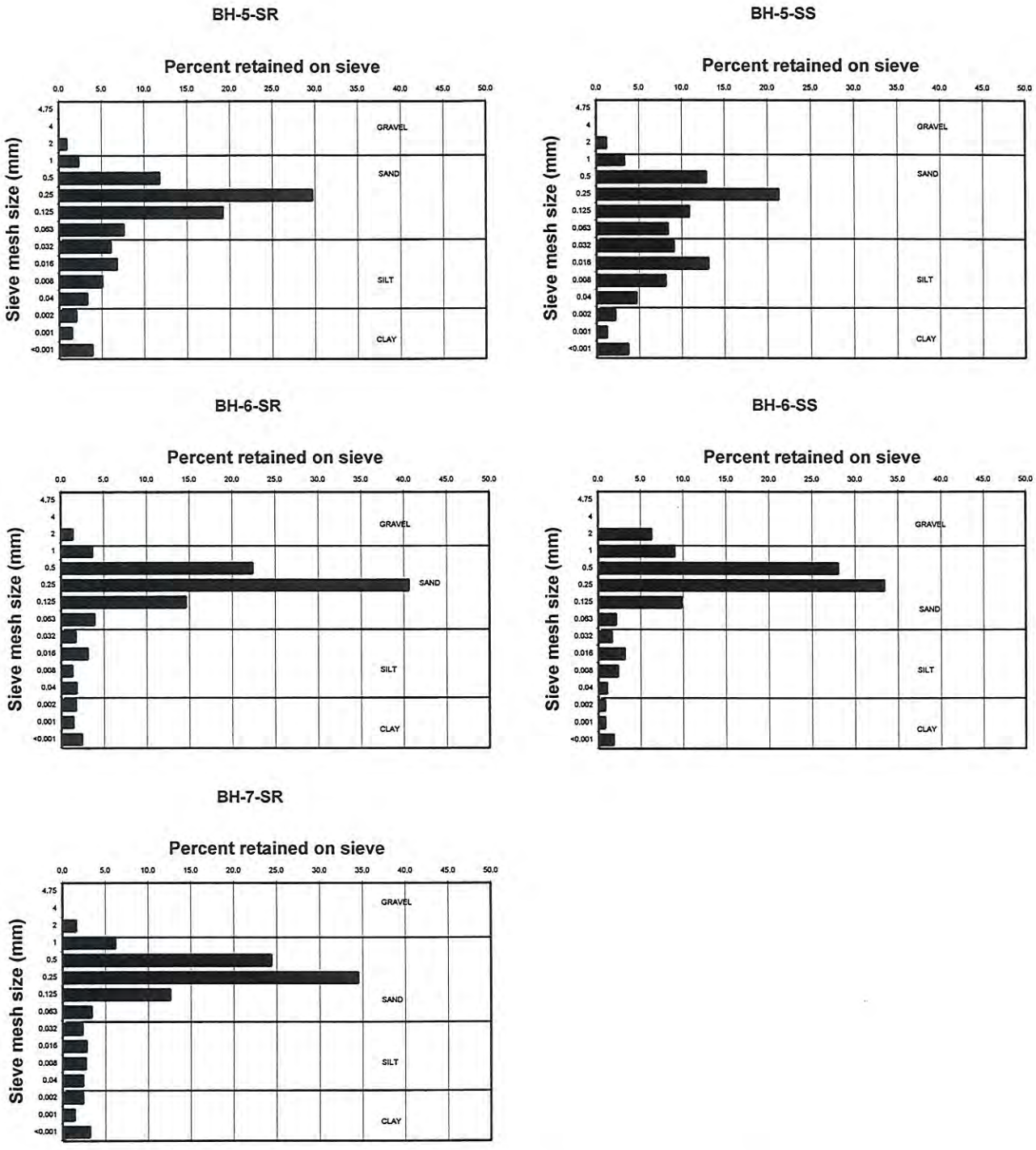


Figure D-5. March 2004 sediment grain size analysis - BH-5, BH-6, and BH-7 samples.

Table D-19. Pier 64/65 March 2004 sediment chemistry - Stations BH-8 and BH-9 (**).
Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	BH-8-SR [surface*] GL75G		BH-9-SR [surface*] GL75A		BH-9-SR-FS [surface*] GL75D		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	64.2		66.7		66.6			
Total Organic Carbon (%)	2.5		2.9		3.0			
Total Sulfides (mg/kg)	840		2700		1800			
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	0.10 JDV		0.06 U		0.07 U		0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	102.9	2572	21.7	628	23.8	714	370	780
Naphthalene	2.4 U	59 U	4.1	120	3.3	100	99	170
Acenaphthylene	2.5	62	1.3 U	39 U	1.4	41	66	66
Acenaphthene	4.8	120	2.1	62	2.3	68	16	57
Fluorene	9.6	240	2.0	59	2.3	69	23	79
Phenanthrene	64.0	1600	8.6	250	9.7	290	100	480
Anthracene	18.4	460	2.9	83	3.3	100	220	1200
2-Methylnaphthalene	3.6	90	1.9	54	1.5	46	38	64
HPAHs								
Total HPAHs	221.1	5528	63.9	1852	72.9	2186	960	5300
Fluoranthene	40.0	1000	9.3	270	12.0	360	160	1200
Pyrene	48.0	1200	11.7	340	14.7	440	1000	1400
Benzo(a)anthracene	20.8	520	5.5	160	5.7	170	110	270
Chrysene	25.2	630	7.6	220	8.0	240	110	460
Total Benzofluoranthenes	44.8	1120	17.9	520	19.3	580	230	450
Benzo(b)fluoranthene	24.0	600	8.6	250	9.0	270		
Benzo(k)fluoranthene	20.8	520	9.3	270	10.3	310		
Benzo(a)pyrene	23.2	580	7.2	210	8.0	240	99	210
Indeno(1,2,3-cd)pyrene	8.0	200	2.4	69	2.9	87	34	88
Dibenzo(a,h)anthracene	2.7	68	1.3 U	39 U	1.3 U	39 U	12	33
Benzo(g,h,i)perylene	8.4	210	2.2	63	2.3	69	31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	5.2	130	4.8	140	3.3	100	47	78
MISCELLANEOUS								
Dibenzofuran	2.4 U	59 U	1.4	42	1.4	42	15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	2.3	58	1.8	51	1.2	35.8	12	65
Aroclor 1016	0.2 U	4.0 U	0.1 U	3.9 U	0.1 U	3.9 U		
Aroclor 1221	0.2 U	4.0 U	0.1 U	3.9 U	0.1 U	3.9 U		
Aroclor 1232	0.2 U	4.0 U	0.1 U	3.9 U	0.1 U	3.9 U		
Aroclor 1242	0.2 U	4.0 U	0.1 U	3.9 U	0.1 U	3.9 U		
Aroclor 1248	0.4	11	0.5	14	0.4	12		
Aroclor 1254	1.0	25	0.8	23	0.5	14		
Aroclor 1260	0.9 P	22 P	0.5 P	14 P	0.3	9.8		

NOTES:

(**) Samples BH-8-SS, BH-8-BC, BH-9-SS, BH-9-BC, BH-9-SS-FS, BH-9-BC-FS archived

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm)
core sample
SS = sub-surface core sample
10 to 20 cm above cap interface
BC = below cap core sample
top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference; also flagged 'J' in DV report
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-20. Sediment grain size analysis results - March 2004 sediment sampling - BH-8 and BH-9 samples.

Grain Size Classification	Grain Size Phi	Grain Size Opening (mm)	Sample ID:					
			BH-8-SR	BH-9-SR*	BH-9-SR-FS			
			Percent retained on sieve:					
GRAVEL		4.75						
GRAVEL	-2	4						
GRAVEL (J)	-1	2	1.9	1.3	1.7			
VERY COARSE SAND (J)	0	1	4.7	5.1	5.4			
COARSE SAND	1	0.5	21.9	17.3	17.3			
MEDIUM SAND	2	0.25	29.9	30.3	31.3			
FINE SAND	3	0.125	9.4	21.6	21.4			
VERY FINE SAND	4	0.063	5.6	7.0	7.1			
COARSE SILT (J)	5	0.032	4.4	3.6	2.5			
MEDIUM SILT	6	0.016	4.7	3.0	2.8			
FINE SILT	7	0.008	4.7	3.4	3.2			
VERY FINE SILT	8	0.04	4.1	2.0	1.8			
CLAY	9	0.002	2.7	1.5	1.5			
CLAY (J)	10	0.001	1.9	1.0	1.3			
CLAY	>+10	<0.001	4.0	2.9	2.7			
		Percent gravel:	1.9	1.3	1.7			
		Percent sand:	71.5	81.3	82.5			
		Percent silt:	17.9	12.0	10.3			
		Percent clay:	8.6	5.4	5.5			
		Percent fines:	26.5	17.4	15.8			
		(silt + clay)						
		Total solids (%):**	64.6	66.8	63.9			

(*) Triplicate 1 results used

(**) Total Solids data from grain size analysis

J = results qualified as estimated in Data Validation report - High triplicate RSD

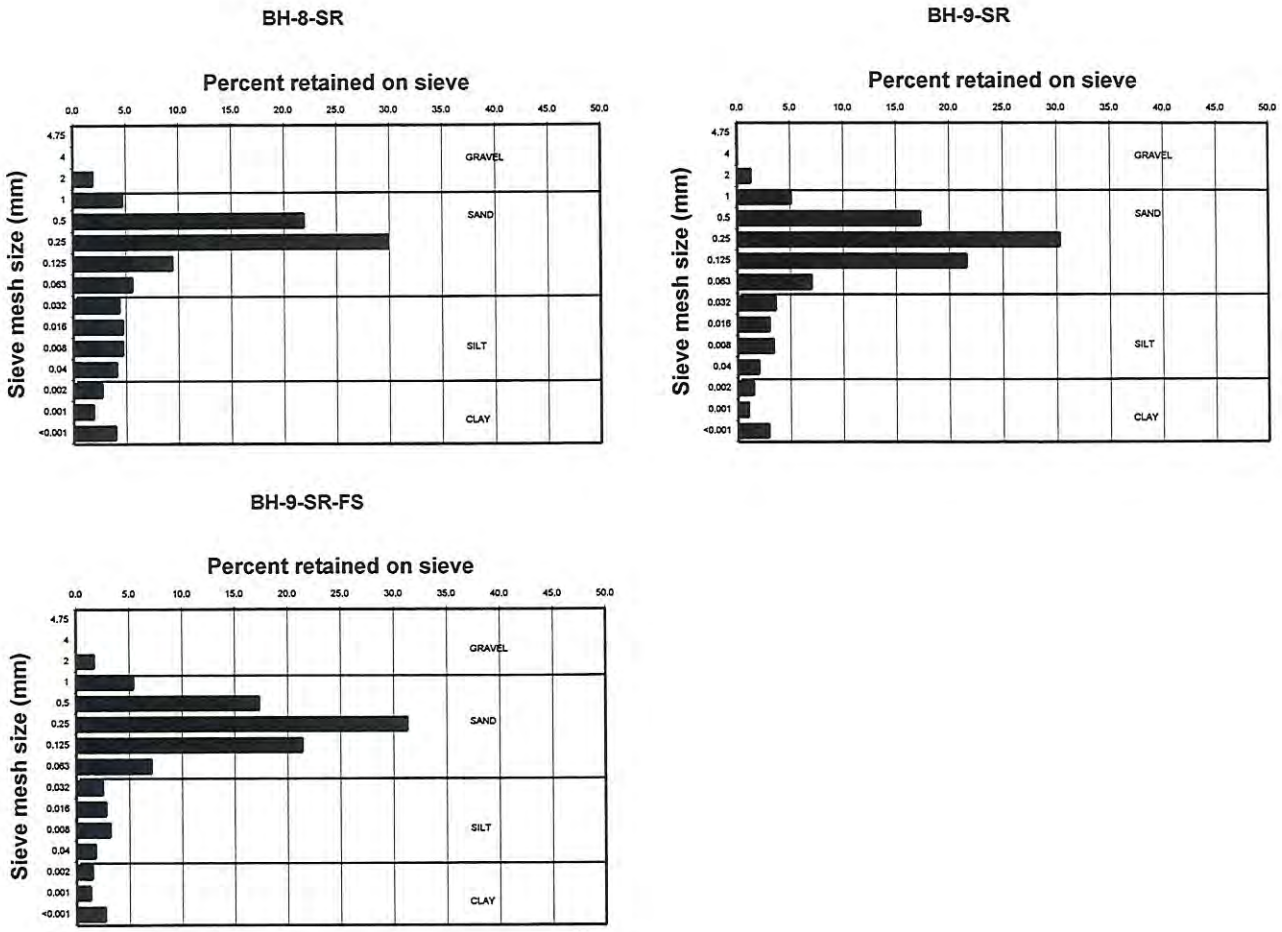


Figure D-6. March 2004 sediment grain size analysis - BH-8 and BH-9 samples.

Table D-21. Pier 64/65 March 2004 sediment chemistry - Stations BH-10 and BH-11.**
Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	BH-10-SR [surface*] GL76G		BH-11-SR [surface*] GL76A				SQS	MCUL
CONVENTIONALS								
Total Solids (%)	70.9		72.1					
Total Organic Carbon (%)	3.8		2.2					
Total Sulfides (mg/kg)	990		2400					
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	0.20 JDV		0.06 JDV				0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	39.7	1510	8.5	187			370	780
Naphthalene	2.0 U	77 U	2.1	46			99	170
Acenaphthylene	5.8	220	1.7 U	38 U			66	66
Acenaphthene	2.0 U	77 U	1.7 U	38 U			16	57
Fluorene	2.6	100	1.7 U	38 U			23	79
Phenanthrene	14.2	540	5.0	110			100	480
Anthracene	17.1	650	3.5	77			220	1200
2-Methylnaphthalene	2.0 U	77 U	1.7 U	38 U			38	64
HPAHs								
Total HPAHs	326.8	12420	74.8	1646			960	5300
Fluoranthene	31.6	1200	9.1	200			160	1200
Pyrene	42.1	1600	12.3	270			1000	1400
Benzo(a)anthracene	34.2	1300	5.9	130			110	270
Chrysene	60.5	2300	10.0	220			110	460
Total Benzofluoranthenes	97.4	3700	21.4	470			230	450
Benzo(b)fluoranthene	52.6	2000	10.0	220				
Benzo(k)fluoranthene	44.7	1700	11.4	250				
Benzo(a)pyrene	36.8	1400	9.1	200			99	210
Indeno(1,2,3-cd)pyrene	10.8	410	3.8	84			34	88
Dibenzo(a,h)anthracene	4.5	170	1.7 U	38 U			12	33
Benzo(g,h,i)perylene	8.9	340	3.3	72			31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	3.9	150	3.7	81			47	78
MISCELLANEOUS								
Dibenzofuran	2.0 U	77 U	1.7 U	38 U			15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	1.6	61.1	1.3	28			12	65
Aroclor 1016	0.1 U	3.9 U	0.2 U	3.8 U				
Aroclor 1221	0.1 U	3.9 U	0.2 U	3.8 U				
Aroclor 1232	0.1 U	3.9 U	0.2 U	3.8 U				
Aroclor 1242	0.1 U	3.9 U	0.2 U	3.8 U				
Aroclor 1248	0.2	9.1	0.4 Y	7.7 Y				
Aroclor 1254	0.7	26	0.6	14				
Aroclor 1260	0.7	26	0.6	14				

NOTES:

(**) Samples BH-10-SS, BH-10-BC, BH-11-SS, and BH-11-BC archived

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm)
core sample
SS = sub-surface core sample
10 to 20 cm above cap interface
BC = below cap core sample
top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-22. Pier 64/65 March 2004 sediment chemistry - Stations BH-12, BH-13 and SS5-B. Sediment Management Standards (SMS) data summary. SQS and MCUL criteria from Ecology (1995).

Sampling Station ID. / Laboratory Sample ID.	BH-12-SR [surface*] GL88G		BH-13-SR [surface*] GL88H		SS5-B-SR [surface*] GL44J		SQS	MCUL
CONVENTIONALS								
Total Solids (%)	44.5		43.0		56.6			
Total Organic Carbon (%)	5.9		4.9		2.0			
Total Sulfides (mg/kg)	3900		3600		150			
METALS (mg/kg) Dry weight	ppm dry wt.		ppm dry wt.		ppm dry wt.		ppm dry wt.	ppm dry wt.
Mercury	1.2 JDV		1.9 JDV		0.89 JDV		0.41	0.59
ORGANICS (mg/kg) - TOC Normalized								
LPAHs	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	ppb dry wt.	**ppm OC**	**ppm OC**
Total LPAHs	81.9	4830	81.6	4000	45.9	918	370	780
Naphthalene	2.2	130	3.7	180	3.8	76	99	170
Acenaphthylene	8.0	470	4.7	230	6.0	120	66	66
Acenaphthene	2.4	140	5.9	290	2.9 U	57 U	16	57
Fluorene	8.3 dl	490 dl	6.1	300	3.1	62	23	79
Phenanthrene	33.9	2000	38.8	1900	18.0	360	100	480
Anthracene	27.1	1600	22.4	1100	15.0	300	220	1200
2-Methylnaphthalene	2.0 U	120 U	2.4 U	120 U	2.9 U	57 U	38	64
HPAHs								
Total HPAHs	621.2	36650	425.5	20850	252.5	5049	960	5300
Fluoranthene	47.5	2800	49.0	2400	28.5	570	160	1200
Pyrene	237.3 DL	14000 DL	106.1	5200	36.5	730	1000	1400
Benzo(a)anthracene	49.2	2900	30.6	1500	18.5	370	110	270
Chrysene	69.5	4100	44.9	2200	26.0	520	110	460
Total Benzofluoranthenes	140.7	8300	110.2	5400	89.0	1780	230	450
Benzo(b)fluoranthene	79.7	4700	63.3	3100	55.0	1100		
Benzo(k)fluoranthene	61.0	3600	46.9	2300	34.0	680		
Benzo(a)pyrene	50.8	3000	51.0	2500	34.5	690	99	210
Indeno(1,2,3-cd)pyrene	10.2	600	14.7	720	8.5	170	34	88
Dibenzo(a,h)anthracene	8.3 dl	490 dl	5.5	270	3.5	69	12	33
Benzo(g,h,i)perylene	7.8	460	13.5	660	7.5	150	31	78
PHTHALATES ESTERS								
Bis(2-ethylhexyl)phthalate	9.0 dl	530 dl	5.3	260	5.0	100	47	78
MISCELLANEOUS								
Dibenzofuran	2.0 J	120 J	3.1	150	2.9 U	57 U	15	58
PCBs (mg/kg) TOC Normalized								
Total PCBs	13.7	810	6.3	308	14.5	289	12	65
Aroclor 1016	1.3 U	79 U	0.8 U	39 U	0.2 U	3.8 U		
Aroclor 1221	1.3 U	79 U	0.8 U	39 U	0.2 U	3.8 U		
Aroclor 1232	1.3 U	79 U	0.8 U	39 U	0.2 U	3.8 U		
Aroclor 1242	1.3 U	79 U	0.8 U	39 U	0.2 U	3.8 U		
Aroclor 1248	3.1 P	180 P	0.8 U	39 U	2.0 dl	39 dl		
Aroclor 1254	6.8	400	4.5 P	220 P	7.0 DL	140 DL		
Aroclor 1260	3.9	230	1.8	88	5.5 DL	110 DL		

NOTES:

SQS = SMSs Sediment Quality Standards criteria
MCUL = SMSs Minimum Cleanup Level criteria
SMSs = WA Sediment Management Standards (173-204 WAC)
TOC = Total organic carbon
OC = organic carbon
LPAHs = low molecular weight PNA hydrocarbons
HPAHs = high molecular weight PNA hyrdrocarbons
PNAs = polynuclear aromatic hydrocarbons
PCBs = polychlorinated biphenyls
DV = data validation report
(*) Sediment sample types:
SR = surface sediment (top 10 cm) core sample
SS = sub-surface core sample 10 to 20 cm above cap interface
BC = below cap core sample top 10 cm of underlying sediment
FR = field replicate sample
FS = field split sample

U = Undetected at the reported concentration
J = estimated concentration when value is less than calcultated reporting limit
Y = raised reporting limit due to background interference or activity on instrument; compound is still not detected at or above raised level
P = high RPD between detected concentrations for dual column GC analyses, without obvious interference; also flagged 'J' in DV report
DL = concentration shown from diluted sample (analyte flagged E in undiluted sample)
E = value above linear range of detector; sample dilution required
JDV = flagged 'J' in DV report; for mercury: High MS recovery
dl = higher concentration from diluted sample results (not flagged 'E' in initial analysis) - DV

Analyte concentration exceeds MCUL criterion

Analyte concentration exceeds SQS criterion

Analyte undetected, but Detection Limit greater than or equal to MCUL criterion

Analyte undetected, but Detection Limit greater than or equal to SQS criterion

Table D-23. Sediment grain size analysis results - March 2004 sediment sampling - BH-10, BH-11, BH-12, BH-13 and SS5-B samples.

Grain Size Classification	Grain Size Phi	Grain Size Opening (mm)	Sample ID:					
			BH-10-SR	BH-11-SR	BH-12-SR	BH-13-SR	SS5-B-SR*	
			Percent retained on sieve:					
GRAVEL		4.75						
GRAVEL	-2	4						
GRAVEL (J)	-1	2	1.8	1.6	15.7	10.9	0.2	
VERY COARSE SAND (J)	0	1	2.3	4.5	7.6	3.4	0.7	
COARSE SAND	1	0.5	20.1	26.2	11.2	4.7	2.0	
MEDIUM SAND	2	0.25	45.3	38.7	17.5	11.4	5.4	
FINE SAND	3	0.125	13.6	8.6	7.6	10.5	8.4	
VERY FINE SAND	4	0.063	3.0	3.4	3.2	5.8	10.2	
COARSE SILT (J)	5	0.032	1.7	3.5	2.9	3.3	14.3	
MEDIUM SILT	6	0.016	2.6	3.4	11.2	10.7	18.2	
FINE SILT	7	0.008	3.3	2.3	6.1	8.5	12.0	
VERY FINE SILT	8	0.04	1.6	2.4	4.1	7.7	9.2	
CLAY	9	0.002	1.2	1.4	3.0	7.3	5.8	
CLAY (J)	10	0.001	0.1	1.2	3.3	5.4	4.4	
CLAY	>+10	<0.001	3.3	2.8	6.7	10.5	9.3	
		Percent gravel:	1.8	1.6	15.7	10.9	0.2	
		Percent sand:	84.3	81.4	47.1	35.8	26.7	
		Percent silt:	9.2	11.6	24.3	30.2	53.7	
		Percent clay:	4.6	5.4	13.0	23.2	19.5	
		Percent fines:	13.8	17.0	37.3	53.4	73.2	
		(silt + clay)						
		Total solids (%):**	71.5	71.7	45.9	44.3	56.2	

(*) Triplicate B results used

(**) Total Solids data from grain size analysis

J = results qualified as estimated in Data Validation report - High triplicate RSD

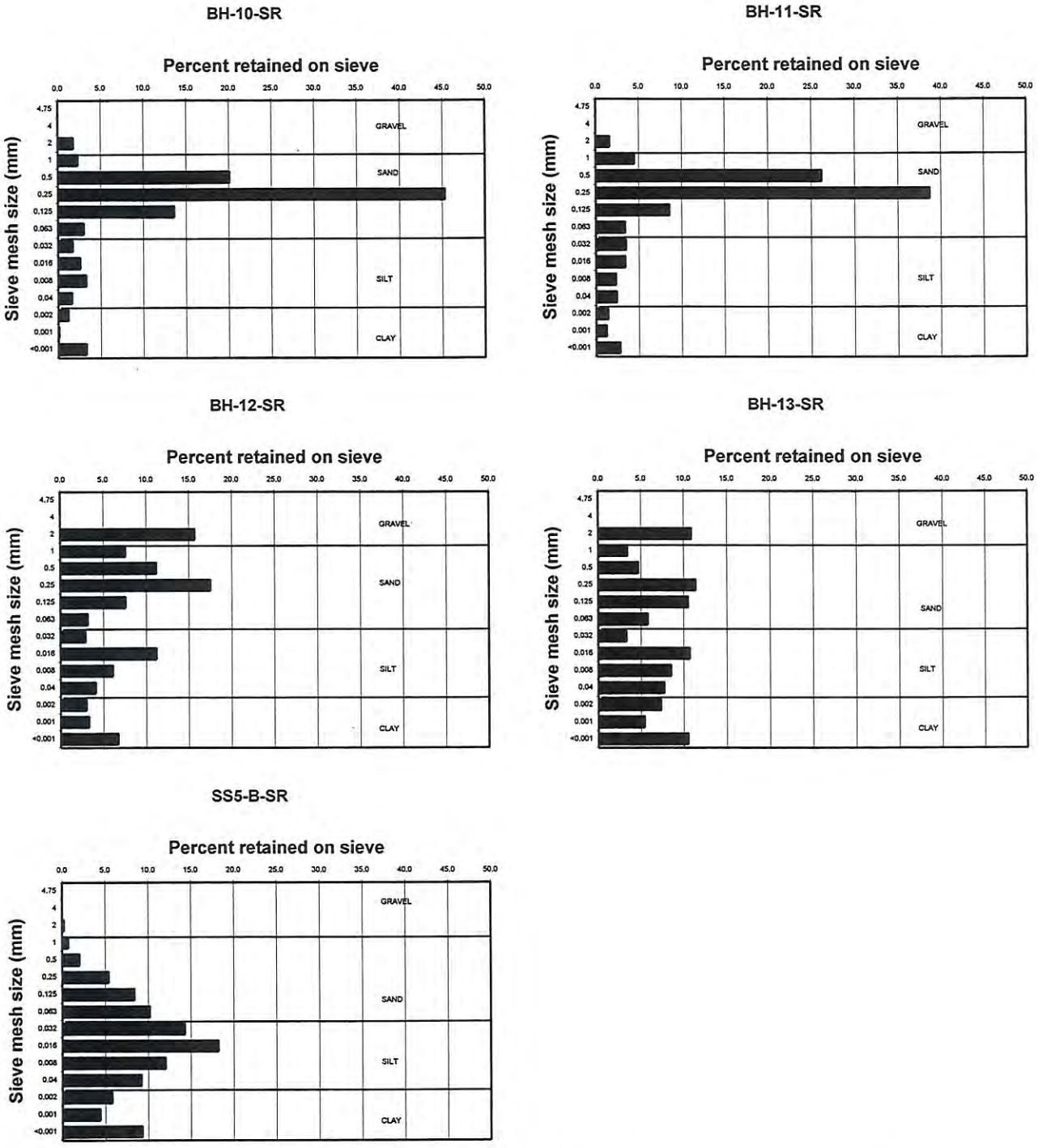


Figure D-7. March 2004 sediment grain size analysis - BH-10, BH-11, BH-12, BH-13, SS5-B samples.

APPENDIX E

ARI LABORATORY ANALYSIS REPORTS

ARI Laboratory Reports with analytical results for sediment core samples collected in March 2004 are divided into four sections by Delivery Groups:

GL44 (3/23 Delivery Group)

BH-3-SR
BH-3-SS
BH-3-BC (Archived)
BH-6-SR
BH-6-SS
BH-6-BC (Archived)
BH-7-SR
BH-7-SS
BH-7-BC (Archived)
SS5-B-SR

GL75 (3/24 Delivery Group)

CS-1-SR
CS-1-SS
CS-1-BC
CS-1-INCL1
CS-1-INCL2
CS-1-INCL3
BH-2-SR
BH-2-SS
BH-2-BC (Archived)
BH-4-SR
BH-4-SS
BH-4-BC (Archived)
BH-8-SR
BH-8-SS (Archived)
BH-8-BC (Archived)
BH-9-SR
BH-9-SS (Archived)
BH-9-BC (Archived)
BH-9-SR-FS
BH-9-SS-FS (Archived)
BH-9-BC-FS (Archived)

GL76 (3/25 Delivery Group)

CS-2-SR
CS-2-SS
CS-2-BC
BH-5-SR
BH-5-SS
BH-5-BC (Archived)
BH-5-SR-MSD
BH-5-SS-MSD
BH-5-BC-MSD (Archived)
BH-10-SR
BH-10-SS (Archived)
BH-10-BC (Archived)
BH-11-SR
BH-11-SS (Archived)
BH-11-BC (Archived)

GL88 (3/26 Delivery Group)

CS-3-SR
CS-3-SS
CS-3-BC
CS-3-SR-FR
CS-3-SS-FR
CS-3-BC-FR
BH-5-SR-MST
BH-5-SS-MST
BH-5-BC-MST (Archived)
BH-12-SR
BH-13-SR

Analytical Resources, Incorporated
Analytical Chemists and Consultants

May 3, 2004

Mr. Jerry Erickson
Polaris Applied Sciences, Inc.
12509 130th Lane N. E.
Kirkland, WA 98034

RE: Client Project – 1002.027; P66 Sed Cap (Pier 64/65)
ARI Job No: GL44

Dear Mr. Erickson:

Please find enclosed the final data for the samples from the project referenced above. ARI received ten sediment samples on March 23, 2004. The samples were received in good condition. No discrepancies were noted in the chain of custody documentation. The samples were analyzed for SVOAs, PCBs, grain size, mercury, TOC and sulfides. Selected samples were placed on hold and are being held in a freezer (chemistry analyses) and refrigerator (grain size analysis).

Issues associated with the chemical analysis are discussed in the case narrative.

A copy of this report and the supporting data will remain on file with ARI. Please feel free to contact me at your convenience if you need any additional information.

Respectfully,

ANALYTICAL RESOURCES, INC.

MaryLou Fox

Mary Lou Fox
Project Manager
marylou@arilabs.com
206/695-6211

Enclosures

cc: File GL44

MLF/mdh

GL44 5.5

POLARIS APPLIED SCIENCES, INC.

12509 130th Lane NE, Kirkland, Washington 98034-7713 425/823-4841 Fax 425/823-3805

CHAIN OF CUSTODY RECORD

POLARIS PROJECT # 1002.027	PROJECT NAME: P66 Sed Cap (Piers 64/65)
CLIENT: Port of Seattle	LOCATION: Bell Harbor Marina
PROJECT MANAGER: Erickson Jerry ~~Erikson~~	SEND REPORTS TO: Erickson Jerry ~~Erikson~~
SAMPLER: (SIGNATURE) Gerald M. Erickson	

ANALYSIS REQUESTED

Analytes as per MaryLou Fox

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	Grain Size, TS	Total Sulfides	TOC	SVOA's, PCBs, BEHP	Dibenzofurans	Mercury	LOCATION/REMARKS:
	BH3-SR-A	3/23/04	1600	SED		X	1	X						Subsampled from composite of cores BH3 cores A + B (sulfide from BH3 core A) (from 3 core layers)
	BH3-SR-B		1530		X		1		X					
	BH3-SR-C		1600			X	1			X				
	BH3-SR-D					X	1				X			
	BH3-SR-E					X	1					X		
	BH3-SS-A	3/23/04	1600	SED		X	1	X						
	BH3-SS-B		1530		X		1		X					
	BH3-SS-C		1600			X	1			X				
	BH3-SS-D					X	1				X			
	BH3-SS-E					X	1					X		
	BH3-BC-A	3/23/04	1600	SED		X	1	X						[redacted] This sample to be archived
	BH3-BC-B		1530		X		1		X					
	BH3-BC-C		1600			X	1			X				
	BH3-BC-D					X	1				X			
	BH3-BC-E					X	1					X		

RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
Gerald M. Erickson	3-23-04 1735	
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)

LABORATORY NAME: ARI

LAB PROJECT NUMBER:

LAB ADDRESS:

LAB PHONE:

LAB CONTACT PERSON: MaryLou Fox

POLARIS CONTACT PERSON:

POLARIS P.O. NUMBER:

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CHAIN OF CUSTODY RECORD

POLARIS PROJECT # 1002,027	PROJECT NAME: P66 SEDCAP (Pier 64/65)
CLIENT: Port of Seattle	LOCATION: Bell Harbor Marina
PROJECT MANAGER: Jerry Erickson	SEND REPORTS TO: Jerry Erickson
SAMPLER: (SIGNATURE) Gerald M. Erickson	

ANALYSIS REQUESTED

analytes as per Mary Lou Fox

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	Grain size, TS	Total sulfides	TOC	SVOAs; PCBs, BEHP	Dibenzofuran, PAHs	Mercury	LOCATION/REMARKS:
	BH-7-SR-A	3-23-04	1455	SED		X	1	X						Subsampled from Core BH7 CORE A+B (sulfides from CORE A)
	BH7-SR-B		1430		X		1		X					
	BH7-SR-C		1455			X	1			X				
	BH7-SR-D					X	1				X			
	BH7-SR-E					X	1					X		~~3 layers of cores~~ from 3 core layers
	~~BH7-SS-A~~					X	1	X						→ no grain size for sample BH7 SS
	BH7-SS-B		1430		X		1		X					
	BH7-SS-C		1455			X	1			X				
	BH7-SS-D					X	1				X			
	BH7-SS-E					X	1					X		
	BH7-BC-A					X	1	X						This sample to be archived
	BH7-BC-B		1430		X	X	1		X					
	BH7-BC-C		1455			X	1			X				
	BH7-BC-D					X	1				X			
	BH7-BC-E					X	1					X		

RELINQUISHED BY: (signature) Gerald M. Erickson	DATE/TIME 3-23-04 ~~1735~~ PM	RECEIVED BY: (signature)
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)

LABORATORY NAME: ARI	LAB PROJECT NUMBER:
LAB ADDRESS:	
LAB PHONE:	LAB CONTACT PERSON: Mary Lou Fox
POLARIS CONTACT PERSON:	POLARIS P.O. NUMBER:

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CHAIN OF CUSTODY RECORD

POLARIS PROJECT #: 102.027 | PROJECT NAME: P66 SEDCAP (Pier 64/65)

CLIENT: Port of Seattle | LOCATION: Bell Harbor Marina

PROJECT MANAGER: Jerry Erickson | SEND REPORTS TO: Jerry Erickson

SAMPLER: (SIGNATURE) Jerald M Erickson

ANALYSIS REQUESTED

Analytes as per Mary Lou Fox

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	Grain size, TS	Total Sulfides	TOC	SVOAs; PCBs, BEHP Dibenzofuran, PAHs	Mercury	LOCATION/REMARKS:
	BH6-SR-A	3-23-04	1204	SED		X	1	X					Subsampled from
	BH6-SR-B	"	1200	"	X		1		X				Composite of Cores
	BH6-SR-C	"	1204	"		X	1			X			BH6 CORES A & B
	BH6-SR-D	"	"	"		X	1				X		(sulfide from BH6 core A)
	BH6-SR-E	"	"	"		X	1					X	
	BH6-SS-A	3-23-04	1204	SED		X	1	X					(from 3 core layers)
	BH6-SS-B	"	1200	"	X		1		X				
	BH6-SS-C	"	1204	"		X	1			X			
	BH6-SS-D	"	"	"		X	1				X		
	BH6-SS-E	"	"	"		X	1					X	
	BH6-BC-A	3-23-04	1208	SED		X	1	X					This sample to be archived
	BH6-BC-B	"	1200	"	X		1		X				
	BH6-BC-C	"	1208	"		X	1			X			
	BH6-BC-D	"	"	"		X	1				X		
	BH6-BC-E	"	"	"		X	1					X	

RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
Jerald M Erickson	3-23-04 1735	
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)

LABORATORY NAME: ARI | LAB PROJECT NUMBER:

LAB ADDRESS:

LAB PHONE: | LAB CONTACT PERSON: Mary Lou Fox

POLARIS CONTACT PERSON: | POLARIS P.O. NUMBER:

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12509 130th Lane NE, Kirkland, Washington 98034-7713 425/823-4841 Fax 425/823-3805

CHAIN OF CUSTODY RECORD

POLARIS PROJECT # 1002.027	PROJECT NAME: P66 SEDCAP (Pier 64/65)
CLIENT: Port of Seattle	LOCATION: Bell Harbor Marina
PROJECT MANAGER: Jerry Erickson	SEND REPORTS TO: Jerry Erickson
SAMPLER: (SIGNATURE) Gerald M Ems	

ANALYSIS REQUESTED

analytes as per Mary Cox

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	Grain size, TS	Total Solids	TOC	SVOHs: PCBs, DEHP, Dibenzofuran, PAHs	Mercury	LOCATION/REMARKS:
	SS5B-SR-A	~~3-23-04~~	1650	SED		X	1	X					SS sampled from
	SS5B-SR-B	3-23-04	1630		X		1		X				Cores SS5B CORE A&B
	SS5B-SR-C		1650			X	1			X			(Subsamples from COREA)
	SS5B-SR-D		1650			X	1				X		
	SS5B-SR-E	↓	1650	↓		X	1					X	From 3 core layers

RELINQUISHED BY: (signature) Gerald M Ems	DATE/TIME 3-23-04 1735	RECEIVED BY: (signature)	LABORATORY NAME: / LAB PROJECT NUMBER:
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)	LAB ADDRESS:
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)	LAB PHONE: / LAB CONTACT PERSON:
			POLARIS CONTACT PERSON: / POLARIS P.O. NUMBER:

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Case Narrative

Client Project – 1002.027, P66 Sed Cap (Pier 64/65)
ARI Job No: GL44
Matrix: Sediment
Date: May 3, 2004

Semivolatile Organic Compounds Analysis referencing EPA SW-846 method 8270C

The extraction of these samples was batched with those of the samples received on 3/24 (GL75). The extracts for all samples, except **BH7-SS-A-D** and **BH6-SR-A-E**, were pre-diluted 1:3 due to extract appearance. Sulfur began to fall out of the extracts for many of the samples as the extracts were concentrated down. A final volume of 1.0 mL was used for samples where this began to happen, rather than 0.5 mL.

No further analytical complications were noted.

PSDDA PCB Analysis referencing EPA SW-846 method 8082

The extraction of these samples was batched with those of the samples received on 3/24 (GL75). The samples required additional cleaning for the sulfur after the initial sulfur cleaning and the matrices of the samples caused the continuing calibrations to fall. All continuing calibrations were acceptable with the exception of those closing the bracket for the dilutions of samples **BH3-SR-A-E** and **SS5B-SR-A-E**. The closing calibration was for the two dilutions showed AR1260 to be 6% low on the second column.

No further analytical complications were noted.

Mercury Analysis referencing EPA SW-846 method 7471A

The total mercury analyses of these samples have been batched with those of the samples received on 3/24 (GL75). A matrix duplicate (MD) was prepared and analyzed in conjunction with sample **BH3-SR-A-E**. The RPD was high following the initial analysis of the MD. The sample and its QC were re-prepared and re-analyzed. The QC was good for the re-analyses. Only the re-analyses for this sample have been reported.

No further analytical complications were noted

Conventionals Analyses referencing EPA method 376.2 and Plumb, 1981

The TOC analyses of these samples were batched with those of the samples received on 3/24 (GL75). A sample duplicate and matrix spike were prepared and analyzed for sulfide in conjunction with sample **BH3-SR-A-E**. The level of sulfide spiked was too low relative to the native concentration in the sample to yield meaningful recovery information. Since the percent recovery for sulfide was within acceptable QC limits for the corresponding LCS, no corrective actions were taken.

No further analytical complications were noted.

Grain Size Analysis

A separate case narrative is provided by the geotechnical lab manager.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Client: Polaris Applied Sciences, Inc.	Project No.: GL44
Client Project: P66 Sed Cap	

Case Narrative

1. The samples were submitted for grain size analysis according to PSEP methodology.
2. One sample was chosen for triplicate analysis. The triplicate data is reported on the QA summary.
3. The data is provided in summary tables and plots.
4. There were no noted anomalies in the samples or methods on this project.

