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Organics Verification Study for Sinclair and Dyes Inlets, Washington

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September 2006

Prepared for the
Puget Sound Naval Shipyard and
Intermediate Maintenance Facility
Project ENVVEST
Bremerton, Washington
under Contract DE-AC06-76RLO 1830-RS

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Richland, Washington 99352

Executive Summary

Sinclair and Dyes Inlets near Bremerton, Washington, are on the State of Washington 1998 303(d) list of impaired waters because of fecal coliform contamination in marine water, metals in sediment and fish tissue, and organics in sediment and fish tissue. Because significant cleanup and source control activities have been conducted in the inlets since the data supporting the 1998 303(d) listings were collected, two verification studies were performed to address the 303(d) segments that were listed for metal and organic contaminants in marine sediment. The Metals Verification Study (MVS) was conducted in 2003; the final report, *Metals Verification Study for Sinclair and Dyes Inlets, Washington*,[1] was published in March 2004 (Kohn et al. 2004).

This report describes the Organics Verification Study that was conducted in 2005. The study approach was similar to the MVS in that a large number of surface sediment samples were screened for the major classes of organic contaminants, and then the screening results and other available data were used to select a subset of samples for quantitative chemical analysis. Because the MVS was designed to obtain representative data on concentrations of contaminants in surface sediment throughout Sinclair Inlet, Dyes Inlet, Port Orchard Passage, and Rich Passage, aliquots of the 160 MVS sediment samples were used in the analysis for the Organics Verification Study. However, unlike metals screening methods, organics screening methods are not specific to individual organic compounds, and are not available for some target organics. Therefore, only the quantitative analytical results were used in the organics verification evaluation.

The results of the Organics Verification Study showed that sediment quality outside of Sinclair Inlet is unlikely to be impaired because of organic contaminants. Similar to the results for metals, in Sinclair Inlet, the distribution of residual organic contaminants is generally limited to areas immediately adjacent to the actively managed Puget Sound Naval Shipyard and Intermediate Maintenance Facility Superfund Site, where further source-control actions and monitoring are under way.

[1] Report is available electronically from www.pnl.gov/main/publications by searching keyword "Sinclair" or by report number PNNL-14872.

Acknowledgments

This report was prepared as part of the Puget Sound Naval Shipyard (PSNS) Project ENVVEST, a cooperative project among the U.S. Navy, U.S. Environmental Protection Agency, Washington State Department of Ecology, and technical stakeholders to help improve the environmental quality of the Sinclair and Dyes Inlet Watershed. This work was conducted under the direction of Gerald M. Sherrell, Project ENVVEST Program Manager, and Robert K. Johnston, Project ENVVEST Technical Coordinator, with contributions from members of the technical working group. The work plan was approved by the Washington State Department of Ecology, Environmental Assessment Program. The authors of this report recognize the significant contributions made to this work by the following members of the Project ENVVEST technical working group:

Puget Sound Naval Shipyard & Intermediate Maintenance Facility: Gerald M. Sherrell, Dwight Leisle, Bruce Beckwith, Brooks Walpole, Vickie Whitney, Joe Wright, and Steve Rupp

Space and Naval Warfare Systems Center: Jim Leather, Vicky Kirtay, Brian Ayers, and Joel Guerrero

U.S. EPA Region X: Mike Rylko and Martha Turvey

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Suquamish Tribe: Tom Ostrom

Naval Facilities Engineering Command, Engineering Field Activity Northwest: Dina Ginn and Larry Tucker

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Acronyms

CSOs	combined sewer overflows
EFANW	Engineering Field Activity Northwest
ELISA	enzyme-linked immunosorbent assay
EPA	U.S. Environmental Protection Agency
GC	gas chromatography
GC/ECD	gas chromatography with electron capture detection
GC/MS	gas chromatography/mass spectrometry
HPAH	high molecular weight PAH
IR	Installation Restoration
LPAH	low molecular weight PAH
MCUL	minimum cleanup levels
MSL	Marine Sciences Laboratory
MVS	Metals Verification Study
NOAA	National Oceanic and Atmospheric Administration
OC	organic carbon
OU	Operable Unit
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PSNS & IMF	Puget Sound Naval Shipyard and Intermediate Maintenance Facility
QC	quality control
SOPs	Standard Operating Procedures
SPAWAR SSC	Space and Naval Warfare Systems Center
SQS	sediment quality standards
TMDLs	total maximum daily loads
TOC	total organic carbon
WAC	Washington Administrative Code

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1.0 Introduction

Sinclair and Dyes Inlets, near Bremerton, Washington, are on the State of Washington 1998 303(d) list of impaired waters because of fecal coliform contamination in marine water, metals in sediment and fish tissue, and organics in sediment and fish tissue (Ecology 2003). Water quality issues in Sinclair and Dyes Inlets are being addressed through a partnership among the U.S. Navy, U.S. Environmental Protection Agency (EPA), and Washington State Department of Ecology (Ecology), with the cooperation of other state agencies, local governments, and the Suquamish Tribe, in a program called Project ENVVEST (Environmental Investment). It is an ENVVEST priority to address the development of total maximum daily loads (TMDLs) for the Sinclair and Dyes Inlets system.

The first ENVVEST TMDL study (May and Cullinan 2005) supported the development of a fecal coliform TMDL for the inlets. The 2003-2004 Metals Verification Study (MVS) for Sinclair and Dyes Inlets addressed the 303(d) segments that exceed Washington State sediment quality standards (SQS) or minimum cleanup levels (MCUL) in marine sediment (Kohn et al. 2004). Most of the data supporting the 303(d) listings were collected in 1998 or earlier. Since that time, significant cleanup and source-control activities have been conducted in the inlets. The present Organics Verification Study, like the MVS, was conducted to provide more recent organic contaminant concentration data for sediment throughout the study area and especially in the more contaminated areas where cleanup actions were implemented. These data will be used to determine whether organics remain a source of sediment quality impairment. Future TMDL studies are planned that will address mercury in sediment, nutrients and dissolved oxygen in the water column, and toxic chemicals in fish tissue (ENVVEST 2002).

1.1 Site History

Much of the site and contaminant history is documented in other reports (U.S. Navy 2000, URS 2002, Kohn et al. 2004) and is only briefly summarized here. The Sinclair and Dyes Inlets watershed (Figure 1) is home to the Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF), located on Sinclair Inlet, an arm on the west side of Puget Sound. Sinclair Inlet is open to Puget Sound through the Port Orchard Passage, which extends northward along the west side of Bainbridge Island and through Rich Passage, which exits to the southeast (Figure 2). Immediately to the east of the PSNS & IMF, the Port Washington Narrows enters into Dyes Inlet (Figure 3).

Previous studies indicated that marine sediment in Sinclair Inlet has been contaminated with heavy metals, polychlorinated biphenyls (PCBs), and polynuclear aromatic hydrocarbons (PAHs). Contaminants released within the inlets or transported into the inlets from the greater Puget Sound tend to accumulate in depositional areas (muddy sediment deposits) located within Sinclair and Dyes Inlets, Port Orchard Passage, and Rich Passage. Historical geographic distributions have shown that PSNS & IMF was a significant source of the contamination (Katz et al. 1999, URS 2002). Other sources include municipal wastewater, marinas, industrial effluents, stormwater, agricultural runoff, and atmospheric deposition. Stormwater outfalls and combined sewer overflows (CSOs) discharge to Sinclair and Dyes Inlets and the Port Washington Narrows; those associated with the City of Bremerton and PSNS & IMF are shown in Figures 4 and 5.

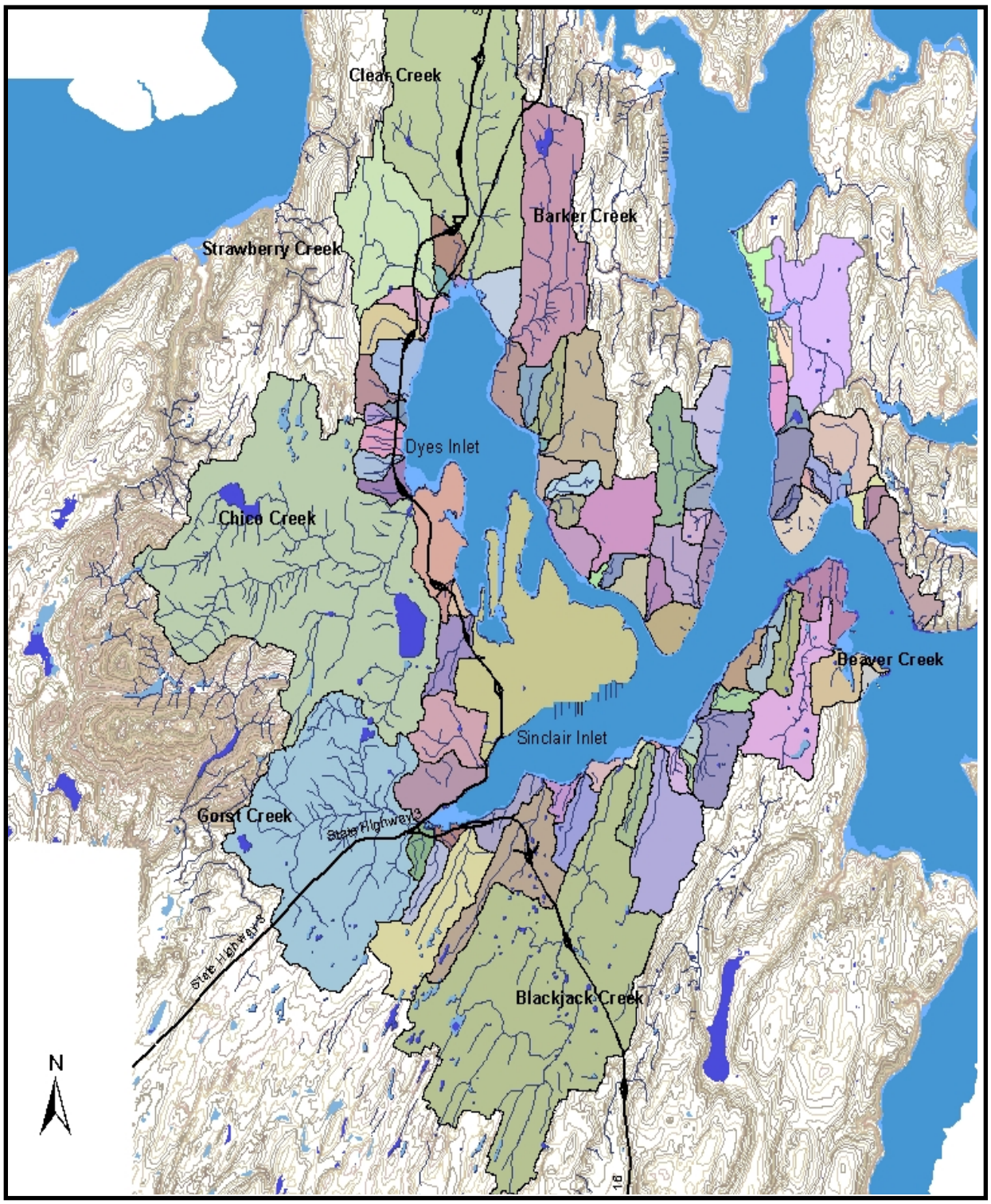


Figure 1. Sinclair and Dyes Inlet Study Area Showing Watershed Subbasins

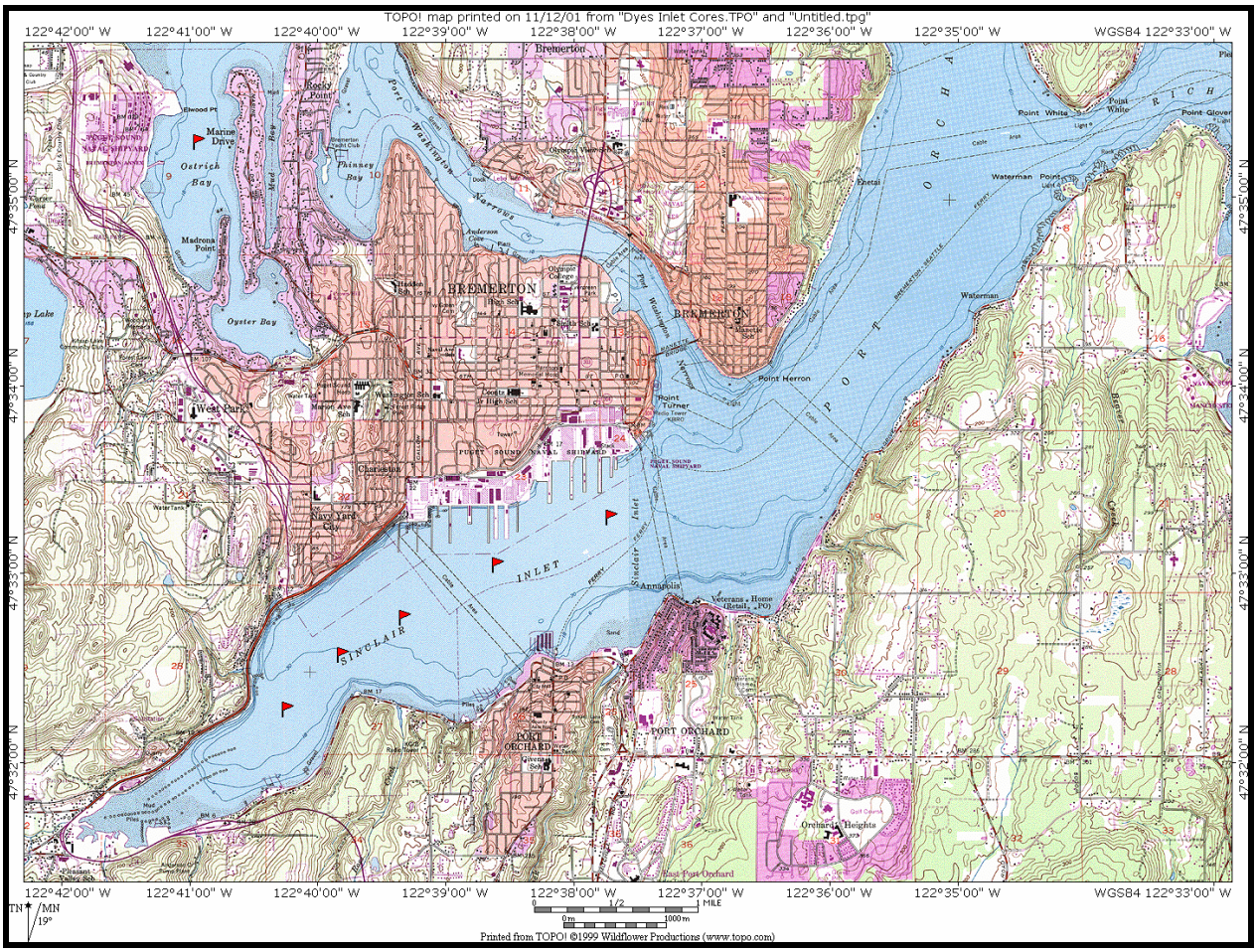


Figure 2. Sinclair Inlet and Surrounding Area

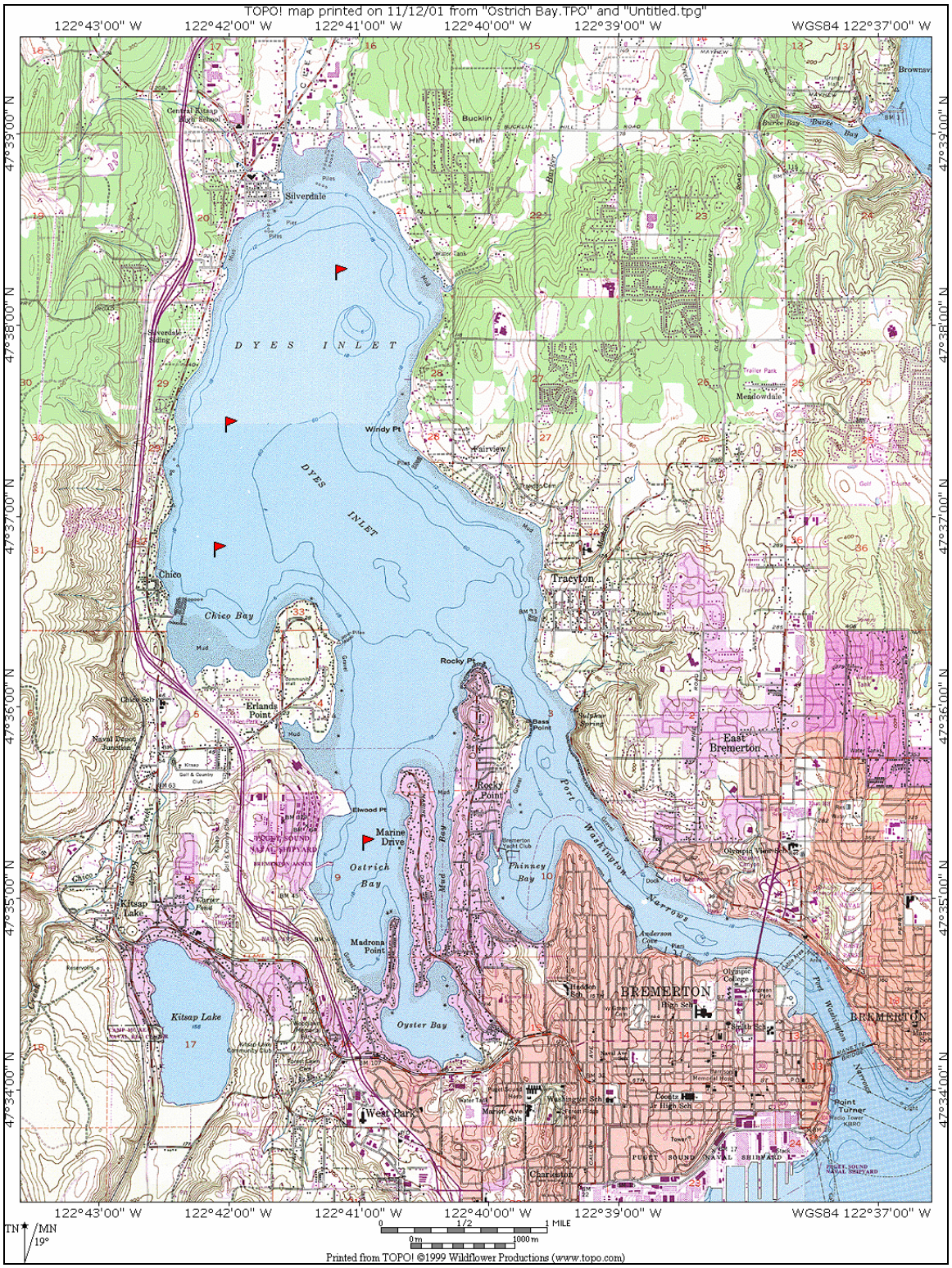


Figure 3. Dyes Inlet, Ostrich Bay, Port Washington Narrows, and Surrounding Area

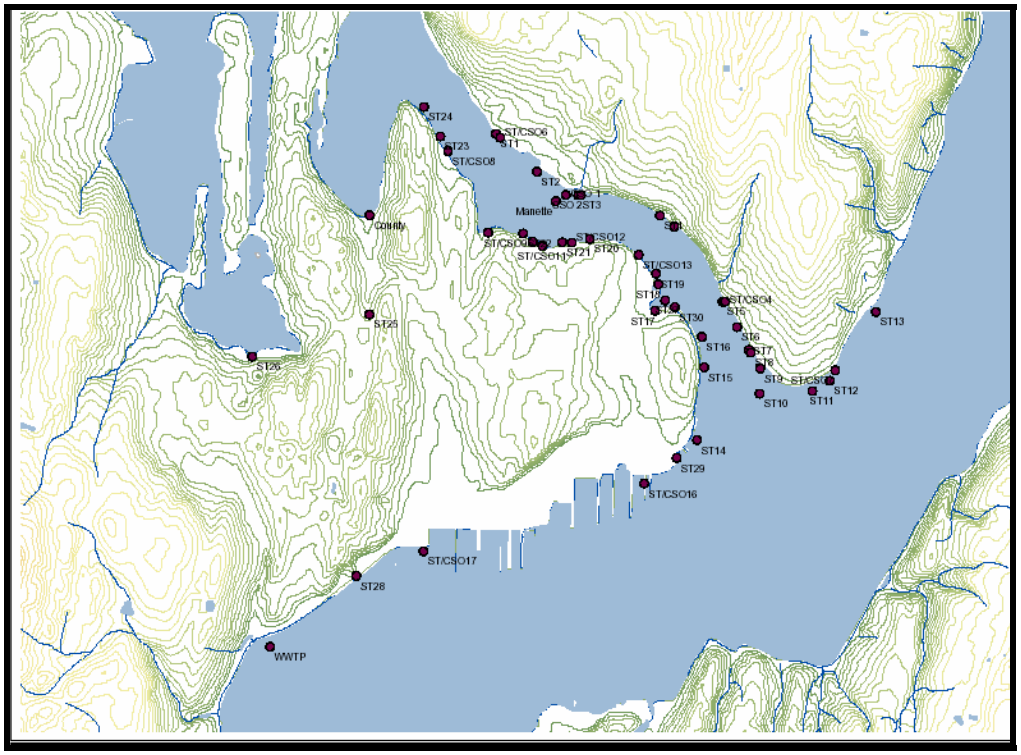


Figure 4. Stormwater Outfalls and Combined Sewer Overflows in the City of Bremerton