Approved by: Hardd Benny Date: 4/19/04
Title: Geotechnical Division Manager

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ORGANIC COMPOUND
DATA REPORTING QUALIFIERS

U	Indicates the compound was undetected at the reported concentration. (Same as ND).
J	Indicates an estimated concentration when the value is less than the calculated reporting limit.
D	Indicates the surrogate/spike(s) was not detected, due to dilution of extract.
NR	Indicates the surrogate recovery cannot be reported due to matrix interference.
E	Indicates a value above the linear range of the detector. Sample dilution required.
S	Indicates no value reported due to saturation of the detector. Sample dilution required.
NA	Indicates compound not analyzed for.
M	Indicates an estimated value of analyte found and confirmed by analyst but with low spectral match.
B	Indicates possible/probable blank contamination. Flagged when the analyte is detected in the blank as well as the sample.
Y	Indicates raised reporting limit due to background interference or to activity on the instrument. Compound is still not detected at or above the raised level.
C	Indicates a probable hit that cannot be confirmed due to matrix interference (GC).
P	Indicates a high RPD for dual column GC analyses without obvious interference.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: MB-040604
METHOD BLANK

Lab Sample ID: MB-040604
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/16/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Date Extracted: 04/06/04
Date Analyzed: 04/12/04 18:10
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.0 g
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: NA
pH: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	20	< 20 U
91-57-6	2-Methylnaphthalene	20	< 20 U
208-96-8	Acenaphthylene	20	< 20 U
83-32-9	Acenaphthene	20	< 20 U
86-73-7	Fluorene	20	< 20 U
85-01-8	Phenanthrene	20	< 20 U
120-12-7	Anthracene	20	< 20 U
206-44-0	Fluoranthene	20	< 20 U
129-00-0	Pyrene	20	< 20 U
56-55-3	Benzo(a)anthracene	20	< 20 U
218-01-9	Chrysene	20	< 20 U
205-99-2	Benzo(b)fluoranthene	20	< 20 U
207-08-9	Benzo(k)fluoranthene	20	< 20 U
50-32-8	Benzo(a)pyrene	20	< 20 U
193-39-5	Indeno(1,2,3-cd)pyrene	20	< 20 U
53-70-3	Dibenz(a,h)anthracene	20	< 20 U
191-24-2	Benzo(g,h,i)perylene	20	< 20 U
132-64-9	Dibenzofuran	20	< 20 U
117-81-7	bis(2-Ethylhexyl)phthalate	20	< 20 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery

d14-p-Terphenyl	107%
d10-Diphenyl	82.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: BH3-SR-A-E
SAMPLE

Lab Sample ID: GL44A
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/16/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/12/04 19:09
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 38.4%
pH: 7.8

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	120	< 120 U
91-57-6	2-Methylnaphthalene	120	< 120 U
208-96-8	Acenaphthylene	120	< 120 U
83-32-9	**Acenaphthene**	**120**	**160**
86-73-7	**Fluorene**	**120**	**180**
85-01-8	**Phenanthrene**	**120**	**910**
120-12-7	**Anthracene**	**120**	**1,000**
206-44-0	**Fluoranthene**	**120**	**1,200**
129-00-0	**Pyrene**	**120**	**1,300**
56-55-3	**Benzo(a)anthracene**	**120**	**670**
218-01-9	**Chrysene**	**120**	**920**
205-99-2	**Benzo(b)fluoranthene**	**120**	**760**
207-08-9	**Benzo(k)fluoranthene**	**120**	**770**
50-32-8	**Benzo(a)pyrene**	**120**	**750**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**120**	**340**
53-70-3	**Dibenz(a,h)anthracene**	**120**	**130**
191-24-2	**Benzo(g,h,i)perylene**	**120**	**320**
132-64-9	Dibenzofuran	120	< 120 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**120**	**130**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	74.6%
d10-Diphenyl	74.4%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: BH3-SS-A-E
SAMPLE

Lab Sample ID: GL44B
LIMS ID: 04-4432
Matrix: Sediment
Data Release Authorized:
Reported: 04/16/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/12/04 19:39
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 27.0%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	120	< 120 U
91-57-6	2-Methylnaphthalene	120	< 120 U
208-96-8	Acenaphthylene	120	< 120 U
83-32-9	Acenaphthene	120	< 120 U
86-73-7	Fluorene	120	< 120 U
85-01-8	**Phenanthrene**	**120**	**380**
120-12-7	**Anthracene**	**120**	**230**
206-44-0	**Fluoranthene**	**120**	**550**
129-00-0	**Pyrene**	**120**	**1,300**
56-55-3	**Benzo(a)anthracene**	**120**	**380**
218-01-9	**Chrysene**	**120**	**490**
205-99-2	**Benzo(b)fluoranthene**	**120**	**480**
207-08-9	**Benzo(k)fluoranthene**	**120**	**540**
50-32-8	**Benzo(a)pyrene**	**120**	**450**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**120**	**170**
53-70-3	Dibenz(a,h)anthracene	120	< 120 U
191-24-2	**Benzo(g,h,i)perylene**	**120**	**170**
132-64-9	Dibenzofuran	120	< 120 U
117-81-7	bis(2-Ethylhexyl)phthalate	120	< 120 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery

d14-p-Terphenyl	85.4%
d10-Diphenyl	81.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: BH3-SS-A-E
MATRIX SPIKE

Lab Sample ID: GL44B
LIMS ID: 04-4432
Matrix: Sediment
Data Release Authorized:
Reported: 04/16/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/12/04 20:09
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO
Alumina: NO

Sample Amount: 26.0 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 27.0%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	120	---
91-57-6	2-Methylnaphthalene	120	< 120 U
208-96-8	Acenaphthylene	120	< 120 U
83-32-9	Acenaphthene	120	---
86-73-7	**Fluorene**	**120**	**120**
85-01-8	**Phenanthrene**	**120**	**360**
120-12-7	**Anthracene**	**120**	**720**
206-44-0	Fluoranthene	120	---
129-00-0	**Pyrene**	**120**	**980**
56-55-3	Benzo(a)anthracene	120	---
218-01-9	**Chrysene**	**120**	**440**
205-99-2	**Benzo(b)fluoranthene**	**120**	**340**
207-08-9	**Benzo(k)fluoranthene**	**120**	**420**
50-32-8	**Benzo(a)pyrene**	**120**	**360**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**120**	**130**
53-70-3	Dibenz(a,h)anthracene	120	< 120 U
191-24-2	**Benzo(g,h,i)perylene**	**120**	**120**
132-64-9	Dibenzofuran	120	< 120 U
117-81-7	bis(2-Ethylhexyl)phthalate	120	---

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	81.6%
d10-Diphenyl	73.9%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: BH3-SS-A-E
MATRIX SPIKE DUPLICATE

Lab Sample ID: GL44B
LIMS ID: 04-4432
Matrix: Sediment
Data Release Authorized:
Reported: 04/16/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/12/04 20:38
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 27.0%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	120	---
91-57-6	2-Methylnaphthalene	120	< 120 U
208-96-8	Acenaphthylene	120	< 120 U
83-32-9	Acenaphthene	120	---
86-73-7	Fluorene	120	< 120 U
85-01-8	**Phenanthrene**	**120**	**180**
120-12-7	**Anthracene**	**120**	**140**
206-44-0	Fluoranthene	120	---
129-00-0	**Pyrene**	**120**	**850**
56-55-3	Benzo(a)anthracene	120	---
218-01-9	**Chrysene**	**120**	**330**
205-99-2	**Benzo(b)fluoranthene**	**120**	**430**
207-08-9	**Benzo(k)fluoranthene**	**120**	**400**
50-32-8	**Benzo(a)pyrene**	**120**	**360**
193-39-5	Indeno(1,2,3-cd)pyrene	120	< 120 U
53-70-3	Dibenz(a,h)anthracene	120	< 120 U
191-24-2	Benzo(g,h,i)perylene	120	< 120 U
132-64-9	Dibenzofuran	120	< 120 U
117-81-7	bis(2-Ethylhexyl)phthalate	120	---

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	79.7%
d10-Diphenyl	70.1%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: BH7-SR-A-E
SAMPLE

Lab Sample ID: GL44D
LIMS ID: 04-4434
Matrix: Sediment
Data Release Authorized:
Reported: 04/16/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/12/04 21:08
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.9 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 34.9%
pH: 7.8

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	120	< 120 U
91-57-6	2-Methylnaphthalene	120	< 120 U
208-96-8	Acenaphthylene	120	< 120 U
83-32-9	Acenaphthene	120	< 120 U
86-73-7	Fluorene	120	< 120 U
85-01-8	**Phenanthrene**	**120**	**230**
120-12-7	**Anthracene**	**120**	**170**
206-44-0	**Fluoranthene**	**120**	**430**
129-00-0	**Pyrene**	**120**	**600**
56-55-3	**Benzo(a)anthracene**	**120**	**300**
218-01-9	**Chrysene**	**120**	**510**
205-99-2	**Benzo(b)fluoranthene**	**120**	**470**
207-08-9	**Benzo(k)fluoranthene**	**120**	**600**
50-32-8	**Benzo(a)pyrene**	**120**	**490**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**120**	**160**
53-70-3	Dibenz(a,h)anthracene	120	< 120 U
191-24-2	**Benzo(g,h,i)perylene**	**120**	**150**
132-64-9	Dibenzofuran	120	< 120 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**120**	**160**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	83.0%
d10-Diphenyl	83.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: BH7-SS-A-D
SAMPLE

Lab Sample ID: GL44E
LIMS ID: 04-4435
Matrix: Sediment
Data Release Authorized:
Reported: 04/16/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 14:21
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 31.9%
pH: 8.0

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	39	< 39 U
91-57-6	2-Methylnaphthalene	39	< 39 U
208-96-8	Acenaphthylene	39	< 39 U
83-32-9	Acenaphthene	39	< 39 U
86-73-7	Fluorene	39	< 39 U
85-01-8	**Phenanthrene**	**39**	**100**
120-12-7	Anthracene	39	< 39 U
206-44-0	**Fluoranthene**	**39**	**210**
129-00-0	**Pyrene**	**39**	**250**
56-55-3	**Benzo(a)anthracene**	**39**	**120**
218-01-9	**Chrysene**	**39**	**160**
205-99-2	**Benzo(b)fluoranthene**	**39**	**170**
207-08-9	**Benzo(k)fluoranthene**	**39**	**150**
50-32-8	**Benzo(a)pyrene**	**39**	**140**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**39**	**55**
53-70-3	Dibenz(a,h)anthracene	39	< 39 U
191-24-2	**Benzo(g,h,i)perylene**	**39**	**65**
132-64-9	Dibenzofuran	39	< 39 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**39**	**89**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	86.4%
d10-Diphenyl	77.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: BH6-SR-A-E
SAMPLE

Lab Sample ID: GL44G
LIMS ID: 04-4437
Matrix: Sediment
Data Release Authorized:
Reported: 04/16/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 14:51
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 26.2 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 28.8%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	38	< 38 U
91-57-6	2-Methylnaphthalene	38	< 38 U
208-96-8	Acenaphthylene	38	< 38 U
83-32-9	Acenaphthene	38	< 38 U
86-73-7	Fluorene	38	< 38 U
85-01-8	**Phenanthrene**	**38**	**160**
120-12-7	**Anthracene**	**38**	**100**
206-44-0	**Fluoranthene**	**38**	**280**
129-00-0	**Pyrene**	**38**	**360**
56-55-3	**Benzo(a)anthracene**	**38**	**180**
218-01-9	**Chrysene**	**38**	**270**
205-99-2	**Benzo(b)fluoranthene**	**38**	**290**
207-08-9	**Benzo(k)fluoranthene**	**38**	**340**
50-32-8	**Benzo(a)pyrene**	**38**	**270**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**38**	**97**
53-70-3	Dibenz(a,h)anthracene	38	< 38 U
191-24-2	**Benzo(g,h,i)perylene**	**38**	**89**
132-64-9	Dibenzofuran	38	< 38 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**38**	**96**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	92.0%
d10-Diphenyl	83.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: BH6-SS-A-E
SAMPLE

Lab Sample ID: GL44H
LIMS ID: 04-4438
Matrix: Sediment
Data Release Authorized:
Reported: 04/16/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/12/04 22:37
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 43.9%
pH: 7.7

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	120	< 120 U
91-57-6	2-Methylnaphthalene	120	< 120 U
208-96-8	Acenaphthylene	120	< 120 U
83-32-9	Acenaphthene	120	< 120 U
86-73-7	Fluorene	120	< 120 U
85-01-8	**Phenanthrene**	**120**	**220**
120-12-7	**Anthracene**	**120**	**180**
206-44-0	**Fluoranthene**	**120**	**390**
129-00-0	**Pyrene**	**120**	**580**
56-55-3	**Benzo(a)anthracene**	**120**	**340**
218-01-9	**Chrysene**	**120**	**620**
205-99-2	**Benzo(b)fluoranthene**	**120**	**610**
207-08-9	**Benzo(k)fluoranthene**	**120**	**780**
50-32-8	**Benzo(a)pyrene**	**120**	**610**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**120**	**170**
53-70-3	Dibenz(a,h)anthracene	120	< 120 U
191-24-2	**Benzo(g,h,i)perylene**	**120**	**140**
132-64-9	Dibenzofuran	120	< 120 U
117-81-7	bis(2-Ethylhexyl)phthalate	120	< 120 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	76.6%
d10-Diphenyl	66.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: SS5B-SR-A-E
SAMPLE

Lab Sample ID: GL44J
LIMS ID: 04-4440
Matrix: Sediment
Data Release Authorized:
Reported: 04/16/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/12/04 23:06
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO
Alumina: NO

Sample Amount: 26.2 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 28.6%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	**Naphthalene**	**57**	**76**
91-57-6	2-Methylnaphthalene	57	< 57 U
208-96-8	**Acenaphthylene**	**57**	**120**
83-32-9	Acenaphthene	57	< 57 U
86-73-7	**Fluorene**	**57**	**62**
85-01-8	**Phenanthrene**	**57**	**360**
120-12-7	**Anthracene**	**57**	**300**
206-44-0	**Fluoranthene**	**57**	**570**
129-00-0	**Pyrene**	**57**	**730**
56-55-3	**Benzo(a)anthracene**	**57**	**370**
218-01-9	**Chrysene**	**57**	**520**
205-99-2	**Benzo(b)fluoranthene**	**57**	**1,100**
207-08-9	**Benzo(k)fluoranthene**	**57**	**680**
50-32-8	**Benzo(a)pyrene**	**57**	**690**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**57**	**170**
53-70-3	**Dibenz(a,h)anthracene**	**57**	**69**
191-24-2	**Benzo(g,h,i)perylene**	**57**	**150**
132-64-9	Dibenzofuran	57	< 57 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**57**	**100**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	75.1%
d10-Diphenyl	74.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: BH3-SS-A-E
MS/MSD

Lab Sample ID: GL44B
LIMS ID: 04-4432
Matrix: Sediment
Data Release Authorized:
Reported: 04/16/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted MS/MSD: 04/06/04

Sample Amount MS: 26.0 g-dry-wt
MSD: 25.8 g-dry-wt

Date Analyzed MS: 04/12/04 20:09
MSD: 04/12/04 20:38

Final Extract Volume MS: 1.0 mL
MSD: 1.0 mL

Instrument/Analyst MS: NT1/LJR
MSD: NT1/LJR

Dilution Factor MS: 3.00
MSD: 3.00

GPC Cleanup: NO

Alumina Cleanup: NO

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Naphthalene	< 116	382	481	79.4%	343	484	70.9%	10.8%
Acenaphthene	< 116	407	481	84.6%	374	484	77.3%	8.5%
Fluoranthene	553	871	481	66.1%	727	484	36.0%	18.0%
Benzo(a)anthracene	377	676	481	62.2%	626	484	51.4%	7.7%
bis(2-Ethylhexyl)phthalate	< 116	511	481	106%	451	484	93.2%	12.5%

Results reported in µg/kg
RPD calculated using sample concentrations per SW846.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: LCS-040604
LAB CONTROL

Lab Sample ID: LCS-040604
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/16/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P56 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/12/04 18:40
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO

Sample Amount: 25.0 g
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Alumina Cleanup: NO

Analyte	Lab Control	Spike Added	Recovery
Naphthalene	324	500	64.8%
Acenaphthene	330	500	66.0%
Fluoranthene	400	500	80.0%
Benzo(a)anthracene	328	500	65.6%
bis(2-Ethylhexyl)phthalate	472	500	94.4%

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	86.0%
d10-Diphenyl	68.8%

Results reported in µg/kg

ANALYTICAL RESOURCES INCORPORATED

SW8270 PNA SURROGATE RECOVERY SUMMARY

Matrix: Sediment

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027

Client ID	TER	DPH	TOT OUT
MB-040604	107%	82.8%	0
LCS-040604	86.0%	68.8%	0
BH3-SR-A-E	74.6%	74.4%	0
BH3-SS-A-E	85.4%	81.8%	0
BH3-SS-A-E MS	81.6%	73.9%	0
BH3-SS-A-E MSD	79.7%	70.1%	0
BH7-SR-A-E	83.0%	83.3%	0
BH7-SS-A-D	86.4%	77.0%	0
BH6-SR-A-E	92.0%	83.2%	0
BH6-SS-A-E	76.6%	66.7%	0
SS5B-SR-A-E	75.1%	74.5%	0

	LCS/MB LIMITS	QC LIMITS
(TER) = d14-p-Terphenyl	(30-160)	(30-160)
(DPH) = d10-Diphenyl	(30-160)	(30-160)

Prep Method: SW3550
Log Number Range: 04-4431 to 04-4440

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
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Sample ID: MB-040604
METHOD BLANK

Lab Sample ID: MB-040604
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/14/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Date Extracted: 04/06/04
Date Analyzed: 04/09/04 21:01
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.0 g
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: NA
Percent Moisture: NA

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	4.0	< 4.0 U
53469-21-9	Aroclor 1242	4.0	< 4.0 U
12672-29-6	Aroclor 1248	4.0	< 4.0 U
11097-69-1	Aroclor 1254	4.0	< 4.0 U
11096-82-5	Aroclor 1260	4.0	< 4.0 U
11104-28-2	Aroclor 1221	4.0	< 4.0 U
11141-16-5	Aroclor 1232	4.0	< 4.0 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	84.2%
Tetrachlorometaxylene	83.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: BH3-SR-A-E
SAMPLE

Lab Sample ID: GL44A
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/14/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/09/04 21:47
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.4 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 7.8
Percent Moisture: 38.4%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	**Aroclor 1248**	**3.9**	**21**
11097-69-1	**Aroclor 1254**	**3.9**	**82 E**
11096-82-5	**Aroclor 1260**	**3.9**	**39**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	71.5%
Tetrachlorometaxylene	46.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
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Sample ID: BH7-SR-A-E
SAMPLE

Lab Sample ID: GL44D
LIMS ID: 04-4434
Matrix: Sediment
Data Release Authorized:
Reported: 04/14/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/09/04 22:33
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 7.8
Percent Moisture: 34.9%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	**Aroclor 1248**	**3.9**	**7.4**
11097-69-1	**Aroclor 1254**	**3.9**	**18**
11096-82-5	**Aroclor 1260**	**3.9**	**17**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	65.0%
Tetrachlorometaxylene	48.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
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Sample ID: BH7-SR-A-E
MATRIX SPIKE

Lab Sample ID: GL44D
LIMS ID: 04-4434
Matrix: Sediment
Data Release Authorized:
Reported: 04/14/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/09/04 22:56
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 7.8
Percent Moisture: 34.9%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	---
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	16	< 16 Y
11097-69-1	**Aroclor 1254**	**3.9**	**29**
11096-82-5	Aroclor 1260	3.9	---
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	54.8%
Tetrachlorometaxylene	47.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: BH7-SR-A-E
MATRIX SPIKE DUP

Lab Sample ID: GL44D
LIMS ID: 04-4434
Matrix: Sediment
Data Release Authorized:
Reported: 04/14/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/10/04 23:19
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.7 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 7.8
Percent Moisture: 34.9%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	---
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	16	< 16 Y
11097-69-1	**Aroclor 1254**	**3.9**	**31**
11096-82-5	Aroclor 1260	3.9	---
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	60.0%
Tetrachlorometaxylene	45.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: BH7-SS-A-D
SAMPLE

Lab Sample ID: GL44E
LIMS ID: 04-4435
Matrix: Sediment
Data Release Authorized:
Reported: 04/14/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/10/04 23:42
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.0
Percent Moisture: 31.9%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	7.8	< 7.8 Y
11097-69-1	**Aroclor 1254**	**3.9**	**12**
11096-82-5	**Aroclor 1260**	**3.9**	**7.0**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	62.8%
Tetrachlorometaxylene	58.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
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Sample ID: BH6-SR-A-E
SAMPLE

Lab Sample ID: GL44G
LIMS ID: 04-4437
Matrix: Sediment
Data Release Authorized:
Reported: 04/14/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/10/04 00:05
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.9 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.1
Percent Moisture: 28.8%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	7.7	< 7.7 Y
11097-69-1	**Aroclor 1254**	**3.9**	**21**
11096-82-5	**Aroclor 1260**	**3.9**	**18**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	74.8%
Tetrachlorometaxylene	56.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
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Sample ID: BH6-SS-A-E
SAMPLE

Lab Sample ID: GL44H
LIMS ID: 04-4438
Matrix: Sediment
Data Release Authorized:
Reported: 04/14/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/10/04 02:00
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.4 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 7.7
Percent Moisture: 43.9%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	**Aroclor 1248**	**3.9**	**10**
11097-69-1	**Aroclor 1254**	**3.9**	**33**
11096-82-5	**Aroclor 1260**	**3.9**	**29**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	63.2%
Tetrachlorometaxylene	40.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
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Sample ID: SS5B-SR-A-E
SAMPLE

Lab Sample ID: GL44J
LIMS ID: 04-4440
Matrix: Sediment
Data Release Authorized:
Reported: 04/14/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/10/04 02:23
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 26.1 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.1
Percent Moisture: 28.6%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.8	< 3.8 U
53469-21-9	Aroclor 1242	3.8	< 3.8 U
12672-29-6	**Aroclor 1248**	**3.8**	**28**
11097-69-1	**Aroclor 1254**	**3.8**	**110 E**
11096-82-5	**Aroclor 1260**	**3.8**	**110 E**
11104-28-2	Aroclor 1221	3.8	< 3.8 U
11141-16-5	Aroclor 1232	3.8	< 3.8 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	100%
Tetrachlorometaxylene	47.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: SS5B-SR-A-E
DILUTION

Lab Sample ID: GL44J
LIMS ID: 04-4440
Matrix: Sediment
Data Release Authorized:
Reported: 04/14/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/14/04 03:38
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 26.1 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 5.00
Silica Gel: No
pH: 8.1
Percent Moisture: 28.6%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	19	< 19 U
53469-21-9	Aroclor 1242	19	< 19 U
12672-29-6	**Aroclor 1248**	**19**	**39**
11097-69-1	**Aroclor 1254**	**19**	**140**
11096-82-5	**Aroclor 1260**	**19**	**110**
11104-28-2	Aroclor 1221	19	< 19 U
11141-16-5	Aroclor 1232	19	< 19 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	136%
Tetrachlorometaxylene	81.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
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Sample ID: BH7-SR-A-E
MS/MSD

Lab Sample ID: GL44D
LIMS ID: 04-4434
Matrix: Sediment
Data Release Authorized:
Reported: 04/14/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted MS/MSD: 04/06/04

Date Analyzed MS: 04/09/04 22:56
MSD: 04/10/04 23:19
Instrument/Analyst MS: ECD5/PK
MSD: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount MS: 25.8 g-dry-wt
MSD: 25.7 g-dry-wt
Final Extract Volume MS: 1.0 mL
MSD: 1.0 mL
Dilution Factor MS: 1.00
MSD: 1.00
Silica Gel: No
pH: 7.8
Percent Moisture: 34.9%

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Aroclor 1016	< 3.9 U	25.0	38.8	64.4%	25.3	39.0	64.9%	1.2%
Aroclor 1260	16.8	38.2	38.8	55.2%	40.5	39.0	60.8%	5.8%

Results reported in µg/kg (ppb)
RPD calculated using sample concentrations per SW846.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
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Sample ID: LCS-040604
LAB CONTROL

Lab Sample ID: LCS-040604
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/14/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Date Extracted: 04/06/04
Date Analyzed: 04/09/04 21:24
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.0 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: NA
Percent Moisture: NA

Analyte	Lab Control	Spike Added	Recovery
Aroclor 1016	31.6	40.0	79.0%
Aroclor 1260	32.8	40.0	82.0%

PCB Surrogate Recovery

Decachlorobiphenyl	89.8%
Tetrachlorometaxylene	84.5%

Results reported in µg/kg (ppb)

ANALYTICAL RESOURCES INCORPORATED

SW8082/PCB SOIL/SEDIMENTS SURROGATE RECOVERY SUMMARY

Matrix: Sediment

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027

Client ID	DCBP	TCMX	TOT OUT
MB-040604	84.2%	83.2%	0
LCS-040604	89.8%	84.5%	0
BH3-SR-A-E	71.5%	46.8%	0
BH3-SR-A-E DL	91.2%	75.0%	0
BH3-SS-A-E	75.0%	57.0%	0
BH7-SR-A-E	65.0%	48.5%	0
BH7-SR-A-E MS	54.8%	47.2%	0
BH7-SR-A-E MSD	60.0%	45.5%	0
BH7-SS-A-D	62.8%	58.5%	0
BH6-SR-A-E	74.8%	56.5%	0
BH6-SS-A-E	63.2%	40.0%	0
SS5B-SR-A-E	100%	47.0%	0
SS5B-SR-A-E DL	136%	81.2%	0

	LCS/MB LIMITS	QC LIMITS
(DCBP) = Decachlorobiphenyl	(44-131)	(18-161)
(TCMX) = Tetrachlorometaxylene	(27-125)	(18-136)

Prep Method: SW3550B
Log Number Range: 04-4431 to 04-4440

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
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Sample ID: METHOD BLANK

Lab Sample ID: GL44MB
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Percent Total Solids: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	7439-97-6	Mercury	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Sample ID: METHOD BLANK

Lab Sample ID: GL44MB
LIMS ID: 04-4432
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Percent Total Solids: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/05/04	7471A	04/09/04	7439-97-6	Mercury	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
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Sample ID: BH3-SR-A-E
SAMPLE

Lab Sample ID: GL44A
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Percent Total Solids: 64.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/05/04	7471A	04/09/04	**7439-97-6**	**Mercury**	0.08	**0.19**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: BH3-SR-A-E
DUPLICATE

Lab Sample ID: GL44A
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Mercury	7471A	0.19	0.25	27.3%	+/- 0.08	L

Reported in mg/kg-dry

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH3-SR-A-E
MATRIX SPIKE

Lab Sample ID: GL44A
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Mercury	7471A	0.19	1.14	0.78	122%	

Reported in mg/kg-dry

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH3-SS-A-E
SAMPLE

Lab Sample ID: GL44B
LIMS ID: 04-4432
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Percent Total Solids: 69.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.05	**0.09**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH7-SR-A-E
SAMPLE

Lab Sample ID: GL44D
LIMS ID: 04-4434
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Percent Total Solids: 68.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.06	**0.11**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH7-SS-A-D
SAMPLE

Lab Sample ID: GL44E
LIMS ID: 04-4435
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Percent Total Solids: 71.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	7439-97-6	Mercury	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH6-SR-A-E
SAMPLE

Lab Sample ID: GL44G
LIMS ID: 04-4437
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Percent Total Solids: 74.7%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.05	**0.17**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH6-SS-A-E
SAMPLE

Lab Sample ID: GL44H
LIMS ID: 04-4438
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Percent Total Solids: 77.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.06	0.09	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: SS5B-SR-A-E
SAMPLE

Lab Sample ID: GL44J
LIMS ID: 04-4440
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Percent Total Solids: 58.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.07	**0.89**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: STD REFERENCE
ERA D034

Lab Sample ID: GL44SRM
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Analyte	Analysis Method	Analysis Date	mg/kg-dry	Certified Value	Advisory Range
Mercury	7471A	04/02/04	11.7	9.4	6.2-12.6

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: STD REFERENCE
ERA D034

Lab Sample ID: GL44SRM
LIMS ID: 04-4432
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Analyte	Analysis Method	Analysis Date	mg/kg-dry	Certified Value	Advisory Range
Mercury	7471A	04/09/04	10.3	9.4	6.2-12.6

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: MB-GL44**
Page 1 of 1 METHOD BLANK

Lab Sample ID: MB-GL44
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized: AH
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

METHOD BLANK RESULTS
CONVENTIONALS

Analyte	Analysis Date	Method	RL	Units	Result	
Total Solids	03/30/04	EPA 160.3 SM 2540 B	0.01	Percent	< 0.01	U
Preserved Total Solids	03/25/04	EPA 160.3 SM 2540 B	0.01	mg residue	< 0.01	U
Sulfide	03/25/04	EPA 376.2 SM4500S2-D	0.05	mg/L	< 0.05	U
Total Organic Carbon	04/06/04	Plumb,1981	0.020	Percent	< 0.020	U

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH3-SR-A-E**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL44A
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized: ajp
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	63.0
Preserved Total Solids	03/25/04 032504#1	EPA 160.3 SM 2540 B		0.01	Percent	58.9
Sulfide	03/25/04 032504#1	EPA 376.2 SM4500S2-D	100	169	mg/kg	1,200
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	2.6

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH3-SS-A-E**
Page 1 of 1 SAMPLE

Lab Sample ID: GL44B
LIMS ID: 04-4432
Matrix: Sediment
Data Release Authorized: alp
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	70.9
Preserved Total Solids	03/25/04 032504#1	EPA 160.3 SM 2540 B		0.01	Percent	65.5
Sulfide	03/25/04 032504#1	EPA 376.2 SM4500S2-D	100	150	mg/kg	1,400
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	1.4

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH7-SR-A-E**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL44D
LIMS ID: 04-4434
Matrix: Sediment
Data Release Authorized: AH
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	65.7
Preserved Total Solids	03/25/04 032504#1	EPA 160.3 SM 2540 B		0.01	Percent	59.0
Sulfide	03/25/04 032504#1	EPA 376.2 SM4500S2-D	100	168	mg/kg	1,300
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	3.3

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH7-SS-A-D**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL44E
LIMS ID: 04-4435
Matrix: Sediment
Data Release Authorized: ap
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	64.4
Preserved Total Solids	03/25/04 032504#1	EPA 160.3 SM 2540 B		0.01	Percent	71.6
Sulfide	03/25/04 032504#1	EPA 376.2 SM4500S2-D	100	140	mg/kg	880
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	2.7

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH6-SR-A-E**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL44G
LIMS ID: 04-4437
Matrix: Sediment
Data Release Authorized: ap
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	72.4
Preserved Total Solids	03/25/04 032504#1	EPA 160.3 SM 2540 B		0.01	Percent	67.7
Sulfide	03/25/04 032504#1	EPA 376.2 SM4500S2-D	100	148	mg/kg	2,700
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	2.1

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH6-SS-A-E**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL44H
LIMS ID: 04-4438
Matrix: Sediment
Data Release Authorized: ap
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	73.0
Preserved Total Solids	03/25/04 032504#1	EPA 160.3 SM 2540 B		0.01	Percent	60.1
Sulfide	03/25/04 032504#1	EPA 376.2 SM4500S2-D	200	333	mg/kg	3,700
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	2.6

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: SS5B-SR-A-E**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL44J
LIMS ID: 04-4440
Matrix: Sediment
Data Release Authorized: ap
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: 03/23/04
Date Received: 03/23/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	56.6
Preserved Total Solids	03/25/04 032504#1	EPA 160.3 SM 2540 B		0.01	Percent	54.3
Sulfide	03/25/04 032504#1	EPA 376.2 SM4500S2-D	10	18.3	mg/kg	150
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	2.0

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: LCS-GL44**
Page 1 of 1 LAB CONTROL

Lab Sample ID: LCS-GL44
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized: QAP
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

LABORATORY CONTROL RESULTS
CONVENTIONALS

Analyte	Analysis Date	Method	Units	LCS	True	REC
Sulfide	03/25/04	EPA 376.2	mg/L	6.78	6.94	97.7%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: SRM-GL44**
Page 1 of 1 **STANDARD REFERENCE**

Lab Sample ID: SRM-GL44
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized: asp
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

STANDARD REFERENCE RESULTS
CONVENTIONALS

Analyte	Analysis Date & Batch	Method	Units	SRM	True	REC
NIST #8704						
Total Carbon	04/06/04 040604#1	Plumb,1981	Percent	3.18	3.35	94.9%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: DUP-GL44**
Page 1 of 1 **DUPLICATE**

Lab Sample ID: DUP-GL44 QC Report No: GL44-Polaris Applied Sciences, Inc.
LIMS ID: 04-4431 Project: P66 Sed Cap (Pier 64/65)
Matrix: Sediment 1002.027
Data Release Authorized: gjp Date Received: 03/23/04
Reported: 04/12/04

DUPLICATE RESULTS
CONVENTIONALS

Analyte	Method	Units	Sample	Replicate	RPD/RSD
ARI ID: 04-4431, GL44A	**Client Sample ID: BH3-SR-A-E**				
Total Solids	EPA 160.3 SM 2540 B	Percent	63.0	64.7 63.8	1.3%
Preserved Total Solids	EPA 160.3 SM 2540 B	Percent	58.9	59.8 60.2	1.1%
Sulfide	EPA 376.2 SM4500S2-D	mg/kg	1,200	1,150	4.3%
Total Organic Carbon	Plumb,1981	Percent	2.6	3.1 3.0	9.1%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS
Page 1 of 1

Sample ID: MS/MSD-GL44
MATRIX SPIKE

Lab Sample ID: MS-GL44
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized: ap
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Received: 03/23/04

MATRIX SPIKE RESULTS
CONVENTIONALS

Analyte	Method	Units	Sample	Spike	MS/MSD	REC
ARI ID: 04-4431, GL44A	**Client Sample ID: BH3-SR-A-E**					
Sulfide	EPA 376.2	mg/kg	1,200	234	1,820	265%
Total Organic Carbon	Plumb,1981	Percent	2.61	2.95	5.94	113%

ANALYTICAL RESOURCES INCORPORATED

Polaris Applied Sciences, Inc.
P66 Sed Cap

Apparent Grain Size Distribution Summary
Percent Finer Than Indicated Size

Sample No.	Gravel			Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt				Clay	
Phi Size	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Sieve Size (microns)	3/8"	#4	#10 (2000)	#18 (1000)	#35 (500)	#60 (250)	#120 (125)	#230 (62)	31.00	15.60	7.80	3.90	2.00	1.00
SS5B-SR-A-E-A	100.0	99.5	99.1	97.9	96.4	91.0	82.2	72.4	57.5	39.4	28.3	20.0	13.7	9.1
SS5B-SR-A-E-B	100.0	100.0	99.8	99.1	97.1	91.7	83.3	73.1	58.8	40.7	28.7	19.5	13.7	9.3
SS5B-SR-A-E-C	100.0	100.0	99.7	99.0	97.2	91.3	82.3	72.5	57.3	40.8	29.3	20.1	14.3	8.9
BH3-SR-A-E	100.0	89.5	83.1	78.6	65.0	36.6	24.1	19.8	18.5	14.4	11.0	8.3	5.9	3.7
BH3-SS-A-E	100.0	99.1	97.1	92.9	74.8	36.0	20.5	16.1	12.2	8.1	4.6	3.2	2.6	1.8
BH7-SR-A-E	100.0	100.0	98.4	92.2	67.8	33.3	20.7	17.2	15.0	12.1	9.4	7.0	4.6	3.2
BH6-SR-A-E	100.0	99.5	98.6	94.9	72.5	31.9	17.3	13.4	11.6	8.6	7.3	5.4	3.8	2.4
BH6-SS-A-E	100.0	97.6	93.7	84.7	56.7	23.3	13.5	11.4	9.8	6.7	4.3	3.3	2.6	1.8

Notes to the Testing:

1. Apparent grain size distributions according to PSEP protocols.

ANALYTICAL RESOURCES INCORPORATED

Polaris Applied Sciences, Inc.
P66 Sed Cap

Apparent Grain Size Distribution Summary
Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay		
Phi Size	> -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	< 10
Sieve Size (microns)	> #10 (2000)	10 to 18 (2000-1000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0
SS5B-SR-A-E-A	0.9	1.2	1.5	5.4	8.8	9.8	14.9	18.1	11.0	8.3	6.3	4.6	9.1
SS5B-SR-A-E-B	0.2	0.7	2.0	5.4	8.4	10.2	14.3	18.2	12.0	9.2	5.8	4.4	9.3
SS5B-SR-A-E-C	0.3	0.7	1.8	5.8	9.0	9.8	15.2	16.5	11.5	9.2	5.9	5.4	8.9
BH3-SR-A-E	16.9	4.5	13.6	28.4	12.5	4.3	1.3	4.2	3.3	2.7	2.3	2.3	3.7
BH3-SS-A-E	2.9	4.2	18.1	38.8	15.5	4.4	3.9	4.2	3.4	1.4	0.6	0.9	1.8
BH7-SR-A-E	1.6	6.2	24.4	34.5	12.6	3.4	2.3	2.8	2.7	2.4	2.4	1.4	3.2
BH6-SR-A-E	1.4	3.7	22.4	40.6	14.6	3.9	1.7	3.1	1.3	1.8	1.7	1.4	2.4
BH6-SS-A-E	6.3	9.0	28.0	33.4	9.8	2.1	1.6	3.1	2.3	1.0	0.8	0.8	1.8

Notes to the Testing:

1. Apparent grain size distributions according to PSEP protocols.

QA SUMMARY

ANALYTICAL RESOURCES INCORPORATED

PROJECT:	Polaris Applied Sciences, Inc.	Project No.:	P66 Sed Cap
ARI Triplicate Sample ID:	GL44J-1	Batch No.:	GL44 -01
Client Triplicate Sample ID:	SS5B-SR-A-E-A	Page:	1 of 1

Relative Standard Deviation, By Phi Size

Sample ID	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
S5B-SR-A-E-	100.0	99.5	99.1	97.9	96.4	91.0	82.2	72.4	57.5	39.4	28.3	20.0	13.7	9.1
S5B-SR-A-E-	100.0	100.0	99.8	99.1	97.1	91.7	83.3	73.1	58.8	40.7	28.7	19.5	13.7	9.3
S5B-SR-A-E-	100.0	100.0	99.7	99.0	97.2	91.3	82.3	72.5	57.3	40.8	29.3	20.1	14.3	8.9
AVE	NA	99.82	99.52	98.65	96.89	91.36	82.60	72.66	57.87	40.28	28.77	19.87	13.89	9.10
STDEV	NA	0.31	0.39	0.69	0.44	0.37	0.64	0.39	0.82	0.80	0.48	0.34	0.33	0.23
%RSD	NA	0.31	0.39	0.70	0.45	0.41	0.77	0.54	1.42	1.97	1.68	1.72	2.40	2.51

The Triplicate Applies To The Following Samples

ARI ID	Client ID	Date Sampled	Date Extracted	Date Complete	QA*
GL44J-1	SS5B-SR-A-E-A	3/23/04	4/12/04	4/20/04	102.0
GL44J-2	SS5B-SR-A-E-B	3/23/04	4/12/04	4/20/04	101.1
GL44J-3	SS5B-SR-A-E-C	3/23/04	4/12/04	4/20/04	101.4
GL44A	BH3-SR-A-E	3/23/04	4/12/04	4/20/04	97.8
GL44B	BH3-SS-A-E	3/23/04	4/12/04	4/20/04	101.1
GL44D	BH7-SR-A-E	3/23/04	4/12/04	4/20/04	100.0
GL44G	BH6-SR-A-E	3/23/04	4/12/04	4/20/04	99.4
GL44H	BH6-SS-A-E	3/23/04	4/12/04	4/20/04	97.4

* ARI Internal QA limits = 95-105%

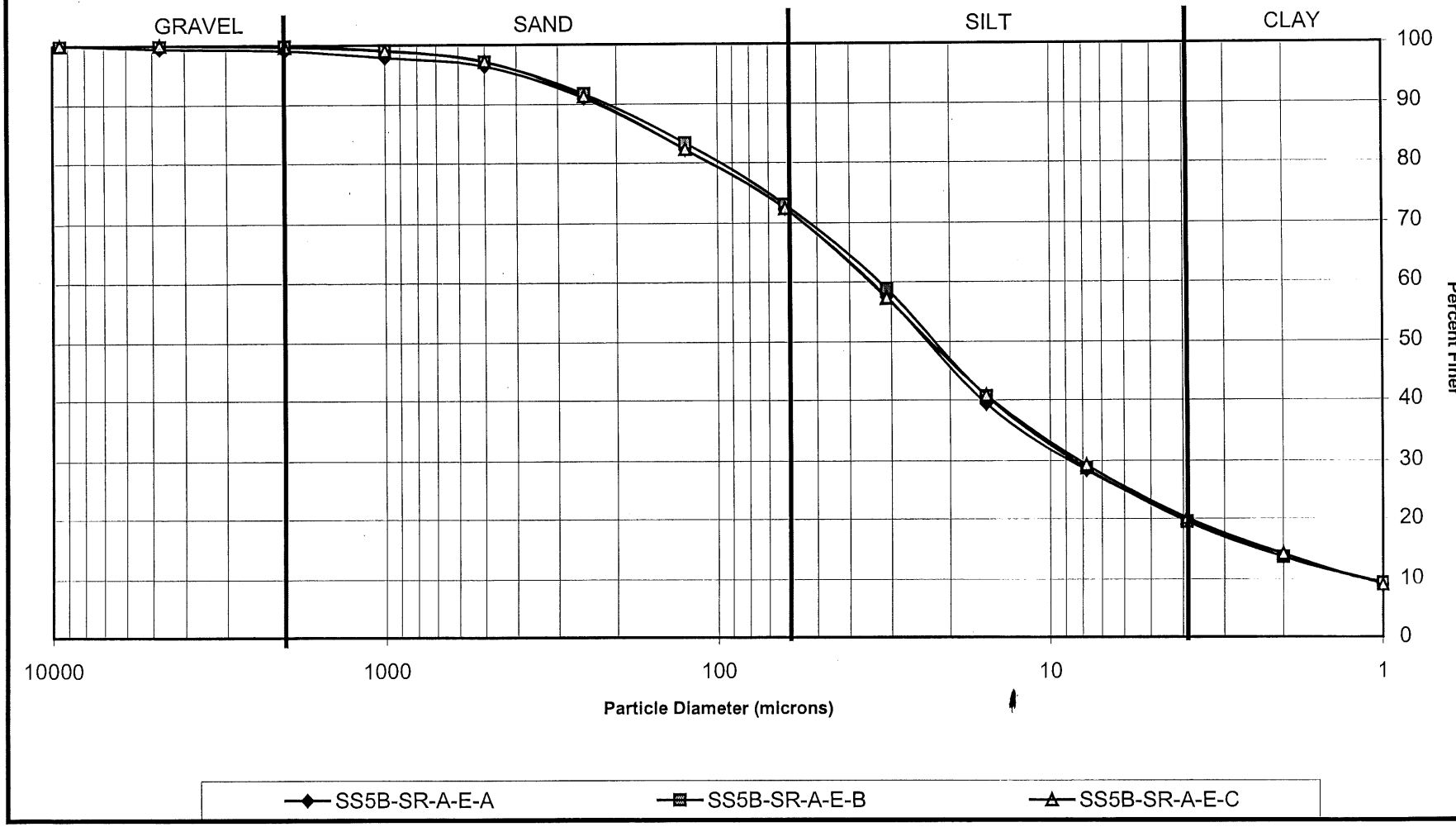
Notes to the Testing:

1. See narrative for discussion of testing.

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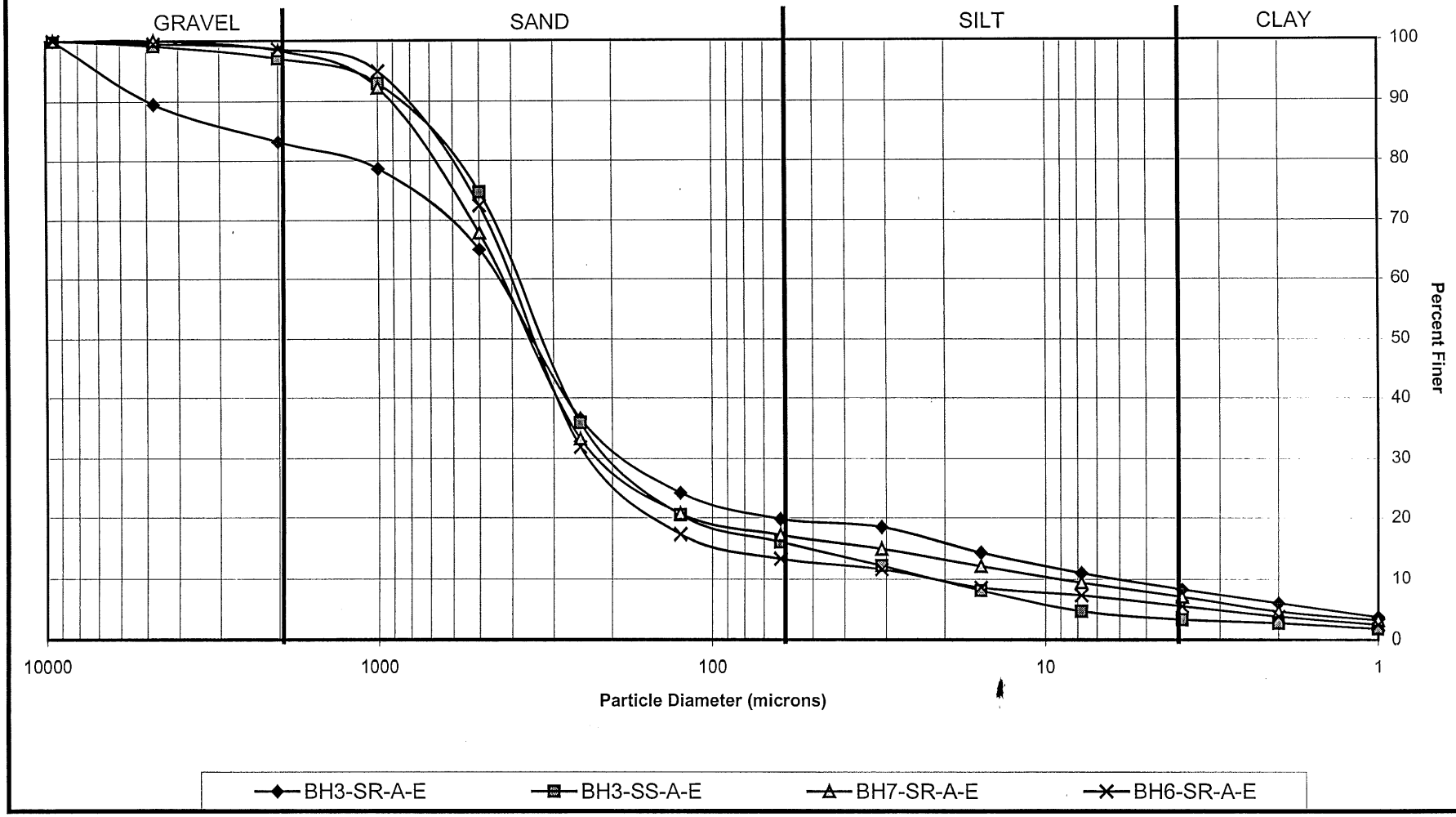
PSEP Grain Size Distribution

Triplicate Sample Plot



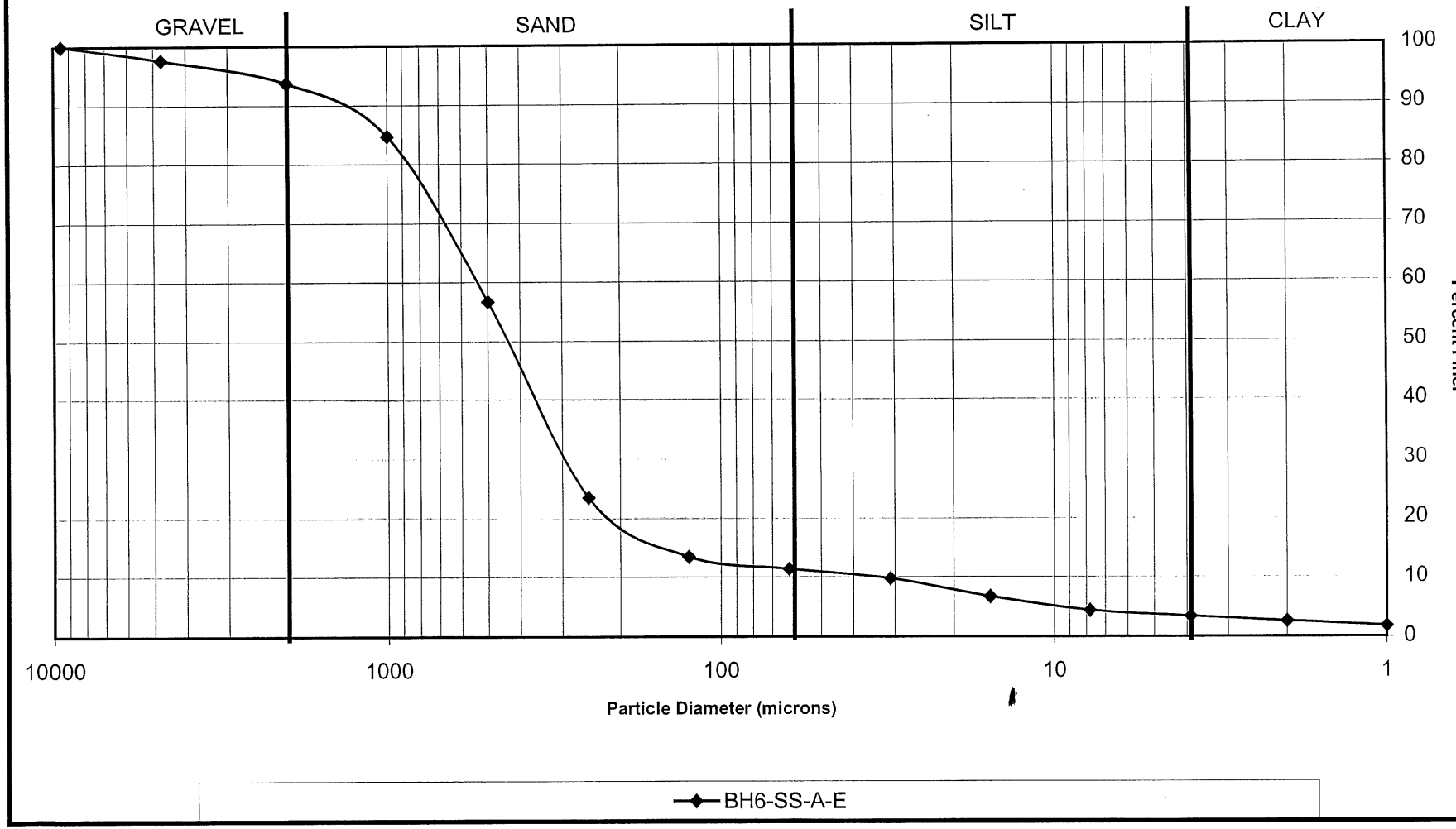
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PSEP Grain Size Distribution



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PSEP Grain Size Distribution



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Polaris Applied Sciences, Inc.
P66 Sed Cap

PSEP Total Solids Analysis
Percent of Wet Weight

Sample No.	Total Solids (%)
SS5B-SR-A-E-A	56.4
SS5B-SR-A-E-B	56.2
SS5B-SR-A-E-C	56.3
BH3-SR-A-E	62.9
BH3-SS-A-E	72.2
BH7-SR-A-E	65.5
BH6-SR-A-E	71.6
BH6-SS-A-E	70.3

Triplicate Average	56.3
Standard Deviation	0.11
%RSD	0.19

GL44

Analytical Resources, Incorporated
Analytical Chemists and Consultants

May 4, 2004

Mr. Jerry Erickson
Polaris Applied Sciences, Inc.
12509 130th Lane N. E.
Kirkland, WA 98034

RE: Client Project – 1002.027; P66 Sed Cap (Pier 64/65)
ARI Job No: GL75

Dear Mr. Erickson:

Please find enclosed the final data for the samples from the project referenced above. ARI received twenty-one sediment samples on March 24, 2004. The samples were received in good condition. No discrepancies were noted in the chain of custody documentation. The samples were analyzed for SVOAs, PCBs, grain size, mercury, TOC and sulfides. Selected samples were placed on hold and are being held in a freezer (chemistry analyses) and refrigerator (grain size analysis).

Issues associated with the chemical analysis are discussed in the case narrative.

A copy of this report and the supporting data will remain on file with ARI. Please feel free to contact me at your convenience if you need any additional information.

Respectfully,

ANALYTICAL RESOURCES, INC.

Mary Lou Fox

Mary Lou Fox
Project Manager
marylou@arilabs.com
206/695-6211

Enclosures

cc: File GL75

MLF/mdh

POLARIS APPLIED SCIENCES, INC.
12509 130th Lane NE, Kirkland, Washington 98034-7713 425/823-4841 Fax 425/823-3805

CHAIN OF CUSTODY RECORD

POLARIS PROJECT #: 100207 | PROJECT NAME: P66 sed cap (Pier 64/65)
CLIENT: Port of Seattle | LOCATION: Bell Harbor Marina
PROJECT MANAGER: Jerry Ericksen | SEND REPORTS TO: Jerry Ericksen
SAMPLER: (SIGNATURE) Gerald M Ericksen

ANALYSIS REQUESTED: Grainsize TS (A), Total solids (B), TOC (C), SVOAs: PCBs, PCBP, Dioxin/Furans (E), Mercury (C), letters on jars & labels

analytes as per Mary Lou Fox

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS	Grainsize TS (A)	Total solids (B)	TOC (C)	SVOAs: PCBs, PCBP, Dioxin/Furans (E)	Mercury (C)	LOCATION/REMARKS:
	BH9-SR	3-24-04	1440	Sed	X		1		X				
	BH9-SR		1615			X	4	X		X	X	X	Composited from BH9 4 per cores A B C & D (BC samples A & D lower subsides from core A)
	BH9-SS		1440		X		1		X				to be archived
	BH9-SS		1615			X	4	X		X	X	X	
	BH9-BC		1440		X		1		X				
	BH9-BC		1615			X	4	X		X	X	X	
	BH9-SR-FS	3-24-04	1440	Sed	X		1		X				
	BH9-SR-FS		1615			X	4	X		X	X	X	
	BH9-SS-FS		1440		X		1		X				to be archived
	BH9-SS-FS		1615			X	4	X		X	X	X	
	BH9-BC-FS		1440		X		1		X				
	BH9-BC-FS		1615			X	4	X		X	X	X	

RELINQUISHED BY: (signature) | DATE/TIME: 3-24-04 1818 | RECEIVED BY: (signature)
RELINQUISHED BY: (signature) | DATE/TIME | RECEIVED BY: (signature)
RELINQUISHED BY: (signature) | DATE/TIME | RECEIVED FOR LAB BY: (signature)

LABORATORY NAME: ARI | LAB PROJECT NUMBER:
LAB ADDRESS:
LAB PHONE: | LAB CONTACT PERSON: Mary Lou Fox
POLARIS CONTACT PERSON: | POLARIS P.O. NUMBER:

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CHAIN OF CUSTODY RECORD

POLARIS PROJECT # 1002.027	PROJECT NAME: P66 Sed cap (Pier 64/65)
CLIENT: Port of	LOCATION: Bell Harbor Marina
PROJECT MANAGER: Jerry Erickson	SEND REPORTS TO: Jerry Erickson
SAMPLER: (SIGNATURE) Gerald M. Erickson	

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	Grain size, TS (A)	Total sulfides (B)	TOC (C)	SVOAs; PCBs, BEHP (D)	Dibenzofuran, PAHs	Mercury (E)					LOCATION/REMARKS:
	BH8-SR	3-24-04	1650	Sed	X		1		X									Composite from BH8 cores A & B
	BH8-SR		1730			X	4	X		X	X	X						
	BH8-SS		1650		X		1		X									
	BH8-SS		1730			X	4	X		X	X	X						To be archived
	BH8-BC		1650		X		1		X									
	BH8-BC		1730			X	4	X		X	X	X						

ANALYSIS REQUESTED: Letters on lines top of labels

RELINQUISHED BY: (signature)	DATE/TIME 3-24-04 1818	RECEIVED BY: (signature)	LABORATORY NAME: ARI
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)	LAB ADDRESS:
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)	LAB PHONE: LAB CONTACT PERSON: Mary Lou Fox
			POLARIS CONTACT PERSON: POLARIS P.O. NUMBER:

LAB PROJECT NUMBER:

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CHAIN OF CUSTODY RECORD

POLARIS PROJECT # 1002.027	PROJECT NAME: P66 Sedcap (Pier 64/65)
CLIENT: Port of Seattle	LOCATION: Bell Harbor Marina
PROJECT MANAGER: Jerry Erickson	SEND REPORTS TO: Jerry Erickson
SAMPLER: (SIGNATURE) Gerald McCune	

ANALYSIS REQUESTED

analytes as per Mary Lou Fox

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	Grain size, TS (A)	Total sulfides (B)	TOC	SVOAs; PCBs, BEHP (C)	Dioxins/furans, PAHs (D)	Mercury (E)	A	Volatiles	Majors (waters)	LOCATION/REMARKS:
	BH2-SR	3-24-04	0910	Sed	X		1		X								composited from BH2 cores A+B (sulfides from core A (3 core layers)
	BH2-SR	3-24-04	0930	Sed		X	4	X		X	X		X				
	BH2-SS	11	0910	Sed	X		1		X								
	BH-2-SS	3-24-04	0930	Sed		X	4	X		X	X		X				
	BH-2-BC	3-24-04	0910	Sed	X		1		X								to be archived
	BH2-BC	3-24-04	0930	Sed		X	4	X		X	X		X				
	BH4-SR	3-24-04	1330	Sed	X		1		X								composited from BH4 cores A+B (sulfides from core A (3 core layers)
	BH4-SR		1345			X	4	X		X	X		X				
	BH4-SS		1330		X		1		X								
	BH4-SS		1345			X	4	X		X	X		X				
	BH4-BC		1330		X		1		X								to be archived
	BH4-BC	↓	1345	↓		X	4	X		X	X		X				

RELINQUISHED BY: (signature)	DATE/TIME 3-24-04 1818	RECEIVED BY: (signature)	LABORATORY NAME: ARI
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)	LAB ADDRESS:
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)	LAB PHONE: LAB CONTACT PERSON: Mary Lou Fox
			POLARIS CONTACT PERSON: POLARIS P.O. NUMBER:

LAB PROJECT NUMBER:

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CHAIN OF CUSTODY RECORD

POLARIS PROJECT # 1002.027	PROJECT NAME: P66 Sedcap Pier 64/65
CLIENT: Port of Seattle	LOCATION: Bell Harbor Marina
PROJECT MANAGER: Jerry Erickson	SEND REPORTS TO: Jerry Erickson
SAMPLER: (SIGNATURE)	

ANALYSIS REQUESTED

Letters are on Jar Tops and Jar labels

Analytes per MaryLou Fox

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	Grain size	Total Sulfides (A)	TOC	SVOA's (B)	PAHs, BCBs, BEHP (C)	Mercury (D)	Dibenzofuran (E)	LOCATION/REMARKS:
	CS1-SR	3/24/04	1000	SED	X		1		X						composited from CS1 cores A+B (sulfides from core A) 3 core layers
	CS1-SR	3/24/04	1030			X	4	X		X	X		X		
	CS1-SS		1000		X		1		X						
	CS1-SS		1030			X	4	X		X	X		X		
	CS1-BC		1000		X		1		X						
	CS1-BC		1030			X	4	X		X	X		X		
	CS1-INCL1	3/24/04	1100	SED	X		1		X						CS1 INCL1 and CS1 INCL2 taken from CS1 core C
	CS1-INCL1		1100		X		4	X		X	X		X		
	CS1-INCL2		1100		X		1		X						
	CS1-INCL2		1100		X		4	X		X	X		X		
	CS1-INCL3		1140		X		1		X						
	CS1-INCL3		1140		X		4	X		X	X		X		CS1 INCL3 taken from core D

RELINQUISHED BY: (signature)	DATE/TIME 3-24-04 1818	RECEIVED BY: (signature)	LABORATORY NAME: ARI / LAB PROJECT NUMBER:
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)	LAB ADDRESS:
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)	LAB PHONE: / LAB CONTACT PERSON: MaryLou Fox
			POLARIS CONTACT PERSON: / POLARIS P.O. NUMBER:

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Case Narrative

Client Project – 1002.027 / P66 Sed Cap (Pier 64/65)
ARI Job No: GL75
Matrix: Sediment
Date: May 3, 2004

Semivolatile Organic Compounds Analysis referencing EPA SW-846 method 8270C

The extraction of these samples was batched with the extraction of the samples received on 3/23 (GL44).

Sulfur began to fall out of the extracts for many of the samples as the extracts were concentrated down. A final volume of 1.0 mL was used for samples where this began to happen, rather than 0.5 mL.

The extracts for several samples were pre-diluted 1:3 due to extract appearance.

The area for the internal standard, d12-perylene, was low following the initial analysis of sample **CS1-SS**. This sample was diluted and re-analyzed. The areas for all internal standards were within acceptable QC limits for the dilution. The results for both analyses of this sample have been submitted.

No further analytical complications were noted.

PSDDA PCB Analysis referencing EPA SW-846 method 8082

The extraction of these samples was batched with the extraction of the samples received on 3/23 (GL44).

The samples required additional cleaning for the sulfur after the initial sulfur cleaning and the sample matrices tended to lower the continuing calibrations (C-Cals). The samples were re-analyzed after the initial analyses due to failing C-Cals. The C-Cal closing the bracket containing samples **CS1-SR, CS1-SS, CS1-BC, CS1-INCL1, CS1-INCL2,** and **CS1-INCL3** was below the QC limits in the re-analyses as well as the initial analyses. Only the second analyses have been reported for these samples. The C-Cal closing the bracket of samples was 1% below the QC limit for AR1254 and 3% below the QC limit for AR1260. The C-Cals bracketing the dilution of sample **CS1-SS** were good. Both analyses of this sample have been reported.

No further analytical complications were noted.

Mercury Analysis referencing EPA SW-846 method 7471A

The analyses of these samples were batched with those in the delivery group of samples received on 3/23(GL44).

The method blank and standard reference material are reported originally for the 3/23 delivery group (ARI job number GL44). A copy of each is included in this data package for your convenience.

No analytical complications were noted.

Conventionals Analyses referencing EPA method 376.2 and Plumb, 1981

The TOC analyses of these samples were batched with those of the samples received on 3/23 (GL44).

A matrix spike (MS) was prepared and analyzed for sulfide in conjunction with sample **BH9-SR**. The spike recovery was low following the initial analysis of the MS. The amount of sulfide spiked with respect to the relatively high amount of sulfide that was already present in this sample was too low to yield meaningful recovery information. Since the percent recovery for sulfide was within acceptable QC limits for the corresponding LCS, no corrective actions were taken.

No further analytical complications were noted.

Grain Size Analysis

A separate case narrative is provided by the geotechnical lab manager.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Client: Polaris Applied Sciences, Inc. Project No.: GL75

Client Project: P66 Sed Cap

Case Narrative

1. The samples were submitted for grain size analysis according to PSEP methodology.
2. The samples were run in a single batch and one sample was chosen for triplicate analysis. The triplicate data is reported on the QA summary.
3. The percent retained on the sieve size fractions are calculated using a moisture content measured at the time of sample preparation. Sometimes, especially with samples containing mostly sand, a small variation in the before and after moisture contents can lead to negative values for the first pipette value (5 phi). The before/after moisture content is reported as the "QA Ratio" on the QA summary page. From this, it can be seen that all of the samples are within our internal 90-105 percent range, but some samples were recalculated using the after moisture content to eliminate the negative values. These samples were BH9-SR-2 (one of the triplicate samples), BH9-SR-FS, BH4-SR, CSI-BC, and BH2-SR.
4. Sample CSI-BC had all the pipette readings adjusted to "0" because they were negative. Calgon is added to keep the particles from flocculating. If there not enough fines in a test sample (5 grams) random weighing errors can cause the phi values to be negative when the weight of Calgon is subtracted. Samples BH2-SS and CSI-BC had less than 5 grams of solids in the pipette portion of the analysis. The weight of the test sample is limited by the capacity of the balance (200 g x 0.0001 g).
5. The data is provided in summary tables and plots.
6. There were no noted anomalies in the samples or methods on this project.

Approved by: Harold Berry Date: 4/23/04
Title: Geotechnical Division Manager

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ORGANIC COMPOUND
DATA REPORTING QUALIFIERS

U — Indicates the compound was undetected at the reported concentration. (Same as ND).

J — Indicates an estimated concentration when the value is less than the calculated reporting limit.

D — Indicates the surrogate/spike(s) was not detected, due to dilution of extract.

NR — Indicates the surrogate recovery cannot be reported due to matrix interference.

E — Indicates a value above the linear range of the detector. Sample dilution required.

S — Indicates no value reported due to saturation of the detector. Sample dilution required.

NA — Indicates compound not analyzed for.

M — Indicates an estimated value of analyte found and confirmed by analyst but with low spectral match. (GC-MS)

B — Indicates possible/probable blank contamination. Flagged when the analyte is detected in the blank as well as the sample.

Y — Indicates raised reporting limit due to background interference or to activity on the instrument. Compound is still not detected at or above the raised level.

C — Indicates a probable hit that cannot be confirmed due to matrix interference (GC).

P — Indicates a high RPD between detected concentrations for dual column GC analyses, without obvious interference.

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: MB-040604
METHOD BLANK

Lab Sample ID: MB-040604
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Date Extracted: 04/06/04
Date Analyzed: 04/12/04 18:10
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.0 g
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: NA
pH: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	20	< 20 U
91-57-6	2-Methylnaphthalene	20	< 20 U
208-96-8	Acenaphthylene	20	< 20 U
83-32-9	Acenaphthene	20	< 20 U
86-73-7	Fluorene	20	< 20 U
85-01-8	Phenanthrene	20	< 20 U
120-12-7	Anthracene	20	< 20 U
206-44-0	Fluoranthene	20	< 20 U
129-00-0	Pyrene	20	< 20 U
56-55-3	Benzo(a)anthracene	20	< 20 U
218-01-9	Chrysene	20	< 20 U
205-99-2	Benzo(b)fluoranthene	20	< 20 U
207-08-9	Benzo(k)fluoranthene	20	< 20 U
50-32-8	Benzo(a)pyrene	20	< 20 U
193-39-5	Indeno(1,2,3-cd)pyrene	20	< 20 U
53-70-3	Dibenz(a,h)anthracene	20	< 20 U
191-24-2	Benzo(g,h,i)perylene	20	< 20 U
132-64-9	Dibenzofuran	20	< 20 U
117-81-7	bis(2-Ethylhexyl)phthalate	20	< 20 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery

d14-p-Terphenyl	107%
d10-Diphenyl	82.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: BH9-SR
SAMPLE

Lab Sample ID: GL75A
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 15:21
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 31.4%
pH: 8.0

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	39	120
91-57-6	2-Methylnaphthalene	39	54
208-96-8	Acenaphthylene	39	< 39 U
83-32-9	Acenaphthene	39	62
86-73-7	Fluorene	39	59
85-01-8	Phenanthrene	39	250
120-12-7	Anthracene	39	83
206-44-0	Fluoranthene	39	270
129-00-0	Pyrene	39	340
56-55-3	Benzo(a)anthracene	39	160
218-01-9	Chrysene	39	220
205-99-2	Benzo(b)fluoranthene	39	250
207-08-9	Benzo(k)fluoranthene	39	270
50-32-8	Benzo(a)pyrene	39	210
193-39-5	Indeno(1,2,3-cd)pyrene	39	69
53-70-3	Dibenz(a,h)anthracene	39	< 39 U
191-24-2	Benzo(g,h,i)perylene	39	63
132-64-9	Dibenzofuran	39	42
117-81-7	bis(2-Ethylhexyl)phthalate	39	140

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	96.8%
d10-Diphenyl	85.6%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: BH9-SR-FS
SAMPLE

Lab Sample ID: GL75D
LIMS ID: 04-4587
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 15:50
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 32.1%
pH: 8.0

CAS Number	Analyte	RL	Result
91-20-3	**Naphthalene**	39	100
91-57-6	**2-Methylnaphthalene**	39	46
208-96-8	**Acenaphthylene**	39	41
83-32-9	**Acenaphthene**	39	68
86-73-7	**Fluorene**	39	69
85-01-8	**Phenanthrene**	39	290
120-12-7	**Anthracene**	39	100
206-44-0	**Fluoranthene**	39	360
129-00-0	**Pyrene**	39	440
56-55-3	**Benzo(a)anthracene**	39	170
218-01-9	**Chrysene**	39	240
205-99-2	**Benzo(b)fluoranthene**	39	270
207-08-9	**Benzo(k)fluoranthene**	39	310
50-32-8	**Benzo(a)pyrene**	39	240
193-39-5	**Indeno(1,2,3-cd)pyrene**	39	87
53-70-3	Dibenz(a,h)anthracene	39	< 39 U
191-24-2	**Benzo(g,h,i)perylene**	39	69
132-64-9	**Dibenzofuran**	39	42
117-81-7	**bis(2-Ethylhexyl)phthalate**	39	100

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	93.6%
d10-Diphenyl	77.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: BH8-SR
SAMPLE

Lab Sample ID: GL75G
LIMS ID: 04-4590
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 00:35
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 35.8%
pH: 7.7

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	59	< 59 U
91-57-6	**2-Methylnaphthalene**	**59**	**90**
208-96-8	**Acenaphthylene**	**59**	**62**
83-32-9	**Acenaphthene**	**59**	**120**
86-73-7	**Fluorene**	**59**	**240**
85-01-8	**Phenanthrene**	**59**	**1,600**
120-12-7	**Anthracene**	**59**	**460**
206-44-0	**Fluoranthene**	**59**	**1,000**
129-00-0	**Pyrene**	**59**	**1,200**
56-55-3	**Benzo(a)anthracene**	**59**	**520**
218-01-9	**Chrysene**	**59**	**630**
205-99-2	**Benzo(b)fluoranthene**	**59**	**600**
207-08-9	**Benzo(k)fluoranthene**	**59**	**520**
50-32-8	**Benzo(a)pyrene**	**59**	**580**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**59**	**200**
53-70-3	**Dibenz(a,h)anthracene**	**59**	**68**
191-24-2	**Benzo(g,h,i)perylene**	**59**	**210**
132-64-9	Dibenzofuran	59	< 59 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**59**	**130**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	88.3%
d10-Diphenyl	80.4%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: BH2-SR
SAMPLE

Lab Sample ID: GL75J
LIMS ID: 04-4593
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 01:05
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO
Alumina: NO

Sample Amount: 26.2 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 5.6%
pH: 8.7

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	57	< 57 U
91-57-6	2-Methylnaphthalene	57	< 57 U
208-96-8	Acenaphthylene	57	< 57 U
83-32-9	Acenaphthene	57	< 57 U
86-73-7	Fluorene	57	< 57 U
85-01-8	**Phenanthrene**	**57**	**110**
120-12-7	**Anthracene**	**57**	**150**
206-44-0	**Fluoranthene**	**57**	**270**
129-00-0	**Pyrene**	**57**	**370**
56-55-3	**Benzo(a)anthracene**	**57**	**260**
218-01-9	**Chrysene**	**57**	**370**
205-99-2	**Benzo(b)fluoranthene**	**57**	**380**
207-08-9	**Benzo(k)fluoranthene**	**57**	**380**
50-32-8	**Benzo(a)pyrene**	**57**	**310**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**57**	**91**
53-70-3	Dibenz(a,h)anthracene	57	< 57 U
191-24-2	**Benzo(g,h,i)perylene**	**57**	**77**
132-64-9	Dibenzofuran	57	< 57 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**57**	**62**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	87.4%
d10-Diphenyl	80.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: BH2-SS
SAMPLE

Lab Sample ID: GL75K
LIMS ID: 04-4594
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 16:20
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 26.4 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 4.1%
pH: 7.7

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	19	< 19 U
91-57-6	2-Methylnaphthalene	19	< 19 U
208-96-8	Acenaphthylene	19	< 19 U
83-32-9	Acenaphthene	19	< 19 U
86-73-7	Fluorene	19	< 19 U
85-01-8	Phenanthrene	19	< 19 U
120-12-7	Anthracene	19	< 19 U
206-44-0	Fluoranthene	19	< 19 U
129-00-0	Pyrene	19	< 19 U
56-55-3	Benzo(a)anthracene	19	< 19 U
218-01-9	Chrysene	19	< 19 U
205-99-2	Benzo(b)fluoranthene	19	< 19 U
207-08-9	Benzo(k)fluoranthene	19	< 19 U
50-32-8	Benzo(a)pyrene	19	< 19 U
193-39-5	Indeno(1,2,3-cd)pyrene	19	< 19 U
53-70-3	Dibenz(a,h)anthracene	19	< 19 U
191-24-2	Benzo(g,h,i)perylene	19	< 19 U
132-64-9	Dibenzofuran	19	< 19 U
117-81-7	bis(2-Ethylhexyl)phthalate	19	< 19 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery

d14-p-Terphenyl	102%
d10-Diphenyl	81.6%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: BH4-SR
SAMPLE

Lab Sample ID: GL75M
LIMS ID: 04-4596
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 02:04
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO
Alumina: NO

Sample Amount: 26.1 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 22.1%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	110	< 110 U
91-57-6	2-Methylnaphthalene	110	< 110 U
208-96-8	Acenaphthylene	110	< 110 U
83-32-9	Acenaphthene	110	< 110 U
86-73-7	Fluorene	110	< 110 U
85-01-8	**Phenanthrene**	**110**	**500**
120-12-7	Anthracene	110	< 110 U
206-44-0	**Fluoranthene**	**110**	**630**
129-00-0	**Pyrene**	**110**	**660**
56-55-3	**Benzo(a)anthracene**	**110**	**260**
218-01-9	**Chrysene**	**110**	**420**
205-99-2	**Benzo(b)fluoranthene**	**110**	**390**
207-08-9	**Benzo(k)fluoranthene**	**110**	**470**
50-32-8	**Benzo(a)pyrene**	**110**	**340**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**110**	**120**
53-70-3	Dibenz(a,h)anthracene	110	< 110 U
191-24-2	Benzo(g,h,i)perylene	110	< 110 U
132-64-9	Dibenzofuran	110	< 110 U
117-81-7	bis(2-Ethylhexyl)phthalate	110	< 110 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	64.8%
d10-Diphenyl	62.9%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: BH4-SS
SAMPLE

Lab Sample ID: GL75N
LIMS ID: 04-4597
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 16:50
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.5%
pH: 8.3

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	20	< 20 U
91-57-6	2-Methylnaphthalene	20	< 20 U
208-96-8	Acenaphthylene	20	< 20 U
83-32-9	Acenaphthene	20	< 20 U
86-73-7	Fluorene	20	< 20 U
85-01-8	**Phenanthrene**	**20**	**47**
120-12-7	**Anthracene**	**20**	**29**
206-44-0	**Fluoranthene**	**20**	**76**
129-00-0	**Pyrene**	**20**	**140**
56-55-3	**Benzo(a)anthracene**	**20**	**45**
218-01-9	**Chrysene**	**20**	**67**
205-99-2	**Benzo(b)fluoranthene**	**20**	**90**
207-08-9	**Benzo(k)fluoranthene**	**20**	**89**
50-32-8	**Benzo(a)pyrene**	**20**	**69**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**20**	**23**
53-70-3	Dibenz(a,h)anthracene	20	< 20 U
191-24-2	**Benzo(g,h,i)perylene**	**20**	**19 J**
132-64-9	Dibenzofuran	20	< 20 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**20**	**39**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	102%
d10-Diphenyl	85.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS **Sample ID: CS1-SR**
Page 1 of 1 SAMPLE

Lab Sample ID: GL75P
LIMS ID: 04-4599
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 17:20
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 30.2%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	120	160
91-57-6	2-Methylnaphthalene	120	130
208-96-8	Acenaphthylene	120	200
83-32-9	Acenaphthene	120	530
86-73-7	Fluorene	120	560
85-01-8	Phenanthrene	120	2,600
120-12-7	Anthracene	120	950
206-44-0	Fluoranthene	120	4,000
129-00-0	Pyrene	120	5,500
56-55-3	Benzo(a)anthracene	120	1,800
218-01-9	Chrysene	120	2,000
205-99-2	Benzo(b)fluoranthene	120	2,200
207-08-9	Benzo(k)fluoranthene	120	2,000
50-32-8	Benzo(a)pyrene	120	1,700
193-39-5	Indeno(1,2,3-cd)pyrene	120	340
53-70-3	Dibenz(a,h)anthracene	120	150
191-24-2	Benzo(g,h,i)perylene	120	320
132-64-9	Dibenzofuran	120	360
117-81-7	bis(2-Ethylhexyl)phthalate	120	360

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	82.1%
d10-Diphenyl	69.6%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: CS1-SS
SAMPLE

Lab Sample ID: GL75Q
LIMS ID: 04-4600
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 17:49
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 17.5 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 3.00
Percent Moisture: 32.3%
pH: 8.2

CAS Number	Analyte	RL	Result	
91-20-3	Naphthalene	86	350	
91-57-6	2-Methylnaphthalene	86	1,100	
208-96-8	Acenaphthylene	86	330	
83-32-9	Acenaphthene	86	7,900	E
86-73-7	Fluorene	86	11,000	E
85-01-8	Phenanthrene	86	32,000	E
120-12-7	Anthracene	86	5,500	
206-44-0	Fluoranthene	86	16,000	E
129-00-0	Pyrene	86	12,000	E
56-55-3	Benzo(a)anthracene	86	3,400	
218-01-9	Chrysene	86	3,400	
205-99-2	Benzo(b)fluoranthene	86	2,600	
207-08-9	Benzo(k)fluoranthene	86	2,600	
50-32-8	Benzo(a)pyrene	86	2,200	
193-39-5	Indeno(1,2,3-cd)pyrene	86	400	
53-70-3	Dibenz(a,h)anthracene	86	170	
191-24-2	Benzo(g,h,i)perylene	86	360	
132-64-9	Dibenzofuran	86	7,200	E
117-81-7	bis(2-Ethylhexyl)phthalate	86	140	

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	104%
d10-Diphenyl	76.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: CS1-SS
DILUTION

Lab Sample ID: GL75Q
LIMS ID: 04-4600
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/21/04 14:23
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 17.5 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 50.0
Percent Moisture: 32.3%
pH: 8.2

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	1400	< 1,400 U
91-57-6	2-Methylnaphthalene	1400	< 1,400 U
208-96-8	Acenaphthylene	1400	< 1,400 U
83-32-9	**Acenaphthene**	**1400**	**9,500**
86-73-7	**Fluorene**	**1400**	**12,000**
85-01-8	**Phenanthrene**	**1400**	**41,000**
120-12-7	**Anthracene**	**1400**	**5,400**
206-44-0	**Fluoranthene**	**1400**	**20,000**
129-00-0	**Pyrene**	**1400**	**15,000**
56-55-3	**Benzo(a)anthracene**	**1400**	**3,300**
218-01-9	**Chrysene**	**1400**	**3,400**
205-99-2	**Benzo(b)fluoranthene**	**1400**	**2,200**
207-08-9	**Benzo(k)fluoranthene**	**1400**	**2,200**
50-32-8	**Benzo(a)pyrene**	**1400**	**1,800**
193-39-5	Indeno(1,2,3-cd)pyrene	1400	< 1,400 U
53-70-3	Dibenz(a,h)anthracene	1400	< 1,400 U
191-24-2	Benzo(g,h,i)perylene	1400	< 1,400 U
132-64-9	**Dibenzofuran**	**1400**	**7,700**
117-81-7	bis(2-Ethylhexyl)phthalate	1400	< 1,400 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery

d14-p-Terphenyl	D
d10-Diphenyl	D

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: CS1-BC
SAMPLE

Lab Sample ID: GL75R
LIMS ID: 04-4601
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 18:19
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.4 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1.00
Percent Moisture: 10.4%
pH: 8.6

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	20	97
91-57-6	2-Methylnaphthalene	20	250
208-96-8	Acenaphthylene	20	39
83-32-9	Acenaphthene	20	1,200
86-73-7	Fluorene	20	1,700 E
85-01-8	Phenanthrene	20	6,200 E
120-12-7	Anthracene	20	720
206-44-0	Fluoranthene	20	5,100 E
129-00-0	Pyrene	20	3,100 E
56-55-3	Benzo(a)anthracene	20	990
218-01-9	Chrysene	20	790
205-99-2	Benzo(b)fluoranthene	20	350
207-08-9	Benzo(k)fluoranthene	20	340
50-32-8	Benzo(a)pyrene	20	190
193-39-5	Indeno(1,2,3-cd)pyrene	20	31
53-70-3	Dibenz(a,h)anthracene	20	< 20 U
191-24-2	Benzo(g,h,i)perylene	20	21
132-64-9	Dibenzofuran	20	1,000
117-81-7	bis(2-Ethylhexyl)phthalate	20	< 20 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	109%
d10-Diphenyl	83.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: CS1-BC
DILUTION

Lab Sample ID: GL75R
LIMS ID: 04-4601
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/21/04 14:59
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.4 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 10.0
Percent Moisture: 10.4%
pH: 8.6

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	200	< 200 U
91-57-6	**2-Methylnaphthalene**	**200**	**220**
208-96-8	Acenaphthylene	200	< 200 U
83-32-9	**Acenaphthene**	**200**	**1,300**
86-73-7	**Fluorene**	**200**	**1,700**
85-01-8	**Phenanthrene**	**200**	**7,500**
120-12-7	**Anthracene**	**200**	**760**
206-44-0	**Fluoranthene**	**200**	**5,400**
129-00-0	**Pyrene**	**200**	**3,000**
56-55-3	**Benzo(a)anthracene**	**200**	**900**
218-01-9	**Chrysene**	**200**	**790**
205-99-2	**Benzo(b)fluoranthene**	**200**	**260**
207-08-9	**Benzo(k)fluoranthene**	**200**	**250**
50-32-8	Benzo(a)pyrene	200	< 200 U
193-39-5	Indeno(1,2,3-cd)pyrene	200	< 200 U
53-70-3	Dibenz(a,h)anthracene	200	< 200 U
191-24-2	Benzo(g,h,i)perylene	200	< 200 U
132-64-9	**Dibenzofuran**	**200**	**1,000**
117-81-7	bis(2-Ethylhexyl)phthalate	200	< 200 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	88.8%
d10-Diphenyl	78.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: CS1-INCL1
SAMPLE

Lab Sample ID: GL75S
LIMS ID: 04-4602
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 18:49
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 31.3%
pH: 8.4

CAS Number	Analyte	RL	Result
91-20-3	**Naphthalene**	**120**	**250**
91-57-6	2-Methylnaphthalene	120	< 120 U
208-96-8	**Acenaphthylene**	**120**	**370**
83-32-9	**Acenaphthene**	**120**	**380**
86-73-7	**Fluorene**	**120**	**300**
85-01-8	**Phenanthrene**	**120**	**2,000**
120-12-7	**Anthracene**	**120**	**1,500**
206-44-0	**Fluoranthene**	**120**	**12,000 E**
129-00-0	**Pyrene**	**120**	**13,000 E**
56-55-3	**Benzo(a)anthracene**	**120**	**3,900**
218-01-9	**Chrysene**	**120**	**5,500**
205-99-2	**Benzo(b)fluoranthene**	**120**	**5,500**
207-08-9	**Benzo(k)fluoranthene**	**120**	**4,500**
50-32-8	**Benzo(a)pyrene**	**120**	**3,400**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**120**	**710**
53-70-3	**Dibenz(a,h)anthracene**	**120**	**280**
191-24-2	**Benzo(g,h,i)perylene**	**120**	**560**
132-64-9	**Dibenzofuran**	**120**	**150**
117-81-7	**bis(2-Ethylhexyl)phthalate**	**120**	**200**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	94.3%
d10-Diphenyl	75.4%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: CS1-INCL1
DILUTION

Lab Sample ID: GL75S
LIMS ID: 04-4602
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/21/04 15:29
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 10.0
Percent Moisture: 31.3%
pH: 8.4

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	390	< 390 U
91-57-6	2-Methylnaphthalene	390	< 390 U
208-96-8	Acenaphthylene	390	< 390 U
83-32-9	**Acenaphthene**	**390**	**410**
86-73-7	Fluorene	390	< 390 U
85-01-8	**Phenanthrene**	**390**	**2,100**
120-12-7	**Anthracene**	**390**	**1,400**
206-44-0	**Fluoranthene**	**390**	**15,000**
129-00-0	**Pyrene**	**390**	**13,000**
56-55-3	**Benzo(a)anthracene**	**390**	**4,000**
218-01-9	**Chrysene**	**390**	**5,800**
205-99-2	**Benzo(b)fluoranthene**	**390**	**3,900**
207-08-9	**Benzo(k)fluoranthene**	**390**	**4,300**
50-32-8	**Benzo(a)pyrene**	**390**	**3,200**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**390**	**1,300**
53-70-3	**Dibenz(a,h)anthracene**	**390**	**520**
191-24-2	**Benzo(g,h,i)perylene**	**390**	**1,300**
132-64-9	Dibenzofuran	390	< 390 U
117-81-7	bis(2-Ethylhexyl)phthalate	390	< 390 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	80.8%
d10-Diphenyl	81.6%

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Sample ID: CS1-INCL2
SAMPLE

Lab Sample ID: GL75T
LIMS ID: 04-4603
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 19:18
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 33.6%
pH: 8.4

CAS Number	Analyte	RL	Result
91-20-3	**Naphthalene**	**120**	**240**
91-57-6	2-Methylnaphthalene	120	< 120 U
208-96-8	**Acenaphthylene**	**120**	**380**
83-32-9	**Acenaphthene**	**120**	**320**
86-73-7	**Fluorene**	**120**	**340**
85-01-8	**Phenanthrene**	**120**	**2,000**
120-12-7	**Anthracene**	**120**	**1,300**
206-44-0	**Fluoranthene**	**120**	**3,600**
129-00-0	**Pyrene**	**120**	**11,000 E**
56-55-3	**Benzo(a)anthracene**	**120**	**2,000**
218-01-9	**Chrysene**	**120**	**2,500**
205-99-2	**Benzo(b)fluoranthene**	**120**	**3,900**
207-08-9	**Benzo(k)fluoranthene**	**120**	**4,100**
50-32-8	**Benzo(a)pyrene**	**120**	**3,000**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**120**	**630**
53-70-3	**Dibenz(a,h)anthracene**	**120**	**270**
191-24-2	**Benzo(g,h,i)perylene**	**120**	**540**
132-64-9	**Dibenzofuran**	**120**	**200**
117-81-7	**bis(2-Ethylhexyl)phthalate**	**120**	**320**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	104%
d10-Diphenyl	82.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
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Sample ID: CS1-INCL2
DILUTION

Lab Sample ID: GL75T
LIMS ID: 04-4603
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/21/04 16:01
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 10.0
Percent Moisture: 33.6%
pH: 8.4

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	390	< 390 U
91-57-6	2-Methylnaphthalene	390	< 390 U
208-96-8	Acenaphthylene	390	< 390 U
83-32-9	Acenaphthene	390	< 390 U
86-73-7	Fluorene	390	< 390 U
85-01-8	**Phenanthrene**	**390**	**1,900**
120-12-7	**Anthracene**	**390**	**1,100**
206-44-0	**Fluoranthene**	**390**	**3,500**
129-00-0	**Pyrene**	**390**	**9,800**
56-55-3	**Benzo(a)anthracene**	**390**	**1,900**
218-01-9	**Chrysene**	**390**	**2,500**
205-99-2	**Benzo(b)fluoranthene**	**390**	**2,700**
207-08-9	**Benzo(k)fluoranthene**	**390**	**3,100**
50-32-8	**Benzo(a)pyrene**	**390**	**2,600**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**390**	**960**
53-70-3	**Dibenz(a,h)anthracene**	**390**	**400**
191-24-2	**Benzo(g,h,i)perylene**	**390**	**930**
132-64-9	Dibenzofuran	390	< 390 U
117-81-7	bis(2-Ethylhexyl)phthalate	390	< 390 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	78.4%
d10-Diphenyl	75.2%