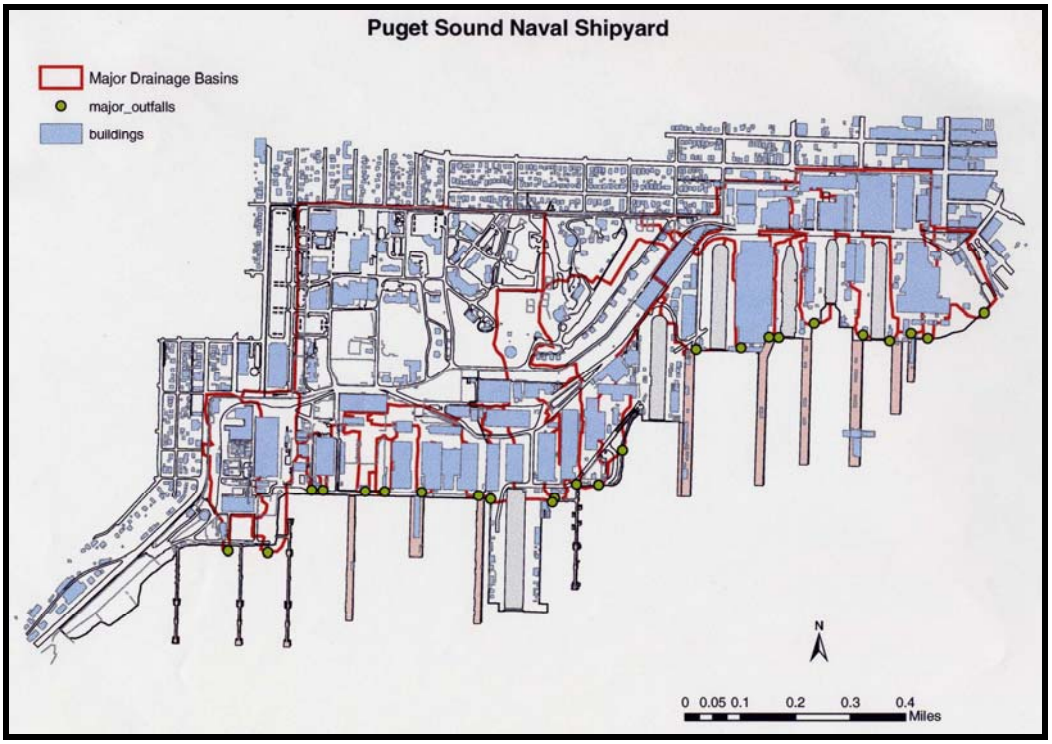


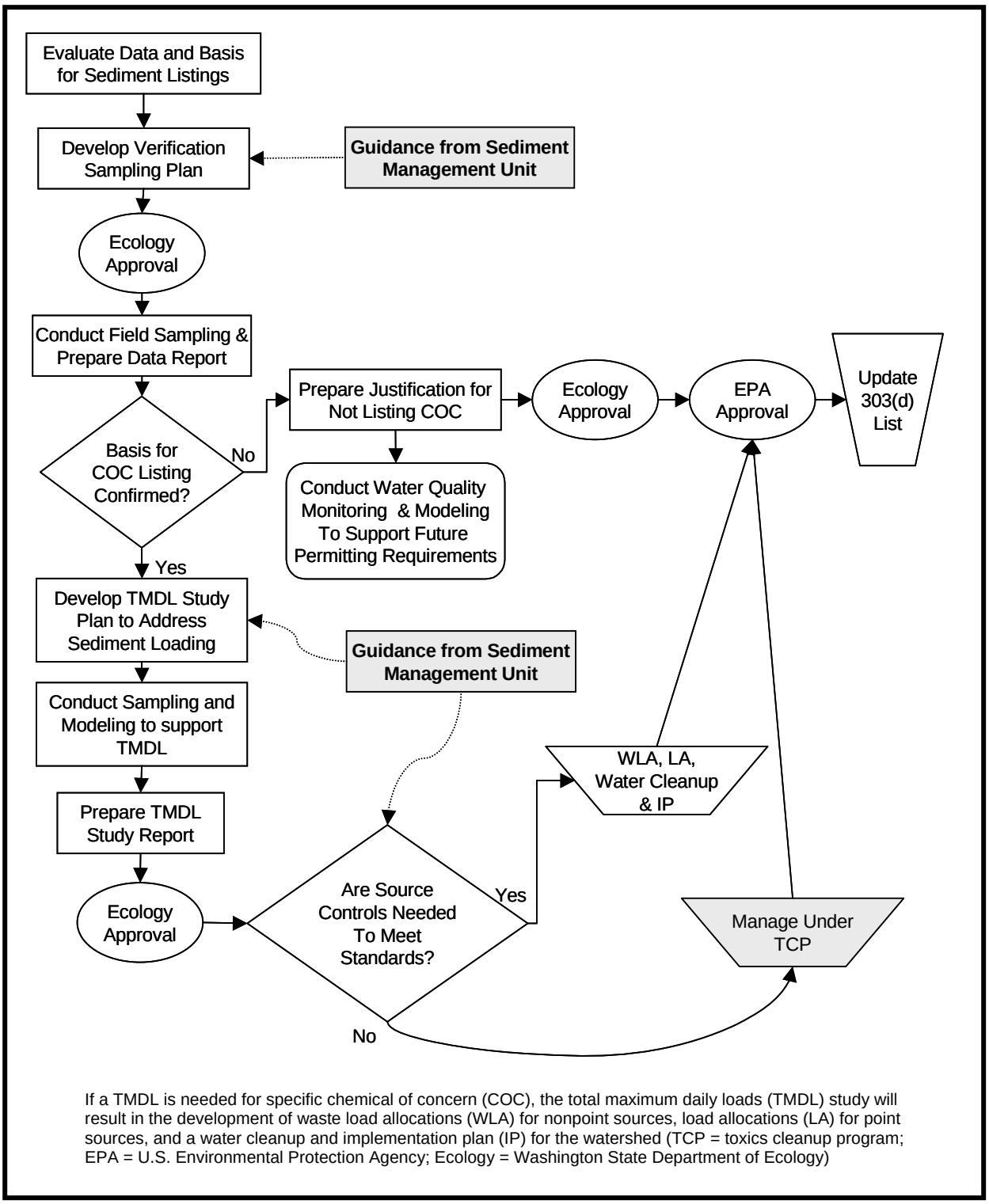
Figure 5. Buildings, Catch Basins, and Major Stormwater Outfalls Within the Bremerton Naval Complex

Most of the locations where existing sediment organics data exceed SQS are located either in Ostrich Bay offshore of the Jackson Park Housing Complex, or immediately offshore of PSNS & IMF. The offshore sediment at PSNS & IMF is part of a Superfund site and managed under the federal facilities Installation Restoration (IR) cleanup program by the Navy's Engineering Field Activity Northwest (EFANW). The marine sediment is designated as Operable Unit (OU)-B Marine. Significant contaminated sediment removal and capping activities were performed in OU-B Marine in 2000-2001. Post-remediation monitoring was planned; the first round of sediment monitoring sampling occurred in fall 2003, and the second round of monitoring sampling occurred in fall 2005.

1.2 Organics Verification Study Background and Objectives

During development of the metals TMDL study plan, the Project ENVVEST Technical Team conducted a review of the available sediment and water quality information for Sinclair and Dyes Inlets (Diefenderfer et al. 2003). The technical team concluded that the sediment data on which the 303(d) listings were based may not be representative of the present-day sediment conditions in Sinclair and Dyes Inlets, and recommended that representative data be collected before continuing work on the metals or organics TMDL study plans. Furthermore, spatially representative data for the Sinclair and Dyes Inlet watershed were needed to support watershed-level contaminant modeling, which would also support TMDL development. The schematic diagram in Figure 6 shows how such data would be used to verify the need for TMDL planning.

ENVVEST proceeded to develop an Organics Verification Study addendum to the MVS Sampling and Analysis Plan (Figure 6, "Develop Verification Sampling Plan"). The sampling and analysis plan was guided by state sediment management sampling and analysis requirements to ensure collection of appropriate samples and data with which to meet the state Water Quality Program Policy. The Organics Verification Study was designed to answer the question of whether present-day concentrations of organics in Sinclair and Dyes Inlet sediment still exceed Washington State SQS, and if so, where? In addition, hydrodynamic modeling has shown significant water exchange and sediment transport between Sinclair and Dyes Inlets. Another objective was to provide organic contaminant and total organic carbon (TOC) data to support contaminant loading, transport modeling, and sediment trends analysis throughout Sinclair and Dyes Inlets. The *Addendum to [Metals Verification Study] Sampling and Analysis Plan to Include Organics Verification Study* was submitted to Ecology, the EPA, and other ENVVEST parties in January 2005. The plan addendum was approved by Ecology in April 2005, and the Organics Verification Study was implemented starting in late April 2005.



If a TMDL is needed for specific chemical of concern (COC), the total maximum daily loads (TMDL) study will result in the development of waste load allocations (WLA) for nonpoint sources, load allocations (LA) for point sources, and a water cleanup and implementation plan (IP) for the watershed (TCP = toxics cleanup program; EPA = U.S. Environmental Protection Agency; Ecology = Washington State Department of Ecology)

Figure 6. Schematic Drawing of the Process to Assess 303(d) Listings in Sinclair and Dyes Inlets, Washington

2.0 Methods

The Organics Verification Study approach was to analyze surface sediment samples that had already been collected from throughout Sinclair and Dyes Inlets and the adjoining water bodies (Port Orchard Passage and Rich Passage). The sampling design and sample collection are described in detail in the MVS report (Kohn et al. 2004, Sections 2.2 and 2.3) and are briefly summarized below. Sample analysis, including the selection process used to select samples for confirmatory analysis, and analytical methods, are provided in Section 2.3 of this report.

2.1 Verification Study Design

The overall study design for the MVS considered a variety of research needs, including those of the state 303(d) and sediment management programs, the existing monitoring program for OU-B Marine, and those relevant to potential contaminant transport modeling. Specific design considerations for station placement were as follows:

- Higher sampling density in areas affected by dredging and cleanup activities (OU B Marine, Sinclair Inlet, Ostrich Bay)
- Proximity to known or potential sources
- Minimum of three samples in each 303(d) segment listed for contaminants in sediment
- Locations with recent existing data (i.e., from ENVVEST Mass Balance Study [Miller et al. 2003])
- Spatial coverage should support short- and long-term contaminant transport modeling
- Depositional vs. erosional areas.

Inside Sinclair Inlet, ENVVEST obtained splits of over 100 surface sediment samples collected by the PSNS & IMF OU-B Marine monitoring program, which allowed ENVVEST to avoid duplication of sampling effort and focus on optimizing the sampling design for Dyes Inlet and Port Orchard Passage outside of Sinclair Inlet. Sampling designs both inside and outside Sinclair Inlet are described below and summarized in Table 1.

During the MVS, aliquots of each sediment sample were archived frozen for the later Organics Verification Study. Like the MVS, the Organics Verification Study employed a tiered analytical approach to analyzing the large number of sediment samples. The first step was to conduct rapid screening for two major contaminant classes (PAHs and PCBs), followed by confirmatory analysis for all target organic analytes in approximately 15% of samples.

Details of the verification sampling design and station selection are summarized in Table 1 and are provided in the MVS final report (Kohn et al. 2004). A significant portion of the listed segments are within the boundary of PSNS & IMF OU-B Marine, which is managed as a contaminated sediment site with oversight by Ecology's Sediment Management Unit. A sediment management plan (OU-B Marine Monitoring Program) is in place for OU-B; the proposed monitoring area extent covers all of Sinclair

Inlet. There were 103 verification study samples from inside Sinclair Inlet provided to ENVVEST by the OU-B Marine monitoring program, and 59 samples from outside Sinclair Inlet collected by ENVVEST.

Of the 103 samples inside Sinclair Inlet, 71 samples were from the very high density 500-ft grid representing OU-B Marine (OUBM, Figure 7) and 32 samples from the 1500-ft grid representing Sinclair Inlet outside of OU-B Marine (OOUB, Figure 8). Samples outside Sinclair Inlet were concentrated in the depositional areas of Dyes Inlet and Ostrich Bay, with slightly lower sampling density in Port Orchard Passage near the confluence of Sinclair and Dyes Inlets, and the lowest sampling density in nondepositional areas where sediment data were needed primarily for spatial distribution (north Port Orchard Passage and Rich Passage) (Figure 9)

Table 1. Verification Study Design Summary for Sinclair and Dyes Inlets

Location	Objective(s)	Approach	Number of Stations
Sinclair Inlet, Inside PSNS & IMF OU-B	1. Present-day sediment quality in listed segments 47122F6F2, 47122F6F3, 47122F6F4, 47122F6F5, and 47122F6E6 that are all or partly within OU-B boundary 2. Spatially representative data to support contaminant transport modeling in Sinclair & Dyes Inlets	Obtain and analyze an aliquot of OU-B Marine monitoring samples	71
Sinclair Inlet, Outside PSNS & IMF OU-B	1. Present-day sediment quality throughout Sinclair Inlet, especially in listed segments with boundaries extending outside the OU-B boundary 2. Spatially representative data to support contaminant transport modeling in Sinclair & Dyes Inlets		32
		Sinclair Inlet Subtotal	103
Dyes Inlet	1. Present-day sediment quality in listed segments 47122F6I8 and 47122F6J8 (Ostrich Bay) 2. Spatially representative data to support contaminant transport modeling in Sinclair & Dyes Inlets	Stratified design with stations on triangular grid with random start point.	37
Port Washington Narrows	Data from potential source and depositional areas to support contaminant transport modeling in Sinclair & Dyes Inlets	Use existing data from outfalls sampled during Mass Balance Study	1 (Phinney Bay)
Port Orchard Passage at confluence of Port Washington Narrows and Sinclair Inlet	Spatially representative data to support contaminant transport modeling in Sinclair & Dyes Inlets	Stations on triangular grid with random start point within defined area of interest	17
North Port Orchard Passage and Rich Passage	Sediment quality of locations not impacted by contaminants from Sinclair and Dyes Inlets, to initialize model parameters	Existing ENVVEST stations or new judgment stations	4
		Dyes Inlet, Port Washington Narrows, Port Orchard & Rich Passages Subtotal[b]	59

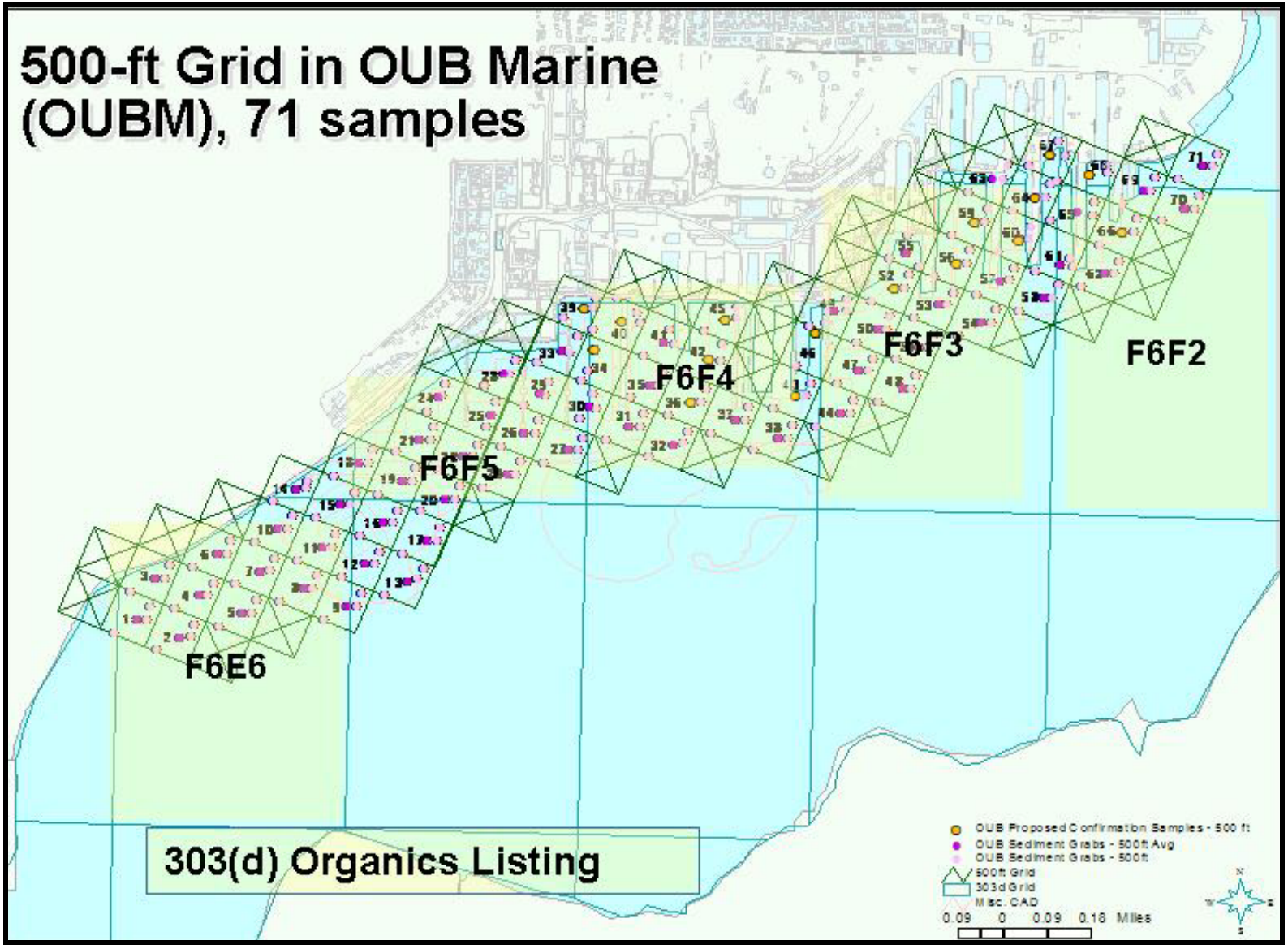


Figure 7. 500-ft monitoring grids within the OU-B Marine boundary (OUBM), with 303(d) segment overlay

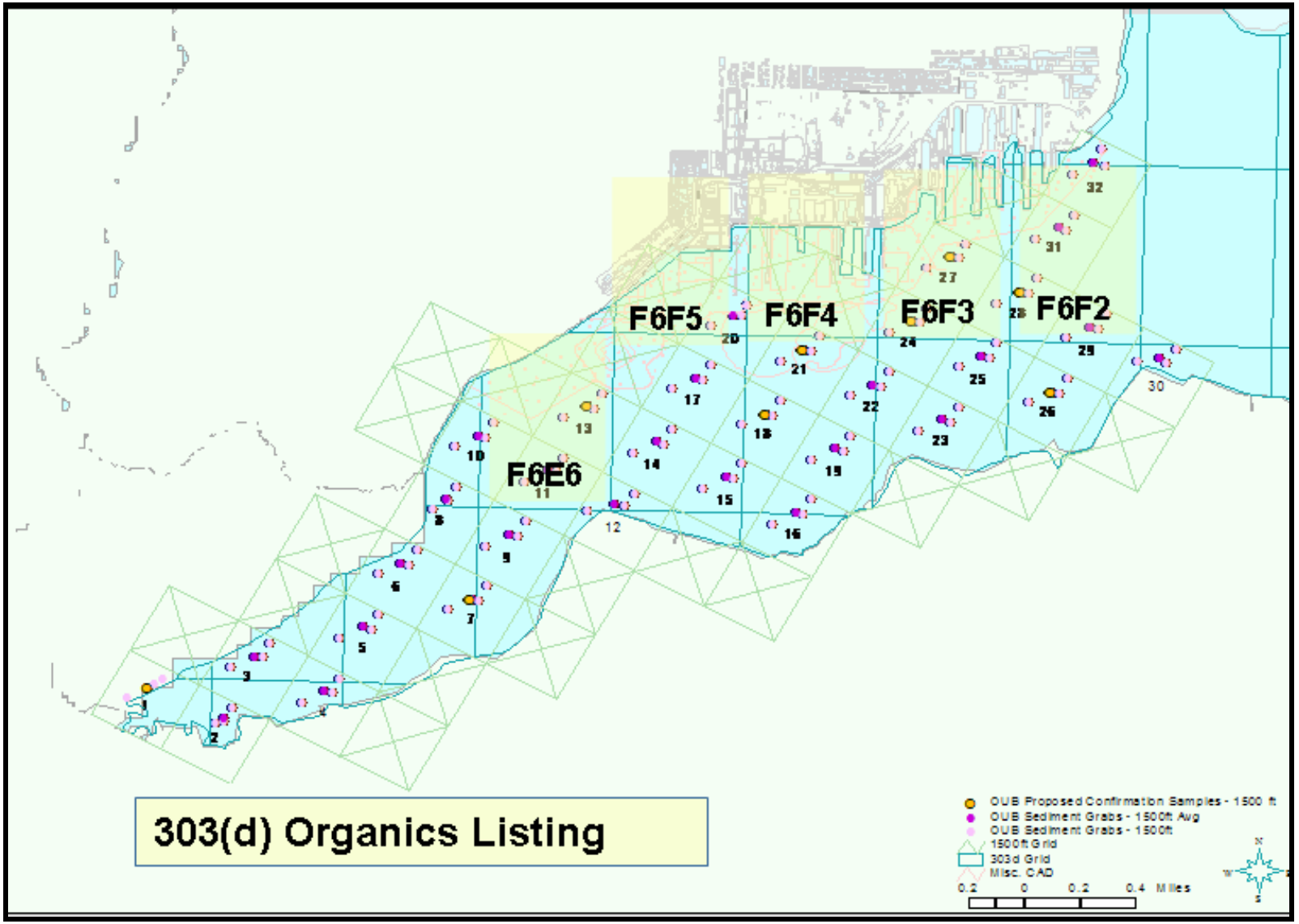


Figure 8. 1500-ft Monitoring Grids Outside of the OU-B Marine boundary (OOUB), with 303(d) Segment Overlay

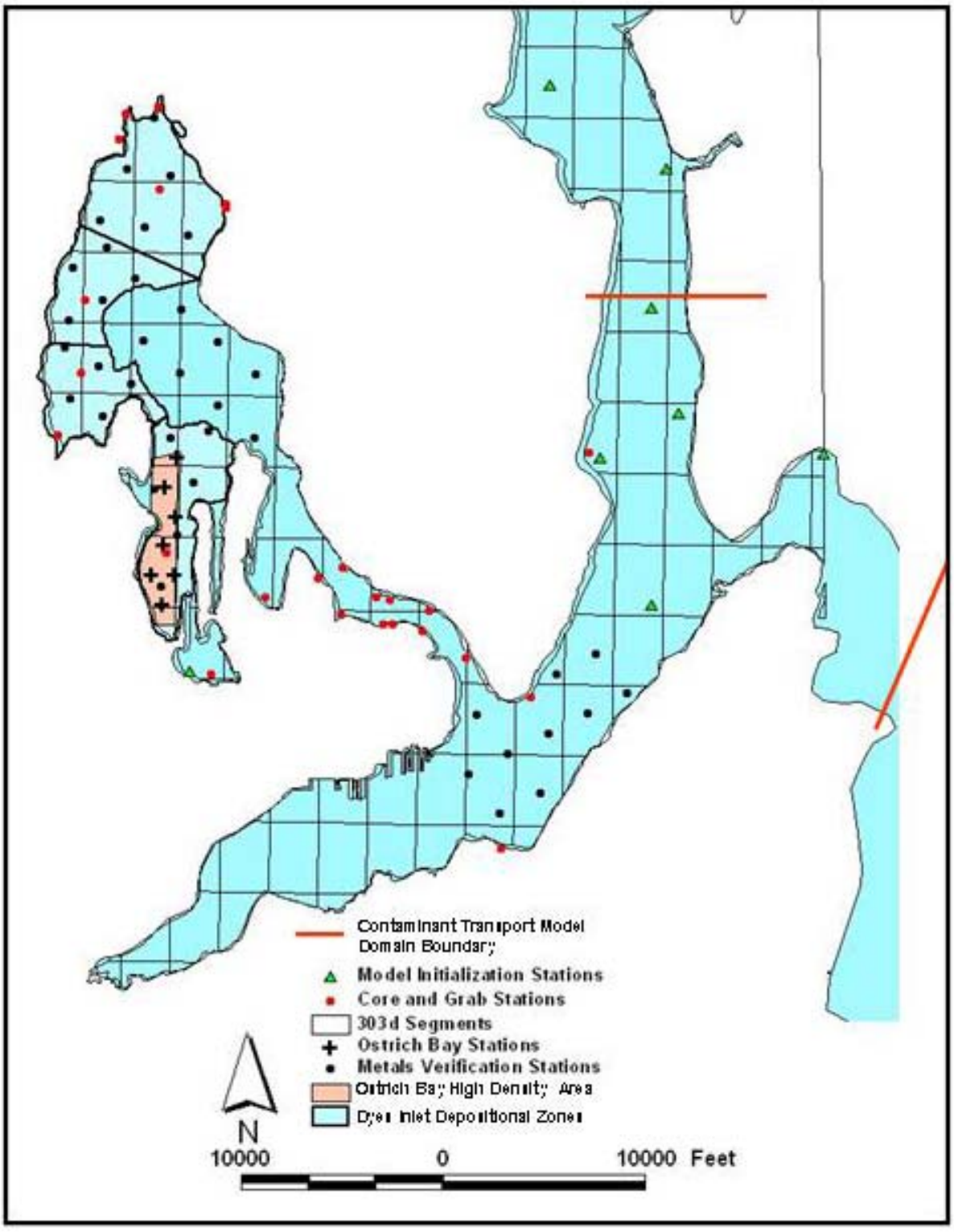


Figure 9. Planned Verification Study (black dots and crosses) and Model Initialization (green triangles) Stations in Dyes Inlet, Port Washington Narrows, and Port Orchard Passage

2.2 Sediment Sample Collection

The samples for the Organics Verification Study were all collected during the MVS (August 2003) and OU-B Marine Monitoring Program (October 2003). Station locations are shown in Figures 7, 8, and 9; maps with station labels are also provided in Appendix A. Field sampling information is provided in the MVS report (Kohn et al. 2004). All samples consisted of the 0- to 10-cm interval of sediment collected using a van Veen grab sampler. Homogenized sediment samples for organics analysis were archived frozen since collection.

2.3 Chemical Analysis

The primary organic contaminants of concern are PAHs and chlorobenzenes in both Sinclair Inlet and in Ostrich Bay (south Dyes Inlet), and PCBs in Sinclair Inlet. Phthalates were occasionally detected above SQS in Sinclair Inlet samples and, although not the basis for listing, are noted as requiring confirmation for exclusion from the list. Two segments in Ostrich Bay had listings for hexachlorobutadiene and phenols; however, ENVVEST Organics Verification Study samples were not analyzed for these parameters as these analytes were included in Ecology's recent Ostrich Bay Sediment Toxicity Evaluation (Blakley 2005), which sampled and analyzed organic constituents at high enough resolution to evaluate current condition. Ecology found that in Ostrich Bay, most organic contaminants were either undetected or did not exceed the SQS concentration. The only exception was benzoic acid, which was detected above the SQS at four stations (Blakley 2005).

The Organics Verification Study employed the following tiered analytical approach, for which methods are described below:

- Tier 1 - Rapid screening analysis of all archived MVS samples for total PCB and PAH by immunoassay, conducted by the Space and Naval Warfare Systems Center (SSC), San Diego, California
- Tier 2 - Confirmatory analysis of approximately 15% of samples for PCBs, PAHs, and other organic compounds, conducted by the Marine Sciences Laboratory (MSL), Sequim, Washington. Analysis of TOC in all samples from outside Sinclair Inlet and approximately 15% of samples from inside Sinclair Inlet.

2.3.1 PAH and PCB Rapid Screening by Immunoassay

Rapid screening analyses for PAHs and PCBs were conducted by the Navy's Space and Undersea Warfare Systems Center (SPAWAR) in San Diego, California. Both classes of analytes were screened using enzyme-linked immunosorbent assay (ELISA) methods. Sample aliquots for PCB screening were extracted with methanol and measured by immunoassay techniques using a modification of EPA Method 4020 (EPA 1996). Sample aliquots for total PAH screening were extracted with methanol and measured by immunoassay techniques using a modification of EPA Method 4035 (EPA 1996). The screening methods report only total PCBs and total PAHs rather than individual constituents.

In a previous study using sediment from San Francisco Bay, SPAWAR found concentrations of total PCBs and PAHs measured by ELISA showed fairly good correlation with the sum of detected

concentrations measured by gas chromatography (GC) (Figure 10). If an acceptable correlation is found, ELISA concentrations could be used to predict total PCB and PAH concentrations in samples that did not undergo confirmatory analysis. However, because the SQS are developed for individual PAH compounds rather than total PAHs, and the immunoassay screening methods do not identify all analytes of concern, the Organics Verification Study emphasized selection and analysis of samples to provide appropriate data for evaluation of 303(d)-listed segments.

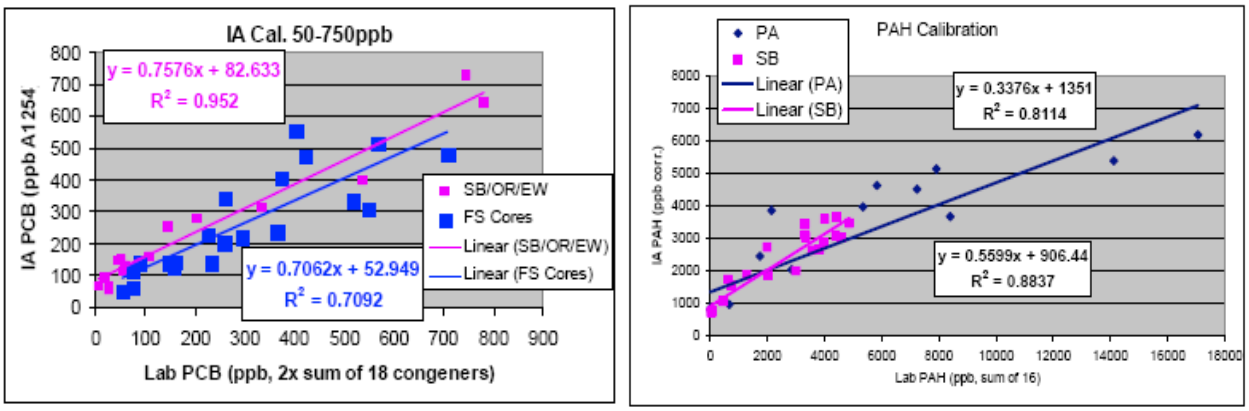


Figure 10. Historical Linear Correlation of Immunoassay and Confirmatory GC-ECD Measurements for PCBs (left) and PAHs (right)

2.3.2 Confirmatory Analysis of Organics

The MSL performed sample extraction and cleanup procedures for organics according to Standard Operating Procedure (SOP) MSL-O-009, which follows the low-level methods developed for the National Oceanic and Atmospheric Administration (NOAA) Status and Trends Program (NOAA 1985; Lauenstein and Cantillo 1993). Analysis of PAHs, chlorobenzenes, and phthalates followed SOP MSL-O-015, "Identification and Quantification of Polynuclear Aromatic Hydrocarbons by Gas Chromatography/Mass Spectrometry (GC/MS) Following EPA Method 8270C Quality Control Criteria." Analysis of PCBs followed SOP MSL-O-016, "Analysis of PCBs and Chlorinated Pesticides by Gas Chromatography with Electron Capture Detection (GC/ECD) Following EPA Method 8080A Quality Control Criteria." Both MSL methods are modifications of SW-846 EPA Methods 8270C and 8080A. Specific analytes and their respective detection and reporting limits are provided in Table 2. The following quality control samples were analyzed with each batch of up to 20 samples: procedural blank, laboratory control sample, analytical duplicate, matrix spike, and matrix spike duplicate.

Table 2. Detection and Reporting Limits for Organic Analytes, Organics Verification Study

Analytes	Laboratory Values for Sediment Analysis	
	Method Detection Limit (µg/kg dry wt)	**Reporting Limit (µg/kg dry wt)**
PAHs		
Naphthalene	0.28	4
2-Methyl naphthalene	0.54	4
Acenaphthylene	0.45	4
Acenaphthene	0.43	4
Fluorene	0.54	4
Phenanthrene	0.70	4
Anthracene	0.76	4
Fluoranthene	0.62	4
Pyrene	0.60	4
Benzo(a)anthracene	0.55	4
Chrysene	0.66	4
Benzo(a)pyrene	0.81	4
Total Benzofluoranthenes	NA[a]	NA
Indeno(1,2,3-c,d)pyrene	1.05	4
Dibenz(a,h)anthracene	0.80	4
Benzo(g,h,i)perylene	0.89	4
Other Semivolatile Organics		
Di-n-butyl Phthalate	NA	8
Butylbenzyl Phthalate	NA	8
Bis (2-ethylhexyl) Phthalate	NA	8
1,2-Dichlorobenzene[b]	NA	4
1,4-Dichlorobenzene[b]	NA	4
1,2,4-Trichlorobenzene[b]	NA	4
Hexachlorobenzene[b]	NA	4
PCBs		
PCB Congeners (NOAA NS&T 20 congeners)	0.075	0.4
Aroclor 1268	1.5	8

2.3.3 Total Organic Carbon

In addition to quantitative organics measurements, TOC data are provided in the Organics Verification Study. TOC content is critical in controlling bioavailability of sediment-associated organic contaminants, many of the SQS concentrations for organics are normalized to TOC, and TOC content is typically correlated with fine particle distribution; therefore, it is important to have sediment TOC data for both comparisons with SQS and contaminant transport modeling. In Sinclair Inlet, TOC data are already available for all samples through the PSNS OU-B Marine Monitoring program. The ENVVEST Organics Verification Study measured TOC in all samples from Dyes Inlet, Port Orchard Passage, and Rich Passage. Approximately 15% of the OU-B Sinclair Inlet samples were also analyzed to confirm TOC concentration. TOC analyses were conducted by Columbia Analytical Services, Kelso, Washington, following ASTM D4129M.

3.0 Results and Discussion

3.1 ELISA Rapid Screening Results

Rapid screening results for total PAHs and PCBs are provided in Appendix A and shown graphically in Figure 11 through Figure 13. In these figures, stations outside Sinclair Inlet are shown in numerical order: MVS-001 through MVS-036 are in Dyes Inlet, MVS-037 through MVS-059 are in Port Washington Narrows, Port Orchard Passage, and Rich Passage. The OU-B Marine stations are also shown in increasing numerical order of grid number. The ELISA screening method was able to detect total PAHs above 0.5 to 1 mg/kg dry weight, although most concentrations less than 2 mg/kg are flagged as estimates. Total PAHs were greater than 5 mg/kg at fifteen stations (Figure 12), all of which were located inside the OU-B Marine boundary (500-ft grid). The ELISA screening method was able to detect total PCBs above 100 µg/kg dry weight, but concentrations less than 175 µg/kg are flagged as estimates (Figure 13). Screening concentrations of PAHs and PCBs were one of the key inputs to confirmatory sample selection, which is described in the following section.

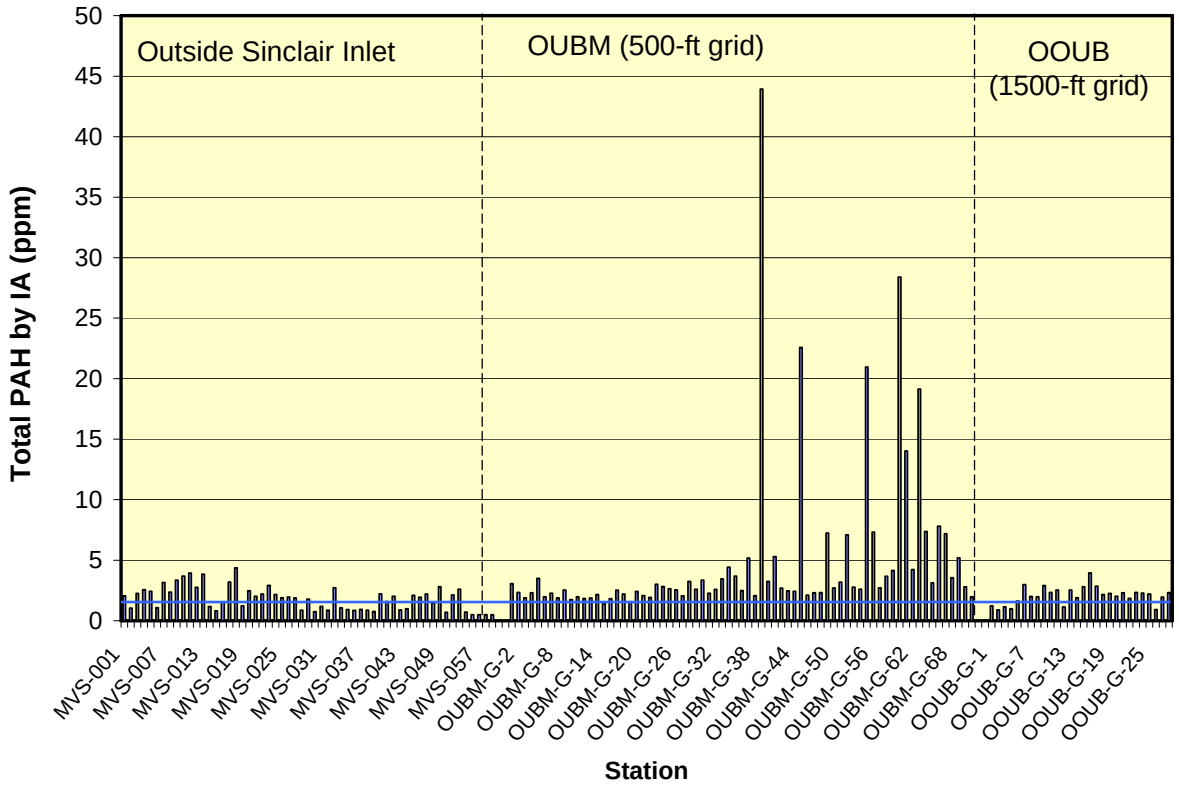


Figure 11. Immunoassay Screening Results for Total PAHs, All Verification Study Stations