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Sample ID: CS1-INCL3
SAMPLE

Lab Sample ID: GL75U
LIMS ID: 04-4604
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/13/04 19:48
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 34.2%
pH: 7.8

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	120	230
91-57-6	2-Methylnaphthalene	120	110 J
208-96-8	Acenaphthylene	120	190
83-32-9	Acenaphthene	120	260
86-73-7	Fluorene	120	290
85-01-8	Phenanthrene	120	1,600
120-12-7	Anthracene	120	760
206-44-0	Fluoranthene	120	2,000
129-00-0	Pyrene	120	6,200
56-55-3	Benzo(a)anthracene	120	1,200
218-01-9	Chrysene	120	1,500
205-99-2	Benzo(b)fluoranthene	120	2,300
207-08-9	Benzo(k)fluoranthene	120	2,100
50-32-8	Benzo(a)pyrene	120	1,700
193-39-5	Indeno(1,2,3-cd)pyrene	120	320
53-70-3	Dibenz(a,h)anthracene	120	140
191-24-2	Benzo(g,h,i)perylene	120	300
132-64-9	Dibenzofuran	120	180
117-81-7	bis(2-Ethylhexyl)phthalate	120	190

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	92.2%
d10-Diphenyl	78.2%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: LCS-040604
LAB CONTROL

Lab Sample ID: LCS-040604
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/12/04 18:40
Instrument/Analyst: NT1/LJR
GPC Cleanup: NO

Sample Amount: 25.0 g
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Alumina Cleanup: NO

Analyte	Lab Control	Spike Added	Recovery
Naphthalene	324	500	64.8%
Acenaphthene	330	500	66.0%
Fluoranthene	400	500	80.0%
Benzo(a)anthracene	328	500	65.6%
bis(2-Ethylhexyl)phthalate	472	500	94.4%

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	86.0%
d10-Diphenyl	68.8%

Results reported in µg/kg

ANALYTICAL RESOURCES INCORPORATED

SW8270 PNA SURROGATE RECOVERY SUMMARY

Matrix: Sediment

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027

Client ID	TER	DPH	TOT OUT
MB-040604	107%	82.8%	0
LCS-040604	86.0%	68.8%	0
BH9-SR	96.8%	85.6%	0
BH9-SR-FS	93.6%	77.2%	0
BH8-SR	88.3%	80.4%	0
BH2-SR	87.4%	80.3%	0
BH2-SS	102%	81.6%	0
BH4-SR	64.8%	62.9%	0
BH4-SS	102%	85.2%	0
CS1-SR	82.1%	69.6%	0
CS1-SS	104%	76.3%	0
CS1-SS DL	D	D	0
CS1-BC	109%	83.2%	0
CS1-BC DL	88.8%	78.8%	0
CS1-INCL1	94.3%	75.4%	0
CS1-INCL1 DL	80.8%	81.6%	0
CS1-INCL2	104%	82.8%	0
CS1-INCL2 DL	78.4%	75.2%	0
CS1-INCL3	92.2%	78.2%	0

	LCS/MB LIMITS	QC LIMITS
(TER) = d14-p-Terphenyl	(30-160)	(30-160)
(DPH) = d10-Diphenyl	(30-160)	(30-160)

Prep Method: SW3550
Log Number Range: 04-4584 to 04-4604

ANALYTICAL RESOURCES INCORPORATED

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PSDDA PCB by GC/ECD
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Sample ID: MB-040604
METHOD BLANK

Lab Sample ID: MB-040604
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized: [signature]
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Date Extracted: 04/06/04
Date Analyzed: 04/09/04 21:01
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.0 g
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: NA
Percent Moisture: NA

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	4.0	< 4.0 U
53469-21-9	Aroclor 1242	4.0	< 4.0 U
12672-29-6	Aroclor 1248	4.0	< 4.0 U
11097-69-1	Aroclor 1254	4.0	< 4.0 U
11096-82-5	Aroclor 1260	4.0	< 4.0 U
11104-28-2	Aroclor 1221	4.0	< 4.0 U
11141-16-5	Aroclor 1232	4.0	< 4.0 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	84.2%
Tetrachlorometaxylene	83.2%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: BH9-SR
SAMPLE

Lab Sample ID: GL75A
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/10/04 02:46
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.0
Percent Moisture: 31.4%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	**Aroclor 1248**	**3.9**	**14**
11097-69-1	**Aroclor 1254**	**3.9**	**23**
11096-82-5	**Aroclor 1260**	**3.9**	**14 P**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	63.0%
Tetrachlorometaxylene	54.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
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Sample ID: BH9-SR-FS
SAMPLE

Lab Sample ID: GL75D
LIMS ID: 04-4587
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/10/04 03:09
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.0
Percent Moisture: 32.1%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	**Aroclor 1248**	**3.9**	**12**
11097-69-1	**Aroclor 1254**	**3.9**	**14**
11096-82-5	**Aroclor 1260**	**3.9**	**9.8**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	57.8%
Tetrachlorometaxylene	47.2%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: BH8-SR
SAMPLE

Lab Sample ID: GL75G
LIMS ID: 04-4590
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/10/04 03:32
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 7.7
Percent Moisture: 35.8%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	4.0	< 4.0 U
53469-21-9	Aroclor 1242	4.0	< 4.0 U
12672-29-6	**Aroclor 1248**	**4.0**	**11**
11097-69-1	**Aroclor 1254**	**4.0**	**25**
11096-82-5	**Aroclor 1260**	**4.0**	**22 P**
11104-28-2	Aroclor 1221	4.0	< 4.0 U
11141-16-5	Aroclor 1232	4.0	< 4.0 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	74.0%
Tetrachlorometaxylene	54.5%

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Sample ID: BH2-SR
SAMPLE

Lab Sample ID: GL75J
LIMS ID: 04-4593
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/10/04 03:56
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 26.2 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.7
Percent Moisture: 5.6%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.8	< 3.8 U
53469-21-9	Aroclor 1242	3.8	< 3.8 U
12672-29-6	Aroclor 1248	3.8	< 3.8 U
11097-69-1	**Aroclor 1254**	**3.8**	**5.6**
11096-82-5	Aroclor 1260	3.8	< 3.8 U
11104-28-2	Aroclor 1221	3.8	< 3.8 U
11141-16-5	Aroclor 1232	3.8	< 3.8 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	64.2%
Tetrachlorometaxylene	58.2%

ANALYTICAL RESOURCES INCORPORATED

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Sample ID: BH2-SS
SAMPLE

Lab Sample ID: GL75K
LIMS ID: 04-4594
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/10/04 04:19
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 26.2 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 7.7
Percent Moisture: 4.1%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.8	< 3.8 U
53469-21-9	Aroclor 1242	3.8	< 3.8 U
12672-29-6	Aroclor 1248	3.8	< 3.8 U
11097-69-1	Aroclor 1254	3.8	< 3.8 U
11096-82-5	Aroclor 1260	3.8	< 3.8 U
11104-28-2	Aroclor 1221	3.8	< 3.8 U
11141-16-5	Aroclor 1232	3.8	< 3.8 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	74.0%
Tetrachlorometaxylene	75.2%

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Sample ID: BH4-SR
SAMPLE

Lab Sample ID: GL75M
LIMS ID: 04-4596
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/10/04 04:41
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 26.3 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.1
Percent Moisture: 22.1%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.8	< 3.8 U
53469-21-9	Aroclor 1242	3.8	< 3.8 U
12672-29-6	Aroclor 1248	15	< 15 Y
11097-69-1	**Aroclor 1254**	**3.8**	**34**
11096-82-5	**Aroclor 1260**	**3.8**	**28 P**
11104-28-2	Aroclor 1221	3.8	< 3.8 U
11141-16-5	Aroclor 1232	3.8	< 3.8 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	86.2%
Tetrachlorometaxylene	60.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: BH4-SS
SAMPLE

Lab Sample ID: GL75N
LIMS ID: 04-4597
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/10/04 05:04
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.3
Percent Moisture: 10.5%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	4.0	< 4.0 U
53469-21-9	Aroclor 1242	4.0	< 4.0 U
12672-29-6	Aroclor 1248	4.0	< 4.0 U
11097-69-1	**Aroclor 1254**	**4.0**	**11**
11096-82-5	**Aroclor 1260**	**4.0**	**26**
11104-28-2	Aroclor 1221	4.0	< 4.0 U
11141-16-5	Aroclor 1232	4.0	< 4.0 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	74.8%
Tetrachlorometaxylene	64.8%

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Sample ID: CS1-SR
SAMPLE

Lab Sample ID: GL75P
LIMS ID: 04-4599
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/14/04 17:21
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 10.0
Silica Gel: No
pH: 8.1
Percent Moisture: 30.2%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	40	< 40 U
53469-21-9	Aroclor 1242	40	< 40 U
12672-29-6	**Aroclor 1248**	**40**	**75**
11097-69-1	**Aroclor 1254**	**40**	**210 P**
11096-82-5	**Aroclor 1260**	**40**	**160**
11104-28-2	Aroclor 1221	40	< 40 U
11141-16-5	Aroclor 1232	40	< 40 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	NR
Tetrachlorometaxylene	80.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: CS1-SS
SAMPLE

Lab Sample ID: GL75Q
LIMS ID: 04-4600
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/14/04 17:42
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.2
Percent Moisture: 32.3%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	24	< 24 Y
11097-69-1	**Aroclor 1254**	**3.9**	**140 EP**
11096-82-5	**Aroclor 1260**	**3.9**	**150 EP**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	NR
Tetrachlorometaxylene	65.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: CS1-SS
DILUTION

Lab Sample ID: GL75Q
LIMS ID: 04-4600
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/17/04 05:20
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 5.00
Silica Gel: No
pH: 8.2
Percent Moisture: 32.3%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	20	< 20 U
53469-21-9	Aroclor 1242	20	< 20 U
12672-29-6	Aroclor 1248	20	< 20 U
11097-69-1	**Aroclor 1254**	**20**	**170 P**
11096-82-5	**Aroclor 1260**	**20**	**180 P**
11104-28-2	Aroclor 1221	20	< 20 U
11141-16-5	Aroclor 1232	20	< 20 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	NR
Tetrachlorometaxylene	70.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: CS1-BC
SAMPLE

Lab Sample ID: GL75R
LIMS ID: 04-4601
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/14/04 18:02
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.6
Percent Moisture: 10.4%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	3.9	< 3.9 U
11097-69-1	Aroclor 1254	3.9	< 3.9 U
11096-82-5	Aroclor 1260	3.9	< 3.9 U
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	82.2%
Tetrachlorometaxylene	61.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: CS1-INCL1
SAMPLE

Lab Sample ID: GL75S
LIMS ID: 04-4602
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/14/04 18:23
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 10.0
Silica Gel: No
pH: 8.4
Percent Moisture: 31.3%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	39	< 39 U
53469-21-9	Aroclor 1242	39	< 39 U
12672-29-6	Aroclor 1248	78	< 78 Y
11097-69-1	**Aroclor 1254**	**39**	**220**
11096-82-5	**Aroclor 1260**	**39**	**130**
11104-28-2	Aroclor 1221	39	< 39 U
11141-16-5	Aroclor 1232	39	< 39 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	NR
Tetrachlorometaxylene	72.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: CS1-INCL2
SAMPLE

Lab Sample ID: GL75T
LIMS ID: 04-4603
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/14/04 18:44
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.4 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 20.0
Silica Gel: No
pH: 8.4
Percent Moisture: 33.6%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	79	< 79 U
53469-21-9	Aroclor 1242	79	< 79 U
12672-29-6	Aroclor 1248	160	< 160 Y
11097-69-1	**Aroclor 1254**	**79**	**390**
11096-82-5	**Aroclor 1260**	**79**	**340**
11104-28-2	Aroclor 1221	79	< 79 U
11141-16-5	Aroclor 1232	79	< 79 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	NR
Tetrachlorometaxylene	80.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: CS1-INCL3
SAMPLE

Lab Sample ID: GL75U
LIMS ID: 04-4604
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/14/04 19:04
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.4 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 10.0
Silica Gel: No
pH: 7.8
Percent Moisture: 34.2%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	39	< 39 U
53469-21-9	Aroclor 1242	39	< 39 U
12672-29-6	Aroclor 1248	79	< 79 Y
11097-69-1	**Aroclor 1254**	**39**	**220**
11096-82-5	**Aroclor 1260**	**39**	**230**
11104-28-2	Aroclor 1221	39	< 39 U
11141-16-5	Aroclor 1232	39	< 39 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	NR
Tetrachlorometaxylene	72.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LCS-040604
LAB CONTROL

Lab Sample ID: LCS-040604
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Date Extracted: 04/06/04
Date Analyzed: 04/09/04 21:24
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.0 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: NA
Percent Moisture: NA

Analyte	Lab Control	Spike Added	Recovery
Aroclor 1016	31.6	40.0	79.0%
Aroclor 1260	32.8	40.0	82.0%

PCB Surrogate Recovery

Decachlorobiphenyl	89.8%
Tetrachlorometaxylene	84.5%

Results reported in µg/kg (ppb)

ANALYTICAL RESOURCES INCORPORATED

SW8082/PCB SOIL/SEDIMENTS SURROGATE RECOVERY SUMMARY

Matrix: Sediment

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027

Client ID	DCBP	TCMX	TOT OUT
MB-040604	84.2%	83.2%	0
LCS-040604	89.8%	84.5%	0
BH9-SR	63.0%	54.0%	0
BH9-SR-FS	57.8%	47.2%	0
BH8-SR	74.0%	54.5%	0
BH2-SR	64.2%	58.2%	0
BH2-SS	74.0%	75.2%	0
BH4-SR	86.2%	60.8%	0
BH4-SS	74.8%	64.8%	0
CS1-SR	NR	80.0%	0
CS1-SS	NR	65.8%	0
CS1-SS DL	NR	70.0%	0
CS1-BC	82.2%	61.0%	0
CS1-INCL1	NR	72.5%	0
CS1-INCL2	NR	80.0%	0
CS1-INCL3	NR	72.5%	0

	LCS/MB LIMITS	QC LIMITS
(DCBP) = Decachlorobiphenyl	(44-131)	(18-161)
(TCMX) = Tetrachlorometaxylene	(27-125)	(18-136)

Prep Method: SW3550B
Log Number Range: 04-4584 to 04-4604

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS **Sample ID: METHOD BLANK**

Lab Sample ID: GL44MB
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Percent Total Solids: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	7439-97-6	Mercury	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH9-SR
SAMPLE

Lab Sample ID: GL75A
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 68.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	7439-97-6	Mercury	0.06	0.06	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: BH9-SR-FS
SAMPLE

Lab Sample ID: GL75D
LIMS ID: 04-4587
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 66.6%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	7439-97-6	Mercury	0.07	0.07	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH8-SR
SAMPLE

Lab Sample ID: GL75G
LIMS ID: 04-4590
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 64.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.08	**0.10**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: BH2-SR
SAMPLE

Lab Sample ID: GL75J
LIMS ID: 04-4593
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 96.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	7439-97-6	Mercury	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH2-SS
SAMPLE

Lab Sample ID: GL75K
LIMS ID: 04-4594
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 96.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	7439-97-6	Mercury	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH4-SR
SAMPLE

Lab Sample ID: GL75M
LIMS ID: 04-4596
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 80.9%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.06	**0.14**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH4-SS
SAMPLE

Lab Sample ID: GL75N
LIMS ID: 04-4597
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 88.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.04	**0.08**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: CS1-SR
SAMPLE

Lab Sample ID: GL75P
LIMS ID: 04-4599
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 70.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	7439-97-6	Mercury	0.05	1.28	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: CS1-SS
SAMPLE

Lab Sample ID: GL75Q
LIMS ID: 04-4600
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 69.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.06	**6.12**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: STD REFERENCE
ERA D034

Lab Sample ID: GL44SRM
LIMS ID: 04-4431
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL44-Polaris Applied Sciences, Inc.
Project: P66 Sed Cap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Analyte	Analysis Method	Analysis Date	mg/kg-dry	Certified Value	Advisory Range
Mercury	7471A	04/02/04	11.7	9.4	6.2-12.6

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: CS1-BC
SAMPLE

Lab Sample ID: GL75R
LIMS ID: 04-4601
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 87.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	7439-97-6	Mercury	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: CS1-INCL1
SAMPLE

Lab Sample ID: GL75S
LIMS ID: 04-4602
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 71.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.06	**0.68**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: CS1-INCL2
SAMPLE

Lab Sample ID: GL75T
LIMS ID: 04-4603
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 61.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.08	**3.58**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: CS1-INCL3
SAMPLE

Lab Sample ID: GL75U
LIMS ID: 04-4604
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Percent Total Solids: 62.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/01/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.06	**2.01**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: MB-GL75**
Page 1 of 1 **METHOD BLANK**

Lab Sample ID: MB-GL75
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized: 04
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

METHOD BLANK RESULTS
CONVENTIONALS

Analyte	Analysis Date	Method	RL	Units	Result	
Total Solids	03/30/04	EPA 160.3 SM 2540 B	0.01	Percent	< 0.01	U
Preserved Total Solids	03/30/04	EPA 160.3 SM 2540 B	0.01	mg residue	< 0.01	U
Sulfide	03/30/04	EPA 376.2 SM4500S2-D	0.05	mg/L	< 0.05	U
Total Organic Carbon	04/06/04	Plumb,1981	0.020	Percent	< 0.020	U

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH9-SR**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL75A
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized: dlp
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	66.7
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	55.9
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D	100	178	mg/kg	2,700
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	2.9

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS

Sample ID: BH9-SR-FS
SAMPLE

Lab Sample ID: GL75D
LIMS ID: 04-4587
Matrix: Sediment
Data Release Authorized: [signature]
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	66.6
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	56.0
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D	100	178	mg/kg	1,800
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	3.0

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH8-SR**
 SAMPLE

Lab Sample ID: GL75G
LIMS ID: 04-4590
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	64.2
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	56.8
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D	50	87.6	mg/kg	840
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	2.5

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH2-SR**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL75J
LIMS ID: 04-4593
Matrix: Sediment
Data Release Authorized: QAP
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	95.9
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	82.5
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D	10	12.1	mg/kg	23.0
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	0.12

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH2-SS**
 SAMPLE

Lab Sample ID: GL75K
LIMS ID: 04-4594
Matrix: Sediment
Data Release Authorized: MP
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	96.6
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	87.5
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D		1.12	mg/kg	< 1.10 U
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	0.080

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH4-SR**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL75M
LIMS ID: 04-4596
Matrix: Sediment
Data Release Authorized: ap
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	77.2
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	74.9
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D	10	13.1	mg/kg	240
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	2.4

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH4-SS**
Page 1 of 1 SAMPLE

Lab Sample ID: GL75N
LIMS ID: 04-4597
Matrix: Sediment
Data Release Authorized: AAP
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	89.5
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	70.3
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D	100	142	mg/kg	570
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	0.51

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS1-SR**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL75P
LIMS ID: 04-4599
Matrix: Sediment
Data Release Authorized: AAP
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	67.2
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	65.8
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D	50	75.4	mg/kg	980
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	4.1

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS1-SS**
 SAMPLE

Lab Sample ID: GL75Q
LIMS ID: 04-4600
Matrix: Sediment
Data Release Authorized: ASP
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	68.6
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	59.4
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D	100	167	mg/kg	780
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	4.3

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS1-BC**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL75R
LIMS ID: 04-4601
Matrix: Sediment
Data Release Authorized: dd
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	87.2
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	82.8
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D	10	12.0	mg/kg	39.0
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	0.13

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS1-INCL1**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL75S
LIMS ID: 04-4602
Matrix: Sediment
Data Release Authorized: ad
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	70.2
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	65.9
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D	100	150	mg/kg	2,200
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	3.3

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS1-INCL2**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL75T
LIMS ID: 04-4603
Matrix: Sediment
Data Release Authorized:
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	60.0
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	54.0
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D	100	185	mg/kg	1,800
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	3.6

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS1-INCL3**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL75U
LIMS ID: 04-4604
Matrix: Sediment
Data Release Authorized: 04
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: 03/24/04
Date Received: 03/24/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	03/30/04 033004#4	EPA 160.3 SM 2540 B		0.01	Percent	63.4
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	57.9
Sulfide	03/30/04 033004#1	EPA 376.2 SM4500S2-D	100	172	mg/kg	2,100
Total Organic Carbon	04/06/04 040604#1	Plumb,1981		0.020	Percent	3.3

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS

Sample ID: LCS-GL75
LAB CONTROL

Lab Sample ID: LCS-GL75
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized: ad
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

LABORATORY CONTROL RESULTS
CONVENTIONALS

Analyte	Analysis Date	Method	Units	LCS	True	REC
Sulfide	03/30/04	EPA 376.2	mg/L	7.81	8.76	89.2%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: SRM-GL75**
Page 1 of 1 **STANDARD REFERENCE**

Lab Sample ID: SRM-GL75
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized: [signature]
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

STANDARD REFERENCE RESULTS
CONVENTIONALS

Analyte	Analysis Date & Batch	Method	Units	SRM	True	REC
NIST #8704						
Total Carbon	04/06/04 040604#1	Plumb,1981	Percent	3.18	3.35	94.9%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: DUP-GL75**
Page 1 of 1 **DUPLICATE**

Lab Sample ID: DUP-GL75
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized: ps
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Received: 03/24/04

DUPLICATE RESULTS
CONVENTIONALS

Analyte	Method	Units	Sample	Replicate	RPD/RSD
ARI ID: 04-4584, GL75A Client Sample ID: BH9-SR					
Preserved Total Solids	EPA 160.3 SM 2540 B	Percent	55.9	54.8 55.8	1.1%
Sulfide	EPA 376.2 SM4500S2-D	mg/kg	2,700	2,690	0.4%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS
Page 1 of 1

Sample ID: MS/MSD-GL75
MATRIX SPIKE

Lab Sample ID: MS-GL75
LIMS ID: 04-4584
Matrix: Sediment
Data Release Authorized: QAP
Reported: 04/12/04

QC Report No: GL75-Polaris Applied Sciences, Inc.
Project: P66 Sedcap (Pier 64/65)
1002.027
Date Received: 03/24/04

MATRIX SPIKE RESULTS
CONVENTIONALS

Analyte	Method	Units	Sample	Spike	MS/MSD	REC
ARI ID: 04-4584, GL75A	**Client Sample ID: BH9-SR**					
Sulfide	EPA 376.2	mg/kg	2,700	313	2,780	25.6%

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Polaris Applied Sciences
1002.027

PSEP Total Solids Analysis
Percent of Wet Weight

Sample No.	Total Solids (%)
BH9-SR-1	66.8
BH9-SR-2	66.6
BH9-SR-3	65.8
BH9-SR-FS	63.9
BH8-SR	64.6
BH2-SS	96.3
BH4-SR	80.3
BH4-SS	88.3
CSI-SR	68.7
CSI-SS	63.0
CSI-BC	87.8
CSI-INCL1	68.9
CS1-INCL2	62.2
CS1-INCL3	59.6
BH2-SR	94.9

Triplicate Average	66.4
Standard Deviation	0.49
%RSD	0.74

GL75

QA SUMMARY

ANALYTICAL RESOURCES INCORPORATED

PROJECT:	Polaris Applied Sciences	Project No.:	1002.027
ARI Triplicate Sample ID:	GL75A1	Batch No.:	GL75 -01
Client Triplicate Sample ID:	BH9-SR-1	Page:	1 of 1

Relative Standard Deviation, By Phi Size

Sample ID	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
BH9-SR-1	100.0	100.0	98.7	93.7	76.3	46.0	24.4	17.4	13.8	10.8	7.4	5.4	3.9	2.9
BH9-SR-2	100.0	100.0	95.3	90.4	73.9	43.9	23.1	16.3	13.6	10.7	7.1	5.4	3.9	2.8
BH9-SR-3	100.0	100.0	98.8	94.1	76.7	45.8	23.9	16.6	14.1	10.9	7.4	5.5	4.0	2.7
AVE	NA	100.00	97.61	92.72	75.64	45.25	23.78	16.77	13.82	10.80	7.28	5.41	3.92	2.84
STDEV	NA	0.00	2.03	1.99	1.51	1.15	0.63	0.56	0.25	0.14	0.17	0.09	0.07	0.10
%RSD	NA	0.00	2.08	2.14	2.00	2.54	2.65	3.34	1.82	1.27	2.37	1.68	1.88	3.49

The Triplicate Applies To The Following Samples

ARI ID	Client ID	Date Sampled	Date Extracted	Date Complete	QA*
GL75A1	BH9-SR-1	3/24/04	4/15/04	4/23/04	101.1
GL75A2	BH9-SR-2	3/24/04	4/15/04	4/23/04	96.4
GL75A3	BH9-SR-3	3/24/04	4/15/04	4/23/04	99.8
GL75D	BH9-SR-FS	3/24/04	4/15/04	4/23/04	95.4
GL75G	BH8-SR	3/24/04	4/15/04	4/23/04	99.7
GL75K	BH2-SS	3/24/04	4/15/04	4/23/04	99.5
GL75M	BH4-SR	3/24/04	4/15/04	4/23/04	100.3
GL75N	BH4-SS	3/24/04	4/15/04	4/23/04	99.0
GL75P	CSI-SR	3/24/04	4/15/04	4/23/04	98.6
GL75Q	CSI-SS	3/24/04	4/15/04	4/23/04	99.8
GL75R	CSI-BC	3/24/04	4/15/04	4/23/04	99.5
GL75S	CSI-INCL1	3/24/04	4/15/04	4/23/04	97.9
GL75T	CS1-INCL2	3/24/04	4/15/04	4/23/04	96.0
GL75U	CS1-INCL3	3/24/04	4/15/04	4/23/04	95.0
GL75J	BH2-SR	3/24/04	4/15/04	4/23/04	100.8

* ARI Internal QA limits = 95-105%

Notes to the Testing:

1. See narrative for discussion of testing.

ANALYTICAL RESOURCES INCORPORATED

Polaris Applied Sciences
1002.027

Apparent Grain Size Distribution Summary
Percent Finer Than Indicated Size

Sample No.	Gravel			Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt				Clay	
Phi Size	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Sieve Size (microns)	3/8"	#4	#10 (2000)	#18 (1000)	#35 (500)	#60 (250)	#120 (125)	#230 (62)	31.00	15.60	7.80	3.90	2.00	1.00
BH9-SR-1	100.0	100.0	98.7	93.7	76.3	46.0	24.4	17.4	13.8	10.8	7.4	5.4	3.9	2.9
BH9-SR-2	100.0	100.0	95.3	90.4	73.9	43.9	23.1	16.3	13.6	10.7	7.1	5.4	3.9	2.8
BH9-SR-3	100.0	100.0	98.8	94.1	76.7	45.8	23.9	16.6	14.1	10.9	7.4	5.5	4.0	2.7
BH9-SR-FS	100.0	99.5	98.3	92.9	75.6	44.5	23.1	16.0	13.5	10.6	7.4	5.6	4.0	2.7
BH8-SR	100.0	99.8	98.1	93.4	71.6	41.6	32.2	26.6	22.1	17.4	12.7	8.6	5.9	4.0
BH2-SS	100.0	63.2	38.9	31.8	18.5	4.4	2.1	1.6	1.2	0.9	0.7	0.5	0.4	0.3
BH4-SR	100.0	98.8	92.8	87.9	70.5	33.7	15.6	10.2	8.0	6.3	5.0	3.4	2.2	1.3
BH4-SS	100.0	82.1	68.7	60.9	48.7	21.3	6.2	4.2	3.5	2.8	2.3	1.6	1.1	0.7
CSI-SR	100.0	98.0	94.6	91.5	79.2	51.8	36.9	32.1	29.3	24.0	18.7	13.9	9.1	5.2
CSI-SS	100.0	96.4	93.5	90.2	80.5	59.0	43.5	38.1	33.9	27.2	21.6	15.2	9.9	6.0
CSI-BC	100.0	77.4	61.1	53.2	44.8	23.7	4.2	1.4	0.0	0.0	0.0	0.0	0.0	0.0
CSI-INCL1	100.0	96.2	94.1	90.8	75.9	46.8	34.1	29.3	26.7	22.7	18.1	13.6	9.5	5.8
CS1-INCL2	100.0	87.4	85.2	83.0	77.0	63.2	52.4	46.2	43.0	34.7	25.9	18.1	11.9	6.8
CS1-INCL3	100.0	98.2	95.5	92.7	84.3	68.0	56.1	48.7	45.4	34.9	25.7	20.5	14.3	9.0
BH2-SR	100.0	83.9	60.4	51.5	31.5	8.9	4.7	3.9	2.5	2.0	1.6	1.3	0.9	0.7

Notes to the Testing:

1. Apparent grain size distributions according to PSEP protocols.

GL75

ANALYTICAL RESOURCES INCORPORATED

Polaris Applied Sciences
1002.027

Apparent Grain Size Distribution Summary
Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay		
Phi Size	> -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	< 10
Sieve Size (microns)	> #10 (2000)	10 to 18 (2000-1000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0
BH9-SR-1	1.3	5.1	17.3	30.3	21.6	7.0	3.6	3.0	3.4	2.0	1.5	1.0	2.9
BH9-SR-2	4.7	4.8	16.5	30.0	20.8	6.8	2.7	2.9	3.6	1.7	1.5	1.0	2.8
BH9-SR-3	1.2	4.8	17.4	30.8	22.0	7.2	2.6	3.1	3.6	1.8	1.5	1.3	2.7
BH9-SR-FS	1.7	5.4	17.3	31.1	21.4	7.1	2.5	2.8	3.2	1.8	1.5	1.3	2.7
BH8-SR	1.9	4.7	21.9	29.9	9.4	5.6	4.4	4.7	4.7	4.1	2.7	1.9	4.0
BH2-SS	61.1	7.0	13.3	14.2	2.3	0.5	0.4	0.3	0.2	0.2	0.1	0.1	0.3
BH4-SR	7.2	4.9	17.4	36.7	18.2	5.3	2.3	1.7	1.3	1.5	1.3	0.9	1.3
BH4-SS	31.3	7.8	12.2	27.4	15.1	2.1	0.7	0.6	0.6	0.6	0.6	0.4	0.7
CSI-SR	5.4	3.1	12.4	27.4	14.9	4.8	2.8	5.3	5.3	4.8	4.8	3.9	5.2
CSI-SS	6.5	3.3	9.7	21.5	15.5	5.4	4.1	6.8	5.6	6.4	5.3	3.9	6.0
CSI-BC	38.9	7.9	8.3	21.1	19.6	2.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0
CSI-INCL1	5.9	3.4	14.8	29.2	12.6	4.9	2.6	4.0	4.6	4.5	4.1	3.7	5.8
CS1-INCL2	14.8	2.2	6.0	13.8	10.8	6.2	3.2	8.3	8.8	7.8	6.2	5.1	6.8
CS1-INCL3	4.5	2.7	8.5	16.3	11.9	7.3	3.3	10.5	9.2	5.2	6.2	5.4	9.0
BH2-SR	39.6	8.8	20.0	22.7	4.2	0.8	1.4	0.5	0.4	0.3	0.3	0.2	0.7

Notes to the Testing:

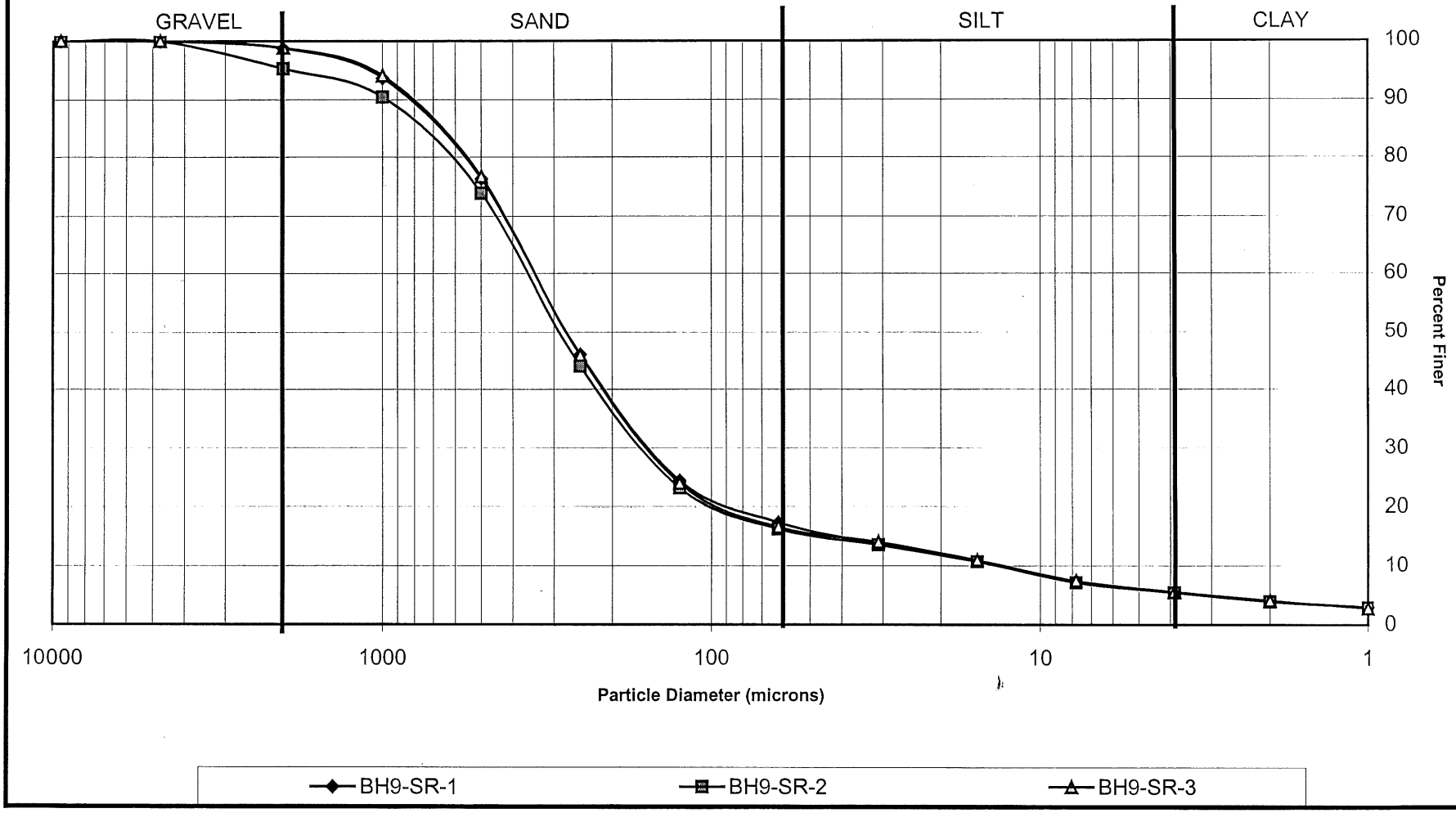
1. Apparent grain size distributions according to PSEP protocols.

GL75

ANALYTICAL RESOURCES INCORPORATED

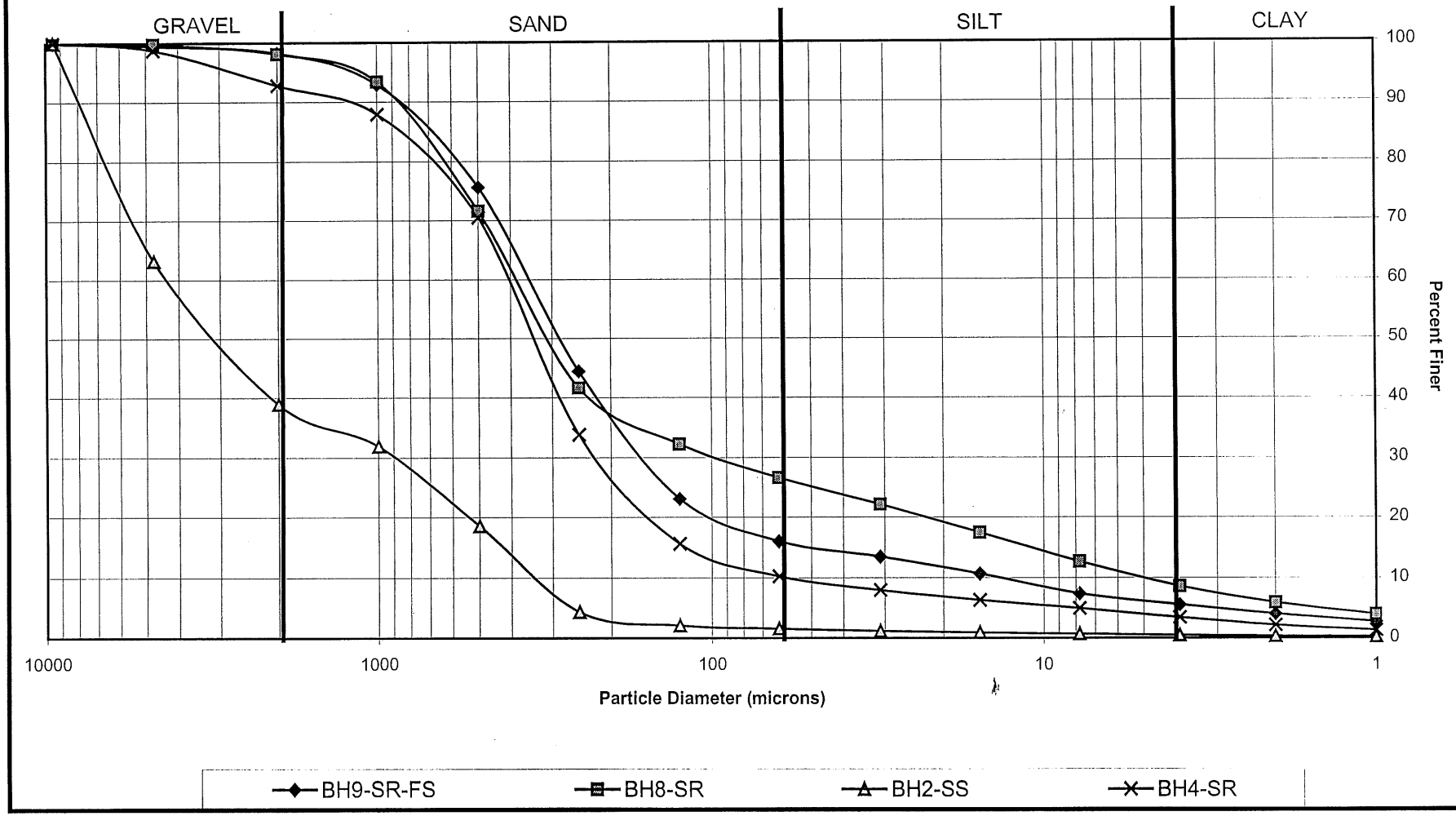
PSEP Grain Size Distribution

Triplicate Sample Plot



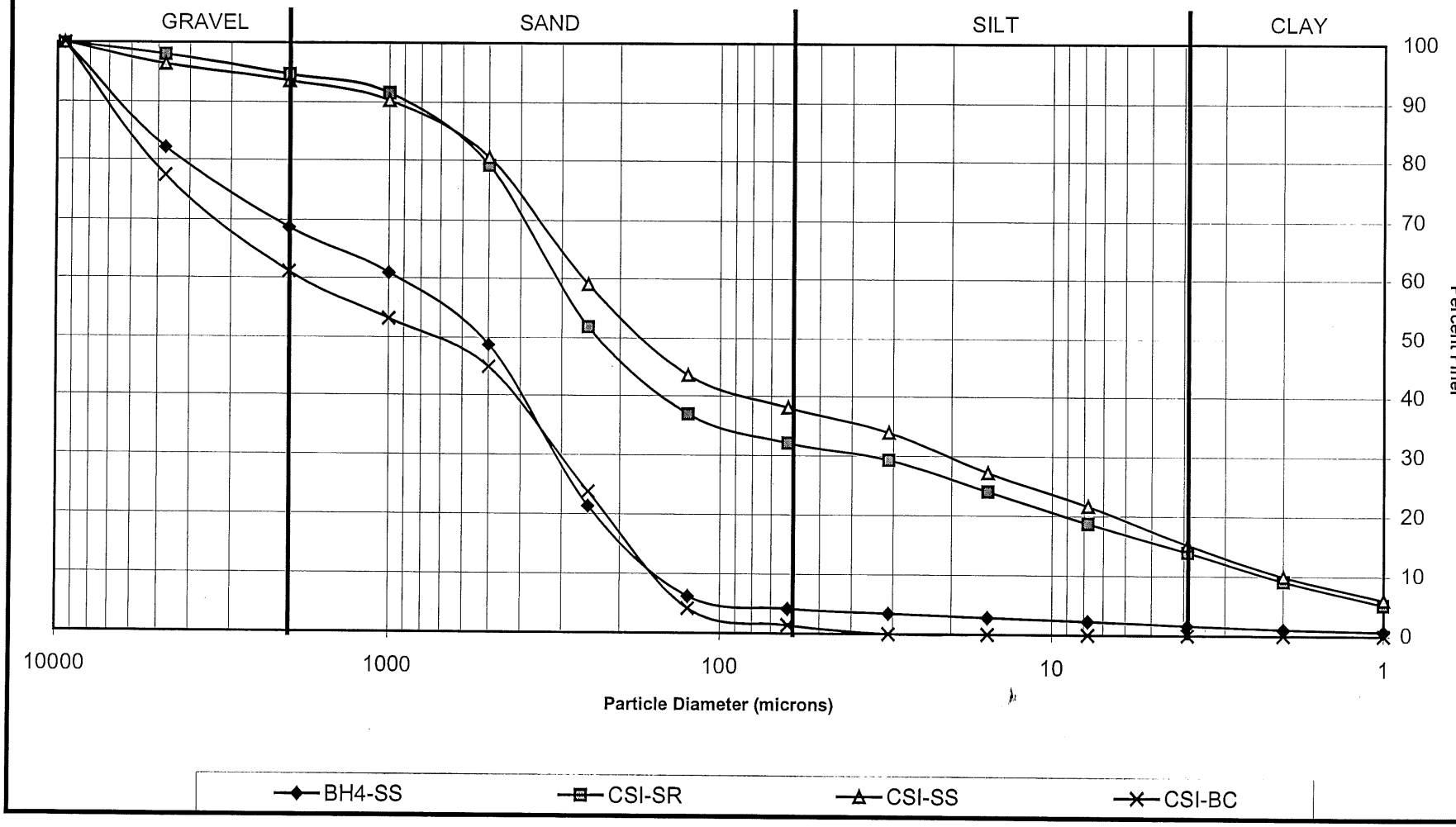
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PSEP Grain Size Distribution



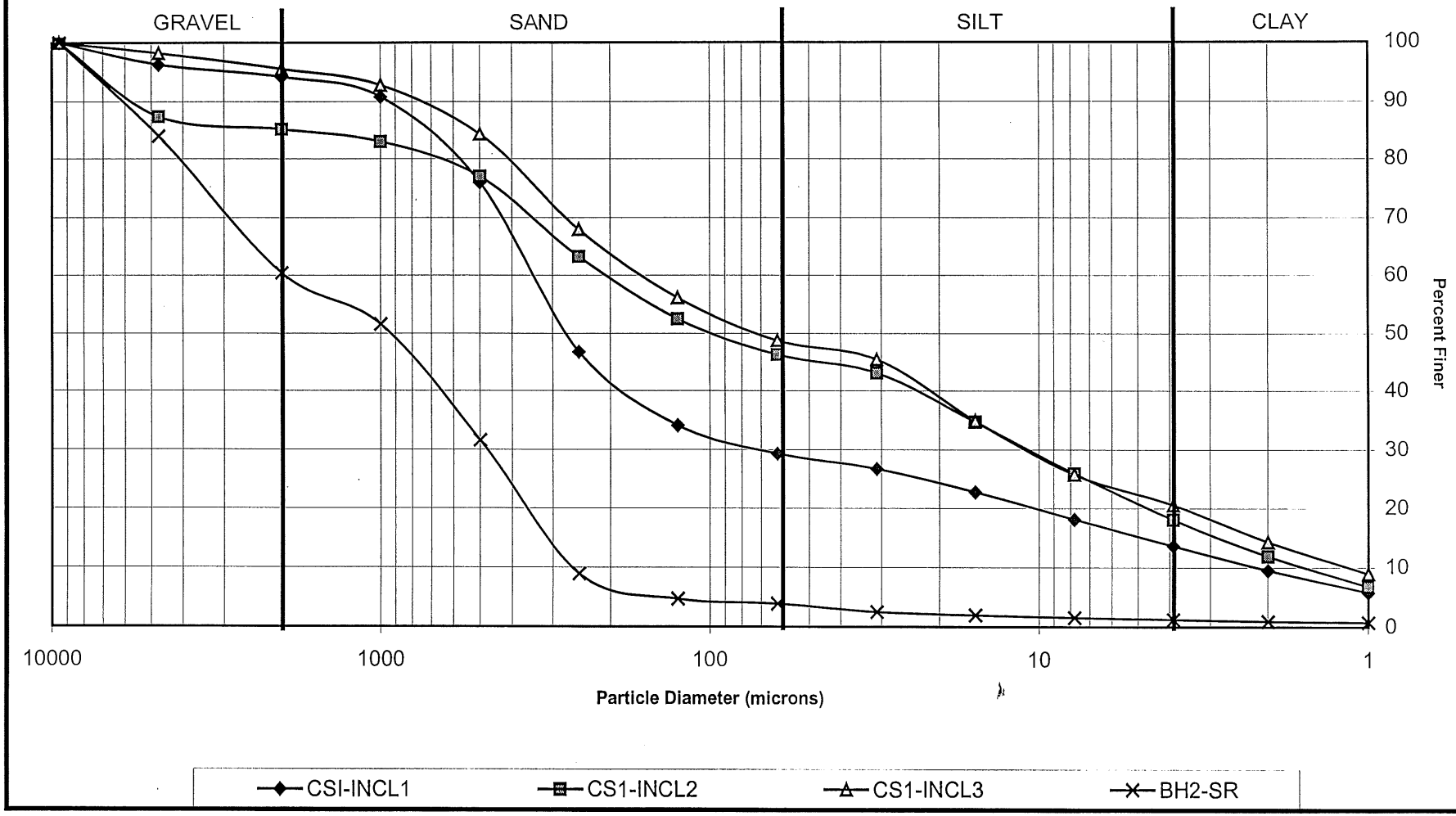
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PSEP Grain Size Distribution



ANALYTICAL RESOURCES INCORPORATED

PSEP Grain Size Distribution



Analytical Resources, Incorporated
Analytical Chemists and Consultants

May 4, 2004

Mr. Jerry Erickson
Polaris Applied Sciences, Inc.
12509 130th Lane N. E.
Kirkland, WA 98034

RE: Client Project – 1002.027 / P66 Sed Cap (Pier 64/65)
ARI Job No: GL76

Dear Mr. Erickson:

Please find enclosed the final data for the samples from the project referenced above. ARI received thirteen sediment samples on March 25, 2004. The samples were received in good condition. No discrepancies were noted in the chain of custody documentation. The samples were analyzed for SVOAs, PCBs, grain size, mercury, TOC, and sulfide. Selected samples were placed on hold and are being held in a freezer (chemistry analyses) and refrigerator (grain size analysis).