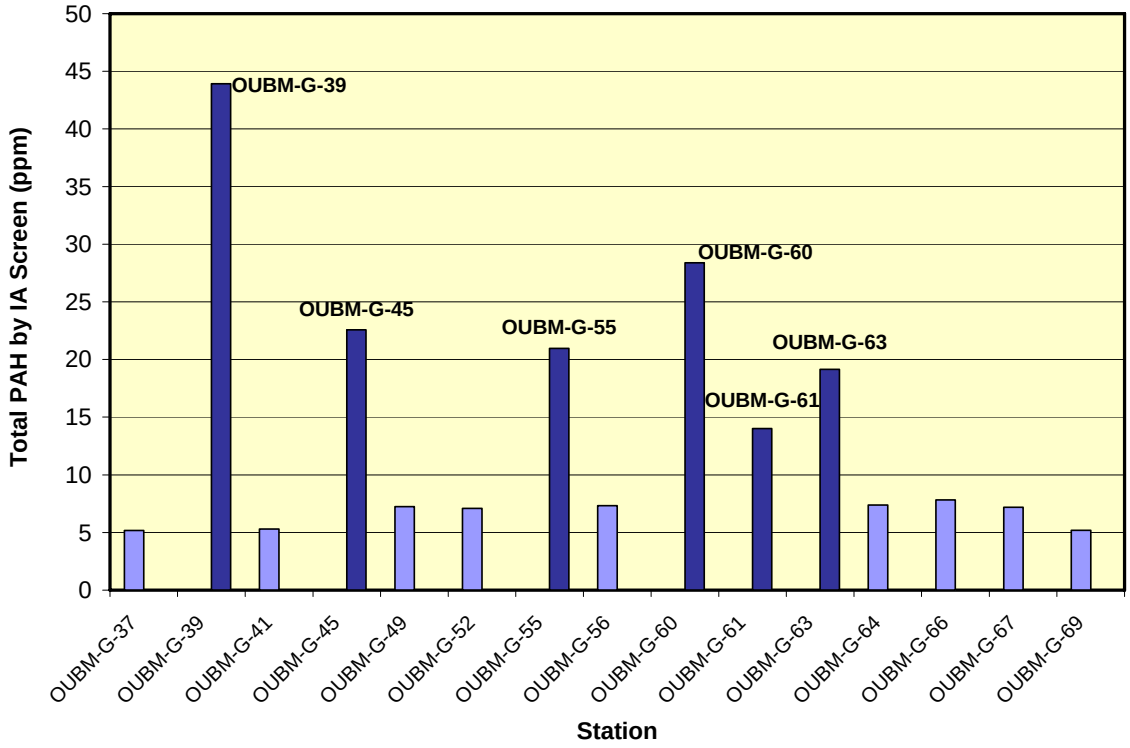


Figure 12. Stations with Screening Results >500 mg/kg Total PAHs

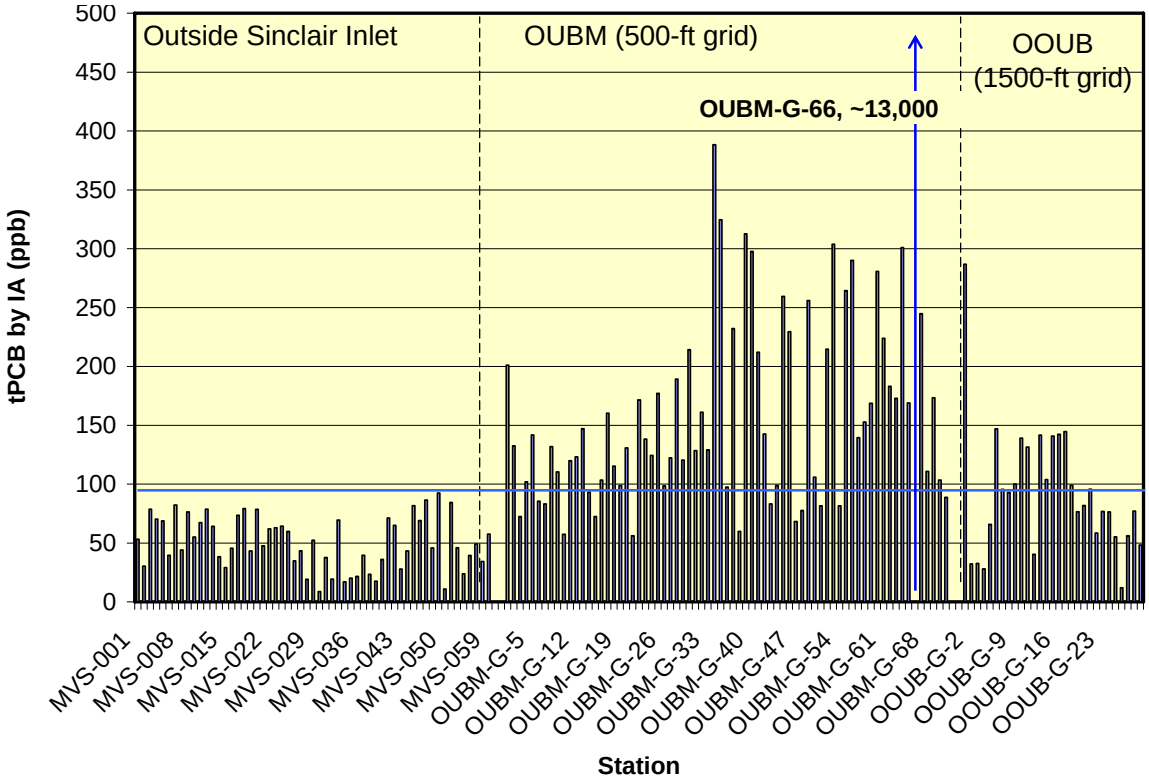


Figure 13. Immunoassay Screening Results for Total PCBs, All Verification Study Stations

3.2 Confirmatory Sample Selection for Organics Analysis

Selection of the subset of Organics Verification Study samples for quantitative analysis required careful review of available information to maximize the resulting data from a very limited analytical budget. Unlike the MVS, the screening data for organics are not compound-specific and therefore cannot be used for evaluation relative to numerical SQS for individual compounds. The quantitative data must be of appropriately high resolution in distribution and low in analytical detection limit to allow comparison with SQS and 303(d) listing criteria.

The following information was used to select samples for confirmatory organics analysis:

- Existing sediment PAH, PCB, and TOC data for Sinclair and Dyes Inlet extracted from the Ecology SEDQUAL sediment quality database
- PAH and PCB rapid screening results for all verification study samples (provided in Appendix A)
- Reference TOC levels provided in the state SQS documentation
- Draft 2003 OU-B Marine Monitoring PCB and TOC data for Sinclair Inlet (provided in Appendix A)
- 1998 303(d) list of impacted water bodies (specifically, segments in Sinclair and Dyes Inlets)
- 2004 update to 303(d) list of impacted water bodies, which divides listed segments into categories depending on factors such as present level of site management and quantity of available data (Ecology 2004)
- Sampling design for Ecology's Ostrich Bay Sediment Toxicity Evaluation (Blakley 2004).

Verification Study samples were selected for quantitative PAH and PCB analysis independently because PAH and PCB sources, distribution, and fate are not necessarily similar. Samples selected for chlorobenzene and phthalate analysis were included in the PAH list, because the extraction and analytical methods are the same as those for PAHs.

Specific sample selection criteria were as follows:

- Inside Sinclair Inlet, select at least three samples in segments listed for organics on either the 1998 303(d) list or the 2004 Category 5 or 4b lists; these are segments F6F3 (PCBs, PAHs, chlorobenzene) and F6F4 (PAHs, chlorobenzene).
- Outside Sinclair Inlet, select at least one sample in segments listed for organics on either the 1998 303(d) list or the 2004 Category 5 or 4b lists; these are segments F6I8 and F6J8 in Ostrich Bay (PAHs, chlorobenzene). This lower density was justified because in October 2004, Ecology conducted a comprehensive sediment survey of Ostrich Bay in which data for all organic contaminants of concern were measured at adequate density for 303(d) evaluation (Blakley 2004). Therefore, the ENVVEST study will simply provide additional recent data for Ostrich Bay as part of spatially distributed samples in Dyes Inlet and Port Orchard Passage.

- Select samples to represent areas where there appears to be potential for PAHs or PCBs to exceed SQS. This was done using the OU-B Marine monitoring data, rapid screening data, and measured or estimated TOC values (Appendix A).
- Select at least one sample in segments on the 2004 Category 2 listed segments. These are segments in which organic analytes (particularly phthalates and chlorobenzenes) were measured and not detected, but the reporting limits were higher than the SQS.
- Select additional samples to
  - represent distribution over range of screening values.
  - represent spatial distribution over range of sediment types throughout Sinclair Inlet, Dyes Inlet, Port Orchard Passage, and Rich Passage, to support contaminant transport modeling
  - provide quantitative data for samples with apparent discrepancies between screening and existing data (OU-B Marine samples only).

Because the screening methods only provide total PAH rather than individual constituent concentrations, they are limited in their application to state SQS, which exist for individual PAHs, total low molecular weight PAH (LPAH), and total high molecular weight PAH (HPAH). However, a conservative approach was taken by assuming the screening total PAH concentration was all LPAH or all HPAH when comparing levels with the associated SQS. Because TOC data were not available for samples outside Sinclair Inlet, further assumptions were made to calculate carbon-normalized values for comparison with SQS. Two sources of TOC values were used: a) the Washington Administrative Code (WAC 1995), which provided reference TOC values that were determined by relationships between TOC and grain-size distribution in a number of Puget Sound reference site sediments, and b) the SEDQUAL database, which provided a range of TOC values for Sinclair and Dyes Inlet samples. In Appendix A, screening PAH and PCB values were normalized to the TOC values listed below, and normalized values exceeding SQS or cleanup screening/ MCULs are highlighted.

- WAC-referenced TOC: a value is assigned to each sample based on its grain-size distribution (percentage of fines), as measured for ENVVEST by GeoSea:

  0-20% fines, reference TOC = 0.5%
  20-50% fines, reference TOC = 1.7%
  50-80% fines, reference TOC = 3.2%
  80-100% fines, reference TOC = 2.6%

- SEDQUAL TOC in Sinclair and Dyes Inlet samples: the 15^{th} percentile of all SEDQUAL values for Sinclair and Dyes Inlet samples was 0.95% TOC, so 1% TOC was selected as a conservative estimator of TOC. 85% of samples would be expected to have more than 1% TOC and, therefore, less than the corresponding carbon-normalized PAH or PCB value
- Measured TOC from OU-B Marine Monitoring Program, 2003 (Sinclair Inlet samples only).

Samples selected for organics and TOC quantitative analysis are listed in Table 3 and shown graphically in Figures 14 and 15 for organics and TOC, respectively.

Table 3. Samples for Quantitative Analysis, ENVVEST Organics Verification Study

Station or OU-B Grid	303(d) Segment	Quantitative Analysis			Selection Comments
		PCBs	PAHs[a]	TOC	
MVS-009		Y	Y		Spatial distribution, Dyes Inlet
MVS-011		No	Y		Spatial distribution, Dyes Inlet
MVS-034		Y	Y		Spatial distribution, Dyes Inlet
MVS-049		Y	Y	Y	Spatial distribution, Port Orchard Passage
MVS-038	F5H8 (closest)	No	Y		
MVS-041	F6F1	Y	Y	All non-OU-B samples will get TOC	Sand, low TOC
MVS-022	F6I8	No	No		
MVS-026	F6I8	No	Y		
MVS-028	F6I8	No	No		
MVS-019	F6J8	No	No		
MVS-023	F6J8	No	No		
MVS-024	F6J8	Y	Y		
MVS-025	F6J8	No	No		
MVS-001	G6A8 (closest?)	Y	Y		
MVS-020		No	Y		Spatial distribution, Dyes Inlet
OOUB-G1	F6C9	Y	Y	Y	Spatial distribution, Sinclair Inlet
OOUB-G9	F6D6	Y	Y	Y	Spatial distribution, Sinclair Inlet
OOUB-G21	F6E4	No	Y	No	
OOUB-G17	F6E5	Y	Y	Y	
OUBM-G1	F6E6	Y	No	No	High OUB-M PCB
OUBM-G66	F6F2	Y	Y	Y	Much higher screening PCB than OUB-M PCB
OUBM-G69	F6F2	Y	No	Y	OUB-M TOC higher than expected for grain size distribution
OOUB-G28	F6F2	Y	Y	Y	
OUBM-G61	F6F2, F6F3	Y	Y	Y	
OUBM-G52	F6F3	Y	No	No	
OUBM-G55	F6F3	Y	Y	Y	
OUBM-G56	F6F3	Y	Y	Y	
OUBM-G60	F6F3	Y	Y	Y	
OUBM-G63	F6F3	No	Y	Y	OUB-M TOC higher than expected for grain size distribution
OUBM-G64	F6F3	No	No	No	
OUBM-G34	F6F4	Y	Y	Y	
OUBM-G35	F6F4	Y	No	No	
OUBM-G41	F6F4	No	Y	No	
OUBM-G45	F6F4	Y	Y	Y	
OUBM-G46	F6F4	Y	No	No	
OUBM-G22	F6F5	Y	No	No	
OUBM-G25	F6F5	Y	No	No	
OUBM-G39	F6F5	Y	Y	Y	
OUBM-G71	F6G2	No	Y	Y	OUB-M TOC lower than expected for grain size distribution
TOTAL		**25**	**26**	**15**	

a. PAH analysis will include selected phthalates and chlorobenzenes.

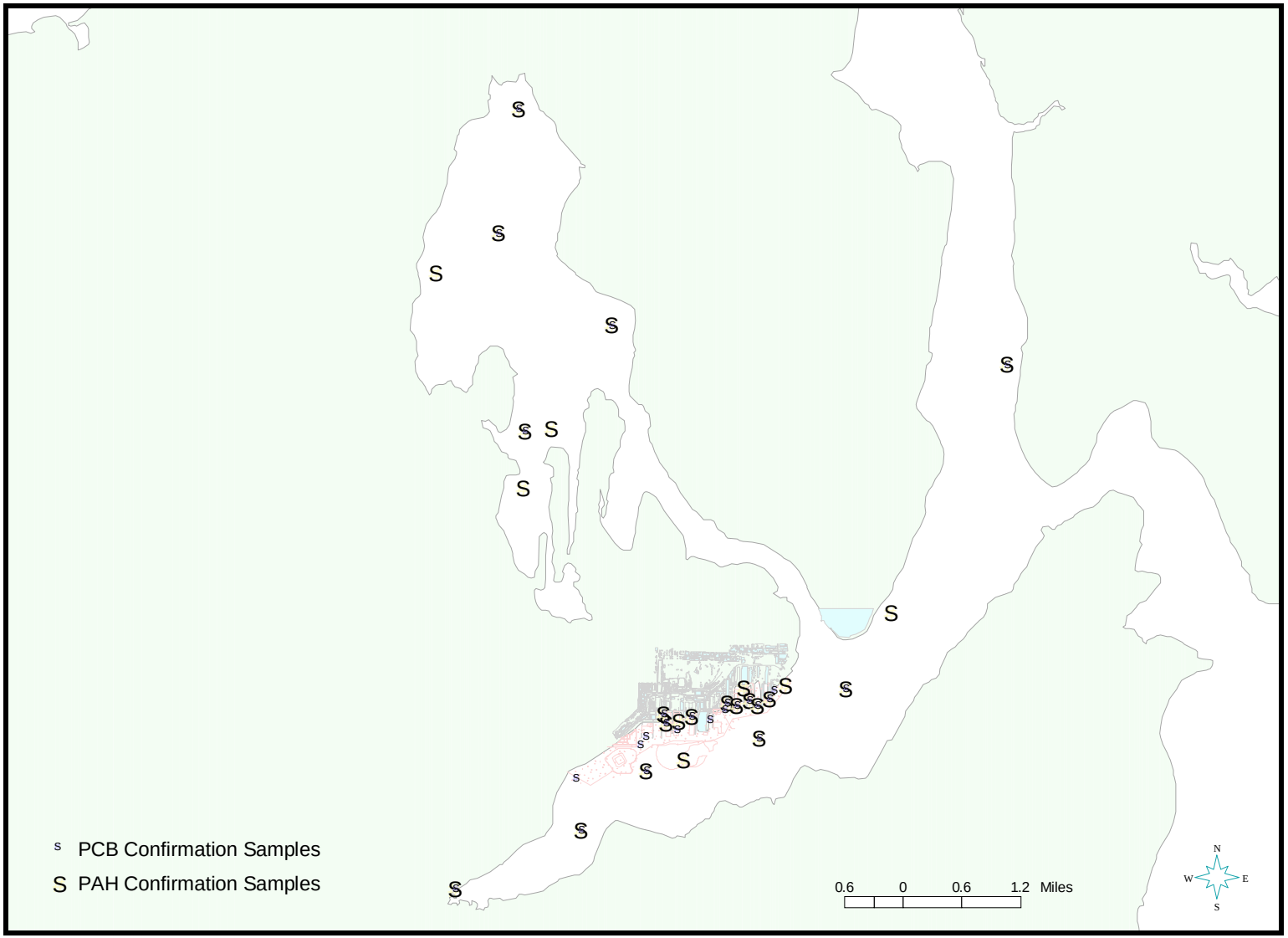


Figure 14. Sinclair Inlet, Dyes Inlet, and Port Orchard Passage Stations Selected for Quantitative PCB and PAH Analysis

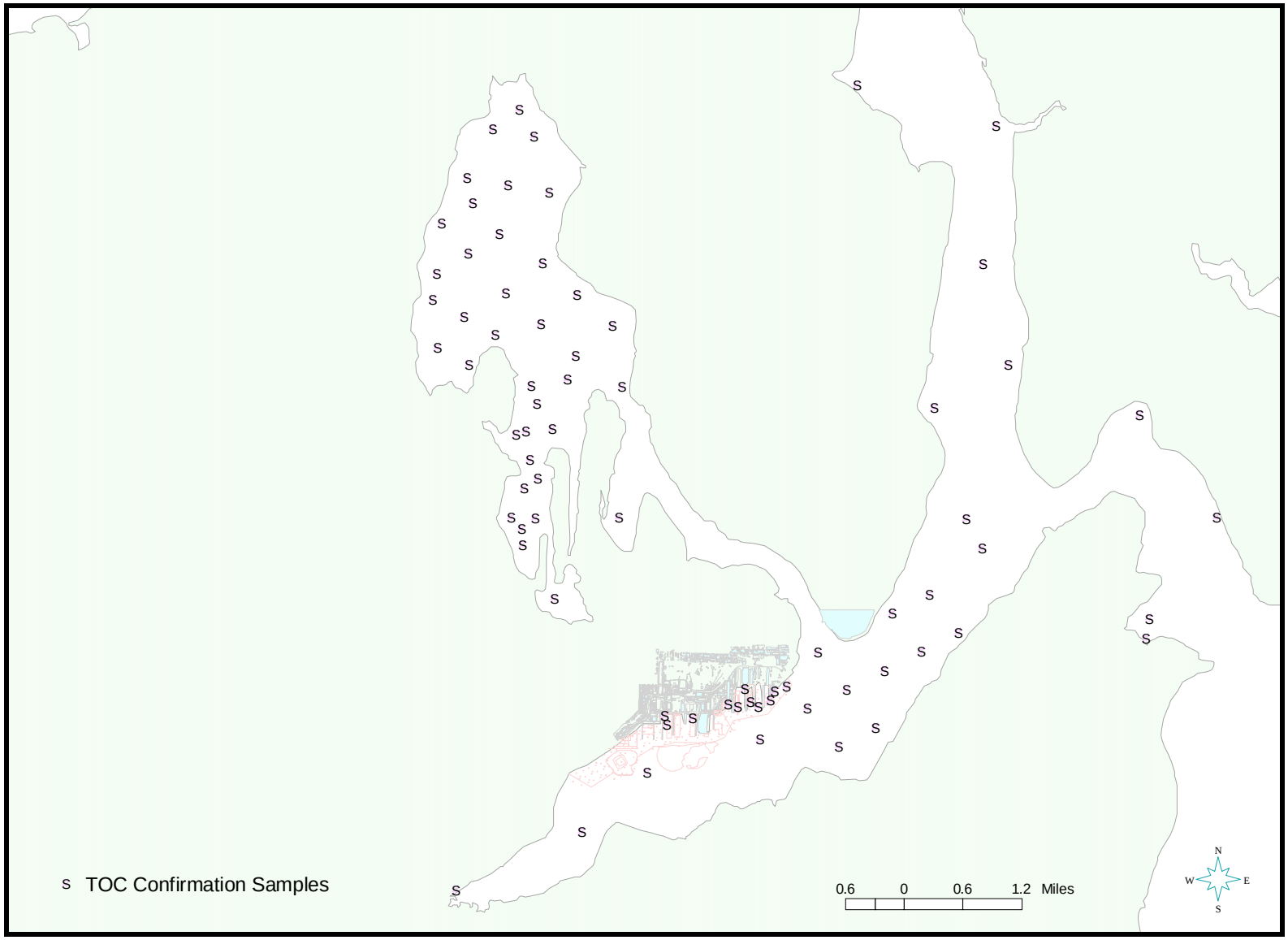


Figure 15. Stations Selected for TOC Analysis, Organics Verification Study

As noted earlier, all verification study samples collected outside of Sinclair Inlet will be analyzed for TOC. In addition, TOC will be analyzed in 15% of OU-B samples from inside Sinclair Inlet: those that are being analyzed for both PAH and PCB in this study, and those for which OU-B Marine Monitoring TOC results were different from what would be expected for the sample's grain-size distribution. The number of samples for confirmatory quantitative organics analysis from each water body area is summarized in Table 4.

Table 4. Organics Verification Study Sample Analysis Summary

Location	Number of ELISA Screening Samples	Number of Confirmatory Samples		
		Samples for TOC	GC/MS Samples for PAHs[a]	GC/ECD Samples for PCBs
Sinclair Inlet, Inside OU-B (OUBM)	71	12	11	15
Sinclair Inlet, Outside OU-B (OOUB)	32	3	5	4
Sinclair Inlet Subtotal	103	15	16	19
Ostrich & Oyster Bays	12	12	3	1
Dyes Inlet (outside Ostrich Bay), Phinney Bay	26	26	4	3
Port Orchard Passage and Rich Passage	19	19	3	2
Dyes Inlet, Port Washington Narrows, Port Orchard & Rich Passages Subtotal	57	57	10	6
TOTAL	**160**	**72**	**26**	**25**

a. Includes analysis for chlorobenzenes and phthalates.