Issues associated with the chemical analysis are discussed in the case narrative.

A copy of this report and the supporting data will remain on file with ARI. Please feel free to contact me at your convenience if you need any additional information.

Respectfully,

ANALYTICAL RESOURCES, INC.

Mary Lou Fox

Mary Lou Fox
Project Manager
marylou@arilabs.com
206/695-6211

Enclosures

cc: File GL76

MLF/mdh

4°C

POLARIS APPLIED SCIENCES, INC.

12509 130th Lane NE, Kirkland, Washington 98034-7713 425/823-4841 Fax 425/823-3805

CHAIN OF CUSTODY RECORD

POLARIS PROJECT # 1002.027	PROJECT NAME: P66 sed cap (Pier 64/65)
CLIENT: Port of Seattle	LOCATION: Bell Harbor Marina
PROJECT MANAGER: Jerry Erickson	SEND REPORTS TO: Jerry Erickson
SAMPLER: (SIGNATURE) Gerald M. Erickson	

ANALYSIS REQUESTED

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	Grain size (A)	TOC (B)	SVOAs: PCBs, DEHP (C)	Dibenzofuran, PAHs	Mercury (E)	Lead-210 (F)	Isotopes (G)	LOCATION/REMARKS:
	BH11-SR	3-25-04	1125	Sed	X		1		X						Composited from BH11 Cores A+B
	BH11-SR		1200			X	4	X		X	X	X			
	BH11-SS		1125		X		1		X						to be archived (3 core tops)
	BH11-SS		1200			X	4	X		X	X	X			
	BH11-BC		1125		X		1		X						
	BH11-BC		1200			X	4	X		X	X	X			
	BH5-SR	3-25-04	1230	Sed	X		1		X						Composited from BH5 Cores A+B
	BH5-SR		1300			X	4	X		X	X	X			
	BH5-SS		1230		X		1		X						to be archived (3 core tops)
	BH5-SS		1300			X	4	X		X	X	X			
	BH5-BC		1230		X		1		X						
	BH5-BC		1300			X	4	X		X	X	X			

Analytes as per Mary Lou Fox

RELINQUISHED BY: (signature) Jerry Erickson	DATE/TIME 3-25-04 1450	RECEIVED BY: (signature) Mary Lou Fox
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)

LABORATORY NAME: ARI

LAB PROJECT NUMBER:

LAB ADDRESS:

LAB PHONE:

LAB CONTACT PERSON: Mary Lou Fox

POLARIS CONTACT PERSON:

POLARIS P.O. NUMBER:

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT, COPY TO FIELD FILES

90C

POLARIS APPLIED SCIENCES, INC.

12509 130th Lane NE, Kirkland, Washington 98034-7713 425/823-4841 Fax 425/823-3805

CHAIN OF CUSTODY RECORD

POLARIS PROJECT # 1002.027	PROJECT NAME: P66 Sedcap (Pier 64/65)
CLIENT: Port of Seattle	LOCATION: Bell Harbor Marina
PROJECT MANAGER: Jerry Erickson	SEND REPORTS TO: Jerry Erickson
SAMPLER: (SIGNATURE) David M. Evans	

Analytes as per Mary Lou Fox

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS	Grain size, TS (A)	Total Sulfides (B)	TOC (C)	SVOA: PAHs, BEHP, Dibenzofuran (D)	Mercury (E)	Retain sample for 3 months (labeled)	LOCATION/REMARKS:
	BH10-SR	3-25-04	0900	Sed	X		1		X					Composited from BH10 Cores A&B
	BH-10-SR	"	0940	"		X	4	X		X	X	X		
	BH-10-SS		0900		X		1		X					Sulfides from Core A
	BH-10-SS		0940			X	4	X		X	X	X		
	BH-10-BC		0900		X		1		X					to be archived (3 core layers)
	BH-10-BC		0940			X	4	X		X	X	X		
	CS2-SR	3-25-04	1030	Sed	X		1		X					
	CS2-SR		1100			X	4	X		X	X	X		Composited from CS2 Cores A&B
	CS2-SS		1030		X		1		X					
	CS2-SS		1100			X	4	X		X	X	X		
	CS2-BC		1030		X		1		X					(3 core layers)
	CS2-BC		1100			X	4	X		X	X	X		

RELINQUISHED BY: (signature) David M. Evans	DATE/TIME 3-25-04 1450	RECEIVED BY: (signature) Mary Lou Fox	LABORATORY NAME: ARI
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)	LAB ADDRESS:
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)	LAB PHONE: LAB CONTACT PERSON: Mary Lou Fox
			POLARIS CONTACT PERSON: POLARIS P.O. NUMBER:

LAB PROJECT NUMBER:

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CHAIN OF CUSTODY RECORD

POLARIS PROJECT # 1002.027	PROJECT NAME: P66 SedCap
CLIENT: Port of Seattle	LOCATION: Bell Harbor Marina
PROJECT MANAGER: Jerry Ericksen	SEND REPORTS TO: Jerry Ericksen
SAMPLER: (SIGNATURE) Gerald M. Ericksen	

ANALYSIS REQUESTED

Analytes as per Mary Lou Fox

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	(Grain size, TS (A))	TOC, Sulfides (B)	PSDDA: PCBs, BEHP (C)	Dioxin/Furan, PAHs (D)	Mercury (E)	LOCATION/REMARKS:
	BH5-SR-MSD	3-25-04	1330	Sed	X		1		X				Composited from BH5 cores MSDA & MSDB (3 core layers)
	BH5-SR-MSD	"	1400	"		X	4	X		X	X	X	
	BH5-SS-MSD		1330		X		1		X				
	BH5-SS-MSD		1400			X	4	X		X	X	X	
	BH5-BC-MSD		1330		X		1		X				To be archived
	BH5-BC-MSD	↓	1400	↓		X	4	X		X	X	X	

RELINQUISHED BY: (signature) Gerald M. Ericksen	DATE/TIME 3-25-04 1450	RECEIVED BY: (signature) Mary Lou Fox	LABORATORY NAME: ARI
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)	LAB ADDRESS:
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)	LAB PHONE: LAB CONTACT PERSON: Mary Lou Fox
			POLARIS CONTACT PERSON: POLARIS P.O. NUMBER:

LAB PROJECT NUMBER:

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT, COPY TO FIELD FILES

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Case Narrative

Client Project – 1002.027, P66 Sed Cap (Pier 64/65)
ARI Job No: GL76
Matrix: Sediment
Date: May 4, 2004

Semivolatile Organic Compounds Analysis referencing EPA SW-846 method 8270C

The extraction of these samples was batched with those of the samples received on 3/26 (GL88).

The organic lab manager determined that the samples would be taken to a final extraction volume of 1.0 mL rather than 0.5 mL due to the very high organic content of the samples.

The extracts for samples **BH10-SR** and **CS2-BC**, were pre-diluted 1:2 and1:3, respectively, due to extract appearance.

No further analytical complications were noted.

PSDDA PCB Analysis referencing EPA SW-846 method 8082

The extraction of these samples was batched with the extraction of the samples received on 3/26 (GL88).

The samples required additional cleaning for the sulfur after the initial sulfur cleaning and the sample matrices tended to lower the continuing calibrations (C-Cals). The samples were re-analyzed due to failing C-Cals. All C-Cals were compliant in the re-analyses. Only the re-analyses have been reported

No further analytical complications were noted.

Mercury Analysis referencing EPA SW-846 method 7471A

The total mercury analyses of these samples were batched with those of the samples received on 3/26 (GL88).

No analytical complications were noted.

Conventionals Analyses referencing EPA method 376.2 and Plumb, 1981

The TOC analyses of these samples were batched with those of the samples received on 3/26 (GL88).

Matrix spikes were prepared and analyzed for the sulfide analysis in conjunction with samples **BH5-SR** and **CS2-BC**. The levels of the spikes were too low relative to the native concentration of the samples to yield meaningful recovery information. Since the percent recoveries for sulfide were within acceptable QC limits for the corresponding LCSs, no corrective actions were taken.

No further analytical complications were noted.

Grain Size Analysis

A separate case narrative is provided by the geotechnical lab manager.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Client: Polaris Applied Sciences, Inc. Project No.: GL76

Client Project: PGG Sed Cap

Case Narrative

1. The samples were submitted for grain size analysis according to PSEP methodology.
2. The samples were run in a batch with other samples and one sample in the set was chosen for triplicate analysis. The triplicate data is reported on the QA summary.
3. The data is provided in summary tables and plots.
4. There were no noted anomalies in the samples or methods on this project.

Approved by: Harold Benny Date: 4/21/04
Title: Geotechnical Division Manager

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ORGANIC COMPOUND
DATA REPORTING QUALIFIERS

U	Indicates the compound was undetected at the reported concentration. (Same as ND).
J	Indicates an estimated concentration when the value is less than the calculated reporting limit.
D	Indicates the surrogate/spike(s) was not detected, due to dilution of extract.
NR	Indicates the surrogate recovery cannot be reported due to matrix interference.
E	Indicates a value above the linear range of the detector. Sample dilution required.
S	Indicates no value reported due to saturation of the detector. Sample dilution required.
NA	Indicates compound not analyzed for.
M	Indicates an estimated value of analyte found and confirmed by analyst but with low spectral match.
B	Indicates possible/probable blank contamination. Flagged when the analyte is detected in the blank as well as the sample.
Y	Indicates raised reporting limit due to background interference or to activity on the instrument. Compound is still not detected at or above the raised level.
C	Indicates a probable hit that cannot be confirmed due to matrix interference (GC).
P	Indicates a high RPD for dual column GC analyses without obvious interference.

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: MB-040704
METHOD BLANK

Lab Sample ID: MB-040704
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 12:39
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.0 g
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: NA
pH: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	40	< 40 U
91-57-6	2-Methylnaphthalene	40	< 40 U
208-96-8	Acenaphthylene	40	< 40 U
83-32-9	Acenaphthene	40	< 40 U
86-73-7	Fluorene	40	< 40 U
85-01-8	Phenanthrene	40	< 40 U
120-12-7	Anthracene	40	< 40 U
206-44-0	Fluoranthene	40	< 40 U
129-00-0	Pyrene	40	< 40 U
56-55-3	Benzo(a)anthracene	40	< 40 U
218-01-9	Chrysene	40	< 40 U
205-99-2	Benzo(b)fluoranthene	40	< 40 U
207-08-9	Benzo(k)fluoranthene	40	< 40 U
50-32-8	Benzo(a)pyrene	40	< 40 U
193-39-5	Indeno(1,2,3-cd)pyrene	40	< 40 U
53-70-3	Dibenz(a,h)anthracene	40	< 40 U
191-24-2	Benzo(g,h,i)perylene	40	< 40 U
132-64-9	Dibenzofuran	40	< 40 U
117-81-7	bis(2-Ethylhexyl)phthalate	40	< 40 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	102%
d10-Diphenyl	85.6%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: BH11-SR
SAMPLE

Lab Sample ID: GL76A
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 16:31
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 26.0 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 28.9%
pH: 8.2

CAS Number	Analyte	RL	Result
91-20-3	**Naphthalene**	38	46
91-57-6	2-Methylnaphthalene	38	< 38 U
208-96-8	Acenaphthylene	38	< 38 U
83-32-9	Acenaphthene	38	< 38 U
86-73-7	Fluorene	38	< 38 U
85-01-8	**Phenanthrene**	38	110
120-12-7	**Anthracene**	38	77
206-44-0	**Fluoranthene**	38	200
129-00-0	**Pyrene**	38	270
56-55-3	**Benzo(a)anthracene**	38	130
218-01-9	**Chrysene**	38	220
205-99-2	**Benzo(b)fluoranthene**	38	220
207-08-9	**Benzo(k)fluoranthene**	38	250
50-32-8	**Benzo(a)pyrene**	38	200
193-39-5	**Indeno(1,2,3-cd)pyrene**	38	84
53-70-3	Dibenz(a,h)anthracene	38	< 38 U
191-24-2	**Benzo(g,h,i)perylene**	38	72
132-64-9	Dibenzofuran	38	< 38 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	38	81

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	74.0%
d10-Diphenyl	71.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: BH5-SR
SAMPLE

Lab Sample ID: GL76D
LIMS ID: 04-4608
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 17:00
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.4 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 37.0%
pH: 7.9

CAS Number	Analyte	RL	Result	
91-20-3	**Naphthalene**	39	**37**	**J**
91-57-6	2-Methylnaphthalene	39	< 39	U
208-96-8	Acenaphthylene	39	< 39	U
83-32-9	Acenaphthene	39	< 39	U
86-73-7	Fluorene	39	< 39	U
85-01-8	**Phenanthrene**	39	**270**	
120-12-7	**Anthracene**	39	**150**	
206-44-0	**Fluoranthene**	39	**410**	
129-00-0	**Pyrene**	39	**550**	
56-55-3	**Benzo(a)anthracene**	39	**230**	
218-01-9	**Chrysene**	39	**350**	
205-99-2	**Benzo(b)fluoranthene**	39	**340**	
207-08-9	**Benzo(k)fluoranthene**	39	**380**	
50-32-8	**Benzo(a)pyrene**	39	**320**	
193-39-5	**Indeno(1,2,3-cd)pyrene**	39	**110**	
53-70-3	**Dibenz(a,h)anthracene**	39	**43**	
191-24-2	**Benzo(g,h,i)perylene**	39	**100**	
132-64-9	Dibenzofuran	39	< 39	U
117-81-7	**bis(2-Ethylhexyl)phthalate**	39	**89**	

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	76.9%
d10-Diphenyl	71.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: BH5-SS
SAMPLE

Lab Sample ID: GL76E
LIMS ID: 04-4609
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 17:30
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 34.9%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	39	< 39 U
91-57-6	2-Methylnaphthalene	39	< 39 U
208-96-8	Acenaphthylene	39	< 39 U
83-32-9	Acenaphthene	39	< 39 U
86-73-7	Fluorene	39	< 39 U
85-01-8	**Phenanthrene**	39	50
120-12-7	Anthracene	39	< 39 U
206-44-0	**Fluoranthene**	39	110
129-00-0	**Pyrene**	39	140
56-55-3	**Benzo(a)anthracene**	39	42
218-01-9	**Chrysene**	39	62
205-99-2	**Benzo(b)fluoranthene**	39	86
207-08-9	**Benzo(k)fluoranthene**	39	72
50-32-8	**Benzo(a)pyrene**	39	61
193-39-5	Indeno(1,2,3-cd)pyrene	39	< 39 U
53-70-3	Dibenz(a,h)anthracene	39	< 39 U
191-24-2	Benzo(g,h,i)perylene	39	< 39 U
132-64-9	Dibenzofuran	39	< 39 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	39	79

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	78.6%
d10-Diphenyl	72.1%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: BH5-SS
MATRIX SPIKE

Lab Sample ID: GL76E
LIMS ID: 04-4609
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 18:00
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 34.9%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	39	---
91-57-6	2-Methylnaphthalene	39	< 39 U
208-96-8	Acenaphthylene	39	< 39 U
83-32-9	Acenaphthene	39	---
86-73-7	Fluorene	39	< 39 U
85-01-8	**Phenanthrene**	39	**42**
120-12-7	Anthracene	39	< 39 U
206-44-0	Fluoranthene	39	---
129-00-0	**Pyrene**	39	**100**
56-55-3	Benzo(a)anthracene	39	---
218-01-9	**Chrysene**	39	**61**
205-99-2	**Benzo(b)fluoranthene**	39	**63**
207-08-9	**Benzo(k)fluoranthene**	39	**58**
50-32-8	**Benzo(a)pyrene**	39	**48**
193-39-5	Indeno(1,2,3-cd)pyrene	39	< 39 U
53-70-3	Dibenz(a,h)anthracene	39	< 39 U
191-24-2	Benzo(g,h,i)perylene	39	< 39 U
132-64-9	Dibenzofuran	39	< 39 U
117-81-7	bis(2-Ethylhexyl)phthalate	39	---

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	75.8%
d10-Diphenyl	65.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: BH5-SS
MATRIX SPIKE DUPLICATE

Lab Sample ID: GL76E
LIMS ID: 04-4609
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 18:30
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 34.9%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	39	---
91-57-6	2-Methylnaphthalene	39	< 39 U
208-96-8	Acenaphthylene	39	< 39 U
83-32-9	Acenaphthene	39	---
86-73-7	Fluorene	39	< 39 U
85-01-8	**Phenanthrene**	39	52
120-12-7	Anthracene	39	< 39 U
206-44-0	Fluoranthene	39	---
129-00-0	**Pyrene**	39	130
56-55-3	Benzo(a)anthracene	39	---
218-01-9	**Chrysene**	39	80
205-99-2	**Benzo(b)fluoranthene**	39	91
207-08-9	**Benzo(k)fluoranthene**	39	85
50-32-8	**Benzo(a)pyrene**	39	66
193-39-5	Indeno(1,2,3-cd)pyrene	39	< 39 U
53-70-3	Dibenz(a,h)anthracene	39	< 39 U
191-24-2	Benzo(g,h,i)perylene	39	< 39 U
132-64-9	Dibenzofuran	39	< 39 U
117-81-7	bis(2-Ethylhexyl)phthalate	39	---

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	75.2%
d10-Diphenyl	66.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: BH10-SR
SAMPLE

Lab Sample ID: GL76G
LIMS ID: 04-4611
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 19:00
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 26.0 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 2.00
Percent Moisture: 25.1%
pH: 7.7

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	77	< 77 U
91-57-6	2-Methylnaphthalene	77	< 77 U
208-96-8	**Acenaphthylene**	77	220
83-32-9	Acenaphthene	77	< 77 U
86-73-7	**Fluorene**	77	100
85-01-8	**Phenanthrene**	77	540
120-12-7	**Anthracene**	77	650
206-44-0	**Fluoranthene**	77	1,200
129-00-0	**Pyrene**	77	1,600
56-55-3	**Benzo(a)anthracene**	77	1,300
218-01-9	**Chrysene**	77	2,300
205-99-2	**Benzo(b)fluoranthene**	77	2,000
207-08-9	**Benzo(k)fluoranthene**	77	1,700
50-32-8	**Benzo(a)pyrene**	77	1,400
193-39-5	**Indeno(1,2,3-cd)pyrene**	77	410
53-70-3	**Dibenz(a,h)anthracene**	77	170
191-24-2	**Benzo(g,h,i)perylene**	77	340
132-64-9	Dibenzofuran	77	< 77 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	77	150

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	77.4%
d10-Diphenyl	73.6%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS **Sample ID: CS2-SR**
Page 1 of 1 SAMPLE

Lab Sample ID: GL76J
LIMS ID: 04-4614
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 19:29
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 33.7%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	39	< 39 U
91-57-6	2-Methylnaphthalene	39	< 39 U
208-96-8	Acenaphthylene	39	< 39 U
83-32-9	Acenaphthene	39	< 39 U
86-73-7	Fluorene	39	< 39 U
85-01-8	**Phenanthrene**	39	**130**
120-12-7	**Anthracene**	39	**130**
206-44-0	**Fluoranthene**	39	**240**
129-00-0	**Pyrene**	39	**360**
56-55-3	**Benzo(a)anthracene**	39	**180**
218-01-9	**Chrysene**	39	**320**
205-99-2	**Benzo(b)fluoranthene**	39	**320**
207-08-9	**Benzo(k)fluoranthene**	39	**400**
50-32-8	**Benzo(a)pyrene**	39	**310**
193-39-5	**Indeno(1,2,3-cd)pyrene**	39	**93**
53-70-3	Dibenz(a,h)anthracene	39	< 39 U
191-24-2	**Benzo(g,h,i)perylene**	39	**80**
132-64-9	Dibenzofuran	39	< 39 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	39	**140**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	80.0%
d10-Diphenyl	77.6%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: CS2-SS
SAMPLE

Lab Sample ID: GL76K
LIMS ID: 04-4615
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 19:59
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.9 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 32.9%
pH: 8.0

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	39	< 39 U
91-57-6	2-Methylnaphthalene	39	< 39 U
208-96-8	Acenaphthylene	39	< 39 U
83-32-9	Acenaphthene	39	< 39 U
86-73-7	Fluorene	39	< 39 U
85-01-8	Phenanthrene	39	< 39 U
120-12-7	Anthracene	39	< 39 U
206-44-0	**Fluoranthene**	39	38 J
129-00-0	**Pyrene**	39	59
56-55-3	Benzo(a)anthracene	39	< 39 U
218-01-9	Chrysene	39	< 39 U
205-99-2	Benzo(b)fluoranthene	39	< 39 U
207-08-9	Benzo(k)fluoranthene	39	< 39 U
50-32-8	Benzo(a)pyrene	39	< 39 U
193-39-5	Indeno(1,2,3-cd)pyrene	39	< 39 U
53-70-3	Dibenz(a,h)anthracene	39	< 39 U
191-24-2	Benzo(g,h,i)perylene	39	< 39 U
132-64-9	Dibenzofuran	39	< 39 U
117-81-7	bis(2-Ethylhexyl)phthalate	39	< 39 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	72.5%
d10-Diphenyl	68.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: CS2-BC
SAMPLE

Lab Sample ID: GL76L
LIMS ID: 04-4616
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 20:28
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.4 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 58.1%
pH: 8.9

CAS Number	Analyte	RL	Result	
91-20-3	Naphthalene	120	280	
91-57-6	2-Methylnaphthalene	120	120	
208-96-8	Acenaphthylene	120	560	
83-32-9	Acenaphthene	120	350	
86-73-7	Fluorene	120	480	
85-01-8	Phenanthrene	120	1,600	
120-12-7	Anthracene	120	3,400	
206-44-0	Fluoranthene	120	6,900	
129-00-0	Pyrene	120	11,000	E
56-55-3	Benzo(a)anthracene	120	4,600	
218-01-9	Chrysene	120	7,800	
205-99-2	Benzo(b)fluoranthene	120	8,900	
207-08-9	Benzo(k)fluoranthene	120	4,200	
50-32-8	Benzo(a)pyrene	120	5,300	
193-39-5	Indeno(1,2,3-cd)pyrene	120	1,300	
53-70-3	Dibenz(a,h)anthracene	120	530	
191-24-2	Benzo(g,h,i)perylene	120	1,100	
132-64-9	Dibenzofuran	120	210	
117-81-7	bis(2-Ethylhexyl)phthalate	120	190	

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	66.0%
d10-Diphenyl	66.7%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: CS2-BC
DILUTION

Lab Sample ID: GL76L
LIMS ID: 04-4616
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/22/04 10:42
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.4 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 10.0
Percent Moisture: 58.1%
pH: 8.9

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	390	< 390 U
91-57-6	2-Methylnaphthalene	390	< 390 U
208-96-8	Acenaphthylene	390	480
83-32-9	Acenaphthene	390	< 390 U
86-73-7	Fluorene	390	500
85-01-8	Phenanthrene	390	1,600
120-12-7	Anthracene	390	3,500
206-44-0	Fluoranthene	390	7,700
129-00-0	Pyrene	390	13,000
56-55-3	Benzo(a)anthracene	390	4,900
218-01-9	Chrysene	390	9,200
205-99-2	Benzo(b)fluoranthene	390	6,100
207-08-9	Benzo(k)fluoranthene	390	6,700
50-32-8	Benzo(a)pyrene	390	6,000
193-39-5	Indeno(1,2,3-cd)pyrene	390	2,100
53-70-3	Dibenz(a,h)anthracene	390	850
191-24-2	Benzo(g,h,i)perylene	390	2,100
132-64-9	Dibenzofuran	390	< 390 U
117-81-7	bis(2-Ethylhexyl)phthalate	390	< 390 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	72.0%
d10-Diphenyl	71.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: BH5-SS
MS/MSD

Lab Sample ID: GL76E
LIMS ID: 04-4609
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted MS/MSD: 04/07/04

Date Analyzed MS: 04/21/04 18:00
MSD: 04/21/04 18:30
Instrument/Analyst MS: NT1/Van
MSD: NT1/Van
GPC Cleanup: NO

Sample Amount MS: 25.8 g-dry-wt
MSD: 25.8 g-dry-wt
Final Extract Volume MS: 1.0 mL
MSD: 1.0 mL
Dilution Factor MS: 1.00
MSD: 1.00
Alumina Cleanup: NO

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Naphthalene	< 38.8	278	484	57.4%	245	484	50.6%	12.6%
Acenaphthene	< 38.8	323	484	66.7%	310	484	64.0%	4.1%
Fluoranthene	110	450	484	70.2%	453	484	70.9%	0.7%
Benzo(a)anthracene	42.2	376	484	69.0%	382	484	70.2%	1.6%
bis(2-Ethylhexyl)phthalate	79.1	612	484	110%	426	484	71.7%	35.8%

Results reported in µg/kg
RPD calculated using sample concentrations per SW846.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: LCS-040704
LAB CONTROL

Lab Sample ID: LCS-040704
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 13:08
Instrument/Analyst: NT1/Van
GPC Cleanup: NO

Sample Amount: 25.0 g
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Alumina Cleanup: NO

Analyte	Lab Control	Spike Added	Recovery
Naphthalene	472	500	94.4%
Acenaphthene	476	500	95.2%
Fluoranthene	524	500	105%
Benzo(a)anthracene	448	500	89.6%
bis(2-Ethylhexyl)phthalate	608	500	122%

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	115%
d10-Diphenyl	101%

Results reported in µg/kg

ANALYTICAL RESOURCES INCORPORATED

SW8270 PNA SURROGATE RECOVERY SUMMARY

Matrix: Sediment

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027

Client ID	TER	DPH	TOT OUT
MB-040704	102%	85.6%	0
LCS-040704	115%	101%	0
BH11-SR	74.0%	71.2%	0
BH5-SR	76.9%	71.2%	0
BH5-SS	78.6%	72.1%	0
BH5-SS MS	75.8%	65.0%	0
BH5-SS MSD	75.2%	66.5%	0
BH10-SR	77.4%	73.6%	0
CS2-SR	80.0%	77.6%	0
CS2-SS	72.5%	68.0%	0
CS2-BC	66.0%	66.7%	0
CS2-BC DL	72.0%	71.2%	0

	LCS/MB LIMITS	QC LIMITS
(TER) = d14-p-Terphenyl	(30-160)	(30-160)
(DPH) = d10-Diphenyl	(30-160)	(30-160)

Prep Method: SW3550
Log Number Range: 04-4605 to 04-4616

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: MB-040704
METHOD BLANK

Lab Sample ID: MB-040704
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Date Extracted: 04/07/04
Date Analyzed: 04/15/04 00:53
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.0 g
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: NA
Percent Moisture: NA

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	4.0	< 4.0 U
53469-21-9	Aroclor 1242	4.0	< 4.0 U
12672-29-6	Aroclor 1248	4.0	< 4.0 U
11097-69-1	Aroclor 1254	4.0	< 4.0 U
11096-82-5	Aroclor 1260	4.0	< 4.0 U
11104-28-2	Aroclor 1221	4.0	< 4.0 U
11141-16-5	Aroclor 1232	4.0	< 4.0 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	64.5%
Tetrachlorometaxylene	63.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: BH11-SR
SAMPLE

Lab Sample ID: GL76A
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/15/04 01:34
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 26.0 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.2
Percent Moisture: 28.9%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.8	< 3.8 U
53469-21-9	Aroclor 1242	3.8	< 3.8 U
12672-29-6	Aroclor 1248	7.7	< 7.7 Y
11097-69-1	**Aroclor 1254**	**3.8**	**14**
11096-82-5	**Aroclor 1260**	**3.8**	**14**
11104-28-2	Aroclor 1221	3.8	< 3.8 U
11141-16-5	Aroclor 1232	3.8	< 3.8 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	62.8%
Tetrachlorometaxylene	57.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: BH5-SR
SAMPLE

Lab Sample ID: GL76D
LIMS ID: 04-4608
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/15/04 01:54
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 7.9
Percent Moisture: 37.0%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	4.0	< 4.0 U
53469-21-9	Aroclor 1242	4.0	< 4.0 U
12672-29-6	**Aroclor 1248**	**4.0**	**12**
11097-69-1	**Aroclor 1254**	**4.0**	**36**
11096-82-5	**Aroclor 1260**	**4.0**	**28**
11104-28-2	Aroclor 1221	4.0	< 4.0 U
11141-16-5	Aroclor 1232	4.0	< 4.0 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	72.5%
Tetrachlorometaxylene	53.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: BH5-SS
SAMPLE

Lab Sample ID: GL76E
LIMS ID: 04-4609
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/15/04 02:56
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.7 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.1
Percent Moisture: 34.9%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	**Aroclor 1248**	**3.9**	**11**
11097-69-1	**Aroclor 1254**	**3.9**	**15**
11096-82-5	**Aroclor 1260**	**3.9**	**9.5**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	45.2%
Tetrachlorometaxylene	42.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: BH10-SR
SAMPLE

Lab Sample ID: GL76G
LIMS ID: 04-4611
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/15/04 03:16
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 7.7
Percent Moisture: 25.1%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	**Aroclor 1248**	**3.9**	**9.1**
11097-69-1	**Aroclor 1254**	**3.9**	**26**
11096-82-5	**Aroclor 1260**	3.9	**26**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	67.5%
Tetrachlorometaxylene	52.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD **Sample ID: CS2-SR**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL76J
LIMS ID: 04-4614
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/15/04 03:37
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.1
Percent Moisture: 33.7%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	4.0	< 4.0 U
53469-21-9	Aroclor 1242	4.0	< 4.0 U
12672-29-6	**Aroclor 1248**	**4.0**	**7.9**
11097-69-1	**Aroclor 1254**	**4.0**	**17**
11096-82-5	**Aroclor 1260**	**4.0**	**16**
11104-28-2	Aroclor 1221	4.0	< 4.0 U
11141-16-5	Aroclor 1232	4.0	< 4.0 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	58.5%
Tetrachlorometaxylene	54.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: CS2-SS
SAMPLE

Lab Sample ID: GL76K
LIMS ID: 04-4615
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/15/04 03:57
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.9 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.0
Percent Moisture: 32.9%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	**Aroclor 1248**	**3.9**	**11**
11097-69-1	**Aroclor 1254**	**3.9**	**6.3**
11096-82-5	**Aroclor 1260**	**3.9**	**4.1 J**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	64.8%
Tetrachlorometaxylene	53.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: CS2-BC
SAMPLE

Lab Sample ID: GL76L
LIMS ID: 04-4616
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/15/04 05:40
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.9
Percent Moisture: 58.1%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	**Aroclor 1248**	**3.9**	**54**
11097-69-1	**Aroclor 1254**	**3.9**	**160 EP**
11096-82-5	**Aroclor 1260**	**3.9**	**140 EP**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	90.5%
Tetrachlorometaxylene	46.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: CS2-BC
DILUTION

Lab Sample ID: GL76L
LIMS ID: 04-4616
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/17/04 05:40
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 5.00
Silica Gel: No
pH: 8.9
Percent Moisture: 58.1%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	20	< 20 U
53469-21-9	Aroclor 1242	20	< 20 U
12672-29-6	**Aroclor 1248**	**20**	**45**
11097-69-1	**Aroclor 1254**	**20**	**150 P**
11096-82-5	**Aroclor 1260**	**20**	**110**
11104-28-2	Aroclor 1221	20	< 20 U
11141-16-5	Aroclor 1232	20	< 20 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	112%
Tetrachlorometaxylene	35.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: BH5-SR
MS/MSD

Lab Sample ID: GL76D
LIMS ID: 04-4608
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted MS/MSD: 04/07/04

Date Analyzed MS: 04/15/04 02:15
MSD: 04/15/04 02:35
Instrument/Analyst MS: ECD5/PK
MSD: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount MS: 25.6 g-dry-wt
MSD: 25.5 g-dry-wt
Final Extract Volume MS: 1.0 mL
MSD: 1.0 mL
Dilution Factor MS: 1.00
MSD: 1.00
Silica Gel: No
pH: 7.9
Percent Moisture: 37.0%

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Aroclor 1016	< 4.0 U	32.2	39.0	82.6%	30.7	39.2	78.3%	4.8%
Aroclor 1260	28.5	56.2	39.0	71.0%	50.5	39.2	56.1%	10.7%

Results reported in µg/kg (ppb)
RPD calculated using sample concentrations per SW846.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: BH5-SR
MATRIX SPIKE

Lab Sample ID: GL76D
LIMS ID: 04-4608
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/15/04 02:15
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 7.9
Percent Moisture: 37.0%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	---
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	31	< 31 Y
11097-69-1	**Aroclor 1254**	**3.9**	**55 P**
11096-82-5	Aroclor 1260	3.9	---
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	70.8%
Tetrachlorometaxylene	54.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: LCS-040704
LAB CONTROL

Lab Sample ID: LCS-040704
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Date Extracted: 04/07/04
Date Analyzed: 04/15/04 01:13
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.0 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: NA
Percent Moisture: NA

Analyte	Lab Control	Spike Added	Recovery
Aroclor 1016	25.1	40.0	62.8%
Aroclor 1260	26.1	40.0	65.2%

PCB Surrogate Recovery

Decachlorobiphenyl	67.2%
Tetrachlorometaxylene	64.0%

Results reported in µg/kg (ppb)

ANALYTICAL RESOURCES INCORPORATED

SW8082/PCB SOIL/SEDIMENTS SURROGATE RECOVERY SUMMARY

Matrix: Sediment

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027

Client ID	DCBP	TCMX	TOT OUT
MB-040704	64.5%	63.5%	0
LCS-040704	67.2%	64.0%	0
BH11-SR	62.8%	57.2%	0
BH5-SR	72.5%	53.5%	0
BH5-SR MS	70.8%	54.0%	0
BH5-SR MSD	72.2%	50.5%	0
BH5-SS	45.2%	42.2%	0
BH10-SR	67.5%	52.2%	0
CS2-SR	58.5%	54.0%	0
CS2-SS	64.8%	53.5%	0
CS2-BC	90.5%	46.5%	0
CS2-BC DL	112%	35.0%	0

	LCS/MB LIMITS	QC LIMITS
(DCBP) = Decachlorobiphenyl	(44-131)	(18-161)
(TCMX) = Tetrachlorometaxylene	(27-125)	(18-136)

Prep Method: SW3550B
Log Number Range: 04-4605 to 04-4616

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: GL76MB
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Percent Total Solids: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	7439-97-6	Mercury	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH11-SR
SAMPLE

Lab Sample ID: GL76A
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Percent Total Solids: 71.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	7439-97-6	Mercury	0.06	0.06	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH5-SR
SAMPLE

Lab Sample ID: GL76D
LIMS ID: 04-4608
Matrix: Sediment
Data Release Authorized: MC
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Percent Total Solids: 59.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.07	**0.22**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: BH5-SR DUPLICATE

Lab Sample ID: GL76D
LIMS ID: 04-4608
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65) 1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Duplicate	RPD	Control Limit	Q
Mercury	7471A	0.22	0.17	25.6%	+/- 0.07	L

Reported in mg/kg-dry

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: BH5-SR
MATRIX SPIKE

Lab Sample ID: GL76D
LIMS ID: 04-4608
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample	Spike	Spike Added	% Recovery	Q
Mercury	7471A	0.22	0.98	0.74	103%	

Reported in mg/kg-dry

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: BH5-SS
SAMPLE

Lab Sample ID: GL76E
LIMS ID: 04-4609
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Percent Total Solids: 65.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	7439-97-6	Mercury	0.07	0.07	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: BH10-SR
SAMPLE

Lab Sample ID: GL76G
LIMS ID: 04-4611
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Percent Total Solids: 66.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	7439-97-6	Mercury	0.07	0.20	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: CS2-SR
SAMPLE

Lab Sample ID: GL76J
LIMS ID: 04-4614
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
0002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Percent Total Solids: 67.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	7439-97-6	Mercury	0.05	0.09	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: CS2-SS
SAMPLE

Lab Sample ID: GL76K
LIMS ID: 04-4615
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Percent Total Solids: 67.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	7439-97-6	Mercury	0.07	0.07	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: CS2-BC
SAMPLE

Lab Sample ID: GL76L
LIMS ID: 04-4616
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Percent Total Solids: 53.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	7439-97-6	Mercury	0.08	0.53	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: STD REFERENCE
ERA D034

Lab Sample ID: GL76SRM
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Analyte	Analysis Method	Analysis Date	mg/kg-dry	Certified Value	Advisory Range
Mercury	7471A	04/02/04	10.2	9.4	6.2-12.6

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS

Sample ID: MB-GL76
METHOD BLANK

Lab Sample ID: MB-GL76
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized: [signature]
Reported: 04/13/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

METHOD BLANK RESULTS
CONVENTIONALS

Analyte	Analysis Date	Method	RL	Units	Result	
Preserved Total Solids	03/30/04	EPA 160.3 SM 2540 B	0.01	mg residue	< 0.01	U
Total Solids	04/01/04	EPA 160.3 SM 2540 B	0.01	Percent	< 0.01	U
Sulfide	03/31/04	EPA 376.2 SM4500S2-D	0.05	mg/L	< 0.05	U
Total Organic Carbon	04/07/04	Plumb,1981	0.020	Percent	< 0.020	U
Sulfide	04/01/04	EPA 376.2 SM4500S2-D	0.05	mg/L	< 0.05	U

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH11-SR**
Page 1 of 1 SAMPLE

Lab Sample ID: GL76A
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized: QAP
Reported: 04/13/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	72.1
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	64.2
Sulfide	03/31/04 033104#1	EPA 376.2 SM4500S2-D	100	156	mg/kg	2,400
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	2.2

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS
Page 1 of 1

Sample ID: BH5-SR
SAMPLE

Lab Sample ID: GL76D
LIMS ID: 04-4608
Matrix: Sediment
Data Release Authorized: ad
Reported: 04/13/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	57.4
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	58.9
Sulfide	03/31/04 033104#1	EPA 376.2 SM4500S2-D	100	167	mg/kg	1,600
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	3.0

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH5-SS**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL76E
LIMS ID: 04-4609
Matrix: Sediment
Data Release Authorized:
Reported: 04/13/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	61.4
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	57.3
Sulfide	03/31/04 033104#1	EPA 376.2 SM4500S2-D	200	348	mg/kg	1,800
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	2.9

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS
Page 1 of 1

Sample ID: BH10-SR
SAMPLE

Lab Sample ID: GL76G
LIMS ID: 04-4611
Matrix: Sediment
Data Release Authorized: ajy
Reported: 04/13/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	70.9
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	69.3
Sulfide	03/31/04 033104#1	EPA 376.2 SM4500S2-D	50	71.9	mg/kg	990
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	3.8

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS
Page 1 of 1

Sample ID: CS2-SR
SAMPLE

Lab Sample ID: GL76J
LIMS ID: 04-4614
Matrix: Sediment
Data Release Authorized: AP
Reported: 04/13/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	68.8
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	65.2
Sulfide	03/31/04 033104#1	EPA 376.2 SM4500S2-D	100	153	mg/kg	860
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	2.9

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS
Page 1 of 1

Sample ID: CS2-SS
SAMPLE

Lab Sample ID: GL76K
LIMS ID: 04-4615
Matrix: Sediment
Data Release Authorized: [signature]
Reported: 04/13/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	66.1
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	60.1
Sulfide	03/31/04 033104#1	EPA 376.2 SM4500S2-D	100	166	mg/kg	2,400
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	5.0

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS2-BC**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL76L
LIMS ID: 04-4616
Matrix: Sediment
Data Release Authorized: ark
Reported: 04/13/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/25/04
Date Received: 03/25/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	53.7
Preserved Total Solids	03/30/04 033004#1	EPA 160.3 SM 2540 B		0.01	Percent	46.0
Sulfide	04/01/04 040104#1	EPA 376.2 SM4500S2-D	400	863	mg/kg	8,200
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	4.9

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS

Sample ID: LCS-GL76
LAB CONTROL

Lab Sample ID: LCS-GL76
LIMS ID: 04-4608
Matrix: Sediment
Data Release Authorized: amp
Reported: 04/13/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

LABORATORY CONTROL RESULTS
CONVENTIONALS

Analyte	Analysis Date	Method	Units	LCS	True	REC
Sulfide	03/31/04	EPA 376.2	mg/L	8.23	8.58	95.9%
Sulfide	04/01/04	EPA 376.2	mg/L	7.77	7.99	97.2%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: SRM-GL76**
Page 1 of 1 **STANDARD REFERENCE**

Lab Sample ID: SRM-GL76
LIMS ID: 04-4608
Matrix: Sediment
Data Release Authorized: AAP
Reported: 04/13/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

STANDARD REFERENCE RESULTS
CONVENTIONALS

Analyte	Analysis Date & Batch	Method	Units	SRM	True	REC
NIST #8704						
Total Carbon	04/07/04 040704#1	Plumb,1981	Percent	3.05	3.35	91.0%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS
Page 1 of 1

Sample ID: DUP-GL76
DUPLICATE

Lab Sample ID: DUP-GL76
LIMS ID: 04-4608
Matrix: Sediment
Data Release Authorized: ARP
Reported: 04/13/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Received: 03/25/04

DUPLICATE RESULTS
CONVENTIONALS

Analyte	Method	Units	Sample	Replicate	RPD/RSD
ARI ID: 04-4608, GL76D	**Client Sample ID: BH5-SR**				
Total Solids	EPA 160.3 SM 2540 B	Percent	57.4	60.9 60.0	3.1%
Sulfide	EPA 376.2 SM4500S2-D	mg/kg	1,600	1,650	3.1%
Total Organic Carbon	Plumb,1981	Percent	3.0	2.9 3.1	3.3%
ARI ID: 04-4616, GL76L	**Client Sample ID: CS2-BC**				
Sulfide	EPA 376.2 SM4500S2-D	mg/kg	8,200	9,580	15.5%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: MS/MSD-GL76**
Page 1 of 1 **MATRIX SPIKE**

Lab Sample ID: MS-GL76
LIMS ID: 04-4608
Matrix: Sediment
Data Release Authorized: ap
Reported: 04/13/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Received: 03/25/04

MATRIX SPIKE RESULTS
CONVENTIONALS

Analyte	Method	Units	Sample	Spike	MS/ MSD	REC
ARI ID: 04-4608, GL76D	**Client Sample ID: BH5-SR**					
Sulfide	EPA 376.2	mg/kg	1,600	290	3,120	524%
Total Organic Carbon	Plumb,1981	Percent	2.97	3.35	6.21	96.7%
ARI ID: 04-4616, GL76L	**Client Sample ID: CS2-BC**					
Sulfide	EPA 376.2	mg/kg	8,200	347	9,350	331%

ANALYTICAL RESOURCES INCORPORATED

Polaris Applied Sciences
1002.027

PSEP Total Solids Analysis
Percent of Wet Weight

Sample No.	Total Solids (%)
Trip-1	63.2
Trip-2	63.1
Trip-3	63.1
BH11-SR	71.7
BH5-SR	65.5
BH5-SS	56.9
BH10-SR	71.5
CS2-SR	70.6
CS2-SS	68.7
CS2-BC	55.1

Triplicate Average	63.1
Standard Deviation	0.02
%RSD	0.03

GL76

QA SUMMARY

ANALYTICAL RESOURCES INCORPORATED

PROJECT:	Polaris Applied Sciences	Project No.:	1002.027
ARI Triplicate Sample ID:	GL20A1	Batch No.:	GL76 -01
Client Triplicate Sample ID:	NA	Page:	1 of 1

Relative Standard Deviation, By Phi Size

Sample ID	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Trip-1	100.0	100.0	99.1	97.7	92.6	82.3	73.7	66.9	59.3	48.9	37.5	26.9	19.4	14.5
Trip-2	100.0	100.0	99.3	98.0	92.5	82.2	73.5	66.8	58.0	48.3	36.7	26.7	19.7	14.7
Trip-3	100.0	99.7	99.0	97.6	92.4	82.0	73.5	66.8	59.5	48.9	37.8	27.0	19.5	14.8
AVE	NA	99.92	99.13	97.77	92.49	82.18	73.58	66.82	58.92	48.69	37.36	26.88	19.51	14.67
STDEV	NA	0.15	0.15	0.19	0.07	0.14	0.10	0.05	0.77	0.32	0.55	0.15	0.12	0.16
%RSD	NA	0.15	0.15	0.19	0.08	0.17	0.14	0.08	1.31	0.66	1.47	0.57	0.63	1.09

The Triplicate Applies To The Following Samples

ARI ID	Client ID	Date Sampled	Date Extracted	Date Complete	QA*
GL20A1	Trip-1	1/31/03	4/13/04	4/21/04	97.9
GL20A2	Trip-2	10/31/03	4/13/04	4/21/04	97.0
GL20A3	Trip-3	10/31/03	4/13/04	4/21/04	97.7
GL76A	BH11-SR	3/25/04	4/6/04	4/21/04	100.6
GL76D	BH5-SR	3/25/04	4/6/04	4/21/04	100.4
GL76E	BH5-SS	3/25/04	4/6/04	4/21/04	99.3
GL76G	BH10-SR	3/25/04	4/6/04	4/21/04	100.3
GL76J	CS2-SR	3/25/04	4/6/04	4/21/04	102.5
GL76K	CS2-SS	3/25/04	4/6/04	4/21/04	100.3
GL76L	CS2-BC	3/25/04	4/6/04	4/21/04	98.6

* ARI Internal QA limits = 95-105%

Notes to the Testing:

1. See narrative for discussion of testing.

ANALYTICAL RESOURCES INCORPORATED

Polaris Applied Sciences
1002.027

Apparent Grain Size Distribution Summary
Percent Finer Than Indicated Size

Sample No.	Gravel			Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt				Clay	
Phi Size	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Sieve Size (microns)	3/8"	#4	#10 (2000)	#18 (1000)	#35 (500)	#60 (250)	#120 (125)	#230 (62)	31.00	15.60	7.80	3.90	2.00	1.00
Trip-1	100.0	100.0	99.1	97.7	92.6	82.3	73.7	66.9	59.3	48.9	37.5	26.9	19.4	14.5
Trip-2	100.0	100.0	99.3	98.0	92.5	82.2	73.5	66.8	58.0	48.3	36.7	26.7	19.7	14.7
Trip-3	100.0	99.7	99.0	97.6	92.4	82.0	73.5	66.8	59.5	48.9	37.8	27.0	19.5	14.8
BH11-SR	100.0	99.8	98.4	94.0	67.8	29.1	20.5	17.1	13.6	10.2	7.8	5.4	4.0	2.8
BH5-SR	100.0	99.8	99.1	96.8	85.0	55.3	36.2	28.6	22.6	15.8	10.7	7.4	5.3	3.9
BH5-SS	100.0	99.9	98.8	95.5	82.6	61.3	50.4	42.0	32.9	19.9	11.8	7.1	4.9	3.7
BH10-SR	100.0	99.9	98.2	95.8	75.8	30.5	16.8	13.9	12.2	9.6	6.2	4.6	3.4	3.3
CS2-SR	100.0	99.9	98.6	95.6	74.9	37.1	25.1	21.9	16.5	12.8	9.3	6.8	4.8	3.3
CS2-SS	100.0	99.1	96.9	89.6	61.9	24.0	9.7	7.1	5.8	3.6	2.0	1.7	1.7	1.5
CS2-BC	100.0	95.0	83.0	74.6	59.9	42.9	34.4	31.6	27.0	18.2	10.4	7.2	4.7	3.3

Notes to the Testing:

1. Apparent grain size distributions according to PSEP protocols.

GL76

ANALYTICAL RESOURCES INCORPORATED

Polaris Applied Sciences
1002.027

Apparent Grain Size Distribution Summary
Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay		
Phi Size	> -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	< 10
Sieve Size (microns)	> #10 (2000)	10 to 18 (2000-1000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0
Trip-1	0.9	1.3	5.2	10.3	8.6	6.8	7.6	10.4	11.4	10.7	7.4	4.9	14.5
Trip-2	0.7	1.3	5.5	10.3	8.7	6.8	8.7	9.7	11.6	10.0	7.1	4.9	14.7
Trip-3	1.0	1.4	5.2	10.4	8.5	6.7	7.4	10.6	11.1	10.8	7.6	4.7	14.8
BH11-SR	1.6	4.5	26.2	38.7	8.6	3.4	3.5	3.4	2.3	2.4	1.4	1.2	2.8
BH5-SR	0.9	2.3	11.8	29.7	19.2	7.6	6.1	6.8	5.1	3.3	2.0	1.5	3.9
BH5-SS	1.2	3.3	12.9	21.3	10.9	8.4	9.1	13.1	8.1	4.7	2.2	1.2	3.7
BH10-SR	1.8	2.3	20.1	45.3	13.6	3.0	1.7	2.6	3.3	1.6	1.2	0.1	3.3
CS2-SR	1.4	3.0	20.7	37.7	12.0	3.2	5.4	3.7	3.6	2.5	2.0	1.5	3.3
CS2-SS	3.1	7.3	27.7	37.9	14.4	2.5	1.4	2.1	1.7	0.3	0.1	0.2	1.5
CS2-BC	17.0	8.3	14.7	17.0	8.5	2.8	4.6	8.8	7.8	3.1	2.5	1.4	3.3

Notes to the Testing:

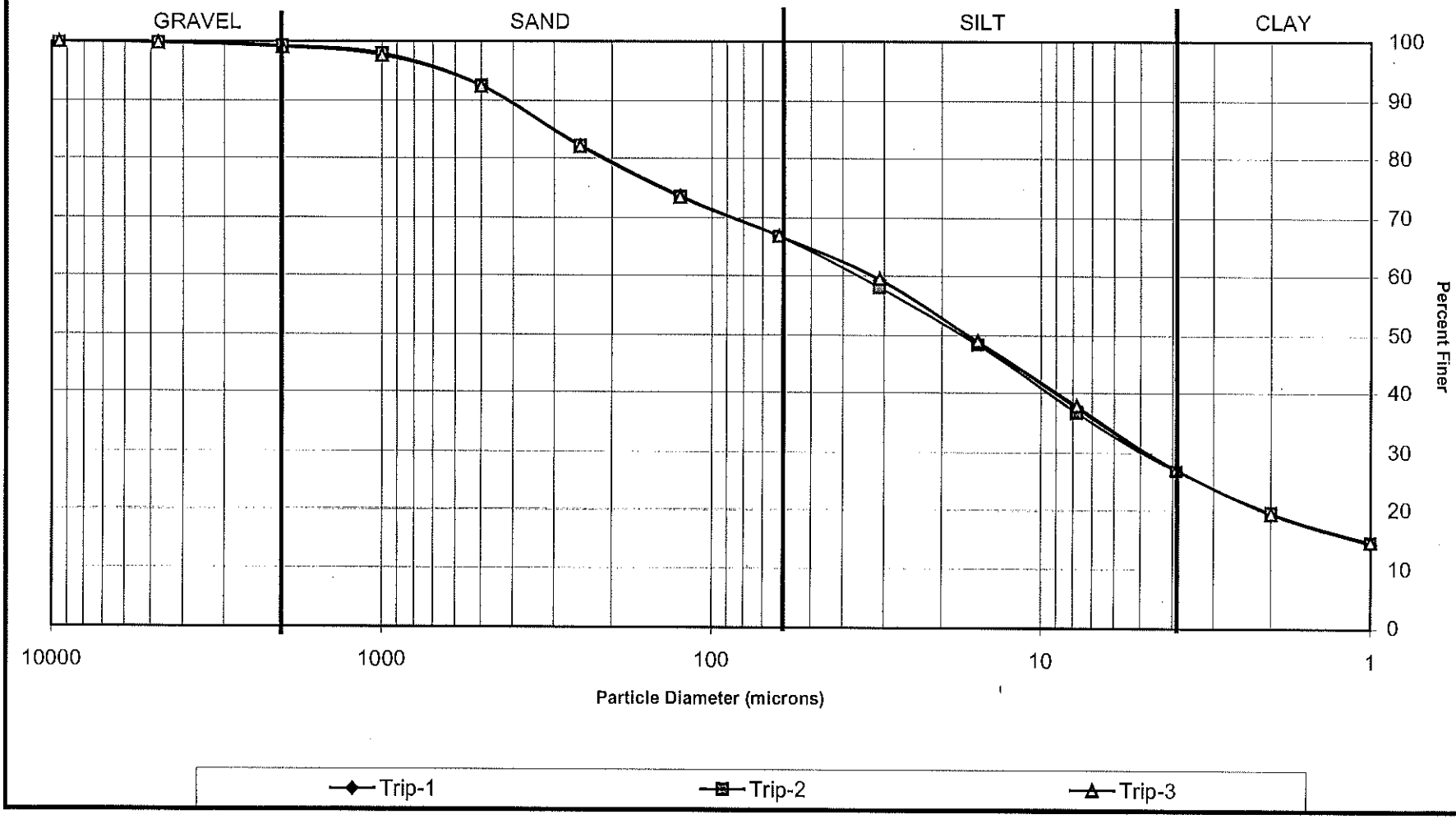
1. Apparent grain size distributions according to PSEP protocols.

GL76

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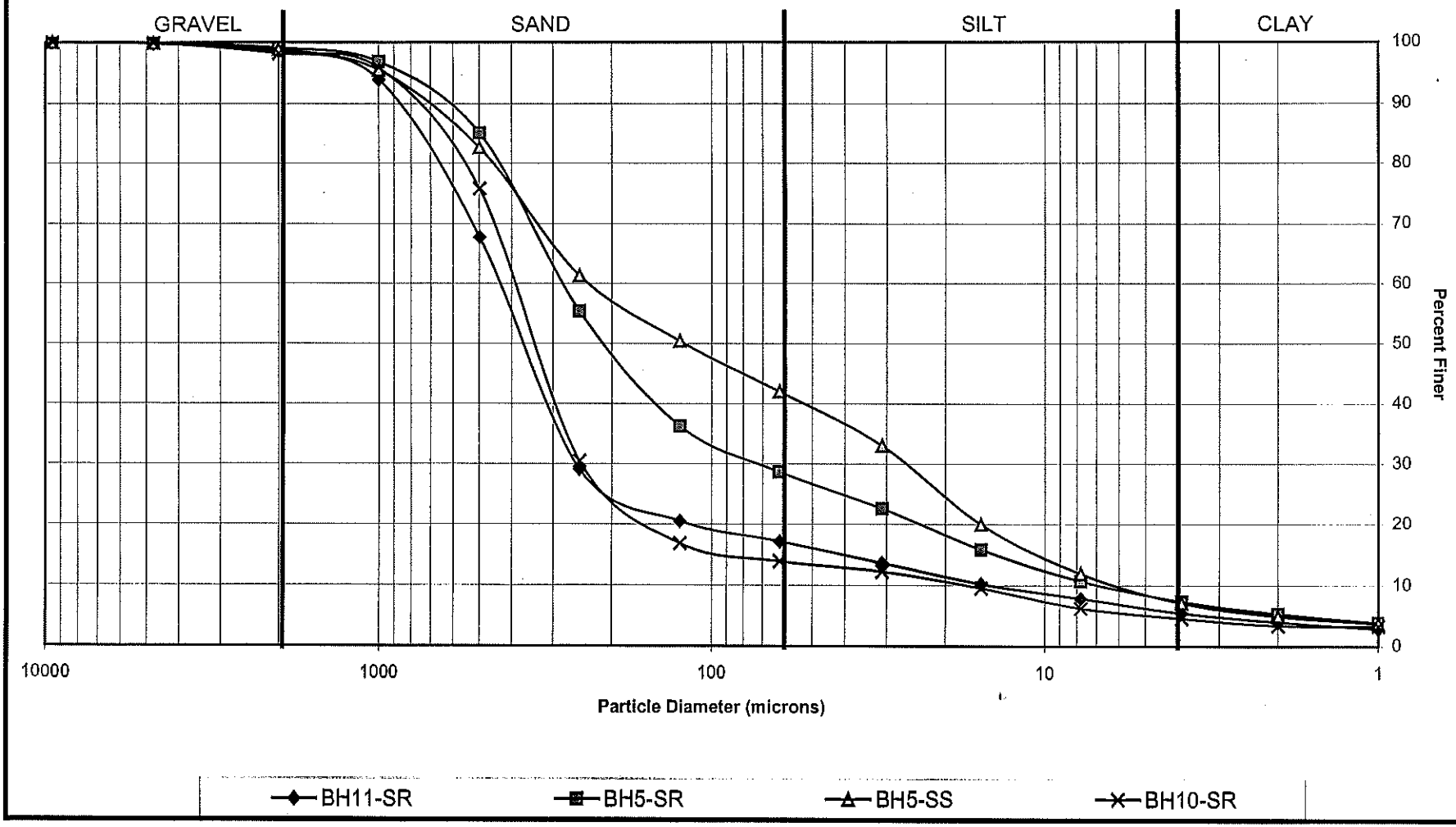
PSEP Grain Size Distribution

Triplicate Sample Plot



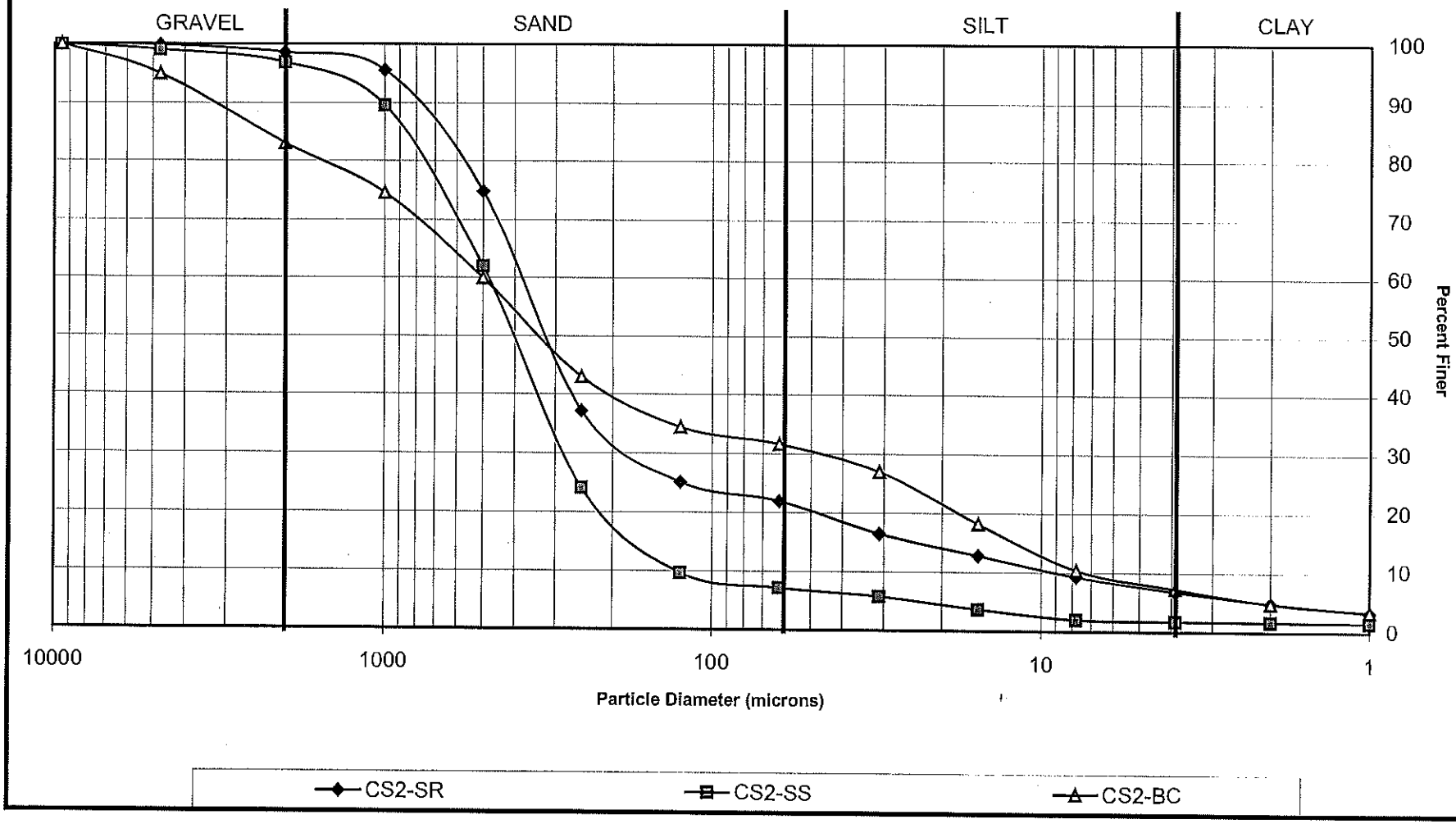
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PSEP Grain Size Distribution



ANALYTICAL RESOURCES INCORPORATED

PSEP Grain Size Distribution



Analytical Resources, Incorporated
Analytical Chemists and Consultants

May 4, 2004

Mr. Jerry Erickson
Polaris Applied Sciences, Inc.
12509 130th Lane N. E.
Kirkland, WA 98034

RE: Client Project – 1002.027 / P66 Sed Cap (Pier 64/65)
ARI Job No: GL88

Dear Mr. Ercikson:

Please find enclosed the final data for the samples from the project referenced above. ARI received eleven sediment samples on March 26, 2004. The samples were received in good condition. No discrepancies were noted in the chain of custody documentation. The samples were analyzed for SVOAs, PCBs, grain size, mercury, TOC, and sulfide. Selected samples were placed on hold and are being held in a freezer (chemistry analyses) and refrigerator (grain size analysis).

Issues associated with the chemical analysis are discussed in the case narrative.

A copy of this report and the supporting data will remain on file with ARI. Please feel free to contact me at your convenience if you need any additional information.

Respectfully,

ANALYTICAL RESOURCES, INC.

Mary Lou Fox

Mary Lou Fox
Project Manager
marylou@arilabs.com
206/695-6211

Enclosures

cc: File GL88

MLF/mdh

14.0

POLARIS APPLIED SCIENCES, INC.

12509 130th Lane NE, Kirkland, Washington 98034-7713 425/823-4841 Fax 425/823-3805

CHAIN OF CUSTODY RECORD

POLARIS PROJECT #: 1002.027 | PROJECT NAME: P66 sedcap (Pier 64/65)

CLIENT: Port of Seattle | LOCATION: Bell Harbour Marina

PROJECT MANAGER: Jerry Erickson | SEND REPORTS TO: Jerry Erickson

SAMPLER: (SIGNATURE) Gerald M. Erickson

ANALYSIS REQUESTED

Analytes as per Mary Lou Fox

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	Grain size TS (A)	Total sulfides (B)	TOC (C)	SVOAs: PCBs, BENP Dibenzofuran, PAHs (D)	Mercury (E)	A	Lotions jar tops + labels	LOCATION/REMARKS:
	BH5-SR-MST	3-26-04	0855	Sed	X		1		X						Composited from ~~BH5~~ cores BH5 MST A + BH5 MST B (+ Ziploc bag for top of BH5 MST A)
	BH5-SR-MST		0930			X	4	X		X	X		X		
	BH5-SS-MST		0855		X		1								
	BH5-SS-MST		0930			X	4	X		X	X		X		
	BH5-BC-MST		0855		X		1								To be archived
	BH5-BC-MST	↓	0930	↓		X	4	X		X	X		X		
	CS3-SR	3-26-04	1000	Sed	X		1		X						Composited from cores CS3 A + B
	CS3-SR		1030			X	4	X		X	X		X		
	CS3-SS		1000		X		1		X						
	CS3-SS		1030			X	4	X		X	X		X		
	CS3-BC		1000		X		1		X						
	CS3-BC	↓	1030	↓		X	4	X		X	X		X		

RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
Jerry Erickson	3-26-04 1345	Mary Lou Fox
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)

LABORATORY NAME: ARI | LAB PROJECT NUMBER:

LAB ADDRESS:

LAB PHONE: | LAB CONTACT PERSON: Mary Lou Fox

POLARIS CONTACT PERSON: | POLARIS P.O. NUMBER:

DISTRIBUTION: ORIGINAL ACCOMPANIES SHIPMENT, COPY TO FIELD FILES

POLARIS APPLIED SCIENCES, INC.

12509 130th Lane NE, Kirkland, Washington 98034-7713 425/823-4841 Fax 425/823-3805

CHAIN OF CUSTODY RECORD

POLARIS PROJECT # 1002027	PROJECT NAME: P66 Sed Cap (Pier 64/65
CLIENT: Port of Seattle	LOCATION: Bell Harbor Marina
PROJECT MANAGER: Jerry Erickson	SEND REPORTS TO: Jerry Erickson
SAMPLER: (SIGNATURE) Gerald M. Erickson	

ANALYSIS REQUESTED

Analytes do per Manlow Fox

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	Grain Size TS (A)	TOC (C)	SVOHs: PCBs (BEHP) Dibenzofuran, PAHs (D)	Mercury (E)	A	Letters on Jar Lids to Label	LOCATION/REMARKS:
	CS3-SR-FR	3-26-04	1100	Sed	X		1		X					
	CS3-SR-FR		1130			X	4	X		X	X	X		Composited from Cores
	CS3-SS-FR		1100		X		1		X					CS3-[redacted] C &
	CS3-SS-FR		1130			X	4	X		X	X	X		CS3-D
	CS3-BC-FR		1100		X		1		X					
	CS3-BC-FR	↓	1130	↓		X	4	X		X	X	X		

RELINQUISHED BY: (signature) Gerald M. Erickson	DATE/TIME 3-26-04 1345	RECEIVED BY: (signature) MaryLou Fox	LABORATORY NAME: / LAB PROJECT NUMBER:
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)	LAB ADDRESS:
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)	LAB PHONE: / LAB CONTACT PERSON:
			POLARIS CONTACT PERSON: / POLARIS P.O. NUMBER:

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12509 130th Lane NE, Kirkland, Washington 98034-7713 425/823-4841 Fax 425/823-3805

CHAIN OF CUSTODY RECORD

POLARIS PROJECT # 1002.027	PROJECT NAME: PLG6 Sed Cap (Pier 64/65)
CLIENT: Port Seattle	LOCATION: Bell Harbor Marina
PROJECT MANAGER: Jerry Erickson	SEND REPORTS TO: Jerry Erickson
SAMPLER: (SIGNATURE)	

ANALYSIS REQUESTED

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	Grain Size, TS (A)	Total Sulfides (B)	TOC	SVOAs; PCBs; BEHP (C)	Dibenzofuran, PAHs	Mercury (E)					LOCATION/REMARKS:
	BH12-SR-				X		1		X									composited from cores BH12A and BH12B
	BH12-SR					X	4	X		X	X		X					
	~~BH12-SR~~																	
	~~BH12-SR~~																	

Analytes as per MaryLou Fox

RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
	3-26-09 1345	MaryLou Fox
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)

LABORATORY NAME: ARI

LAB PROJECT NUMBER:

LAB ADDRESS:

LAB PHONE:

LAB CONTACT PERSON: MaryLou Fox

POLARIS CONTACT PERSON:

POLARIS P.O. NUMBER:

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POLARIS APPLIED SCIENCES, INC.

12509 130th Lane NE, Kirkland, Washington 98034-7713 425/823-4841 Fax 425/823-3805

CHAIN OF CUSTODY RECORD

POLARIS PROJECT # 1002.027	PROJECT NAME: P66 SedCap (Pier 64/65)
CLIENT: Port of Seattle	LOCATION: Bell Harbor Marina
PROJECT MANAGER: Jerry Erickson	SEND REPORTS TO: Jerry Erickson
SAMPLER: (SIGNATURE) Jerry M. Erickson	

ANALYSIS REQUESTED

LABORATORY I.D. NO.	CLIENT SAMPLE I.D. (25 characters)	DATE	TIME	MATRIX	GRAB	COMP	NO. OF CONTAINERS:	Grain Size (A)	Total Sulfides (B)	TOC (C)	SVOAs: PCBs; BEHP (D)	Dibenzofuran, PAHs	Mercury (E)	Letters on jar tops and topsoil labels	LOCATION/REMARKS:
	BH13-SR				X		1		X						composited from cores BH13-A and BH13-B
	BH13-SR					X	4	X		X	X		X		

Analytes as per MaryLou Fox

RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
[signature]	3-26-09 | 1345	MaryLou Fox
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED BY: (signature)
RELINQUISHED BY: (signature)	DATE/TIME	RECEIVED FOR LAB BY: (signature)

LABORATORY NAME: ARI

LAB PROJECT NUMBER:

LAB ADDRESS:

LAB PHONE:

LAB CONTACT PERSON: MaryLou Fox

POLARIS CONTACT PERSON:

POLARIS P.O. NUMBER:

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Case Narrative

Client Project – 1002.027 / P66 Sed Cap (Pier 64/65)
ARI Job No: GL88
Matrix: Sediment
Date: May 4, 2004

Semivolatile Organic Compounds Analysis referencing EPA SW-846 method 8270C

The extraction of these samples was batched with those of the samples received on 3/25 (GL76).

The organic lab manager determined that the samples would be taken to a final extraction volume of 1.0 mL rather than 0.5 mL due to the very high organic content of the samples. Samples **CS3-BC** and **CS3-BC-FR** were taken to 5.0 mLs. These two samples showed high level detections of PNAs.

The extracts for samples **CS3-SR, CS3-BC, CS3-BC-FR, BH12-SR** and **BH13-SR** were pre-diluted 1:3, due to extract appearance.

No further analytical complications were noted.

PSDDA PCB Analysis referencing EPA SW-846 method 8082

The extraction of these samples was batched with the extraction of the samples received on 3/25 (GL764).

The samples required additional cleaning for the sulfur after the initial sulfur cleaning and the sample matrices tended to lower the continuing calibrations (C-Cals). The samples were re-analyzed due to failing C-Cals. All C-Cals were compliant in the re-analyses. Only the re-analyses have been reported

No further analytical complications were noted.

Mercury Analysis referencing EPA SW-846 method 7471A

The total mercury analyses of these samples were batched with those of the samples received on 3/25 (GL76). The method blank and standard reference material are reported originally with the 3/25 delivery group (GL76). A copy of each is included in this data package for your convenience.

No analytical complications were noted.

Conventionals Analyses referencing EPA method 376.2 and Plumb, 1981

The TOC analyses of these samples were batched with those of the samples received on 3/25 (GL76).

No analytical complications were noted.

Grain Size Analysis

A separate case narrative is provided by the geotechnical lab manager.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Client: Polaris Applied Sciences, Inc. Project No.: GL88

Client Project: PGG Sed Cap

Case Narrative

1. The samples were submitted for grain size analysis according to PSEP methodology.
2. The samples were run in a batch with other samples and one sample in the set was chosen for triplicate analysis. The triplicate data is reported on the QA summary.
3. Samples CS3-SR-FR and CS3-SS-FR were mostly sand and had less than the required 5 grams of fines in the pipette portion of the analysis. Because of this, sample CS3-SS-FR had a poor QA ratio (93.3) that was outside of our internal limits of 95-105. Because the matrix was mostly sand, this sample was not re-run. The results were calculated using the "after" moisture content, instead of the "before" moisture content.
4. The data is provided in summary tables and plots.
5. There were no noted anomalies in the samples or methods on this project.

Approved by: Hadel Beyy Date: 4/30/04
Title: Geotechnical Division Manager

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ORGANIC COMPOUND DATA REPORTING QUALIFIERS

U Indicates the compound was undetected at the reported concentration. (Same as ND).

J Indicates an estimated concentration when the value is less than the calculated reporting limit.

D Indicates the surrogate/spike(s) was not detected, due to dilution of extract.

NR Indicates the surrogate recovery cannot be reported due to matrix interference.

E Indicates a value above the linear range of the detector. Sample dilution required.

S Indicates no value reported due to saturation of the detector. Sample dilution required.

NA Indicates compound not analyzed for.

M Indicates an estimated value of analyte found and confirmed by analyst but with low spectral match (GC/MS)

B Indicates possible/probable blank contamination. Flagged when the analyte is detected in the blank as well as the sample.

Y Indicates raised reporting limit due to background interference or to activity on the instrument. Compound is still not detected at or above the raised level.

C Indicates a probable hit that cannot be confirmed due to matrix interference (GC).

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: MB-040704
METHOD BLANK

Lab Sample ID: MB-040704
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 12:39
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.0 g
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: NA
pH: NA

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	40	< 40 U
91-57-6	2-Methylnaphthalene	40	< 40 U
208-96-8	Acenaphthylene	40	< 40 U
83-32-9	Acenaphthene	40	< 40 U
86-73-7	Fluorene	40	< 40 U
85-01-8	Phenanthrene	40	< 40 U
120-12-7	Anthracene	40	< 40 U
206-44-0	Fluoranthene	40	< 40 U
129-00-0	Pyrene	40	< 40 U
56-55-3	Benzo(a)anthracene	40	< 40 U
218-01-9	Chrysene	40	< 40 U
205-99-2	Benzo(b)fluoranthene	40	< 40 U
207-08-9	Benzo(k)fluoranthene	40	< 40 U
50-32-8	Benzo(a)pyrene	40	< 40 U
193-39-5	Indeno(1,2,3-cd)pyrene	40	< 40 U
53-70-3	Dibenz(a,h)anthracene	40	< 40 U
191-24-2	Benzo(g,h,i)perylene	40	< 40 U
132-64-9	Dibenzofuran	40	< 40 U
117-81-7	bis(2-Ethylhexyl)phthalate	40	< 40 U

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	102%
d10-Diphenyl	85.6%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: CS3-SR
SAMPLE

Lab Sample ID: GL88A
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 20:57
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 26.9%
pH: 8.4

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	120	< 120 U
91-57-6	2-Methylnaphthalene	120	< 120 U
208-96-8	Acenaphthylene	120	< 120 U
83-32-9	**Acenaphthene**	**120**	**120**
86-73-7	**Fluorene**	**120**	**130**
85-01-8	**Phenanthrene**	**120**	**520**
120-12-7	**Anthracene**	**120**	**240**
206-44-0	**Fluoranthene**	**120**	**650**
129-00-0	**Pyrene**	**120**	**780**
56-55-3	**Benzo(a)anthracene**	**120**	**370**
218-01-9	**Chrysene**	**120**	**550**
205-99-2	**Benzo(b)fluoranthene**	**120**	**530**
207-08-9	**Benzo(k)fluoranthene**	**120**	**460**
50-32-8	**Benzo(a)pyrene**	**120**	**440**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**120**	**110 J**
53-70-3	Dibenz(a,h)anthracene	120	< 120 U
191-24-2	**Benzo(g,h,i)perylene**	**120**	**120**
132-64-9	Dibenzofuran	120	< 120 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**120**	**150**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	84.7%
d10-Diphenyl	81.6%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: CS3-SS
SAMPLE

Lab Sample ID: GL88B
LIMS ID: 04-4682
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 21:27
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 31.6%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	40	< 40 U
91-57-6	2-Methylnaphthalene	40	< 40 U
208-96-8	Acenaphthylene	40	< 40 U
83-32-9	Acenaphthene	40	78
86-73-7	Fluorene	40	81
85-01-8	Phenanthrene	40	300
120-12-7	Anthracene	40	110
206-44-0	Fluoranthene	40	370
129-00-0	Pyrene	40	390
56-55-3	Benzo(a)anthracene	40	140
218-01-9	Chrysene	40	210
205-99-2	Benzo(b)fluoranthene	40	230
207-08-9	Benzo(k)fluoranthene	40	200
50-32-8	Benzo(a)pyrene	40	170
193-39-5	Indeno(1,2,3-cd)pyrene	40	45
53-70-3	Dibenz(a,h)anthracene	40	< 40 U
191-24-2	Benzo(g,h,i)perylene	40	43
132-64-9	Dibenzofuran	40	43
117-81-7	bis(2-Ethylhexyl)phthalate	40	110

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	84.8%
d10-Diphenyl	73.1%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS **Sample ID: CS3-BC**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL88C
LIMS ID: 04-4683
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 21:57
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.4 g-dry-wt
Final Extract Volume: 5.0 mL
Dilution Factor: 3.00
Percent Moisture: 53.1%
pH: 8.5

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	590	< 590 U
91-57-6	2-Methylnaphthalene	590	< 590 U
208-96-8	**Acenaphthylene**	**590**	**1,000**
83-32-9	Acenaphthene	590	< 590 U
86-73-7	Fluorene	590	< 590 U
85-01-8	**Phenanthrene**	**590**	**3,300**
120-12-7	**Anthracene**	**590**	**3,000**
206-44-0	**Fluoranthene**	**590**	**9,600**
129-00-0	**Pyrene**	**590**	**14,000**
56-55-3	**Benzo(a)anthracene**	**590**	**8,000**
218-01-9	**Chrysene**	**590**	**10,000**
205-99-2	**Benzo(b)fluoranthene**	**590**	**13,000**
207-08-9	**Benzo(k)fluoranthene**	**590**	**9,600**
50-32-8	**Benzo(a)pyrene**	**590**	**8,800**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**590**	**1,800**
53-70-3	**Dibenz(a,h)anthracene**	**590**	**730**
191-24-2	**Benzo(g,h,i)perylene**	**590**	**1,400**
132-64-9	Dibenzofuran	590	< 590 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**590**	**990**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	92.4%
d10-Diphenyl	80.4%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: CS3-SR-FR
SAMPLE

Lab Sample ID: GL88D
LIMS ID: 04-4684
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 22:26
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 26.7%
pH: 8.0

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	39	< 39 U
91-57-6	2-Methylnaphthalene	39	< 39 U
208-96-8	Acenaphthylene	39	< 39 U
83-32-9	Acenaphthene	39	< 39 U
86-73-7	Fluorene	39	55
85-01-8	Phenanthrene	39	200
120-12-7	Anthracene	39	190
206-44-0	Fluoranthene	39	320
129-00-0	Pyrene	39	370
56-55-3	Benzo(a)anthracene	39	180
218-01-9	Chrysene	39	310
205-99-2	Benzo(b)fluoranthene	39	300
207-08-9	Benzo(k)fluoranthene	39	310
50-32-8	Benzo(a)pyrene	39	230
193-39-5	Indeno(1,2,3-cd)pyrene	39	55
53-70-3	Dibenz(a,h)anthracene	39	< 39 U
191-24-2	Benzo(g,h,i)perylene	39	59
132-64-9	Dibenzofuran	39	< 39 U
117-81-7	bis(2-Ethylhexyl)phthalate	39	220

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	84.0%
d10-Diphenyl	78.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: CS3-SS-FR
SAMPLE

Lab Sample ID: GL88E
LIMS ID: 04-4685
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 22:56
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 26.0 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Percent Moisture: 28.9%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	38	< 38 U
91-57-6	2-Methylnaphthalene	38	< 38 U
208-96-8	Acenaphthylene	38	< 38 U
83-32-9	Acenaphthene	38	< 38 U
86-73-7	Fluorene	38	< 38 U
85-01-8	Phenanthrene	38	< 38 U
120-12-7	Anthracene	38	< 38 U
206-44-0	**Fluoranthene**	**38**	**64**
129-00-0	**Pyrene**	**38**	**78**
56-55-3	Benzo(a)anthracene	38	< 38 U
218-01-9	**Chrysene**	**38**	**40**
205-99-2	**Benzo(b)fluoranthene**	**38**	**58**
207-08-9	**Benzo(k)fluoranthene**	**38**	**53**
50-32-8	**Benzo(a)pyrene**	**38**	**45**
193-39-5	Indeno(1,2,3-cd)pyrene	38	< 38 U
53-70-3	Dibenz(a,h)anthracene	38	< 38 U
191-24-2	Benzo(g,h,i)perylene	38	< 38 U
132-64-9	Dibenzofuran	38	< 38 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**38**	**62**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	79.0%
d10-Diphenyl	69.4%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: CS3-BC-FR
SAMPLE

Lab Sample ID: GL88F
LIMS ID: 04-4686
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 23:25
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.7 g-dry-wt
Final Extract Volume: 5.0 mL
Dilution Factor: 3.00
Percent Moisture: 54.6%
pH: 8.8

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	580	< 580 U
91-57-6	2-Methylnaphthalene	580	< 580 U
208-96-8	**Acenaphthylene**	**580**	**950**
83-32-9	Acenaphthene	580	< 580 U
86-73-7	Fluorene	580	< 580 U
85-01-8	**Phenanthrene**	**580**	**3,300**
120-12-7	**Anthracene**	**580**	**3,000**
206-44-0	**Fluoranthene**	**580**	**9,200**
129-00-0	**Pyrene**	**580**	**15,000**
56-55-3	**Benzo(a)anthracene**	**580**	**5,700**
218-01-9	**Chrysene**	**580**	**7,500**
205-99-2	**Benzo(b)fluoranthene**	**580**	**9,800**
207-08-9	**Benzo(k)fluoranthene**	**580**	**7,200**
50-32-8	**Benzo(a)pyrene**	**580**	**6,900**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**580**	**1,400**
53-70-3	**Dibenz(a,h)anthracene**	**580**	**610**
191-24-2	**Benzo(g,h,i)perylene**	**580**	**1,200**
132-64-9	Dibenzofuran	580	< 580 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**580**	**720**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	90.0%
d10-Diphenyl	73.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: BH12-SR
SAMPLE

Lab Sample ID: GL88G
LIMS ID: 04-4687
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 23:55
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 55.7%
pH: 8.2