3.3 Quantitative Analysis Results

Complete analytical data for PAHs, chlorobenzenes, phthalates, and PCBs, including a brief case narrative and all sample and quality control data, are provided in Appendix B. TOC data, including quality control (QC) data, are provided in Appendix C. For presentation and discussion in this section, and to facilitate comparison with SQS and MCUL values, concentrations are reported in both dry weight and OC-normalized concentrations. Carbon-normalization was done using the TOC measured during this study if available (most samples) or measured by the OU-B Marine Monitoring Program (seven Sinclair Inlet samples, see Table 3).

3.3.1 Chlorobenzenes

Chlorobenzenes were detected in very few samples, and of the chlorobenzene compounds, only 1,2- and 1,4-dichlorobenzene were detected (Table 5). 1,2,4-trichlorobenzene and hexachlorobenzene were undetected in all samples. Detection limits were sufficiently low to allow comparison with SQS when concentrations were normalized to TOC: none of the detected chlorobenzenes exceeded their associated SQS or MCULs (Table 5).

Table 5. Detected Chlorobenzenes in Confirmatory Samples

	Concentration (µg/kg dry weight)					Concentration (mg/kg OC)	
Station	**1,2 Dichloro-benzene**		**1,4 Dichloro-benzene**		**TOC (% dry weight)**	**1,2 Dichloro-benzene**	**1,4 Dichloro-benzene**
WA SQS						**2.3**	**3.1**
WA MCUL						**2.3**	**9**
MVS-034	2.57	UE	2.67	E	0.42	0.61	0.64
OUBM-G 41	45.7	E	5.59	E	2.60	1.76	0.22
OUBM-G 56	41.9	E	5.47	UE	3.36	1.25	0.16
OUBM-G 63	47.1	E	5.95	UE	4.51	1.05	0.13
OUBM-G 66	37.1	E	5.40	UE	3.11	1.19	0.17
OUBM-G 71	5.99	E	2.89	UE	0.86	0.70	0.34

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

E Estimate; LPAH spike data used to assess accuracy as matrix spike solution did not contain chlorobenzenes.

3.3.2 Phthalates

Six phthalate compounds were analyzed in the 26 samples selected for confirmatory PAH analysis. Dry weight concentrations are reported in Table 6. Dimethyl phthalate was detected in only three samples. The other phthalates were detected in most confirmatory samples, but many results are flagged as a result of phthalates detected in the blank, with the resulting concentration less than 10 times the amount in the blank. The concentrations were not blank-corrected and can thus be considered conservative. TOC-normalized concentrations that were compared with SQS and MCULs in a handful of samples, all in Sinclair Inlet, exceeded the SQS of 4.9 mg/kg OC for butyl benzyl phthalate: the sample near Gorst (OOUB-G1) and four samples inside the OU-B Marine 500-ft grid (OUBM-G34, -G39, -G55, and –G63) (Table 7). At stations OUBM-G34 and OUBM-G39, bis(2-ethylhexyl) phthalate also exceeded the SQS of 47 mg/kg OC. All phthalate concentrations in all confirmatory samples were below their respective MCUL values. Locations where phthalate SQS are exceeded are shown in Figure 16.

3.3.3 PAHs

PAHs were analyzed in the 26 verification study samples selected for confirmatory PAHs, phthalates, and chlorobenzenes. Achieved detection limits were low enough that most PAHs were detected and quantified in most samples. Dry weight concentrations of LPAHs and HPAHs are provided in Table 8 and Table 9, respectively. Some PAH data are qualified because samples were diluted, target spike recovery ranges were exceeded, or concentrations were above the calibration range even after significant dilution. In general, the QC data were acceptable or indicated a possible high bias (overestimate) of the actual concentration rather than an underestimate; therefore, the concentrations were used in further evaluation relative to SQS and MCULs. Carbon-normalized PAH concentrations are provided in Table 10 and Table 11. TOC concentrations are not repeated in PAH tables as they are provided in the phthalate tables. Of the 26 samples selected for confirmatory analysis, only five had any PAH compounds that exceeded SQS. All were located within the Sinclair Inlet OU-B Marine 500-ft grid at stations inside the PSNS piers and very close to shore, with the exception of MVS-041, which is located at the confluence of Sinclair Inlet, Port Orchard Passage, and Port Washington Narrows (Appendix A, Figure A-3).

Table 6. Dry Weight Phthalate Concentrations in Confirmatory Samples

Station	TOC (% dry weight)	Concentration (µg/kg dry weight)											
		Dimethyl Phthalate		Diethyl Phthalate		Di N Butyl Phthalate		Butyl Benzyl Phthalate		Bis (2-ethylhexyl) Phthalate		Di-N-Octyl Phthalate	
MVS-001	2.28	7.10	U	10.9	B	102	B	9.58	B	397		20.1	
MVS-009	2.75	9.70	U	19.0	B	99.0	B	43.6	B	440		9.70	U
MVS-011	3.33	13.0	U	15.2	B	197	B	51.1	B	231	B	13.6	
MVS-020	3.36	14.0	U	14.0	UB	133	B	79.2	B	307	B	14.0	U
MVS-024	2.34	8.50	U	20.8	B	91.2	B	36.6	B	131	B	13.4	
MVS-026	2.34	9.78	U	13.6	B	180	B	42.4	B	223	B	10.1	
MVS-034	0.42	5.14	U	19.6	B	63.7	B	13.8	B	96.6	B	5.78	
MVS-038	0.34	5.12	U	6.83	B	85.6	B	11.0	B	54.8	B	5.12	U
MVS-041	0.65	5.72	U	16.2	B	94.9	B	16.1	B	136	B	5.91	
MVS-049	2.17	9.34	U	36.5	B	144	B	35.6	B	172	B	12.3	
OOUB-G 1	1.47	5.50	U	6.44	B	190	B	114		576		30.3	
OOUB-G 17	3.29	13.6	U	30.3	B	239	B	101		397		23.2	
OOUB-G 21	2.64	13.6	U	13.6	UB	141	B	82.2	B	389		22.1	
OOUB-G 28	2.95	10.3	U	24.5	B	211	B	62.9	B	433		10.3	U
OOUB-G 9	3.94	14.2	U	124		260	B	132		667		21.1	
OUBM-G 34	3.67	8.90	U	8.90	UB	137	B	226		2220		45.6	
OUBM-G 39	3.35	57.0		19.1	B	194	B	314		2486		187	
OUBM-G 41	2.60	10.9	U	15.5	B	186	B*	88.1		725		19.9	
OUBM-G 45	4.29	8.60	U	12.6	B	119	B	22.3	B	590		26.3	
OUBM-G 55	4.14	9.9	U	40.0	B	487	D	525		620	D	10.7	
OUBM-G 56	3.36	10.9	U	10.9	UB	319	B	154		779		35.3	
OUBM-G 60	5.49	8.6	U	12.5	B	187	B	118		585		25.6	
OUBM-G 61	5.93	11.2	U	15.0	B	151	B	139		763		30.4	
OUBM-G 63	4.51	22.3		24.3	B	475	B	380		1523		53.0	
OUBM-G 66	3.11	15.8		10.8	UB	277	B	98.3		1087		37.9	
OUBM-G 71	0.86	5.78	U	6.23	B	87.4	B	5.78	UB	101	B	5.94	

At MVS-041, only the HPAH benzo(g,h,i)perylene at 34 mg/kg OC exceeded its SQS of 31 mg/kg OC. Of the four stations within PSNS, OUBM-G55, -G63, and –G71 are near piers at the eastern end of PSNS, whereas station OUBM-G39 is further west in PSNS (Appendix A, Figure A-3). At OUBM-G3, one LPAH compound, most HPAH compounds, and total HPAHs exceeded SQS but not MCUL 9; at OUBM-G55, both LPAHs and HPAHs consistently exceeded both SQS and MCUL values (Table 10 and Table 11). Only three individual HPAH compounds exceeded SQS at OUBM-G63, but the total of all detected HPAHs was enough to exceed the HPAH SQS (Table 11). At OUBM-G71, two individual HPAHs exceeded their SQS and two other HPAHs exceeded MCULs, but the SQS for total HPAH was not exceeded. The plots in Figure 17 illustrate the relationship of total LPAH and HPAH concentrations relative to location and to SQS and MCULs. A map of locations where individual PAH compounds or total LPAHs or HPAH SQS are exceeded is shown in Figure 16.

Table 7. Organic Carbon-Normalized Phthalate Concentrations in Confirmatory Samples (shading indicates value exceeds SQS)

Station		Concentration (mg/kg OC)											
	TOC (% dry weight)	Dimethyl Phthalate		Diethyl Phthalate		Di N Butyl Phthalate		Butyl Benzyl Phthalate		Bis (2-ethylhexyl) Phthalate		Di-N-Octyl Phthalate	
WA SQS		**53**		**61**		**220**		**4.9**		**47**		**58**	
WA MCUL		**53**		**110**		**1700**		**64**		**78**		**4500**	
MVS-001	2.28	0	U	0	B	4	B	0	B	17		1	
MVS-009	2.75	0	U	1	B	4	B	2	B	16		0	U
MVS-011	3.33	0	U	0	B	6	B	2	B	7	B	0	
MVS-020	3.36	0	U	0	UB	4	B	2	B	9	B	0	U
MVS-024	2.34	0	U	1	B	4	B	2	B	6	B	1	
MVS-026	2.34	0	U	1	B	8	B	2	B	10	B	0	
MVS-034	0.42	1	U	5	B	15	B	3	B	23	B	1	
MVS-038	0.34	2	U	2	B	25	B	3	B	16	B	2	U
MVS-041	0.65	1	U	2	B	15	B	2	B	21	B	1	
MVS-049	2.17	0	U	2	B	7	B	2	B	8	B	1	
OOUB-G 1	1.47	0	U	0	B	13	B	8		39		2	
OOUB-G 17	3.29	0	U	1	B	7	B	3		12		1	
OOUB-G 21	2.64	1	U	1	UB	5	B	3	B	15		1	
OOUB-G 28	2.95	0	U	1	B	7	B	2	B	15		0	U
OOUB-G 9	3.94	0	U	3		7	B	3		17		1	
OUBM-G 34	3.67	0	U	0	UB	4	B	6		60		1	
OUBM-G 39	3.35	2		1	B	6	B	9		74		6	
OUBM-G 41	2.60	0	U	1	B	7	B	3		28		1	
OUBM-G 45	4.29	0	U	0	B	3	B	1	B	14		1	
OUBM-G 55	4.14	0	U	1	B	12	D	13		15	D	0	
OUBM-G 56	3.36	0	U	0	UB	10	B	5		23		1	
OUBM-G 60	5.49	0	U	0	B	3	B	2		11		0	
OUBM-G 61	5.93	0	U	0	B	3	B	2		13		1	
OUBM-G 63	4.51	0		1	B	11	B	8		34		1	
OUBM-G 66	3.11	1		0	UB	9	B	3		35		1	
OUBM-G 71	0.86	1	U	1	B	10	B	1	UB	12	B	1	

B Analyte detected in the method blank above the RL, sample concentration <10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

D Results determined from dilution.

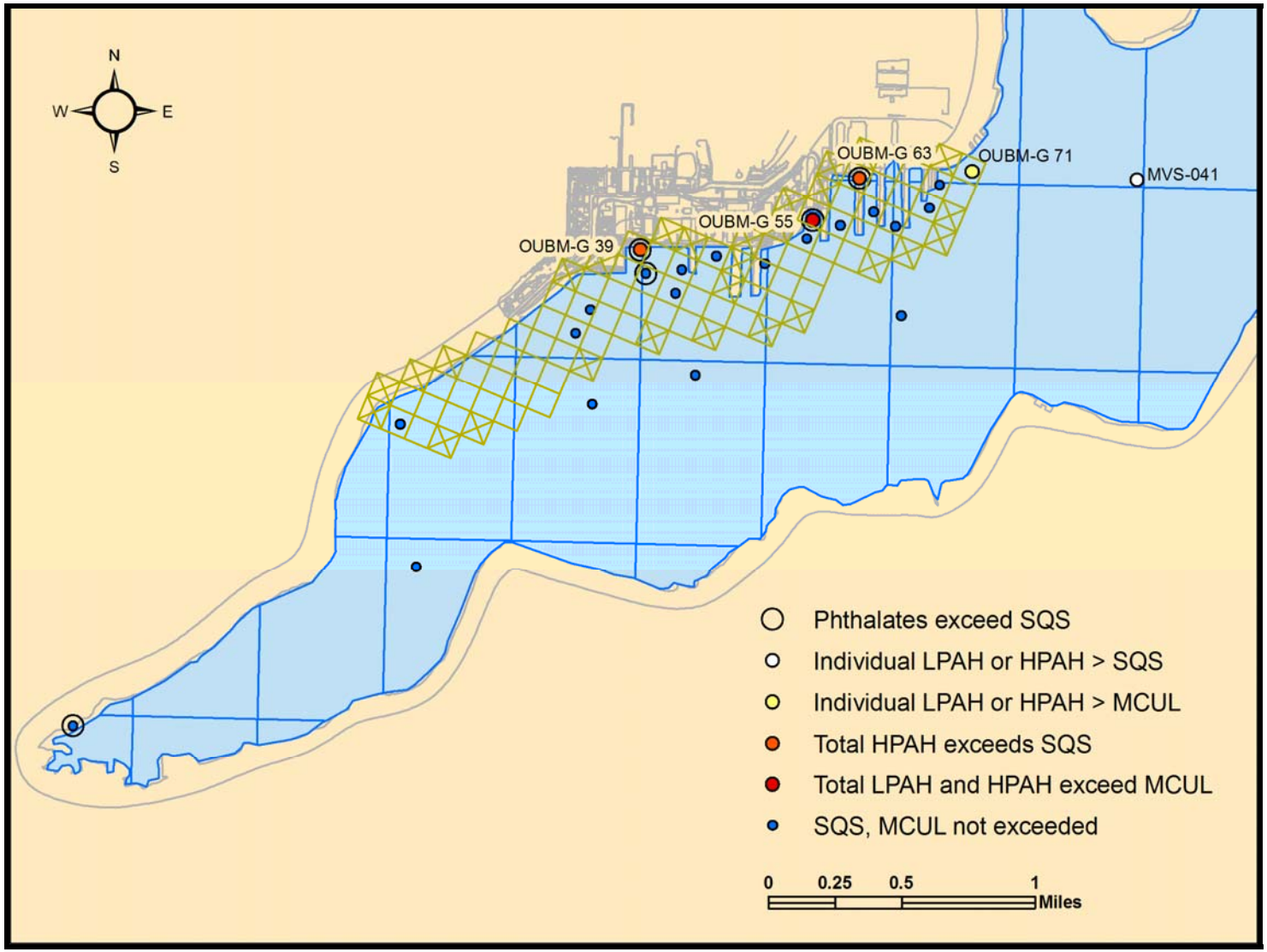


Figure 16. Locations Where Phthalates and PAHs Exceed SQS or MCUL

Table 8. Dry Weight Concentrations of LPAHs in Confirmatory Samples

Station	LPAH Concentration (µg/kg dry weight)																								Total Detected LPAH
	Naphthalene				2 Methyl Naphthalene				Acenaph-thylene				Acenaphthene				Fluorene				Phenanthrene				Anthracene			
MVS-001	12.7				7.56				7.38				3.81	J			6.10				51.7				18.5				108
MVS-009	37.3				25.7				95.4				2.50	U			27.6				202				241				631
MVS-011	31.9				20.0				53.3				8.01				21.7				149				112				396
MVS-020	13.1				10.8				17.4				4.37				9.17				49.3				29.4				134
MVS-024	14.1				8.95				16.8				2.96	J			8.29				46.9				32.2				130
MVS-026	14.8				9.42				17.6				5.53				10.7				69.5				35.9				163
MVS-034	2.44				1.29				1.50	J			1.32	U			1.14	J			6.02				2.74	J			16
MVS-038	1.84	J			1.85	J			1.63	J			1.94	J			1.48	J			7.16				5.98				22
MVS-041	27.3				16.5				9.38				3.43	J			6.80				49.2				25.8				139
MVS-049	32.5				18.0				16.6				5.46				13.4				79.4				34.9				200
OOUB-G 1	8.69				3.97	J			2.37	J			1.42	U			2.92	J			19.2				6.01				45
OOUB-G 17	28.6				18.6				25.4				8.25				17.8				103				52.6				229
OOUB-G 21	43.6				26.0				46.2				12.8				27.1				161				101				255
OOUB-G 28	29.5				18.1				35.1				6.95				18.8				102				74.8				417
OOUB-G 9	27.1				17.8				19.3				8.39				17.0				91.0				48.3				285
OUBM-G 34	221				29.2				52.5				32.7				50.3				242				191				818
OUBM-G 39	167				43.6				399				633				408				3343	D*			2000				6993
OUBM-G 41	50.0				25.2				61.3				61.8				86.7				417	*			311	*			1013
OUBM-G 45	33.8				15.1				83.1				45.2				125				699				623				1624
OUBM-G 55	368				274				1456				20375	D			29165	D			159071	DR			94230	DR			304939
OUBM-G 56	68.9				28.9				84.2				48.4				88.0				447				373				1138
OUBM-G 60	100				30.1				175				139				213				946				1004				2608
OUBM-G 61	61.9				76.85				287				371				348				1923				1170				4238
OUBM-G 63	79.0				54.0				314				132				205				2067				958				3809
OUBM-G 66	49.5				23.6				70.6				23.1				51.4				265				229				712
OUBM-G 71	25.8				34.1				328				8.06				32.6				90.6				128				647

J Analyte concentration is less than the RL, but greater than the MDL.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported.

D Results determined from dilution.

* Associated surrogate recovery exceeded guidelines (40% to 120%).

R Data exceeds calibration range; see narrative in Appendix B for data use limits.

Table 9. Dry Weight Concentrations of HPAHs in Confirmatory Samples

Station	High Molecular Weight PAH Concentration (µg/kg dry weight)																													
	Fluoran-thene		Pyrene		Benzo[a] Anthracene		Chrysene		Benzo [a] Pyrene		Total Benzo-fluoran-thenes		Indeno [1,2,3-c,d] Pyrene		Dibenzo [a,h] Anthracene		Benzo [g,h,i] Perylene		Total Detected HPAH											
MVS-001	202		182		71.0		117		65.2		162		65.7		12.2		60.3		939											
MVS-009	776		1088		568		607		594		814		435		78.8		431		5392											
MVS-011	445		600		284		318		345		561		276		48.8		270		3148											
MVS-020	135		186		87.6		104		116		220		108		18.0		105		1080											
MVS-024	132		174		90.9		106		110		205		106		18.4		100		1044											
MVS-026	197		232		116		155		152		332		140		26.2		129		1479											
MVS-034	14.1		19.3		8.84		8.14		11.2		20		14.5		2.25	J	21.3		119											
MVS-038	20.8		25.3		12.6		12.9		14.7		24		10.1		2.18	U	10.2		131											
MVS-041	105		129		77.2		81.9		129		167		171		25.9		222		1108											
MVS-049	137		153		84.4		99.7		88.8		187		78.9		14.9		74.8		917											
OOUB-G 1	45.2		45.9		19.5		33.3		24.5		59		27.0		5.52		34.2		294											
OOUB-G 17	249		319		153		172		183		395		170		32.0		157		1606											
OOUB-G 21	417		598		254		318		361		658		297		55.4		289		1832											
OOUB-G 28	287		10.3	U	196		234		262		501		184		31.2		158		3247											
OOUB-G 9	299		14.2	U	136		188		170		460		157		27.9		153		1864											
OUBM-G 34	723		1913		397		628		703		1782		422		87.0		321		6976											
OUBM-G 39	14071	D*	13982	D*	5288	D*	8750	D*	3742	D	9053	D	2075		534		1523		59016											
OUBM-G 41	1296		1397		681		1300		634		1688		443		96.2		356		7892											
OUBM-G 45	2391	R	2270	R	1073		1716		1071		2484		717		164		538		12424											
OUBM-G 55	144865	DR	100476	DR	49183	DR	55950	DR	24061	D	48412	DR	8691	D	3121	D	1119	*	435877											
OUBM-G 56	1743		1933		657		1005		765		1738		444		89.6		513		8886											
OUBM-G 60	7931	D	9324	D	2332		3968	D	1637		4145	D	898		216		648		31099											
OUBM-G 61	7038	D*	7180	D*	2340		4428	D*	1839		5125		942		196		642		29731											
OUBM-G 63	15691	D	14572	D	3757	D	7272	D	3198		9283	D	1925		424		1416		57537											
OUBM-G 66	836		10.8	U	493		700		702		1565		427		83.3		332		5138											
OUBM-G 71	228		462		214		289		1645		2130		993		215		998		7174											

J Analyte concentration is less than the RL, but greater than the MDL.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported.