CAS Number	Analyte	RL	Result
91-20-3	**Naphthalene**	120	130
91-57-6	2-Methylnaphthalene	120	< 120 U
208-96-8	**Acenaphthylene**	120	470
83-32-9	**Acenaphthene**	120	140
86-73-7	**Fluorene**	120	380
85-01-8	**Phenanthrene**	120	2,000
120-12-7	**Anthracene**	120	1,600
206-44-0	**Fluoranthene**	120	2,800
129-00-0	**Pyrene**	120	12,000 E
56-55-3	**Benzo(a)anthracene**	120	2,900
218-01-9	**Chrysene**	120	4,100
205-99-2	**Benzo(b)fluoranthene**	120	4,700
207-08-9	**Benzo(k)fluoranthene**	120	3,600
50-32-8	**Benzo(a)pyrene**	120	3,000
193-39-5	**Indeno(1,2,3-cd)pyrene**	120	600
53-70-3	**Dibenz(a,h)anthracene**	120	280
191-24-2	**Benzo(g,h,i)perylene**	120	460
132-64-9	**Dibenzofuran**	120	120 J
117-81-7	**bis(2-Ethylhexyl)phthalate**	120	420

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	79.7%
d10-Diphenyl	65.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS

Sample ID: BH12-SR
DILUTION

Lab Sample ID: GL88G
LIMS ID: 04-4687
Matrix: Sediment
Data Release Authorized:
Reported: 04/26/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/22/04 11:12
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.3 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 10.0
Percent Moisture: 55.7%
pH: 8.2

CAS Number	Analyte	RL	Result
91-20-3	Naphthalene	400	< 400 U
91-57-6	2-Methylnaphthalene	400	< 400 U
208-96-8	**Acenaphthylene**	**400**	**460**
83-32-9	Acenaphthene	400	< 400 U
86-73-7	**Fluorene**	**400**	**490**
85-01-8	**Phenanthrene**	**400**	**2,300**
120-12-7	**Anthracene**	**400**	**1,800**
206-44-0	**Fluoranthene**	**400**	**3,300**
129-00-0	**Pyrene**	**400**	**14,000**
56-55-3	**Benzo(a)anthracene**	**400**	**3,200**
218-01-9	**Chrysene**	**400**	**4,900**
205-99-2	**Benzo(b)fluoranthene**	**400**	**3,600**
207-08-9	**Benzo(k)fluoranthene**	**400**	**4,300**
50-32-8	**Benzo(a)pyrene**	**400**	**3,400**
193-39-5	**Indeno(1,2,3-cd)pyrene**	**400**	**1,100**
53-70-3	**Dibenz(a,h)anthracene**	**400**	**490**
191-24-2	**Benzo(g,h,i)perylene**	**400**	**1,100**
132-64-9	Dibenzofuran	400	< 400 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**400**	**530**

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	78.4%
d10-Diphenyl	74.4%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS Sample ID: **BH13-SR**
Page 1 of 1 SAMPLE

Lab Sample ID: GL88H
LIMS ID: 04-4688
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/22/04 11:41
Instrument/Analyst: NT1/Van
GPC Cleanup: NO
Alumina: NO

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 3.00
Percent Moisture: 56.9%
pH: 8.1

CAS Number	Analyte	RL	Result
91-20-3	**Naphthalene**	120	180
91-57-6	2-Methylnaphthalene	120	< 120 U
208-96-8	**Acenaphthylene**	120	230
83-32-9	**Acenaphthene**	120	290
86-73-7	**Fluorene**	120	300
85-01-8	**Phenanthrene**	120	1,900
120-12-7	**Anthracene**	120	1,100
206-44-0	**Fluoranthene**	120	2,400
129-00-0	**Pyrene**	120	5,200
56-55-3	**Benzo(a)anthracene**	120	1,500
218-01-9	**Chrysene**	120	2,200
205-99-2	**Benzo(b)fluoranthene**	120	3,100
207-08-9	**Benzo(k)fluoranthene**	120	2,300
50-32-8	**Benzo(a)pyrene**	120	2,500
193-39-5	**Indeno(1,2,3-cd)pyrene**	120	720
53-70-3	**Dibenz(a,h)anthracene**	120	270
191-24-2	**Benzo(g,h,i)perylene**	120	660
132-64-9	**Dibenzofuran**	120	150
117-81-7	**bis(2-Ethylhexyl)phthalate**	120	260

Reported in µg/kg (ppb)

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	71.8%
d10-Diphenyl	64.6%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNAs by SW8270C GC/MS
Page 1 of 1

Sample ID: LCS-040704
LAB CONTROL

Lab Sample ID: LCS-040704
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized:
Reported: 04/22/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P65 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/21/04 13:08
Instrument/Analyst: NT1/Van
GPC Cleanup: NO

Sample Amount: 25.0 g
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Alumina Cleanup: NO

Analyte	Lab Control	Spike Added	Recovery
Naphthalene	472	500	94.4%
Acenaphthene	476	500	95.2%
Fluoranthene	524	500	105%
Benzo(a)anthracene	448	500	89.6%
bis(2-Ethylhexyl)phthalate	608	500	122%

Semivolatile Surrogate Recovery	
d14-p-Terphenyl	115%
d10-Diphenyl	101%

Results reported in µg/kg

ANALYTICAL RESOURCES INCORPORATED

SW8270 PNA SURROGATE RECOVERY SUMMARY

Matrix: Sediment

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027

Client ID	TER	DPH	TOT OUT
MB-040704	102%	85.6%	0
LCS-040704	115%	101%	0
CS3-SR	84.7%	81.6%	0
CS3-SS	84.8%	73.1%	0
CS3-BC	92.4%	80.4%	0
CS3-SR-FR	84.0%	78.5%	0
CS3-SS-FR	79.0%	69.4%	0
CS3-BC-FR	90.0%	73.2%	0
BH12-SR	79.7%	65.3%	0
BH12-SR DL	78.4%	74.4%	0
BH13-SR	71.8%	64.6%	0

	LCS/MB LIMITS	QC LIMITS
(TER) = d14-p-Terphenyl	(30-160)	(30-160)
(DPH) = d10-Diphenyl	(30-160)	(30-160)

Prep Method: SW3550
Log Number Range: 04-4681 to 04-4688

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: MB-040704
METHOD BLANK

Lab Sample ID: MB-040704
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Date Extracted: 04/07/04
Date Analyzed: 04/17/04 01:53
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.0 g
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: NA
Percent Moisture: NA

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	4.0	< 4.0 U
53469-21-9	Aroclor 1242	4.0	< 4.0 U
12672-29-6	Aroclor 1248	4.0	< 4.0 U
11097-69-1	Aroclor 1254	4.0	< 4.0 U
11096-82-5	Aroclor 1260	4.0	< 4.0 U
11104-28-2	Aroclor 1221	4.0	< 4.0 U
11141-16-5	Aroclor 1232	4.0	< 4.0 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	90.8%
Tetrachlorometaxylene	55.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: CS3-SR
SAMPLE

Lab Sample ID: GL88A
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/17/04 02:35
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 26.0 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.4
Percent Moisture: 26.9%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.8	< 3.8 U
53469-21-9	Aroclor 1242	3.8	< 3.8 U
12672-29-6	Aroclor 1248	3.8	< 3.8 U
11097-69-1	**Aroclor 1254**	**3.8**	**19 P**
11096-82-5	**Aroclor 1260**	3.8	**19**
11104-28-2	Aroclor 1221	3.8	< 3.8 U
11141-16-5	Aroclor 1232	3.8	< 3.8 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	79.2%
Tetrachlorometaxylene	48.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: CS3-SS
SAMPLE

Lab Sample ID: GL88B
LIMS ID: 04-4682
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/17/04 02:55
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.1
Percent Moisture: 31.6%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	3.9	< 3.9 U
11097-69-1	**Aroclor 1254**	**3.9**	**13**
11096-82-5	**Aroclor 1260**	**3.9**	**11**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	71.8%
Tetrachlorometaxylene	41.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: CS3-BC
SAMPLE

Lab Sample ID: GL88C
LIMS ID: 04-4683
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/17/04 03:57
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 10.0
Silica Gel: No
pH: 8.5
Percent Moisture: 53.1%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	39	< 39 U
53469-21-9	Aroclor 1242	39	< 39 U
12672-29-6	**Aroclor 1248**	**39**	**120 P**
11097-69-1	**Aroclor 1254**	**39**	**180**
11096-82-5	**Aroclor 1260**	**39**	**140**
11104-28-2	Aroclor 1221	39	< 39 U
11141-16-5	Aroclor 1232	39	< 39 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	75.0%
Tetrachlorometaxylene	32.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: CS3-SR-FR
SAMPLE

Lab Sample ID: GL88D
LIMS ID: 04-4684
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/17/04 03:16
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.8 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.0
Percent Moisture: 26.7%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.9	< 3.9 U
53469-21-9	Aroclor 1242	3.9	< 3.9 U
12672-29-6	Aroclor 1248	3.9	< 3.9 U
11097-69-1	**Aroclor 1254**	**3.9**	**11**
11096-82-5	**Aroclor 1260**	**3.9**	**9.0**
11104-28-2	Aroclor 1221	3.9	< 3.9 U
11141-16-5	Aroclor 1232	3.9	< 3.9 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	73.8%
Tetrachlorometaxylene	45.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: CS3-SS-FR
SAMPLE

Lab Sample ID: GL88E
LIMS ID: 04-4685
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/17/04 03:36
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 26.2 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: 8.1
Percent Moisture: 28.9%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	3.8	< 3.8 U
53469-21-9	Aroclor 1242	3.8	< 3.8 U
12672-29-6	Aroclor 1248	3.8	< 3.8 U
11097-69-1	**Aroclor 1254**	3.8	**7.6**
11096-82-5	**Aroclor 1260**	**3.8**	**5.3**
11104-28-2	Aroclor 1221	3.8	< 3.8 U
11141-16-5	Aroclor 1232	3.8	< 3.8 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	73.0%
Tetrachlorometaxylene	49.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: CS3-BC-FR
SAMPLE

Lab Sample ID: GL88F
LIMS ID: 04-4686
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/17/04 04:17
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.5 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 10.0
Silica Gel: No
pH: 8.8
Percent Moisture: 54.6%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	39	< 39 U
53469-21-9	Aroclor 1242	39	< 39 U
12672-29-6	**Aroclor 1248**	**39**	**98**
11097-69-1	**Aroclor 1254**	**39**	**230**
11096-82-5	**Aroclor 1260**	**39**	**210**
11104-28-2	Aroclor 1221	39	< 39 U
11141-16-5	Aroclor 1232	39	< 39 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	NR
Tetrachlorometaxylene	42.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: BH12-SR
SAMPLE

Lab Sample ID: GL88G
LIMS ID: 04-4687
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/17/04 04:38
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.4 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 20.0
Silica Gel: No
pH: 8.2
Percent Moisture: 55.7%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	79	< 79 U
53469-21-9	Aroclor 1242	79	< 79 U
12672-29-6	**Aroclor 1248**	79	**180 P**
11097-69-1	**Aroclor 1254**	79	**400**
11096-82-5	**Aroclor 1260**	79	**230**
11104-28-2	Aroclor 1221	79	< 79 U
11141-16-5	Aroclor 1232	79	< 79 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	75.0%
Tetrachlorometaxylene	45.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD
Page 1 of 1

Sample ID: BH13-SR
SAMPLE

Lab Sample ID: GL88H
LIMS ID: 04-4688
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/17/04 04:59
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.6 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 10.0
Silica Gel: No
pH: 8.1
Percent Moisture: 56.9%

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	39	< 39 U
53469-21-9	Aroclor 1242	39	< 39 U
12672-29-6	Aroclor 1248	39	< 39 U
11097-69-1	**Aroclor 1254**	**39**	**220 P**
11096-82-5	**Aroclor 1260**	**39**	**88**
11104-28-2	Aroclor 1221	39	< 39 U
11141-16-5	Aroclor 1232	39	< 39 U

Reported in µg/kg (ppb)

PCB Surrogate Recovery	
Decachlorobiphenyl	57.5%
Tetrachlorometaxylene	37.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PSDDA PCB by GC/ECD

Sample ID: LCS-040704
LAB CONTROL

Lab Sample ID: LCS-040704
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized:
Reported: 04/19/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Date Extracted: 04/07/04
Date Analyzed: 04/17/04 02:14
Instrument/Analyst: ECD5/PK
GPC Cleanup: No
Sulfur Cleanup: Yes
Acid Cleanup: Yes

Sample Amount: 25.0 g-dry-wt
Final Extract Volume: 1.0 mL
Dilution Factor: 1.00
Silica Gel: No
pH: NA
Percent Moisture: NA

Analyte	Lab Control	Spike Added	Recovery
Aroclor 1016	22.8	40.0	57.0%
Aroclor 1260	32.6	40.0	81.5%

PCB Surrogate Recovery

Decachlorobiphenyl	94.5%
Tetrachlorometaxylene	56.0%

Results reported in µg/kg (ppb)

ANALYTICAL RESOURCES INCORPORATED

SW8082/PCB SOIL/SEDIMENTS SURROGATE RECOVERY SUMMARY

Matrix: Sediment

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027

Client ID	DCBP	TCMX	TOT OUT
MB-040704	90.8%	55.0%	0
LCS-040704	94.5%	56.0%	0
CS3-SR	79.2%	48.5%	0
CS3-SS	71.8%	41.5%	0
CS3-BC	75.0%	32.5%	0
CS3-SR-FR	73.8%	45.0%	0
CS3-SS-FR	73.0%	49.0%	0
CS3-BC-FR	NR	42.5%	0
BH12-SR	75.0%	45.0%	0
BH13-SR	57.5%	37.5%	0

	LCS/MB LIMITS	QC LIMITS
(DCBP) = Decachlorobiphenyl	(44-131)	(18-161)
(TCMX) = Tetrachlorometaxylene	(27-125)	(18-136)

Prep Method: SW3550B
Log Number Range: 04-4681 to 04-4688

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: GL76MB
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Percent Total Solids: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	7439-97-6	Mercury	0.05	0.05	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: CS3-SR
SAMPLE

Lab Sample ID: GL88A
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Percent Total Solids: 73.7%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.06	**0.07**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: CS3-SS
SAMPLE

Lab Sample ID: GL88B
LIMS ID: 04-4682
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Percent Total Solids: 59.1%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	7439-97-6	Mercury	0.06	0.08	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: CS3-BC
SAMPLE

Lab Sample ID: GL88C
LIMS ID: 04-4683
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Percent Total Solids: 40.4%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	7439-97-6	Mercury	0.1	1.3	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: CS3-SR-FR
SAMPLE

Lab Sample ID: GL88D
LIMS ID: 04-4684
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Percent Total Solids: 75.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.05	**0.10**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: CS3-SS-FR
SAMPLE

Lab Sample ID: GL88E
LIMS ID: 04-4685
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Percent Total Solids: 71.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	7439-97-6	Mercury	0.05	0.07	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS

Sample ID: CS3-BC-FR
SAMPLE

Lab Sample ID: GL88F
LIMS ID: 04-4686
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Percent Total Solids: 49.0%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	7439-97-6	Mercury	0.09	1.25	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH12-SR
SAMPLE

Lab Sample ID: GL88G
LIMS ID: 04-4687
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Percent Total Solids: 44.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.1	**1.2**	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: BH13-SR
SAMPLE

Lab Sample ID: GL88H
LIMS ID: 04-4688
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Percent Total Solids: 44.7%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
CLP	04/02/04	7471A	04/02/04	**7439-97-6**	**Mercury**	0.1	1.9	

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: STD REFERENCE
ERA D034

Lab Sample ID: GL76SRM
LIMS ID: 04-4605
Matrix: Sediment
Data Release Authorized:
Reported: 04/02/04

QC Report No: GL76-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

Analyte	Analysis Method	Analysis Date	mg/kg-dry	Certified Value	Advisory Range
Mercury	7471A	04/02/04	10.2	9.4	6.2-12.6

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: MB-GL88**
Page 1 of 1 METHOD BLANK

Lab Sample ID: MB-GL88
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized:
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

METHOD BLANK RESULTS
CONVENTIONALS

Analyte	Analysis Date	Method	RL	Units	Result	
Total Solids	04/01/04	EPA 160.3 SM 2540 B	0.01	Percent	< 0.01	U
Preserved Total Solids	04/01/04	EPA 160.3 SM 2540 B	0.01	mg residue	< 0.01	U
Sulfide	04/02/04	EPA 376.2 SM4500S2-D	0.05	mg/L	< 0.05	U
Total Organic Carbon	04/07/04	Plumb,1981	0.020	Percent	< 0.020	U

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS3-SR**
Page 1 of 1 SAMPLE

Lab Sample ID: GL88A
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized: AP
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	74.4
Preserved Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	74.7
Sulfide	04/02/04 040204#1	EPA 376.2 SM4500S2-D	50	66.4	mg/kg	430
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	2.4

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS3-SS**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL88B
LIMS ID: 04-4682
Matrix: Sediment
Data Release Authorized: ad
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	68.4
Preserved Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	69.9
Sulfide	04/02/04 040204#1	EPA 376.2 SM4500S2-D	100	142	mg/kg	2,500
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	3.2

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS3-BC**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL88C
LIMS ID: 04-4683
Matrix: Sediment
Data Release Authorized: adp
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	39.4
Preserved Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	34.5
Sulfide	04/02/04 040204#1	EPA 376.2 SM4500S2-D	200	580	mg/kg	6,700
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	6.7

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS3-SR-FR**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL88D
LIMS ID: 04-4684
Matrix: Sediment
Data Release Authorized: ap
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	74.2
Preserved Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	69.1
Sulfide	04/02/04 040204#1	EPA 376.2 SM4500S2-D	100	145	mg/kg	730
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	2.4

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS3-SS-FR**
 SAMPLE

Lab Sample ID: GL88E
LIMS ID: 04-4685
Matrix: Sediment
Data Release Authorized: AM
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	74.0
Preserved Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	66.1
Sulfide	04/02/04 040204#1	EPA 376.2 SM4500S2-D	200	300	mg/kg	3,400
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	2.9

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: CS3-BC-FR**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL88F
LIMS ID: 04-4686
Matrix: Sediment
Data Release Authorized: asp
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	47.2
Preserved Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	45.3
Sulfide	04/02/04 040204#1	EPA 376.2 SM4500S2-D	400	879	mg/kg	15,000
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	6.5

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH12-SR**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL88G
LIMS ID: 04-4687
Matrix: Sediment
Data Release Authorized: ap
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	44.5
Preserved Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	40.7
Sulfide	04/02/04 040204#1	EPA 376.2 SM4500S2-D	100	245	mg/kg	3,900
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	5.9

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: BH13-SR**
Page 1 of 1 **SAMPLE**

Lab Sample ID: GL88H
LIMS ID: 04-4688
Matrix: Sediment
Data Release Authorized: ap
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: 03/26/04
Date Received: 03/26/04

Analyte	Analysis Date & Batch	Method	DF	RL	Units	Result
Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	43.0
Preserved Total Solids	04/01/04 040104#1	EPA 160.3 SM 2540 B		0.01	Percent	40.4
Sulfide	04/02/04 040204#1	EPA 376.2 SM4500S2-D	100	246	mg/kg	3,600
Total Organic Carbon	04/07/04 040704#1	Plumb,1981		0.020	Percent	4.9

RL Analytical reporting limit
U Undetected at reported detection limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS
Page 1 of 1

Sample ID: LCS-GL88
LAB CONTROL

Lab Sample ID: LCS-GL88
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized: ap
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

LABORATORY CONTROL RESULTS
CONVENTIONALS

Analyte	Analysis Date	Method	Units	LCS	True	REC
Sulfide	04/02/04	EPA 376.2	mg/L	7.03	7.50	93.7%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS
Page 1 of 1

Sample ID: SRM-GL88
STANDARD REFERENCE

Lab Sample ID: SRM-GL88
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized: asp
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Sampled: NA
Date Received: NA

STANDARD REFERENCE RESULTS
CONVENTIONALS

Analyte	Analysis Date & Batch	Method	Units	SRM	True	REC
NIST #8704						
Total Carbon	04/07/04 040704#1	Plumb,1981	Percent	3.05	3.35	91.0%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS
Page 1 of 1

Sample ID: DUP-GL88
DUPLICATE

Lab Sample ID: DUP-GL88
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized: 04-7
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Received: 03/26/04

DUPLICATE RESULTS
CONVENTIONALS

Analyte	Method	Units	Sample	Replicate	RPD/RSD
ARI ID: 04-4681, GL88A	**Client Sample ID: CS3-SR**				
Preserved Total Solids	EPA 160.3 SM 2540 B	Percent	74.7	74.8 74.9	0.1%
Sulfide	EPA 376.2 SM4500S2-D	mg/kg	430	429	0.2%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
LABORATORY ANALYSIS OF CONVENTIONAL PARAMETERS **Sample ID: MS/MSD-GL88**
Page 1 of 1 **MATRIX SPIKE**

Lab Sample ID: MS-GL88
LIMS ID: 04-4681
Matrix: Sediment
Data Release Authorized: ASP
Reported: 04/13/04

QC Report No: GL88-Polaris Applied Sciences, Inc.
Project: P66 SedCap (Pier 64/65)
1002.027
Date Received: 03/26/04

MATRIX SPIKE RESULTS
CONVENTIONALS

Analyte	Method	Units	Sample	Spike	MS/MSD	REC
ARI ID: 04-4681, GL88A	**Client Sample ID: CS3-SR**					
Sulfide	EPA 376.2	mg/kg	430	199	660	116%

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Polaris Applied Sciences
1002.027

PSEP Total Solids Analysis
Percent of Wet Weight

Sample No.	Total Solids (%)
A-1	73.0
A-2	72.2
A-3	73.6
CS3-SR	75.5
CS3-SS	69.1
CS3-BC	41.5
CS3-SR-FR	74.5
CS3-SS-FR	68.2
CS3-BC-FR	47.4
BH12-SR	45.9
BH13-SR	44.3

Triplicate Average	72.9
Standard Deviation	0.73
%RSD	1.00

GL88

QA SUMMARY

ANALYTICAL RESOURCES INCORPORATED

PROJECT:	Polaris Applied Sciences	Project No.:	1002.027
ARI Triplicate Sample ID:	GL68C-1	Batch No.:	GL88 -01
Client Triplicate Sample ID:	A-1	Page:	1 of 1

Relative Standard Deviation, By Phi Size

Sample ID	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
A-1	100.0	100.0	99.9	99.4	97.5	83.3	50.7	30.1	20.8	15.7	11.4	9.1	6.9	4.8
A-2	100.0	100.0	99.8	99.2	97.3	82.9	50.3	29.2	20.9	15.8	12.2	9.4	7.1	5.2
A-3	100.0	100.0	99.7	99.2	97.2	83.7	52.0	31.9	20.4	15.5	11.9	9.1	7.0	5.1
AVE	NA	100.00	99.81	99.24	97.33	83.30	51.01	30.39	20.68	15.70	11.83	9.17	6.98	5.00
STDEV	NA	0.00	0.06	0.12	0.14	0.40	0.86	1.36	0.29	0.17	0.39	0.18	0.08	0.21
%RSD	NA	0.00	0.06	0.12	0.15	0.48	1.68	4.47	1.39	1.08	3.29	2.00	1.20	4.16

The Triplicate Applies To The Following Samples

ARI ID	Client ID	Date Sampled	Date Extracted	Date Complete	QA*
GL68C-1	A-1	3/26/04	4/22/04	4/30/04	100.6
GL68C-2	A-2	3/26/04	4/22/04	4/30/04	99.6
GL68C-3	A-3	3/26/04	4/22/04	4/30/04	103.1
GL88A	CS3-SR	3/26/04	4/22/04	4/30/04	100.7
GL88B	CS3-SS	3/26/04	4/22/04	4/30/04	99.8
GL88C	CS3-BC	3/26/04	4/22/04	4/30/04	99.9
GL88D	CS3-SR-FR	3/26/04	4/22/04	4/30/04	98.3
GL88E	CS3-SS-FR	3/26/04	4/22/04	4/30/04	93.3
GL88F	CS3-BC-FR	3/26/04	4/22/04	4/30/04	98.9
GL88G	BH12-SR	3/26/04	4/22/04	4/30/04	100.4
GL88H	BH13-SR	3/26/04	4/22/04	4/30/04	97.1

* ARI Internal QA limits = 95-105%

Notes to the Testing:

1. See narrative for discussion of testing.

ANALYTICAL RESOURCES INCORPORATED

Polaris Applied Sciences
1002.027

Apparent Grain Size Distribution Summary
Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay		
Phi Size	> -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	< 10
Sieve Size (microns)	> #10 (2000)	10 to 18 (2000-1000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0
A-1	0.1	0.5	1.9	14.2	32.5	20.7	9.2	5.1	4.4	2.3	2.2	2.1	4.8
A-2	0.2	0.6	1.9	14.4	32.6	21.1	8.4	5.0	3.7	2.8	2.3	1.9	5.2
A-3	0.3	0.6	2.0	13.5	31.8	20.1	11.5	4.8	3.6	2.8	2.1	1.9	5.1
CS3-SR	1.8	4.4	25.1	46.2	11.0	2.3	2.0	1.1	1.2	1.0	1.1	0.9	1.8
CS3-SS	3.1	3.6	24.5	36.5	9.2	3.9	3.3	3.9	5.8	2.0	1.2	0.6	2.3
CS3-BC	0.5	17.0	8.2	10.3	5.8	3.1	3.4	6.9	11.7	9.1	7.0	6.5	10.5
CS3-SR-FR	0.4	3.9	24.3	45.5	13.3	2.9	1.9	1.4	1.5	1.1	1.1	0.8	1.8
CS3-SS-FR	2.5	5.6	28.4	38.7	8.3	2.7	2.6	2.3	3.9	1.9	0.9	0.3	1.8
CS3-BC-FR	16.8	8.0	9.7	12.1	6.4	3.9	1.8	5.8	10.6	6.7	5.2	4.7	8.2
BH12-SR	15.7	7.6	11.2	17.5	7.6	3.2	2.9	11.2	6.1	4.1	3.0	3.3	6.7
BH13-SR	10.9	3.4	4.7	11.4	10.5	5.8	3.3	10.7	8.5	7.7	7.3	5.4	10.5

Notes to the Testing:

1. Apparent grain size distributions according to PSEP protocols.

GL88

ANALYTICAL RESOURCES INCORPORATED

Polaris Applied Sciences
1002.027

Apparent Grain Size Distribution Summary
Percent Finer Than Indicated Size

Sample No.	Gravel			Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt				Clay	
Phi Size	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Sieve Size (microns)	3/8"	#4	#10 (2000)	#18 (1000)	#35 (500)	#60 (250)	#120 (125)	#230 (62)	31.00	15.60	7.80	3.90	2.00	1.00
A-1	100.0	100.0	99.9	99.4	97.5	83.3	50.7	30.1	20.8	15.7	11.4	9.1	6.9	4.8
A-2	100.0	100.0	99.8	99.2	97.3	82.9	50.3	29.2	20.9	15.8	12.2	9.4	7.1	5.2
A-3	100.0	100.0	99.7	99.2	97.2	83.7	52.0	31.9	20.4	15.5	11.9	9.1	7.0	5.1
CS3-SR	100.0	99.1	98.2	93.8	68.7	22.5	11.5	9.2	7.2	6.0	4.8	3.8	2.7	1.8
CS3-SS	100.0	98.0	96.9	93.3	68.8	32.4	23.2	19.2	15.9	11.9	6.1	4.1	2.9	2.3
CS3-BC	100.0	98.9	99.5	82.5	74.3	64.0	58.2	55.1	51.7	44.9	33.1	24.1	17.0	10.5
CS3-SR-FR	100.0	100.0	99.6	95.6	71.3	25.8	12.6	9.6	7.8	6.4	4.9	3.8	2.6	1.8
CS3-SS-FR	100.0	99.5	97.5	91.9	63.5	24.8	16.4	13.7	11.1	8.8	4.8	2.9	2.1	1.8
CS3-BC-FR	100.0	95.5	83.2	75.1	65.4	53.3	46.9	43.0	41.2	35.5	24.9	18.2	13.0	8.2
BH12-SR	100.0	95.6	84.3	76.8	65.5	48.1	40.5	37.3	34.4	23.2	17.1	13.0	10.0	6.7
BH13-SR	100.0	93.0	89.1	85.8	81.0	69.7	59.2	53.4	50.1	39.3	30.8	23.2	15.9	10.5

Notes to the Testing:

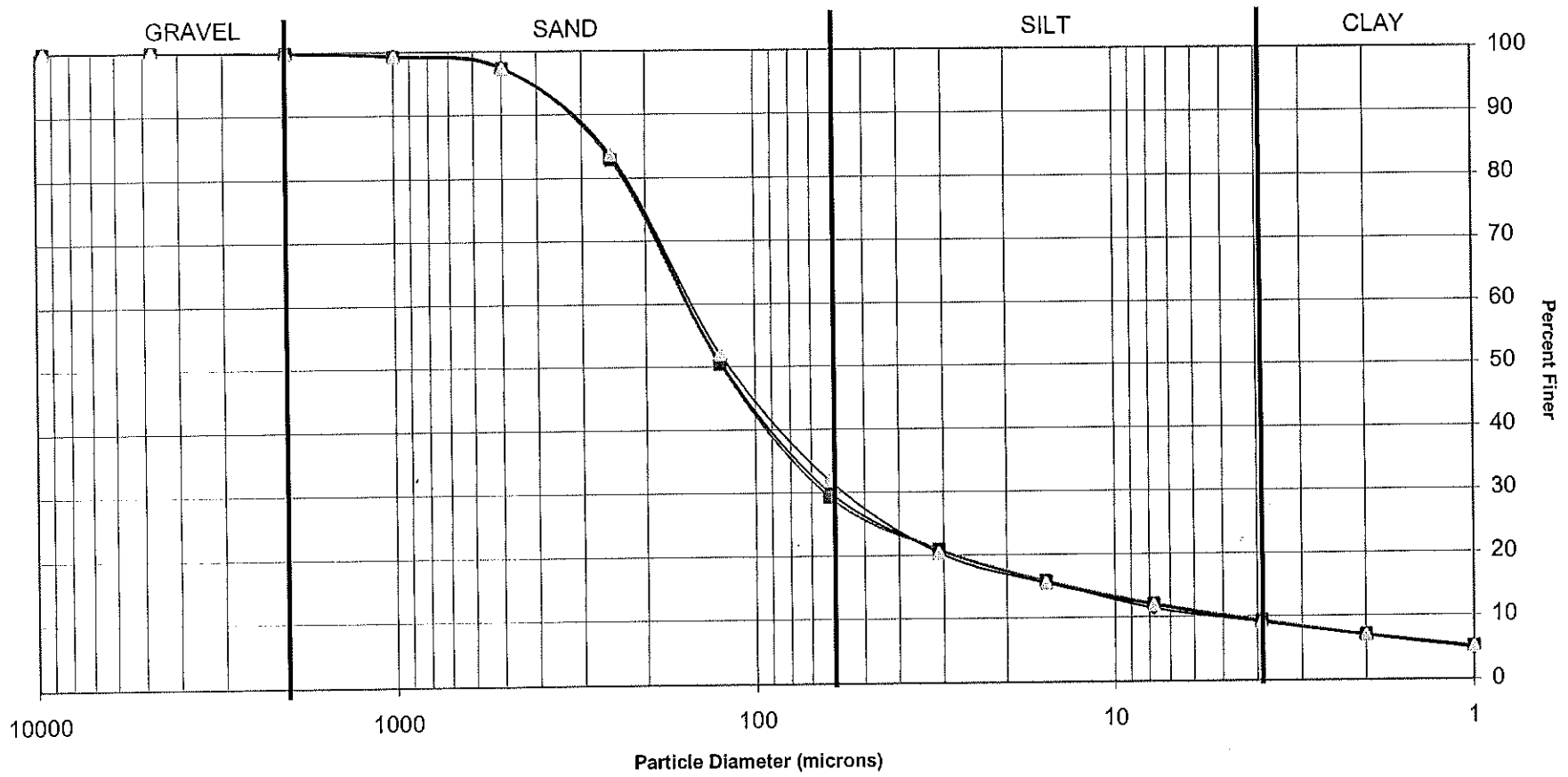
1. Apparent grain size distributions according to PSEP protocols.

GL88

ANALYTICAL RESOURCES INCORPORATED

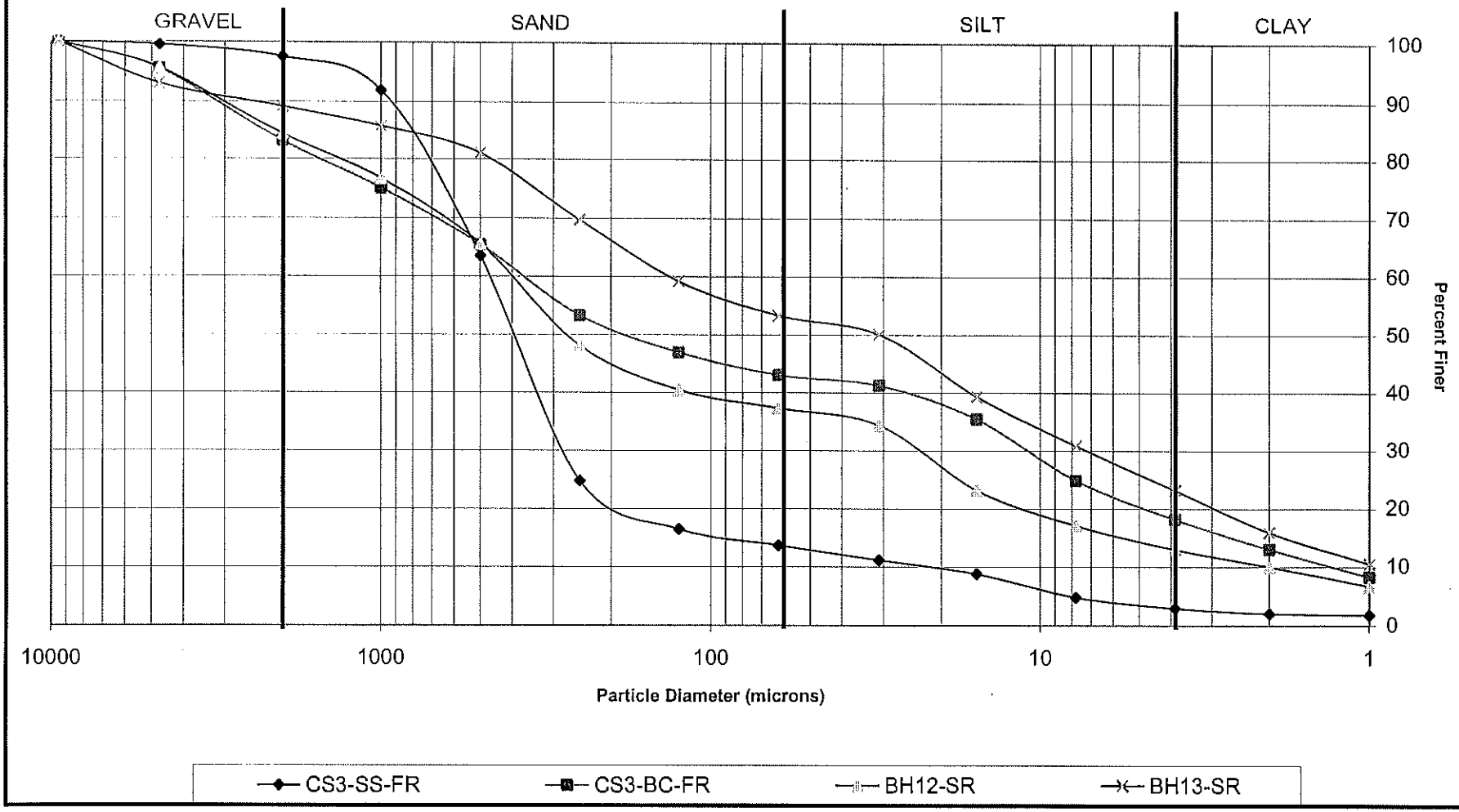
PSEP Grain Size Distribution

Triplicate Sample Plot



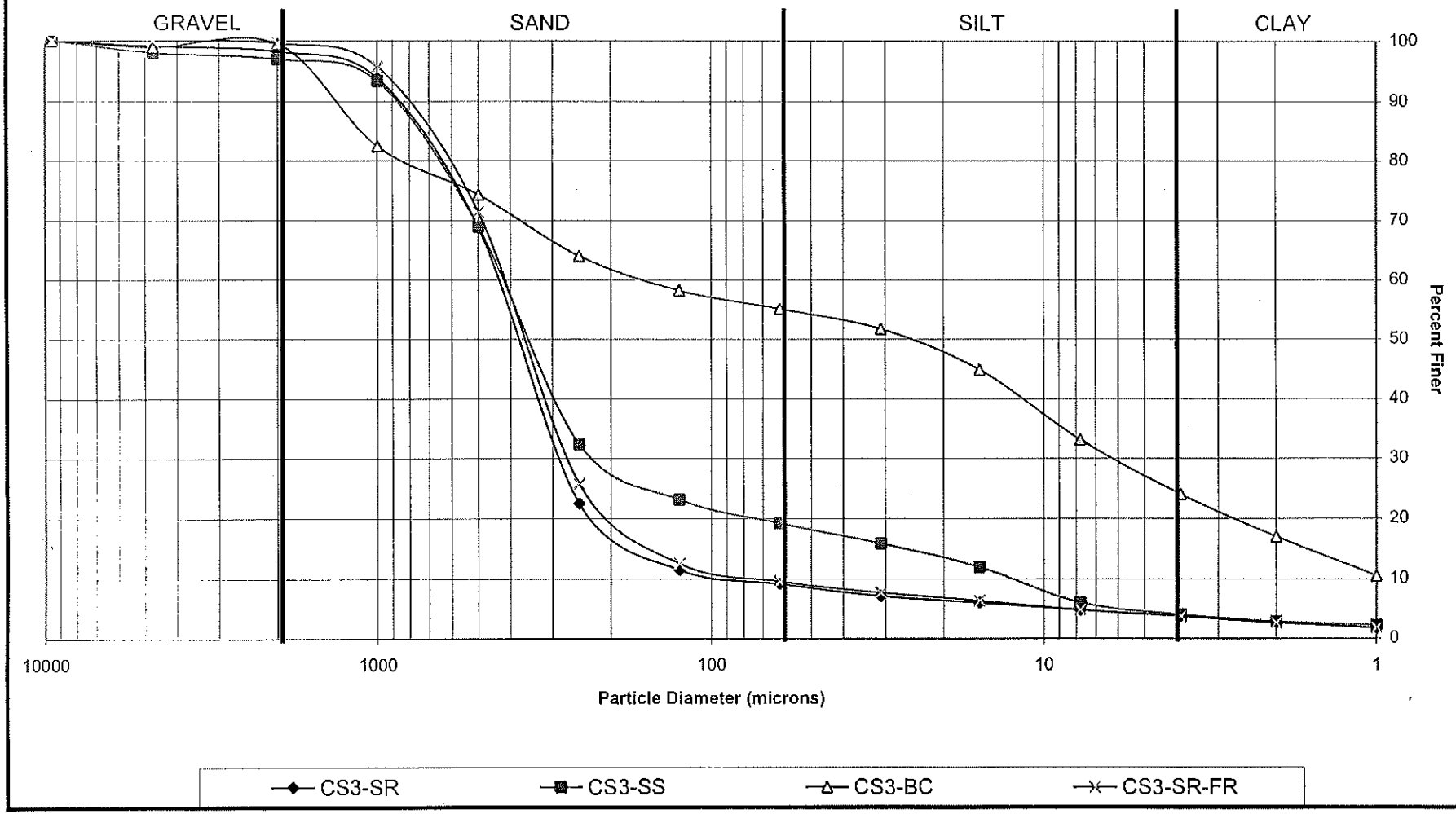
ANALYTICAL RESOURCES INCORPORATED

PSEP Grain Size Distribution



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PSEP Grain Size Distribution



APPENDIX F

DATA VALIDATION REPORT

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Sayler Data Solutions, Inc.

DATA VALIDATION REPORT

Pier 66, March 2004 Sediment Data

Prepared for:

Port of Seattle
PO Box 1209
Seattle, WA 98111

May 12, 2004

1.0 Introduction

Sediment and tissue samples were collected March 23 through 26, 2004. Analyses were performed by Analytical Resources, Inc. in Tukwila, Washington. Samples were assigned laboratory batch numbers GL44, GL75, GL76, and GL88. Data is presented in electronic laboratory reports dated April 27 through May 4, 2004. A sample cross reference is shown in section 7.0 of this report.

A summary evaluation was performed on the analytical results. Evaluation was performed by Cari Sayler. Numeric quality control criteria for the requirements listed below are presented in the laboratory report . Data qualifiers are assigned based only on the criteria reviewed and do not include calibration or instrument performance issues unless noted in the laboratory summary report. Data qualifiers are summarized in section 8.0 of this report.

2.0 Polynuclear Aromatic Hydrocarbon (PAH) Analyses

Analyses Summary
Samples were analyzed by GC/MS, EPA Method 8270C.

Laboratory Quality Control Analysis Frequencies - Acceptable
The QAPP specified that the following quality control samples be analyzed one per sample batch: method blank, spike (MS), and either MS duplicate (MSD) or lab duplicate. The QAPP also specified that surrogate compounds must be measured in each sample.

Each analytical batch included a method blank, LCS, MS, MSD, and appropriate surrogates.

Extraction and Analysis Holding Times - Acceptable
Samples must be extracted within 14 days of collection. Extracts must be analyzed within 40 days of extraction. All holding times were met.

Laboratory Blank Results - Acceptable
Criteria for method blanks are that analyte concentrations must be below the reporting limit. No target analytes were detected in the method blanks.

Surrogate Recoveries - Acceptable with Discussion
The laboratory control limit for surrogate recovery was 30-160%. QAPP control limits are greater than 50%. Surrogates were not reported in sample CS1-SS DL. The sample was analyzed at a dilution factor of 50, and control limits do not apply. All other surrogate recoveries were within both sets of limits.

LCS Recoveries - Acceptable
Laboratory control limits for LCS recoveries are 30-160%. All LCS recoveries were within these limits.

MS and MSD Recoveries - Acceptable with Qualification
Laboratory control limits for MS and MSD recoveries are 30-160%. QAPP control limits are 50-150%. The MSD recovery of fluorene in BH3-SS A-E MS/MSD (36.0%) was below the QAPP control limit. The fluorene result in the native sample is qualified as estimated.

All other MS and MSD recoveries were within limits.

MS/MSD Relative Percent Differences – Acceptable with Qualification
Laboratory control limits for MS/MSD relative percent differences (RPDs) is <30%. . The MS/MSD RPD of bis(2-Ethylhexyl)phthalate in BH5-SS MS/MSD (35.8%) was above the control limit. The bis(2-Ethylhexyl)phthalate result in the native sample is qualified as estimated.

All other MS/MSD RPDs were within these limits.

Laboratory Qualifiers and Multiple Reported Results – Acceptable with Qualification
Concentrations of several compounds in six samples exceeded the calibration range and were flagged "E" by the laboratory. These were reanalyzed at a dilution, with concentrations within range. Both sets of results were reported by the laboratory.

The best result to report was selected based on the following guidelines:

(1) If both results were non-detects, the lower reporting limit was selected.
(2) If one result was not detected and the other detected, the detection was selected.
(3) If both results were detections the following additional criteria were applied:

(a) If one result was off-scale and one was on-scale, the on-scale result was selected.
(b) If associated QC results indicated high bias, the lower concentration result was selected.
(c) The higher concentration result was selected.

Specific qualifiers are shown in the qualifier summary table in section 8.0 of this report.

The laboratory flagged results with concentrations between the MDL and RL with a "J". No further qualification is necessary.

According to the case narrative, the initial analysis of CS1-SS contained a low internal standard area. Those analytes selected as the most appropriate to report from the initial analysis have been qualified as estimated.

Overall Assessment
All LCS, reportable surrogate, and MS recoveries, and all but one of the MSD recoveries were within control limits, demonstrating acceptable method accuracy. All but one of the MS/MSD RPDs were within control limits, demonstrating acceptable method variability.

Multiple analysis results have been evaluated, and reduced to the most appropriate result. All other data, as qualified, are acceptable for use. Data qualifiers are summarized in Section 8.0 of this report.

3.0 Polychorinated Biphenyl (PCB) Aroclor and Congener Analyses

Analyses Summary
Samples were analyzed by GC/ECD, EPA Method 8082.

Laboratory Quality Control Analysis Frequencies - Acceptable
The QAPP specified that the following quality control samples be analyzed one per sample batch: method blank, spike (MS), and either MS duplicate (MSD) or lab duplicate. The QAPP also specified that surrogate compounds must be measured in each sample.

Each analytical batch included a method blank, LCS, MS, MSD, and appropriate surrogates.

Extraction and Analysis Holding Times - Acceptable
Samples must be extracted within 14 days of collection. Extracts must be analyzed within 40 days of extraction. All holding times were met.

Laboratory Blank Results - Acceptable
Criteria for method blanks are that analyte concentrations must be below the reporting limit. No target analytes were detected in the method blanks.

Surrogate Recoveries - Acceptable with Qualification
The laboratory control limit for surrogate recovery are 18-161% for DCBP and 18-136% for TCMX. QAPP control limits for surrogate recoveries are less than 50%. DCBP recoveries in samples CS1-INCL1, CS1-INCL2, CS1-INCL3, CS1-SR, CS1-SS, CS1-SS DL, and CS3-BC-FR were not reported due to matrix interferences. TCMX recoveries in each case were within limits, and no qualifiers are assigned.

The following surrogate recoveries were below the QAPP limit:

Sample ID	Analyte	Recovery (%)
BH3-SR-A-E	Tetrachlorometaxylene	46.8
BH6-SS-A-E	Tetrachlorometaxylene	40.0
BH7-SR-A-E	Tetrachlorometaxylene	48.5
SS5B-SR-A-E	Tetrachlorometaxylene	47.0
BH9-SR-FS	Tetrachlorometaxylene	47.2
BH5-SS	Decachlorobiphenyl	45.2
BH5-SS	Tetrachlorometaxylene	42.2
CS2-BC	Tetrachlorometaxylene	35.0
CS2-BC	Tetrachlorometaxylene	46.5
BH12-SR	Tetrachlorometaxylene	45.0
BH13-SR	Tetrachlorometaxylene	37.5
CS3-BC	Tetrachlorometaxylene	32.5
CS3-BC-FR	Tetrachlorometaxylene	42.5
CS3-SR	Tetrachlorometaxylene	48.5
CS3-SR-FR	Tetrachlorometaxylene	45.0
CS3-SS	Tetrachlorometaxylene	41.5
CS3-SS-FR	Tetrachlorometaxylene	49.0

In all cases except BH5-SS, DCBP recoveries were within limits, and no qualifiers are assigned. All results in BH5-SS are qualified as estimated.

All other surrogate recoveries were within limits.

LCS Recoveries - Acceptable
Laboratory control limits for LCS recoveries are 30-160%. All LCS recoveries were within these limits.

MS and MSD Recoveries - Acceptable
Laboratory control limits for MS and MSD recoveries are 30-160%. QAPP control limits for MS and MSD recoveries are 50-150%. All MS and MSD recoveries were within both limits.

MS/MSD Relative Percent Differences - Acceptable
Laboratory control limits for MS/MSD relative percent differences (RPDs) is <30%. QAPP control limits for MS/MSD RPDs is <100%. All MS/MSD RPDs were within both limits.

Laboratory Qualifiers and Multiple Reported Results – Acceptable with Qualification
Concentrations of several compounds in four samples exceeded the calibration range and were flagged "E" by the laboratory. These were reanalyzed at a dilution,

with concentrations within range. Both sets of results were reported by the laboratory.

The best result to report was selected based the guidelines described in section 3.0: Specific qualifiers are shown in the qualifier summary table in section 8.0 of this report.

The laboratory flagged results with a "Y" to indicate that the presence of interferences caused the reporting limit to be elevated. No further qualification is necessary.

The laboratory flagged results with high dual column RPDs with a "P". All P-flagged data are qualified as estimated.

The laboratory flagged results with concentrations between the MDL and RL with a "J". No further qualification is necessary.

According to the narrative, percent differences in continuing calibrations from batch GL75 were 1 to 3 % below the QC limit. However method performance criteria for continuing calibration (15%) are tighter than data usability criteria (20%) and qualifiers are not required.

According to the narrative, percent differences in continuing calibrations from batch GL44 were 6 % below the QC limit for aroclor 1260. The aroclor 1260 results in samples BH3-SR-A-E DL and SS5B-SR-A-E DL are qualified as estimated.

Overall Assessment
All LCS, MS, and MSD recoveries and at least one surrogate recovery in each sample were within limits, demonstrating acceptable method accuracy. All MS/MSD RPDs were within limits, demonstrating acceptable method variability. High dual column variability and continuing calibration percent differences resulted in some estimated data.

Multiple analysis results have been evaluated, and reduced to the most appropriate result. All other data, as qualified, are acceptable for use. Data qualifiers are summarized in Section 8.0 of this report.

4.0 Mercury Analyses

Analyses Summary
Mercury was analyzed by cold vapor, EPA method 7471A.

Laboratory Quality Control Analysis Frequencies – Acceptable with Discussion
The QAPP specified that the following quality control samples be analyzed one per sample batch: method blank, matrix spike (MS), and either MS duplicate (MSD) or lab duplicate. In addition, an SRM must be analyzed with each batch.

The analytical batches prepared 4/2/2004 and 4/5/2004 included a method blank, a MS, lab duplicate and SRM. The analytical batch prepared 4/1/2004 included a

method blank and SRM. The 5% frequency was met for the MS and lab duplicate, and no qualifiers are assigned.

Analysis Holding Times – Acceptable
Mercury samples must be analyzed within 28 days of collection. All holding times were met.

Laboratory Blank Results – Acceptable
Criteria for method blanks are that analyte concentrations must be below the reporting limit. Mercury was not detected in the method blanks.

MS Recoveries – Acceptable with Qualification
Laboratory and QAPP control limits for MS recoveries are 75-125%. Both MS recoveries were outside of limits as follows:

Batch	MS ID	Analyte	% Recovery
GL44/GL75a	BH3-SR-A-E MS	Mercury	190
GL76/GL88	BH5-SR MS	Mercury	173

All mercury positive results are qualified as estimated.

Laboratory Duplicate Relative Percent Differences (RPDs) – Acceptable with Discussion
Laboratory and QAPP control limits for duplicate RPDs are <20%. However, for results below 5 times the reporting limit, precision is evaluated based on the absolute difference between the two results. Both lab duplicate were within one reporting limit of each other, and no qualifiers are assigned.

SRM Results – Acceptable
SRM ERA DO34 was analyzed with each batch. The certified value is 9.4 and the advisory range is 6.2 to 12.6. Each result was within the advisory range.

Laboratory Qualifiers and Multiple Reported Results – Acceptable
No problems were flagged in the laboratory data and no multiple analysis results were reported.

Overall Assessment
SRM results were within the advisory range. MS recoveries resulted in estimated positive results. Non-detect results were unaffected. All data, as qualified, are acceptable for use. Data qualifiers are summarized in Section 8.0 of this report.

5.0 General Chemistry Analyses

Analyses Summary
TOC analysis was performed by method Plumb, 1981. Sulfides were analyzed by EPA method 376.2. Total solids and preserved total solids were analyzed by EPA method 160.3.

Laboratory Quality Control Analysis Frequencies – Acceptable with Discussion
For TOC and sulfides, the QAPP requires the analysis of a method blank, MS, MSD and matrix replicate with each analytical batch. For TOC the analysis of one SRM per batch is also required. For total solids, the QAPP requires the analysis of one matrix replicate per twenty samples

The following quality control samples were analyzed in each batch:

Analysis	QC samples
TOC	Method blank, SRM, MS, and triplicate
Sulfides	Method blank, LCS, MS, and duplicate
Total solids	Method blank and laboratory triplicate
Preserved total solids	Method blank and laboratory triplicate

No qualifiers are assigned based on the absence of a matrix spike duplicate for TOC or sulfides, or the absence of a triplicate analysis for sulfides.

Analysis Holding Times - Acceptable
Holding times are 14 days for TOC, 14 days for TS and PTS, and 7 days for total sulfides. These holding times were met.

LCS Recoveries - Acceptable
Laboratory control limits for sulfide LCS recoveries are 75-125%. All LCS recoveries were within these limits.

MS Recoveries - Acceptable with Discussion
Laboratory-specified control limits for TOC MS recoveries are 80-120%. QAPP control limits for TOC were 75-125%. All TOC MS recoveries were within limits.

Laboratory-specified control limits for sulfide MS recoveries are 80-120%. QAPP control limits for sulfide were 65-135%. Four of the five sulfide MS recoveries were outside this range. However, the native concentration exceeded the spiked amount, and control limits do not apply.

Laboratory Duplicate and Replicate Variability – Acceptable
The TOC laboratory triplicate RSDs were below the laboratory and QAPP control limits of <20%.

The sulfide laboratory duplicate RPDs were below the laboratory and QAPP control limits of <20%.

The total solids laboratory triplicate RSDs were below the laboratory and QAPP control limits of <20%.

The preserved total solids laboratory triplicate RSDs were below the laboratory and QAPP control limits of <20%.

Laboratory Qualifiers and Multiple Reported Results – Acceptable
No problems were flagged in the laboratory data and no multiple analysis results were reported.

Overall Assessment
All LCS and SRM recoveries were within control limits, demonstrating acceptable method accuracy. MS recoveries with applicable control limits were also within limits. Laboratory duplicate and triplicate RPDs and RSDs were within limits, demonstrating acceptable method precision.

All data, as reported, are acceptable for use. Data qualifiers are summarized in Section 8.0 of this report.

6.0 Grain Size Analyses

Analyses Summary
Grain size analysis was performed by PSEP.

Laboratory Control Analysis Frequencies – Acceptable with Discussion
The QAPP specifies that a laboratory triplicate is analyzed once per sample batch:

The analytical batches analyzed 4/12/2004 (GL44) and 4/15/2004 (GL75) each included a laboratory triplicate. The analytical batches prepared 4/6/2004 (GL76) and 4/22/2004 (GL88) did not. The 5% frequency was met, and no qualifiers are assigned.

Analysis Holding Times - Acceptable
All grain size samples were analyzed within the six month holding time.

Laboratory Triplicate Variability – Acceptable with Qualification
QAPP control limits for Triplicate variability are <20%. The following RSDs exceeded 20%.

LabBatch	Client ID	Analyte	RSD
4/12/2004	SS5B-SR-A-E LT	Gravel	100
4/12/2004	SS5B-SR-A-E LT	Very Coarse Sand	52.6
4/15/2004	BH9-SR LT	9-10 Phi Clay	26.1
4/15/2004	BH9-SR LT	Coarse Silt	32.3

Because triplicates are the only quality control available for grain size, gravel, very

coarse sand, 9-10 Phi Clay, and coarse silt results in all samples are qualified as estimated.

Laboratory Qualifiers and Multiple Reported Results – Acceptable with Qualification

According to the laboratory narrative, samples BH-2SS, CSI-BC, CS3-SR-FR, and CS3-SS-FR had less than 5 grams sample remaining for the pipette portion of the analysis. This is outside the PSEP recommended amount of 5 to 25 grams. The silt and clay results in these four samples are qualified as estimated.

No multiple analysis results were reported.

Overall Assessment

Data for some fractions were estimated due to laboratory triplicate variability. All data, as qualified, are acceptable for use. Data qualifiers are summarized in Section 8.0 of this report.

7.0 Sample Cross Reference

For all samples except BH7-SS-A-D, analyses included PAHs, PCBs, mercury, TOC, sulfides, total solids, preserved total solids and grain size. For sample BH7-SS-A-D, analyses included PAHs, PCBs, mercury, TOC, sulfides, total solids, and preserved total solids.

Lab SDG	Sample ID	Sample Date	Lab ID
GL44	BH3-SR-A-E	3/23/2004	04-4431-GL44A
GL44	BH3-SS-A-E	3/23/2004	04-4432-GL44B
GL44	BH6-SR-A-E	3/23/2004	04-4437-GL44G
GL44	BH6-SS-A-E	3/23/2004	04-4438-GL44H
GL44	BH7-SR-A-E	3/23/2004	04-4434-GL44D
GL44	BH7-SS-A-D	3/23/2004	04-4435-GL44E
GL44	SS5B-SR-A-E	3/23/2004	04-4440-GL44J
GL75	BH2-SR	3/24/2004	04-4593-GL75J
GL75	BH2-SS	3/24/2004	04-4594-GL75K
GL75	BH4-SR	3/24/2004	04-4596-GL75M
GL75	BH4-SS	3/24/2004	04-4597-GL75N
GL75	BH8-SR	3/24/2004	04-4590-GL75G
GL75	BH9-SR	3/24/2004	04-4584-GL75A
GL75	BH9-SR-FS	3/24/2004	04-4587-GL75D
GL75	CS1-BC	3/24/2004	04-4601-GL75R
GL75	CS1-INCL1	3/24/2004	04-4602-GL75S
GL75	CS1-INCL2	3/24/2004	04-4603-GL75T
GL75	CS1-INCL3	3/24/2004	04-4604-GL75U
GL75	CS1-SR	3/24/2004	04-4599-GL75P
GL75	CS1-SS	3/24/2004	04-4600-GL75Q
GL76	BH10-SR	3/25/2004	04-4611-GL76G
GL76	BH11-SR	3/25/2004	04-4605-GL76A
GL76	BH5-SR	3/25/2004	04-4608-GL76D

Lab SDG	Sample ID	Sample Date	Lab ID
GL76	BH5-SS	3/25/2004	04-4609-GL76E
GL76	CS2-BC	3/25/2004	04-4616-GL76L
GL76	CS2-SR	3/25/2004	04-4614-GL76J
GL76	CS2-SS	3/25/2004	04-4615-GL76K
GL88	BH12-SR	3/26/2004	04-4687-GL88G
GL88	BH13-SR	3/26/2004	04-4688-GL88H
GL88	CS3-BC	3/26/2004	04-4683-GL88C
GL88	CS3-BC-FR	3/26/2004	04-4686-GL88F
GL88	CS3-SR	3/26/2004	04-4681-GL88A
GL88	CS3-SR-FR	3/26/2004	04-4684-GL88D
GL88	CS3-SS	3/26/2004	04-4682-GL88B
GL88	CS3-SS-FR	3/26/2004	04-4685-GL88E

8.0 Qualifier Summary Table

Sample ID	Analyte	DV Qualifier	Reason
BH12-SR	Dibenz(a,h)anthracene	R1	Analysis with higher concentration available
BH12-SR DL	2-Methylnaphthalene	R1	Analysis with lower RL available
BH12-SR DL	Acenaphthene	R1	Analysis with detected result available
BH12-SR DL	Acenaphthylene	R1	Analysis with higher concentration available
BH12-SR	bis(2-Ethylhexyl)phthalate	R1	Analysis with higher concentration available
BH12-SR DL	Dibenzofuran	R1	Analysis with lower RL available
BH12-SR	Fluorene	R1	Analysis with higher concentration available
BH12-SR DL	Naphthalene	R1	Analysis with detected result available
BH12-SR	Pyrene	R1	Analysis with on-scale result available
BH3-SS-A-E	Fluorene	UJ	Low MS Recovery
BH5-SS	bis(2-Ethylhexyl)phthalate	J	High MS/MSD RPD
CS1-BC DL	Benzo(g,h,i)perylene	R1	Analysis with detected result available
CS1-BC DL	Dibenz(a,h)anthracene	R1	Analysis with lower RL available
CS1-BC DL	Indeno(1,2,3-cd)pyrene	R1	Analysis with detected result available
CS1-BC DL	2-Methylnaphthalene	R1	Analysis with higher concentration available
CS1-BC	Acenaphthene	R1	Analysis with higher concentration available
CS1-BC DL	Acenaphthylene	R1	Analysis with detected result available
CS1-BC	Anthracene	R1	Analysis with higher concentration available
CS1-BC DL	Benzo(a)anthracene	R1	Analysis with higher concentration available
CS1-BC DL	Benzo(a)pyrene	R1	Analysis with detected result available
CS1-BC DL	Benzo(b)fluoranthene	R1	Analysis with higher concentration available
CS1-BC DL	Benzo(k)fluoranthene	R1	Analysis with higher concentration available
CS1-BC DL	bis(2-Ethylhexyl)phthalate	R1	Analysis with lower RL available

Sample ID	Analyte	DV Qualifier	Reason
CS1-BC DL	Chrysene	R1	Analysis with same result available
CS1-BC DL	Dibenzofuran	R1	Analysis with same result available
CS1-BC	Fluoranthene	R1	Analysis with on-scale result available
CS1-BC	Fluorene	R1	Analysis with on-scale result available
CS1-BC DL	Naphthalene	R1	Analysis with detected result available
CS1-BC	Phenanthrene	R1	Analysis with on-scale result available
CS1-BC	Pyrene	R1	Analysis with on-scale result available
CS1-INCL1	Benzo(g,h,i)perylene	R1	Analysis with higher concentration available
CS1-INCL1	Dibenz(a,h)anthracene	R1	Analysis with higher concentration available
CS1-INCL1	Indeno(1,2,3-cd)pyrene	R1	Analysis with higher concentration available
CS1-INCL1 DL	2-Methylnaphthalene	R1	Analysis with lower RL available
CS1-INCL1	Acenaphthene	R1	Analysis with higher concentration available
CS1-INCL1 DL	Acenaphthylene	R1	Analysis with detected result available
CS1-INCL1 DL	Anthracene	R1	Analysis with higher concentration available
CS1-INCL1	Benzo(a)anthracene	R1	Analysis with higher concentration available
CS1-INCL1 DL	Benzo(a)pyrene	R1	Analysis with higher concentration available
CS1-INCL1 DL	Benzo(b)fluoranthene	R1	Analysis with higher concentration available
CS1-INCL1 DL	Benzo(k)fluoranthene	R1	Analysis with higher concentration available
CS1-INCL1 DL	bis(2-Ethylhexyl)phthalate	R1	Analysis with detected result available
CS1-INCL1	Chrysene	R1	Analysis with higher concentration available
CS1-INCL1 DL	Dibenzofuran	R1	Analysis with detected result available
CS1-INCL1	Fluoranthene	R1	Analysis with on-scale result available
CS1-INCL1 DL	Fluorene	R1	Analysis with detected result available
CS1-INCL1 DL	Naphthalene	R1	Analysis with detected result available
CS1-INCL1	Phenanthrene	R1	Analysis with higher concentration available
CS1-INCL1	Pyrene	R1	Analysis with on-scale result available
CS1-INCL2	Benzo(g,h,i)perylene	R1	Analysis with higher concentration available
CS1-INCL2	Dibenz(a,h)anthracene	R1	Analysis with higher concentration available
CS1-INCL2	Indeno(1,2,3-cd)pyrene	R1	Analysis with higher concentration available
CS1-INCL2 DL	2-Methylnaphthalene	R1	Analysis with lower RL available
CS1-INCL2 DL	Acenaphthene	R1	Analysis with detected result available
CS1-INCL2 DL	Acenaphthylene	R1	Analysis with detected result available
CS1-INCL2 DL	Anthracene	R1	Analysis with higher concentration available
CS1-INCL2 DL	Benzo(a)anthracene	R1	Analysis with higher concentration available
CS1-INCL2 DL	Benzo(a)pyrene	R1	Analysis with higher concentration available
CS1-INCL2 DL	Benzo(b)fluoranthene	R1	Analysis with higher concentration available
CS1-INCL2 DL	Benzo(k)fluoranthene	R1	Analysis with higher concentration available

Sample ID	Analyte	DV Qualifier	Reason
CS1-INCL2 DL	bis(2-Ethylhexyl)phthalate	R1	Analysis with detected result available
CS1-INCL2 DL	Chrysene	R1	Analysis with same result available
CS1-INCL2 DL	Dibenzofuran	R1	Analysis with detected result available
CS1-INCL2 DL	Fluoranthene	R1	Analysis with higher concentration available
CS1-INCL2 DL	Fluorene	R1	Analysis with detected result available
CS1-INCL2 DL	Naphthalene	R1	Analysis with detected result available
CS1-INCL2 DL	Phenanthrene	R1	Analysis with higher concentration available
CS1-INCL2	Pyrene	R1	Analysis with on-scale result available
CS1-SS	Benzo(g,h,i)perylene	J	Low IS Area
CS1-SS DL	Benzo(g,h,i)perylene	R1	Analysis with detected result available
CS1-SS DL	Dibenz(a,h)anthracene	R1	Analysis with detected result available
CS1-SS	Dibenz(a,h)anthracene	J	Low IS Area
CS1-SS DL	Indeno(1,2,3-cd)pyrene	R1	Analysis with detected result available
CS1-SS	Indeno(1,2,3-cd)pyrene	J	Low IS Area
CS1-SS	2-Methylnaphthalene	J	Low IS Area
CS1-SS DL	2-Methylnaphthalene	R1	Analysis with detected result available
CS1-SS	Acenaphthene	R1	Analysis with on-scale result available
CS1-SS DL	Acenaphthylene	R1	Analysis with detected result available
CS1-SS	Acenaphthylene	J	Low IS Area
CS1-SS	Anthracene	J	Low IS Area
CS1-SS DL	Anthracene	R1	Analysis with higher concentration available
CS1-SS	Benzo(a)anthracene	J	Low IS Area
CS1-SS DL	Benzo(a)anthracene	R1	Analysis with higher concentration available
CS1-SS DL	Benzo(a)pyrene	R1	Analysis with higher concentration available
CS1-SS	Benzo(a)pyrene	J	Low IS Area
CS1-SS DL	Benzo(b)fluoranthene	R1	Analysis with higher concentration available
CS1-SS	Benzo(b)fluoranthene	J	Low IS Area
CS1-SS	Benzo(k)fluoranthene	J	Low IS Area
CS1-SS DL	Benzo(k)fluoranthene	R1	Analysis with higher concentration available
CS1-SS DL	bis(2-Ethylhexyl)phthalate	R1	Analysis with detected result available
CS1-SS	bis(2-Ethylhexyl)phthalate	J	Low IS Area
CS1-SS	Chrysene	J	Low IS Area
CS1-SS DL	Chrysene	R1	Analysis with same result available
CS1-SS	Dibenzofuran	R1	Analysis with on-scale result available
CS1-SS	Fluoranthene	R1	Analysis with on-scale result available
CS1-SS	Fluorene	R1	Analysis with on-scale result available
CS1-SS	Naphthalene	J	Low IS Area
CS1-SS DL	Naphthalene	R1	Analysis with detected result available
CS1-SS	Phenanthrene	R1	Analysis with on-scale result available
CS1-SS	Pyrene	R1	Analysis with on-scale result available
CS2-BC	Benzo(g,h,i)perylene	R1	Analysis with higher concentration available
CS2-BC	Dibenz(a,h)anthracene	R1	Analysis with higher concentration available
CS2-BC	Indeno(1,2,3-cd)pyrene	R1	Analysis with higher concentration available
CS2-BC DL	2-Methylnaphthalene	R1	Analysis with detected result available

Sample ID	Analyte	DV Qualifier	Reason
CS2-BC DL	Acenaphthene	R1	Analysis with detected result available
CS2-BC DL	Acenaphthylene	R1	Analysis with higher concentration available
CS2-BC	Anthracene	R1	Analysis with higher concentration available
CS2-BC	Benzo(a)anthracene	R1	Analysis with higher concentration available
CS2-BC	Benzo(a)pyrene	R1	Analysis with higher concentration available
CS2-BC DL	Benzo(b)fluoranthene	R1	Analysis with higher concentration available
CS2-BC	Benzo(k)fluoranthene	R1	Analysis with higher concentration available
CS2-BC DL	bis(2-Ethylhexyl)phthalate	R1	Analysis with detected result available
CS2-BC	Chrysene	R1	Analysis with higher concentration available
CS2-BC DL	Dibenzofuran	R1	Analysis with detected result available
CS2-BC	Fluoranthene	R1	Analysis with higher concentration available
CS2-BC	Fluorene	R1	Analysis with higher concentration available
CS2-BC DL	Naphthalene	R1	Analysis with detected result available
CS2-BC DL	Phenanthrene	R1	Analysis with same result available
CS2-BC	Pyrene	R1	Analysis with on-scale result available
BH12-SR	Aroclor 1248	J	High dual column RPD
BH13-SR	Aroclor 1254	J	High dual column RPD
BH3-SR-A-E DL	Aroclor 1016	R1	Analysis with lower RL available
BH3-SR-A-E DL	Aroclor 1221	R1	Analysis with lower RL available
BH3-SR-A-E DL	Aroclor 1232	R1	Analysis with lower RL available
BH3-SR-A-E DL	Aroclor 1242	R1	Analysis with lower RL available
BH3-SR-A-E	Aroclor 1248	R1	Analysis with higher concentration available
BH3-SR-A-E	Aroclor 1254	R1	Analysis with on-scale result available
BH3-SR-A-E DL	Aroclor 1260	J	Low continuing calibration results
BH3-SR-A-E	Aroclor 1260	R1	Analysis with higher concentration available
BH4-SR	Aroclor 1260	J	High dual column RPD
BH5-SRMS	Aroclor 1254	J	High dual column RPD
BH5-SRSD	Aroclor 1254	J	High dual column RPD
BH5-SS	Aroclor 1016	UJ	Low surrogate recovery
BH5-SS	Aroclor 1221	UJ	Low surrogate recovery
BH5-SS	Aroclor 1232	UJ	Low surrogate recovery
BH5-SS	Aroclor 1242	UJ	Low surrogate recovery
BH5-SS	Aroclor 1248	J	Low surrogate recovery
BH5-SS	Aroclor 1254	J	Low surrogate recovery
BH5-SS	Aroclor 1260	J	Low surrogate recovery
BH8-SR	Aroclor 1260	J	High dual column RPD
BH9-SR	Aroclor 1260	J	High dual column RPD
CS1-SR	Aroclor 1254	J	High dual column RPD
CS1-SS DL	Aroclor 1016	R1	Analysis with lower RL available
CS1-SS DL	Aroclor 1221	R1	Analysis with lower RL available

Sample ID	Analyte	DV Qualifier	Reason
CS1-SS DL	Aroclor 1232	R1	Analysis with lower RL available
CS1-SS DL	Aroclor 1242	R1	Analysis with lower RL available
CS1-SS	Aroclor 1248	R1	Analysis with lower RL available
CS1-SS	Aroclor 1254	R1	Analysis with on-scale result available
CS1-SS DL	Aroclor 1254	J	High dual column RPD
CS1-SS DL	Aroclor 1260	J	High dual column RPD
CS1-SS	Aroclor 1260	R1	Analysis with on-scale result available
CS2-BC DL	Aroclor 1016	R1	Analysis with lower RL available
CS2-BC DL	Aroclor 1221	R1	Analysis with lower RL available
CS2-BC DL	Aroclor 1232	R1	Analysis with lower RL available
CS2-BC DL	Aroclor 1242	R1	Analysis with lower RL available
CS2-BC DL	Aroclor 1248	R1	Analysis with higher concentration available
CS2-BC DL	Aroclor 1254	J	High dual column RPD
CS2-BC	Aroclor 1254	R1	Analysis with on-scale result available
CS2-BC	Aroclor 1260	R1	Analysis with on-scale result available
CS3-BC	Aroclor 1248	J	High dual column RPD
CS3-SR	Aroclor 1254	J	High dual column RPD
SS5B-SR-A-E DL	Aroclor 1016	R1	Analysis with lower RL available
SS5B-SR-A-E DL	Aroclor 1221	R1	Analysis with lower RL available
SS5B-SR-A-E DL	Aroclor 1232	R1	Analysis with lower RL available
SS5B-SR-A-E DL	Aroclor 1242	R1	Analysis with lower RL available
SS5B-SR-A-E	Aroclor 1248	R1	Analysis with higher concentration available
SS5B-SR-A-E	Aroclor 1254	R1	Analysis with on-scale result available
SS5B-SR-A-E DL	Aroclor 1260	J	Low continuing calibration result
SS5B-SR-A-E	Aroclor 1260	R1	Analysis with on-scale result available
BH10-SR	Mercury	J	High MS recovery
BH11-SR	Mercury	J	High MS recovery
BH12-SR	Mercury	J	High MS recovery
BH13-SR	Mercury	J	High MS recovery
BH3-SR-A-E	Mercury	J	High MS recovery
BH3-SS-A-E	Mercury	J	High MS recovery
BH4-SR	Mercury	J	High MS recovery
BH4-SS	Mercury	J	High MS recovery
BH5-SR	Mercury	J	High MS recovery
BH5-SS	Mercury	J	High MS recovery
BH6-SR-A-E	Mercury	J	High MS recovery
BH6-SS-A-E	Mercury	J	High MS recovery
BH7-SR-A-E	Mercury	J	High MS recovery
BH8-SR	Mercury	J	High MS recovery
CS1-INCL1	Mercury	J	High MS recovery
CS1-INCL2	Mercury	J	High MS recovery
CS1-INCL3	Mercury	J	High MS recovery
CS1-SR	Mercury	J	High MS recovery
CS1-SS	Mercury	J	High MS recovery
CS2-BC	Mercury	J	High MS recovery
CS2-SR	Mercury	J	High MS recovery
CS3-BC	Mercury	J	High MS recovery
CS3-BC-FR	Mercury	J	High MS recovery
CS3-SR	Mercury	J	High MS recovery
CS3-SR-FR	Mercury	J	High MS recovery

Sample ID	Analyte	DV Qualifier	Reason
CS3-SS	Mercury	J	High MS recovery
CS3-SS-FR	Mercury	J	High MS recovery
SS5B-SR-A-E	Mercury	J	High MS recovery
BH10-SR	9-10 Phi Clay	J	High triplicate RSD
BH10-SR	Coarse Silt	J	High triplicate RSD
BH10-SR	Gravel	J	High triplicate RSD
BH10-SR	Very Coarse Sand	J	High triplicate RSD
BH11-SR	9-10 Phi Clay	J	High triplicate RSD
BH11-SR	Coarse Silt	J	High triplicate RSD
BH11-SR	Gravel	J	High triplicate RSD
BH11-SR	Very Coarse Sand	J	High triplicate RSD
BH12-SR	9-10 Phi Clay	J	High triplicate RSD
BH12-SR	Coarse Silt	J	High triplicate RSD
BH12-SR	Gravel	J	High triplicate RSD
BH12-SR	Very Coarse Sand	J	High triplicate RSD
BH13-SR	9-10 Phi Clay	J	High triplicate RSD
BH13-SR	Coarse Silt	J	High triplicate RSD
BH13-SR	Gravel	J	High triplicate RSD
BH13-SR	Very Coarse Sand	J	High triplicate RSD
BH2-SR	9-10 Phi Clay	J	High triplicate RSD
BH2-SR	Coarse Silt	J	High triplicate RSD
BH2-SR	Gravel	J	High triplicate RSD
BH2-SR	Very Coarse Sand	J	High triplicate RSD
BH2-SS	<10 Phi Clay	J	Low pipette fraction weight
BH2-SS	8-9 Phi Clay	J	Low pipette fraction weight
BH2-SS	9-10 Phi Clay	J	High triplicate RSD, low pipette fraction weight
BH2-SS	Coarse Silt	J	High triplicate RSD, low pipette fraction weight
BH2-SS	Fine Silt	J	Low pipette fraction weight
BH2-SS	Gravel	J	High triplicate RSD
BH2-SS	Medium Silt	J	Low pipette fraction weight
BH2-SS	Very Coarse Sand	J	High triplicate RSD
BH2-SS	Very Fine Silt	J	Low pipette fraction weight
BH3-SR-A-E	9-10 Phi Clay	J	High triplicate RSD
BH3-SR-A-E	Coarse Silt	J	High triplicate RSD
BH3-SR-A-E	Gravel	J	High triplicate RSD
BH3-SR-A-E	Very Coarse Sand	J	High triplicate RSD
BH3-SS-A-E	9-10 Phi Clay	J	High triplicate RSD
BH3-SS-A-E	Coarse Silt	J	High triplicate RSD
BH3-SS-A-E	Gravel	J	High triplicate RSD
BH3-SS-A-E	Very Coarse Sand	J	High triplicate RSD
BH4-SR	9-10 Phi Clay	J	High triplicate RSD
BH4-SR	Coarse Silt	J	High triplicate RSD
BH4-SR	Gravel	J	High triplicate RSD
BH4-SR	Very Coarse Sand	J	High triplicate RSD
BH4-SS	9-10 Phi Clay	J	High triplicate RSD
BH4-SS	Coarse Silt	J	High triplicate RSD
BH4-SS	Gravel	J	High triplicate RSD
BH4-SS	Very Coarse Sand	J	High triplicate RSD
BH5-SR	9-10 Phi Clay	J	High triplicate RSD
BH5-SR	Coarse Silt	J	High triplicate RSD
BH5-SR	Gravel	J	High triplicate RSD
BH5-SR	Very Coarse Sand	J	High triplicate RSD
BH5-SS	9-10 Phi Clay	J	High triplicate RSD
BH5-SS	Coarse Silt	J	High triplicate RSD

Sample ID	Analyte	DV Qualifier	Reason
BH5-SS	Gravel	J	High triplicate RSD
BH5-SS	Very Coarse Sand	J	High triplicate RSD
BH6-SR-A-E	9-10 Phi Clay	J	High triplicate RSD
BH6-SR-A-E	Coarse Silt	J	High triplicate RSD
BH6-SR-A-E	Gravel	J	High triplicate RSD
BH6-SR-A-E	Very Coarse Sand	J	High triplicate RSD
BH6-SS-A-E	9-10 Phi Clay	J	High triplicate RSD
BH6-SS-A-E	Coarse Silt	J	High triplicate RSD
BH6-SS-A-E	Gravel	J	High triplicate RSD
BH6-SS-A-E	Very Coarse Sand	J	High triplicate RSD
BH7-SR-A-E	9-10 Phi Clay	J	High triplicate RSD
BH7-SR-A-E	Coarse Silt	J	High triplicate RSD
BH7-SR-A-E	Gravel	J	High triplicate RSD
BH7-SR-A-E	Very Coarse Sand	J	High triplicate RSD
BH8-SR	9-10 Phi Clay	J	High triplicate RSD
BH8-SR	Coarse Silt	J	High triplicate RSD
BH8-SR	Gravel	J	High triplicate RSD
BH8-SR	Very Coarse Sand	J	High triplicate RSD
BH9-SR	9-10 Phi Clay	J	High triplicate RSD
BH9-SR	Coarse Silt	J	High triplicate RSD
BH9-SR	Gravel	J	High triplicate RSD
BH9-SR	Very Coarse Sand	J	High triplicate RSD
BH9-SR-FS	9-10 Phi Clay	J	High triplicate RSD
BH9-SR-FS	Coarse Silt	J	High triplicate RSD
BH9-SR-FS	Gravel	J	High triplicate RSD
BH9-SR-FS	Very Coarse Sand	J	High triplicate RSD
CS1-BC	<10 Phi Clay	J	Low pipette fraction weight
CS1-BC	8-9 Phi Clay	J	Low pipette fraction weight
CS1-BC	9-10 Phi Clay	J	High triplicate RSD, low pipette fraction weight
CS1-BC	Coarse Silt	J	High triplicate RSD, low pipette fraction weight
CS1-BC	Fine Silt	J	Low pipette fraction weight
CS1-BC	Gravel	J	High triplicate RSD
CS1-BC	Medium Silt	J	Low pipette fraction weight
CS1-BC	Very Coarse Sand	J	High triplicate RSD
CS1-BC	Very Fine Silt	J	Low pipette fraction weight
CS1-INCL1	9-10 Phi Clay	J	High triplicate RSD
CS1-INCL1	Coarse Silt	J	High triplicate RSD
CS1-INCL1	Gravel	J	High triplicate RSD
CS1-INCL1	Very Coarse Sand	J	High triplicate RSD
CS1-INCL2	9-10 Phi Clay	J	High triplicate RSD
CS1-INCL2	Coarse Silt	J	High triplicate RSD
CS1-INCL2	Gravel	J	High triplicate RSD
CS1-INCL2	Very Coarse Sand	J	High triplicate RSD
CS1-INCL3	9-10 Phi Clay	J	High triplicate RSD
CS1-INCL3	Coarse Silt	J	High triplicate RSD
CS1-INCL3	Gravel	J	High triplicate RSD
CS1-INCL3	Very Coarse Sand	J	High triplicate RSD
CS1-SR	9-10 Phi Clay	J	High triplicate RSD
CS1-SR	Coarse Silt	J	High triplicate RSD
CS1-SR	Gravel	J	High triplicate RSD
CS1-SR	Very Coarse Sand	J	High triplicate RSD
CS1-SS	9-10 Phi Clay	J	High triplicate RSD
CS1-SS	Coarse Silt	J	High triplicate RSD
CS1-SS	Gravel	J	High triplicate RSD

Sample ID	Analyte	DV Qualifier	Reason
CS1-SS	Very Coarse Sand	J	High triplicate RSD
CS2-BC	9-10 Phi Clay	J	High triplicate RSD
CS2-BC	Coarse Silt	J	High triplicate RSD
CS2-BC	Gravel	J	High triplicate RSD
CS2-BC	Very Coarse Sand	J	High triplicate RSD
CS2-SR	9-10 Phi Clay	J	High triplicate RSD
CS2-SR	Coarse Silt	J	High triplicate RSD
CS2-SR	Gravel	J	High triplicate RSD
CS2-SR	Very Coarse Sand	J	High triplicate RSD
CS2-SS	9-10 Phi Clay	J	High triplicate RSD
CS2-SS	Coarse Silt	J	High triplicate RSD
CS2-SS	Gravel	J	High triplicate RSD
CS2-SS	Very Coarse Sand	J	High triplicate RSD
CS3-BC	9-10 Phi Clay	J	High triplicate RSD
CS3-BC	Coarse Silt	J	High triplicate RSD
CS3-BC	Gravel	J	High triplicate RSD
CS3-BC	Very Coarse Sand	J	High triplicate RSD
CS3-BC-FR	9-10 Phi Clay	J	High triplicate RSD
CS3-BC-FR	Coarse Silt	J	High triplicate RSD
CS3-BC-FR	Gravel	J	High triplicate RSD
CS3-BC-FR	Very Coarse Sand	J	High triplicate RSD
CS3-SR	9-10 Phi Clay	J	High triplicate RSD
CS3-SR	Coarse Silt	J	High triplicate RSD
CS3-SR	Gravel	J	High triplicate RSD
CS3-SR	Very Coarse Sand	J	High triplicate RSD
CS3-SR-FR	<10 Phi Clay	J	Low pipette fraction weight
CS3-SR-FR	8-9 Phi Clay	J	Low pipette fraction weight
CS3-SR-FR	9-10 Phi Clay	J	High triplicate RSD, low pipette fraction weight
CS3-SR-FR	Coarse Silt	J	High triplicate RSD, low pipette fraction weight
CS3-SR-FR	Fine Silt	J	Low pipette fraction weight
CS3-SR-FR	Gravel	J	High triplicate RSD
CS3-SR-FR	Medium Silt	J	Low pipette fraction weight
CS3-SR-FR	Very Coarse Sand	J	High triplicate RSD
CS3-SR-FR	Very Fine Silt	J	Low pipette fraction weight
CS3-SS	9-10 Phi Clay	J	High triplicate RSD
CS3-SS	Coarse Silt	J	High triplicate RSD
CS3-SS	Gravel	J	High triplicate RSD
CS3-SS	Very Coarse Sand	J	High triplicate RSD
CS3-SS-FR	<10 Phi Clay	J	Low pipette fraction weight
CS3-SS-FR	8-9 Phi Clay	J	Low pipette fraction weight
CS3-SS-FR	9-10 Phi Clay	J	High triplicate RSD, low pipette fraction weight
CS3-SS-FR	Coarse Silt	J	High triplicate RSD, low pipette fraction weight
CS3-SS-FR	Fine Silt	J	Low pipette fraction weight
CS3-SS-FR	Gravel	J	High triplicate RSD
CS3-SS-FR	Medium Silt	J	Low pipette fraction weight
CS3-SS-FR	Very Coarse Sand	J	High triplicate RSD
CS3-SS-FR	Very Fine Silt	J	Low pipette fraction weight
SS5B-SR-A-E	9-10 Phi Clay	J	High triplicate RSD
SS5B-SR-A-E	Coarse Silt	J	High triplicate RSD
SS5B-SR-A-E	Gravel	J	High triplicate RSD
SS5B-SR-A-E	Very Coarse Sand	J	High triplicate RSD

9.0 Abbreviations and Definitions

DV Qualifer	Definition
B	Suspected laboratory contamination.
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample reporting limit or the amount of contaminant detected in the sample.
J	The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.
UJ	The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
R	The sample result is rejected. The presence or absence of the analyte cannot be verified and data are not usable.
R1	The sample result is rejected due to the availability of a more reliable result.

Abbreviation	Definition
CCal	Continuing Calibration
DV	Data validation
LCS	Laboratory control sample
LCSD	Laboratory control sample duplicate
MS	Matrix spike
MSD	Matrix spike duplicate
RPD	Relative percent difference
RSD	Relative standard deviation
TCMX	Tetrachlorometaxylene
DCBP	Decachlorobiphenyl

10.0 References

USEPA Contract Laboratory Program National Functional Guidelines For Organic Data Review, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, October 1999, EPA540/R-99/008.

USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, July 2002, EPA540/R-01/008.