D Results determined from dilution.

* Associated Surrogate recovery exceeded guidelines (40% to 120%).

R Data exceeds calibration range; see narrative in Appendix B for data use limits.

Table 10. Organic Carbon-Normalized Concentrations of LPAHs in Confirmatory Samples (shading indicates value exceeds SQS; shaded bold type indicates value exceeds MCUL)

Station	LPAH Concentration (mg/kg OC)																			
	Naphthalene		2 Methyl Naphthalene		Acenaph-thylene		Acenaphthene		Fluorene		Phenanthrene		Anthracene		Total Detected LPAH	
WA SQS	**99**		**38**		**66**		**16**		**23**		**100**		**220**		**370**	
WA MCUL	**170**		**64**		**66**		**57**		**79**		**480**		**1200**		**780**	
MVS-001	1		0		0		0	J	0		2		1		5	
MVS-009	1		1		3		0	U	1		7		9		23	
MVS-011	1		1		2		0		1		4		3		12	
MVS-020	0		0		1		0		0		1		1		4	
MVS-024	1		0		1		0	J	0		2		1		6	
MVS-026	1		0		1		0		0		3		2		7	
MVS-034	1		0		0	J	0	U	0	J	1		1	J	4	
MVS-038	1	J	1	J	0	J	1	J	0	J	2		2		6	
MVS-041	4		3		1		1	J	1		8		4		21	
MVS-049	1		1		1		0		1		4		2		9	
OOUB-G 1	1		0	J	0	J	0	U	0	J	1		0		3	
OOUB-G 17	1		1		1		0		1		3		2		6	
OOUB-G 21	2		1		2		0		1		6		4		8	
OOUB-G 28	1		1		1		0		1		3		3		16	
OOUB-G 9	1		0		0		0		0		2		1		10	
OUBM-G 34	6		1		1		1		1		7		5		22	
OUBM-G 39	5		1		12		19		12		100	D*	60		209	
OUBM-G 41	2		1		2		2		3		16	*	12	*	39	
OUBM-G 45	1		0		2		1		3		16		15		38	
OUBM-G 55	9		7		35		**492**	D	**704**	D	**3842**	DR	**2276**	DR	**7366**	
OUBM-G 56	2		1		3		1		3		13		11		34	
OUBM-G 60	2		1		3		3		4		17		18		48	
OUBM-G 61	1		1		5		6		6		32		20		71	
OUBM-G 63	2		1		7		3		5		46		21		84	
OUBM-G 66	2		1		2		1		2		9		7		23	
OUBM-G 71	3		4		38		1		4		11		15		75	

J Analyte dry weight concentration is less than the RL, but greater than the MDL.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported.

D Dry weight result determined from dilution.

* Associated surrogate recovery exceeded guidelines (40% to 120%).

R Dry weight data exceeds calibration range; see narrative in Appendix B for data use limits.

Table 11. Organic Carbon-Normalized Concentrations of HPAHs in Confirmatory Samples (shading indicates value exceeds SQS; shaded bold type indicates value exceeds MCUL)

Station	HPAH Concentration (mg/kg OC)																					
	Fluoran-thene		Pyrene		Benzo[a] Anthracene		Chrysene		Benzo [a] Pyrene		Total Benzo-fluoran-thenes		Indeno [1,2,3-c,d] Pyrene		Dibenzo [a,h] Anthracene		Benzo [g,h,i] Perylene		Total Detected HPAH	
WA SQS	**160**		**1000**		**110**		**110**		**99**		**230**		**34**		**12**		**31**		**960**	
WA MCUL	**1200**		**1400**		**270**		**460**		**210**		**450**		**88**		**33**		**78**		**5300**	
MVS-001	9		8		3		5		3		7		3		1		3		41	
MVS-009	28		40		21		22		22		30		16		3		16		196	
MVS-011	13		18		9		10		10		17		8		1		8		95	
MVS-020	4		6		3		3		3		7		3		1		3		32	
MVS-024	6		7		4		5		5		9		5		1		4		45	
MVS-026	8		10		5		7		7		14		6		1		5		63	
MVS-034	3		5		2		2		3		5		3		1	J	5		28	
MVS-038	6		7		4		4		4		7		3		1	U	3		38	
MVS-041	16		20		12		13		20		26		26		4		34		170	
MVS-049	6		7		4		5		4		9		4		1		3		42	
OOUB-G 1	3		3		1		2		2		4		2		0		2		20	
OOUB-G 17	8		10		5		5		6		12		5		1		5		41	
OOUB-G 21	16		23		10		12		14		25		11		2		11		56	
OOUB-G 28	10		0	U	7		8		9		17		6		1		5		123	
OOUB-G 9	8		0	U	3		5		4		12		4		1		4		63	
OUBM-G 34	20		52		11		17		19		49		11		2		9		190	
OUBM-G 39	420	D*	417	D*	158	D*	261	D*	112	D	270	D	62		16		45		1762	
OUBM-G 41	50		54		26		50		24		65		17		4		14		304	
OUBM-G 45	56	R	53	R	25		40		25		58		17		4		13		290	
OUBM-G 55	**3499**	DR	**2427**	DR	**1188**	DR	**1351**	DR	**581**	D	**1169**	DR	**210**	D	**75**	D	27	*	**10528**	
OUBM-G 56	52		58		20		30		23		52		13		3		15		264	
OUBM-G 60	144	D	170	D	42		72	D	30		76	D	16		4		12		566	
OUBM-G 61	119	D*	121	D*	39		75	D*	31		86		16		3		11		501	
OUBM-G 63	348	D	323	D	83	D	161	D	71		206	D	43		9		31		1276	
OUBM-G 66	27		0	U	16		22		23		50		14		3		11		165	
OUBM-G 71	27		54		25		34		191		248		**115**		25		**116**		834	

J Analyte dry weight concentration is less than the RL, but greater than the MDL.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported.

D Dry weight result determined from dilution.

* Associated surrogate recovery exceeded guidelines (40% to 120%).

R Dry weight data exceeds calibration range; see narrative in Appendix B for data use limits.

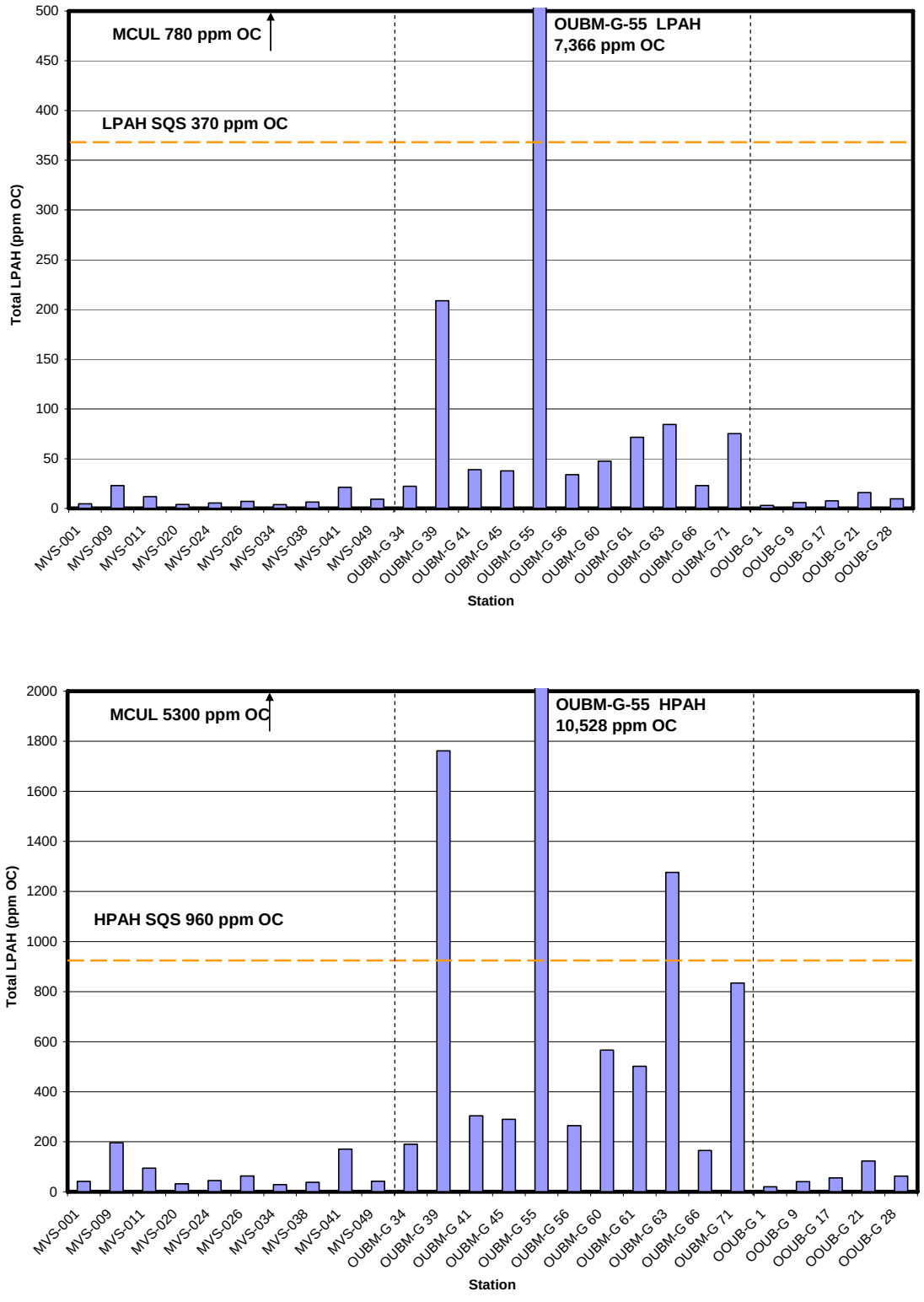


Figure 17. Total LPAH (top) and HPAH (bottom) in Confirmatory Samples

3.3.4 PCBs

The ENVVEST list of 21 PCB congeners plus arochlor 1268 (Table 2) were analyzed in the 25 verification study samples selected for confirmatory PCB analysis. Complete dry weight data for all individual congeners are provided in Appendix B. Because Washington State sediment standards for PCBs are based on total PCBs obtained by summing detected arochlors, the PCB congener data obtained in this study needed to be summed to obtain a comparable total PCB value. This calculation was done following the guidance of NOAA (1995), which found that doubling the sum of 18 PCB congeners[2] closely approximated total PCBs, which are typically calculated by summing the detected PCB arochlors (results based on level of chlorination). Total PCB dry weight concentrations calculated for this study, along with corresponding TOC and OC-normalized concentrations, are provided in Table 12.

Table 12. Total PCBs in Confirmatory Samples (shading indicates value exceeds SQS)

Station	Total PCB (ug/kg dry wt)	TOC (% dry wt)	Total PCB (mg/kg OC)
WA SQS			**12**
WA MCUL			**65**
MVS-001	10.2	2.28	0.4
MVS-009	24.6	2.75	0.9
MVS-024	32.6	2.34	1.4
MVS-034	2.2	0.42	0.5
MVS-041	2.1	0.65	0.3
MVS-049	106	2.17	4.9
OOUB-G 1	181	1.47	12.3
OOUB-G 9	44.6	3.94	1.1
OOUB-G 17	86.0	3.29	2.6
OOUB-G 28	31.6	2.95	1.1
OUBM-G 1	104	2.90	3.6
OUBM-G 22	87.5	2.77	3.2
OUBM-G 25	224	2.73	8.2
OUBM-G 34	448	3.67	12.2
OUBM-G 35	139	2.74	5.1
OUBM-G 39	339	3.35	10.1
OUBM-G 45	114	4.29	2.7
OUBM-G 46	277	1.23	22.5
OUBM-G 52	371	2.51	14.8
OUBM-G 55	587	4.14	14.2
OUBM-G 56	204	3.36	6.1
OUBM-G 60	141	5.49	2.6
OUBM-G 61	70.4	5.93	1.2
OUBM-G 66	234	3.11	7.5
OUBM-G 69	34.3	2.30	1.5

[2] The 18 congeners used to calculate total PCBs per NOAA (1995) are PCB 8, 18, 28, 44, 52, 66, 77, 101, 105, 118, 126, 128, 138, 153, 169, 170, and 180.

Although a few samples exceeded the SQS for PCBs, all were less than 35% of the MCUL. Notably, this study found relatively low PCBs in station OUBM-G1 (located at the west end of the 500-ft grid), which is consistent with neighboring OOUB stations OOUB-G9 and OOUB-G17, but did not confirm the very high PCB result obtained by the OU-B Marine Monitoring program for OUBM-G1. The plot in Figure 18 illustrates the relationship of total PCB concentrations relative to location and to SQS and MCULs. A map of locations where total PCB SQS are exceeded is shown in Figure 19.

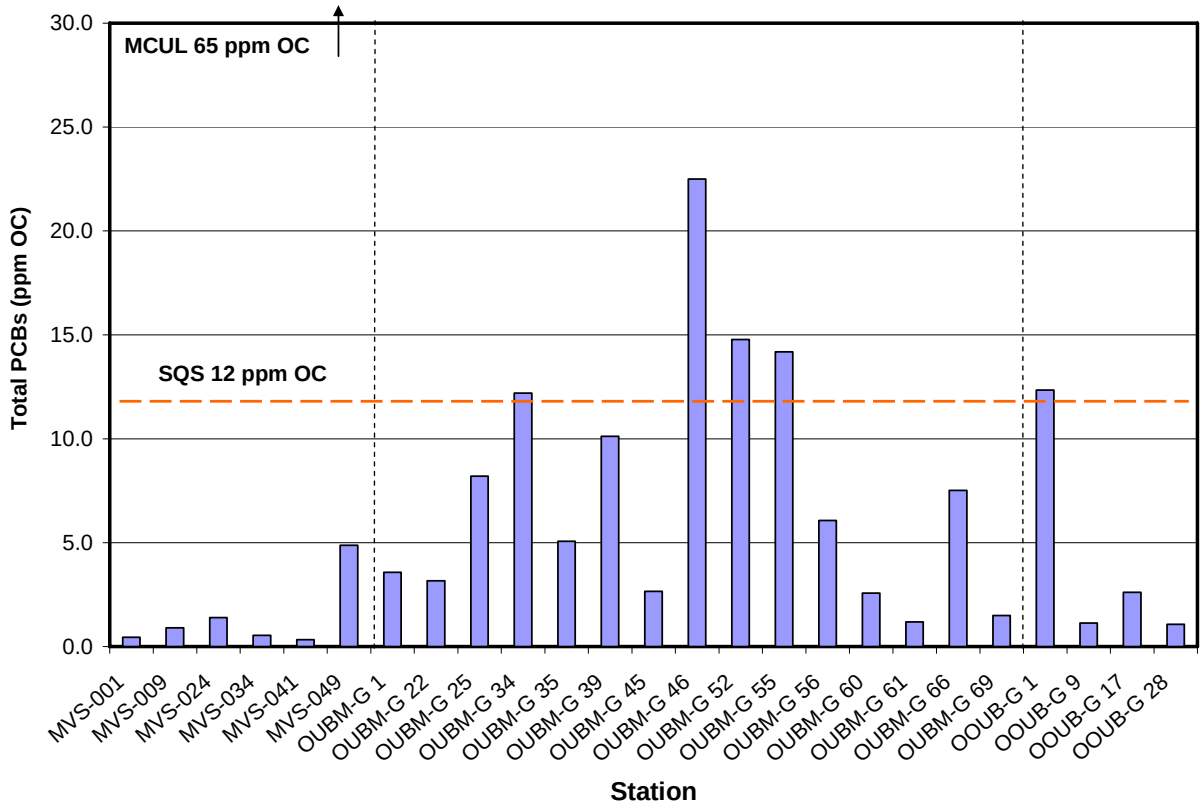


Figure 18. Total PCBs in Confirmatory Samples

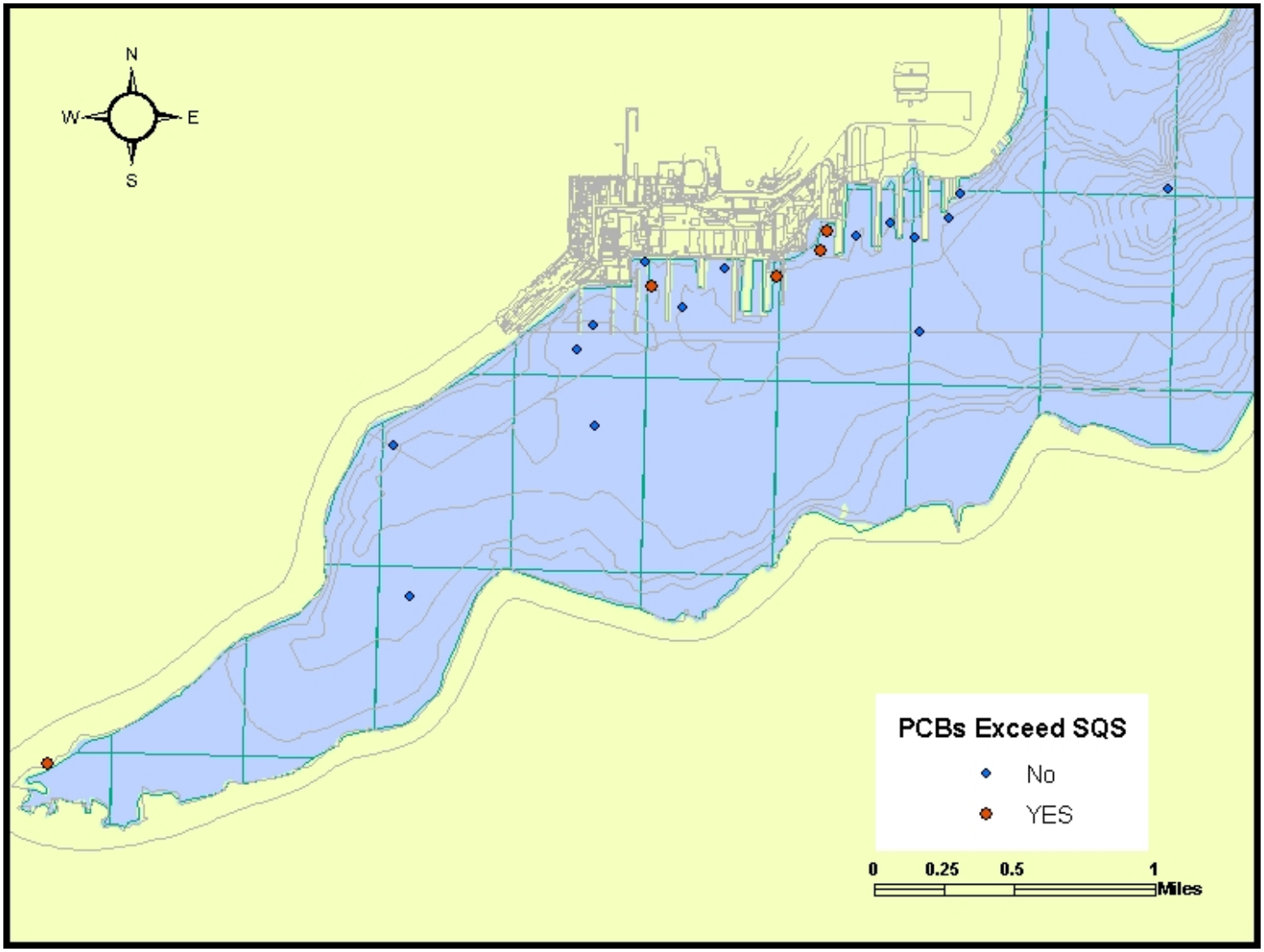


Figure 19. Locations Where Total PCBs Exceed SQS

4.0 Discussion and Conclusions

The Organics Verification Study was conducted to determine present organic contaminant concentrations in the surface sediment of Sinclair and Dyes Inlets, particularly in segments on the state 303(d) list. Although the approach taken for the Organics Verification Study was similar to that of the MVS, i.e., rapid screening of all samples followed by selection of about 20% of samples for confirmatory analysis, the rapid screening methods were not as effective for organics as for metals. The metals screening data correlated very well with confirmatory data for key target metals, allowing definitive concentrations of those metals to be estimated by regression for all samples that did not receive confirmatory analysis (Kohn et al. 2004). The PAH ELISA screening method was too general, as it provided only total PAH and did not identify individual PAH compounds or distinguish LPAH from HPAH, as is necessary for comparisons with SQS. The PCB ELISA screening method reports total PCBs as arochlor 1254, which may not adequately represent the complex mixture of PCBs. In addition, screening methods were not available for other compounds of interest such as phthalates and chlorobenzenes. As described in Section 3.2, the organics screening results were useful for showing the spatial distribution of relative PAH and PCB concentrations, and were a key criterion for selecting which samples would be quantitatively analyzed for all organic compounds of concern.

Quantitative GC analysis at an appropriate level of detection is required for comparisons with action levels such as the SQS and MCUL. In this study, the samples for quantitative analysis were carefully selected to ensure that at least 303(d)-listed segments were appropriately characterized and that the spatial distribution would support future contaminant transport modeling efforts. The quantitative results showed that chlorobenzenes were mostly not detected, and those that were detected fell below SQS. Phthalates, PAHs, and PCBs did not exceed SQS outside of Sinclair Inlet, except for the HPAH benzo(g,h,i)perylene at MVS-041 just outside Sinclair Inlet (Figure 16). Within Sinclair Inlet, the few confirmatory samples exceeding PAH SQS were geographically limited to the OU-B Marine 500-ft grid near the PSNS & IMF piers (Figure 16), as were all but one of the samples exceeding phthalate and PCB SQS. The exception was the sample taken near the mouth of Gorst Creek, OOUB-G1, in which total PCB and butylbenzyl phthalate exceeded their SQS values (Figure 19). This sample is suspected to be affected by runoff from adjacent uplands, roads, and former industrial facilities in Gorst; the MVS found OOUB-G1 to also be elevated in zinc (Kohn et al. 2004).

In conclusion, this study was successful at obtaining quantitative concentrations of PAHs, PCBs, phthalates, and chlorobenzenes at a resolution and spatial distribution that supports evaluation relative to Washington State SQS and 303(d)-listing policy. Nearly all samples in which SQS were exceeded were located within OU-B Marine, which continues to be managed and monitored under Superfund, and where continuing source-control efforts include stormwater monitoring and improvements to PSNS & IMF stormwater catchment systems. The wide range of organic contaminant concentrations plus TOC values from samples distributed throughout Sinclair and Dyes Inlets and Port Orchard Passage will also support water quality and contaminant transport modeling throughout the Sinclair-Dyes Inlet water quality modeling domain.

5.0 References

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APPENDIX A

Verification Study Maps and Rapid Screening Results for PAHs and PCBs

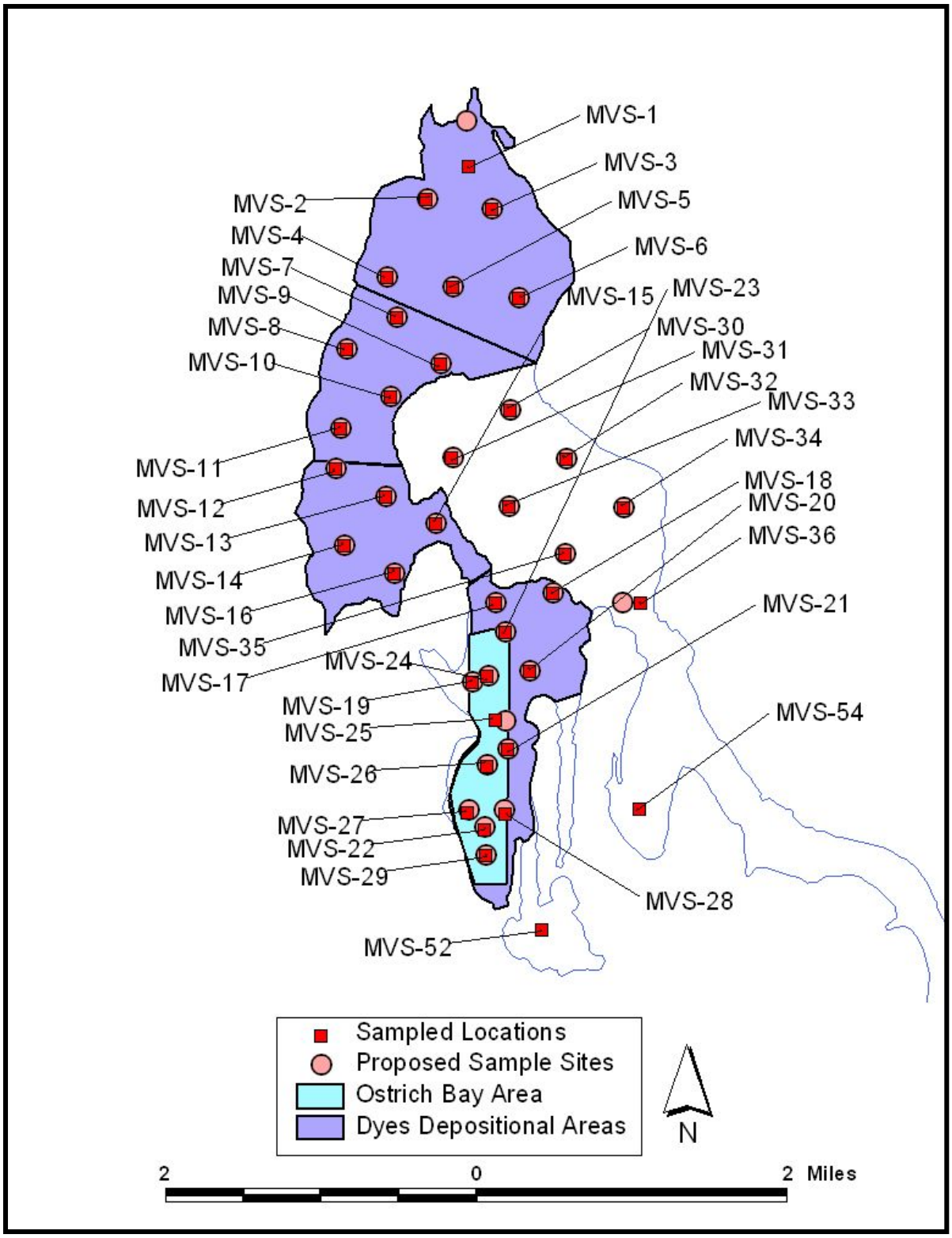

Figure A-1. Verification Study Stations Sampled in Dyes Inlet, Including Ostrich Bay

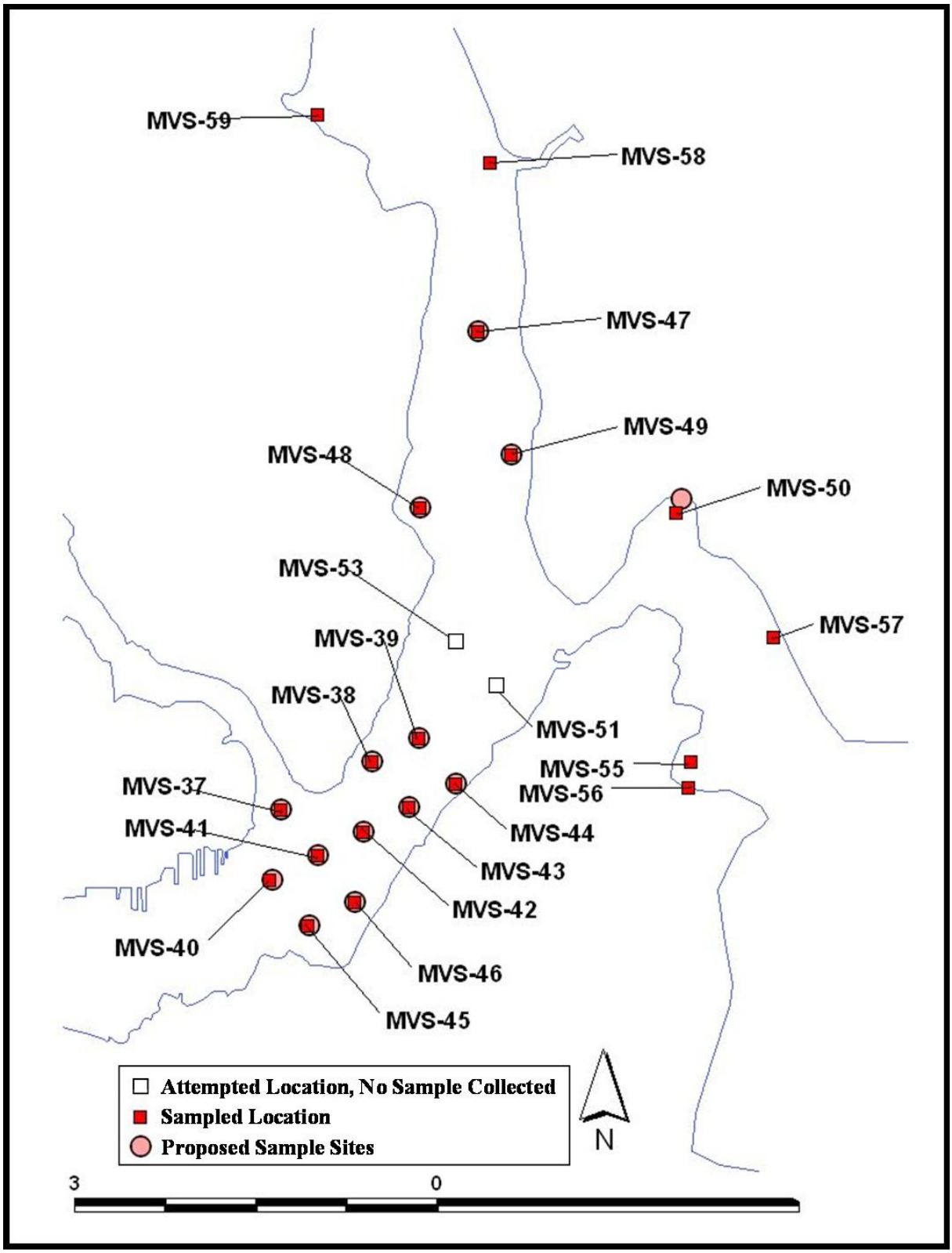

Figure A-2. Metals Verification Study Stations Sampled in Port Orchard Passage and Rich Passage

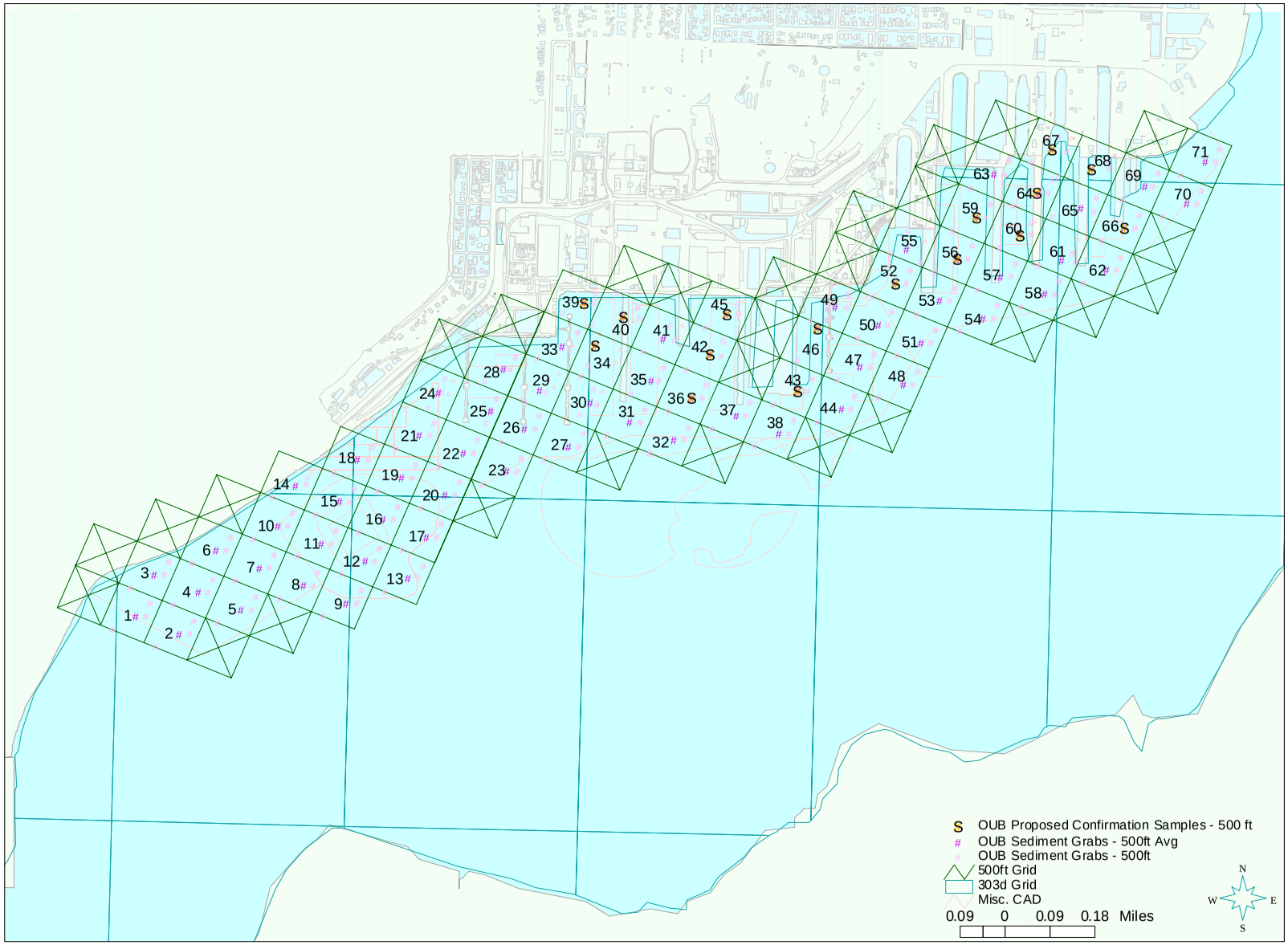

Figure A-3. OU B Marine monitoring stations in 500-ft grid within OU B Marine boundary (OUBM-G number shown in grid)

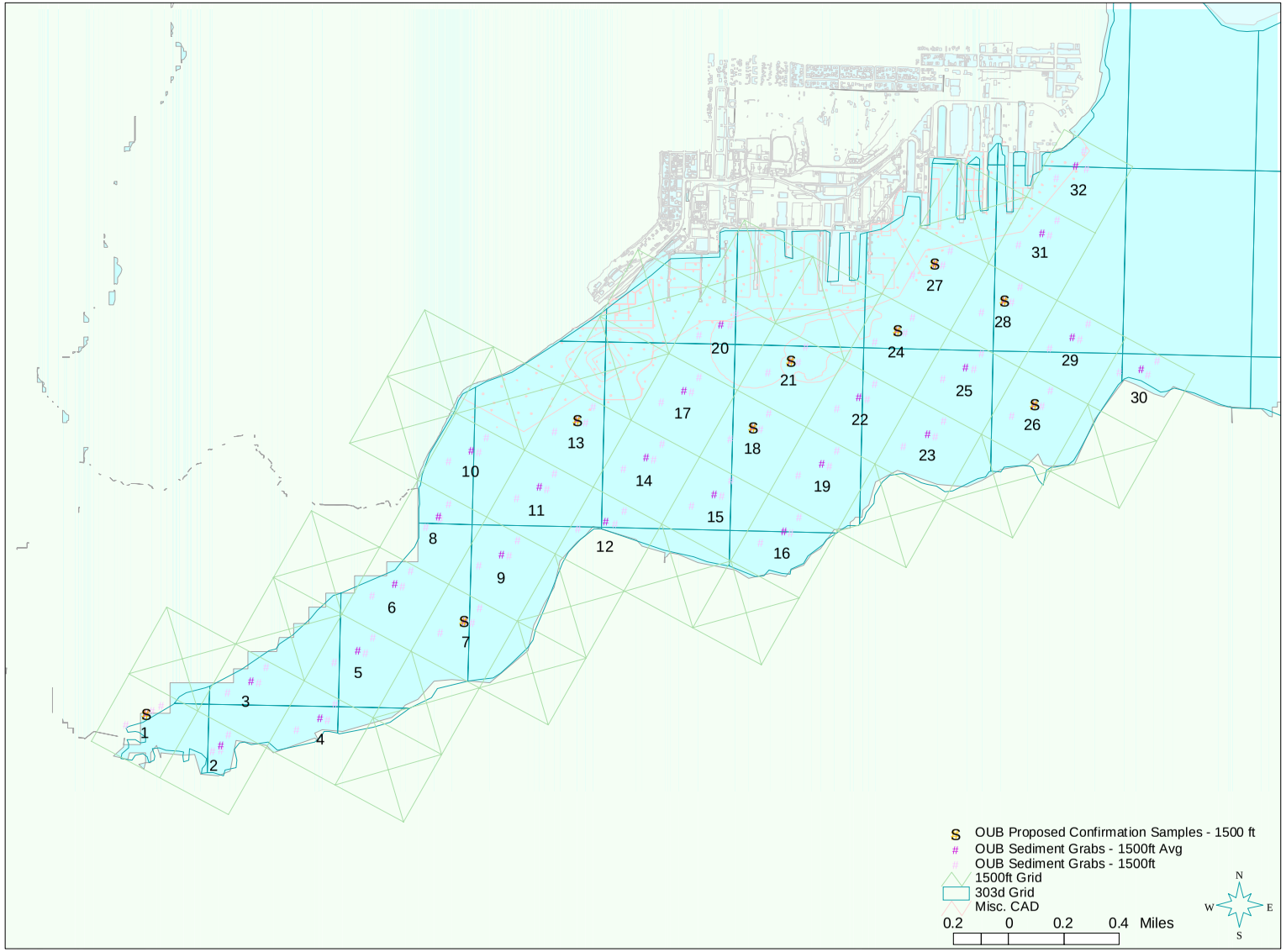

Figure A-4. OU B Marine monitoring stations in 1500-ft grid outside OU B Marine boundary (OOUB-G number shown in grid)

Table A-1. PAH Rapid Screening Results, Estimated Carbon-Normalized Concentrations, and Comparison to SQS

Station or OUB Grid	Total PAH Rapid Screening Result			TOC Values (% dry wt)		Carbon-Normalized Total PAH Estimates (ppm OC)			Select for Quantitative?
	PAH ppb	PAH ppm	Q[b]	OUB-Marine Monitoring	WAC[a] Reference	Using WAC TOC	Using OUB TOC	Using 1% TOC	
							LPAH	HPAH	
						SQS	370 ppm OC	960 ppm OC	
						90% SQS	333 ppm OC	864 ppm OC	
						SQS-SIZ	780 ppm OC	5300 ppm OC	
MVS-001	2066	2.07		NA[c]	3.2	65	NA	207	Y
MVS-002	1054	1.05	J	NA	1.7	62	NA	105	
MVS-003	2252	2.25		NA	2.6	87	NA	225	
MVS-004	2577	2.58		NA	2.6	99	NA	258	
MVS-005	2430	2.43		NA	2.6	93	NA	243	
MVS-006	1089	1.09	J	NA	1.7	64	NA	109	
MVS-007	3158	3.16		NA	2.6	121	NA	316	
MVS-008	2362	2.36		NA	3.2	74	NA	236	
MVS-009	3354	3.35		NA	3.2	105	NA	335	Y
MVS-010	3683	3.68		NA	3.2	115	NA	368	
MVS-011	3934	3.93		NA	3.2	123	NA	393	Y
MVS-012	2766	2.77		NA	3.2	86	NA	277	
MVS-013	3847	3.85		NA	3.2	120	NA	385	
MVS-014	1178	1.18	J	NA	1.7	69	NA	118	
MVS-015	823	0.82	U	NA	0.5	165	NA	82	
MVS-016	1559	1.56	J	NA	3.2	49	NA	156	
MVS-017	3197	3.20		NA	3.2	100	NA	320	
MVS-018	4372	4.37		NA	3.2	137	NA	437	
MVS-019	1216	1.22	J	NA	1.7	72	NA	122	
MVS-020	2488	2.49		NA	2.6	96	NA	249	Y
MVS-021	2026	2.03		NA	3.2	63	NA	203	
MVS-022	2205	2.21		NA	2.6	85	NA	221	
MVS-023	2921	2.92		NA	3.2	91	NA	292	
MVS-024	2173	2.17		NA	3.2	68	NA	217	Y

Table A-1. PAH Screening Results (continued)

Station or OUB Grid	Total PAH Rapid Screening Result			TOC Values (% dry wt)		Carbon-Normalized Total PAH Estimates (ppm OC)			Select for Quantitative?
	PAH ppb	PAH ppm	Q[b]	OUB-Marine Monitoring	WAC[a] Reference	Using WAC TOC	Using OUB TOC	Using 1% TOC	
MVS-025	1901	1.90	J	NA	2.6	73	NA	190	
MVS-026	1958	1.96	J	NA	3.2	61	NA	196	Y
MVS-027	1895	1.89	J	NA	3.2	59	NA	189	
MVS-028	871	0.87	U	NA	0.5	174	NA	87	
MVS-029	1784	1.78	J	NA	2.6	69	NA	178	
MVS-030	745	0.74	U	NA	0.5	149	NA	74	
MVS-031	1196	1.20	J	NA	1.7	70	NA	120	
MVS-032	873	0.87	U	NA	0.5	175	NA	87	
MVS-033	2723	2.72		NA	1.7	160	NA	272	
MVS-034	1069	1.07	J	NA	0.5	214	NA	107	Y
MVS-035	930	0.93	U	NA	0.5	186	NA	93	
MVS-036	863	0.86	U	NA	0.5	173	NA	86	
MVS-037	946	0.95	U	NA	0.5	189	NA	95	
MVS-038	877	0.88	U	NA	0.5	175	NA	88	Y
MVS-039	764	0.76	U	NA	0.5	153	NA	76	
MVS-040	2214	2.21		NA	1.7	130	NA	221	
MVS-041	1587	1.59	J	NA	0.5	317	NA	159	Y
MVS-042	2034	2.03		NA	1.7	120	NA	203	
MVS-043	900	0.90	U	NA	0.5	180	NA	90	
MVS-044	997	1.00	U	NA	0.5	199	NA	100	
MVS-045	2101	2.10		NA	1.7	124	NA	210	
MVS-046	1937	1.94	J	NA	1.7	114	NA	194	
MVS-047	2205	2.20		NA	3.2	69	NA	220	
MVS-048	1449	1.45	J	NA	1.7	85	NA	145	
MVS-049	2812	2.81		NA	3.2	88	NA	281	Y
MVS-050	701	0.70	U	NA	0.5	140	NA	70	
MVS-052	2131	2.13		NA	3.2	67	NA	213	
MVS-054	2614	2.61		NA	1.7	154	NA	261	
MVS-055	724	0.72	U	NA	0.5	145	NA	72	
MVS-056	500	0.50	U	NA	0.5	100	NA	50	
MVS-057	500	0.50	U	NA	0.5	100	NA	50	
MVS-058	500	0.50	U	NA	0.5	100	NA	50	

Table A-1. PAH Screening Results (continued)

Station or OUB Grid		Total PAH Rapid Screening Result			TOC Values (% dry wt)		Carbon-Normalized Total PAH Estimates (ppm OC)			Select for Quantitative?
		PAH ppb	PAH ppm	Q[b]	OUB-Marine Monitoring	WAC[a] Reference	Using WAC TOC	Using OUB TOC	Using 1% TOC	
MVS-059		500	0.50	U	NA	1.7	29	NA	50	
OUBM-G	01	3054	3.05		2.9	3.2	95	105	305	
OUBM-G	02	2339	2.34		3.1	2.6	90	76	234	
OUBM-G	03	1894	1.89	J	1.6	3.2	59	120	189	
OUBM-G	04	2301	2.30		2.8	2.6	88	81	230	
OUBM-G	05	3497	3.50		2.7	2.6	135	128	350	
OUBM-G	06	1969	1.97	J	2.5	2.6	76	78	197	
OUBM-G	07	2267	2.27		2.5	2.6	87	91	227	
OUBM-G	08	1892	1.89	J	2.4	2.6	73	80	189	
OUBM-G	09	2537	2.54		2.7	2.6	98	95	254	
OUBM-G	10	1747	1.75	J	1.2	3.2	55	142	175	
OUBM-G	11	1984	1.98	J	2.2	2.6	76	89	198	
OUBM-G	12	1842	1.84	J	3.1	2.6	71	60	184	
OUBM-G	13	1878	1.88	J	3.1	2.6	72	61	188	
OUBM-G	14	2177	2.18		1.3	1.7	128	173	218	
OUBM-G	15	1420	1.42	J	2.2	2.6	55	65	142	
OUBM-G	16	1813	1.81	J	2.3	2.6	70	78	181	
OUBM-G	17	2512	2.51		2.6	2.6	97	96	251	
OUBM-G	18	2206	2.21		2.5	3.2	69	88	221	
OUBM-G	19	1572	1.57	J	2.1	3.2	49	76	157	
OUBM-G	20	2409	2.41		2.5	2.6	93	96	241	
OUBM-G	21	2077	2.08		1.7	3.2	65	125	208	
OUBM-G	22	1930	1.93		2.8	2.6	74	70	193	
OUBM-G	23	3007	3.01		2.7	2.6	116	113	301	
OUBM-G	24	2837	2.84		2.7	2.6	109	104	284	
OUBM-G	25	2646	2.65		2.7	3.2	83	97	265	
OUBM-G	26	2557	2.56		2.7	3.2	80	95	256	
OUBM-G	27	2058	2.06		2.9	2.6	79	71	206	
OUBM-G	28	3260	3.26		2.0	3.2	102	165	326	
OUBM-G	29	2613	2.61		3.4	3.2	82	78	261	
OUBM-G	30	3355	3.35		3.0	3.2	105	112	335	
OUBM-G	31	2278	2.28		2.9	2.6	88	79	228	

Table A-1. PAH Screening Results (continued)

Station or OUB Grid		Total PAH Rapid Screening Result			TOC Values (% dry wt)		Carbon-Normalized Total PAH Estimates (ppm OC)			Select for Quantitative?
		PAH ppb	PAH ppm	Q[b]	OUB-Marine Monitoring	WAC[a] Reference	Using WAC TOC	Using OUB TOC	Using 1% TOC	
OUBM-G	32	2594	2.59		2.7	2.6	100	98	259	
OUBM-G	33	3464	3.46		3.1	3.2	108	111	346	
OUBM-G	34	4417	4.42		2.3	3.2	138	190	442	Y
OUBM-G	35	3694	3.69		2.7	3.2	115	135	369	
OUBM-G	36	2504	2.50		2.9	3.2	78	86	250	
OUBM-G	37	5176	5.18		2.8	3.2	162	188	518	
OUBM-G	38	2083	2.08		2.3	3.2	65	91	208	
OUBM-G	39	**43927**	**43.9**		1.8	1.7	2584	2440	4393	Y
OUBM-G	40	3261	3.26		2.5	3.2	102	133	326	
OUBM-G	41	5300	5.30		2.6	3.2	166	204	530	
OUBM-G	42	2696	2.70		2.6	2.6	104	105	270	
OUBM-G	43	2459	2.46		3.5	3.2	77	70	246	
OUBM-G	44	2432	2.43		2.8	3.2	76	87	243	
OUBM-G	45	**22583**	**22.6**		3.0	3.2	706	750	2258	Y
OUBM-G	46	2123	2.12		1.2	1.7	125	173	212	
OUBM-G	47	2307	2.31		2.2	3.2	72	104	231	
OUBM-G	48	2326	2.33		3.0	2.6	89	79	233	
OUBM-G	49	7236	7.24		2.6	3.2	226	284	724	
OUBM-G	50	2719	2.72		2.6	3.2	85	105	272	
OUBM-G	51	3190	3.19		3.3	2.6	123	96	319	
OUBM-G	52	7098	7.10		2.5	3.2	222	283	710	
OUBM-G	53	2776	2.78		2.5	3.2	87	111	278	
OUBM-G	54	2597	2.60		3.3	3.2	81	78	260	
OUBM-G	55	**20968**	**21.0**		2.1	3.2	655	994	2097	Y
OUBM-G	56	7331	7.33		3.2	3.2	229	229	733	Y
OUBM-G	57	2733	2.73		5.1	3.2	85	54	273	
OUBM-G	58	3673	3.67		2.9	3.2	115	126	367	
OUBM-G	59	4143	4.14		3.6	3.2	129	115	414	
OUBM-G	60	**28403**	**28.4**		3.1	3.2	888	905	2840	Y
OUBM-G	61	**14017**	**14.0**		1.9	1.7	825	758	1402	Y
OUBM-G	62	4237	4.24		3.1	3.2	132	138	424	
OUBM-G	63	**19148**	**19.1**		5.0	3.2	598	386	1915	Y

Table A-1. PAH Screening Results (continued)

Station or OUB Grid		Total PAH Rapid Screening Result			TOC Values (% dry wt)		Carbon-Normalized Total PAH Estimates (ppm OC)			Select for Quantitative?
		PAH ppb	PAH ppm	Q[b]	OUB-Marine Monitoring	WAC[a] Reference	Using WAC TOC	Using OUB TOC	Using 1% TOC	
OUBM-G	64	7382	7.38		3.6	3.2	231	207	738	
OUBM-G	65	3123	3.12		2.7	3.2	98	117	312	
OUBM-G	66	7825	7.83		3.3	3.2	245	239	783	Y
OUBM-G	67	7180	7.18		4.5	3.2	224	158	718	
OUBM-G	68	3552	3.55		2.8	3.2	111	129	355	
OUBM-G	69	5193	5.19		2.4	1.7	305	216	519	
OUBM-G	70	2792	2.79		2.6	3.2	87	106	279	
OUBM-G	71	1974	1.97	J	0.9	1.7	116	232	197	Y
OOUB-G	01	1220	1.22	J	1.3	1.7	72	94	122	Y
OOUB-G	02	897	0.90	U	0.9	1.7	53	104	90	
OOUB-G	03	1159	1.16	J	1.6	1.7	68	73	116	
OOUB-G	04	997	1.00	U	0.9	1.7	59	106	100	
OOUB-G	05	1620	1.62	J	2.8	3.2	51	58	162	
OOUB-G	06	2998	3.00		3.6	2.6	115	84	300	
OOUB-G	07	2003	2.00		4.1	3.2	63	49	200	
OOUB-G	08	1970	1.97	J	3.6	2.6	76	55	197	
OOUB-G	09	2896	2.90		3.8	3.2	90	77	290	Y
OOUB-G	10	2346	2.35		3.4	2.6	90	70	235	
OOUB-G	11	2535	2.53		3.5	2.6	97	73	253	
OOUB-G	12	1145	1.14	J	0.8	1.7	67	149	114	
OOUB-G	13	2541	2.54		3.0	2.6	98	84	254	
OOUB-G	14	1904	1.90	J	3.6	2.6	73	54	190	
OOUB-G	15	2824	2.82		3.3	3.2	88	87	282	
OOUB-G	16	3946	3.95		3.6	3.2	123	109	395	
OOUB-G	17	2849	2.85		3.2	2.6	110	90	285	Y
OOUB-G	18	2167	2.17		3.2	2.6	83	67	217	
OOUB-G	19	2258	2.26		3.0	2.6	87	75	226	
OOUB-G	20	2030	2.03		2.8	2.6	78	73	203	
OOUB-G	21	2315	2.31		2.6	3.2	72	88	231	Y
OOUB-G	22	1845	1.85	J	2.7	3.2	58	68	185	
OOUB-G	23	2350	2.35		2.4	3.2	73	98	235	
OOUB-G	24	2282	2.28		2.7	3.2	71	85	228	

Table A-1. PAH Screening Results (continued)

Station or OUB Grid		Total PAH Rapid Screening Result PAH ppb	PAH ppm	Q[b]	TOC Values (% dry wt) OUB-Marine Monitoring	WAC[a] Reference	Carbon-Normalized Total PAH Estimates (ppm OC) Using WAC TOC	Using OUB TOC	Using 1% TOC	Select for Quantitative?
OOUB-G	25	2197	2.20		1.6	3.2	69	135	220	
OOUB-G	26	929	0.93	U	0.5	0.5	186	172	93	
OOUB-G	27	1960	1.96	J	3.5	3.2	61	56	196	
OOUB-G	28	2321	2.32		2.5	3.2	73	94	232	Y
OOUB-G	29	2014	2.01		1.5	3.2	63	133	201	
OOUB-G	30	845	0.84	U	0.4	0.5	169	241	84	
OOUB-G	31	2510	2.51		2.4	3.2	78	104	251	
OOUB-G	32	2228	2.23		1.4	1.7	131	155	223	

a. Washington Administrative Code Reference TOC values based on grain size distribution are as follows:

% Fines	% TOC
0-20	0.5
20-50	1.7
50-80	3.2
80-100	2.6

b. Qualifier codes: U = None-Detect, J = Estimated, E = Outside Linear Range

c. NA Not available/not applicable.

Table A-2. PCB Rapid Screening Results, Estimated Carbon-Normalized Concentrations, and Comparison to SQS

Station or OUB Grid	Total PCB Rapid Screening Result		TOC Values (% dry wt)		Carbon-Normalized Total PCB Estimates (ppm OC)			Sinclair Inlet OUB-Marine PCB (ppm OC)	Select for Quantitative?
	PCB (mg/Kg)	Q[b]	OUB-Marine Monitoring	WAC[a] Reference	Using WAC TOC	Using OUB TOC	Using 1% TOC		
						90% SQS	10.8 ppm OC		
						SQS	12 ppm OC		
						SQS-SIZ	65 ppm OC		
MVS-001	53	U	NA[c]	3.2	2	NA	5	NA	Y
MVS-002	30	U	NA	1.7	2	NA	3	NA	
MVS-003	79	U	NA	2.6	3	NA	8	NA	
MVS-004	70	U	NA	2.6	3	NA	7	NA	
MVS-005	69	U	NA	2.6	3	NA	7	NA	
MVS-006	40	U	NA	1.7	2	NA	4	NA	
MVS-007	82	U	NA	2.6	3	NA	8	NA	
MVS-008	44	U	NA	3.2	1	NA	4	NA	
MVS-009	76	U	NA	3.2	2	NA	8	NA	Y
MVS-010	55	U	NA	3.2	2	NA	6	NA	
MVS-011	67	U	NA	3.2	2	NA	7	NA	
MVS-012	79	U	NA	3.2	2	NA	8	NA	
MVS-013	64	U	NA	3.2	2	NA	6	NA	
MVS-014	38	U	NA	1.7	2	NA	4	NA	
MVS-015	29	U	NA	0.5	6	NA	3	NA	
MVS-016	45	U	NA	3.2	1	NA	5	NA	
MVS-017	73	U	NA	3.2	2	NA	7	NA	
MVS-018	79	U	NA	3.2	2	NA	8	NA	
MVS-019	43	U	NA	1.7	3	NA	4	NA	
MVS-020	78	U	NA	2.6	3	NA	8	NA	
MVS-021	48	U	NA	3.2	1	NA	5	NA	
MVS-022	62	U	NA	2.6	2	NA	6	NA	
MVS-023	63	U	NA	3.2	2	NA	6	NA	

Table A-2. PCB Screening Results (continued)

Station or OUB Grid	Total PCB Rapid Screening Result		TOC Values (% dry wt)		Carbon-Normalized Total PCB Estimates (ppm OC)			Sinclair Inlet OUB-Marine PCB (ppm OC)	Select for Quantitative?
	PCB (mg/Kg)	Q[b]	OUB-Marine Monitoring	WAC[a] Reference	Using WAC TOC	Using OUB TOC	Using 1% TOC		
MVS-024	64	U	NA	3.2	2	NA	6	NA	Y
MVS-025	60	U	NA	2.6	2	NA	6	NA	
MVS-026	35	U	NA	3.2	1	NA	3	NA	
MVS-027	43	U	NA	3.2	1	NA	4	NA	
MVS-028	19	U	NA	0.5	4	NA	2	NA	
MVS-029	52	U	NA	2.6	2	NA	5	NA	
MVS-030	9	U	NA	0.5	2	NA	1	NA	
MVS-031	38	U	NA	1.7	2	NA	4	NA	
MVS-032	19	U	NA	0.5	4	NA	2	NA	
MVS-033	69	U	NA	1.7	4	NA	7	NA	
MVS-034	17	U	NA	0.5	3	NA	2	NA	Y
MVS-035	20	U	NA	0.5	4	NA	2	NA	
MVS-036	22	U	NA	0.5	4	NA	2	NA	
MVS-037	40	U	NA	0.5	8	NA	4	NA	
MVS-038	23	U	NA	0.5	5	NA	2	NA	
MVS-039	18	U	NA	0.5	4	NA	2	NA	
MVS-040	36	U	NA	1.7	2	NA	4	NA	
MVS-041	71	U	NA	0.5	14	NA	7	NA	Y
MVS-042	65	U	NA	1.7	4	NA	7	NA	
MVS-043	28	U	NA	0.5	6	NA	3	NA	
MVS-044	43	U	NA	0.5	9	NA	4	NA	
MVS-045	82	U	NA	1.7	5	NA	8	NA	
MVS-046	69	U	NA	1.7	4	NA	7	NA	
MVS-047	87	U	NA	3.2	3	NA	9	NA	
MVS-048	46	U	NA	1.7	3	NA	5	NA	
MVS-049	92	U	NA	3.2	3	NA	9	NA	Y
MVS-050	11	U	NA	0.5	2	NA	1	NA	
MVS-052	84	U	NA	3.2	3	NA	8	NA	
MVS-054	46	U	NA	1.7	3	NA	5	NA	
MVS-055	24	U	NA	0.5	5	NA	2	NA	
MVS-056	39	U	NA	0.5	8	NA	4	NA	

Table A-2. PCB Screening Results (continued)

Station or OUB Grid	Total PCB Rapid Screening Result		TOC Values (% dry wt)		Carbon-Normalized Total PCB Estimates (ppm OC)			Sinclair Inlet OUB-Marine PCB (ppm OC)	Select for Quantitative?
	PCB (mg/Kg)	Q[b]	OUB-Marine Monitoring	WAC[a] Reference	Using WAC TOC	Using OUB TOC	Using 1% TOC		
MVS-057	49	U	NA	0.5	10	NA	5	NA	
MVS-058	34	U	NA	0.5	7	NA	3	NA	
MVS-059	58	U	NA	1.7	3	NA	6	NA	
OUBM-G 01	201		2.9	3.2	6	7	20	101	Y
OUBM-G 02	133	J	3.1	2.6	5	4	13	2	
OUBM-G 03	73	U	1.6	3.2	2	5	7	7	
OUBM-G 04	102	J	2.8	2.6	4	4	10	2	
OUBM-G 05	142	J	2.7	2.6	5	5	14	3	
OUBM-G 06	85	U	2.5	2.6	3	3	9	4	
OUBM-G 07	83	U	2.5	2.6	3	3	8	3	
OUBM-G 08	132	J	2.4	2.6	5	6	13	6	
OUBM-G 09	110	J	2.7	2.6	4	4	11	4	
OUBM-G 10	57	U	1.2	3.2	2	5	6	6	
OUBM-G 11	120	J	2.2	2.6	5	5	12	6	
OUBM-G 12	123	J	3.1	2.6	5	4	12	3	
OUBM-G 13	147	J	3.1	2.6	6	5	15	8	
OUBM-G 14	93	U	1.3	1.7	5	7	9	10	
OUBM-G 15	72	U	2.2	2.6	3	3	7	4	
OUBM-G 16	103	J	2.3	2.6	4	4	10	6	
OUBM-G 17	160	J	2.6	2.6	6	6	16	6	
OUBM-G 18	115	J	2.5	3.2	4	5	12	4	
OUBM-G 19	99	U	2.1	3.2	3	5	10	9	
OUBM-G 20	131	J	2.5	2.6	5	5	13	7	
OUBM-G 21	56	U	1.7	3.2	2	3	6	9	
OUBM-G 22	172	J	2.8	2.6	7	6	17	7	Y
OUBM-G 23	138	J	2.7	2.6	5	5	14	10	
OUBM-G 24	124	J	2.7	2.6	5	5	12	14	
OUBM-G 25	177		2.7	3.2	6	6	18	21	Y
OUBM-G 26	99	U	2.7	3.2	3	4	10	10	
OUBM-G 27	122	J	2.9	2.6	5	4	12	10	
OUBM-G 28	189		2.0	3.2	6	10	19	12	

Table A-2. PCB Screening Results (continued)

Station or OUB Grid	Total PCB Rapid Screening Result		TOC Values (% dry wt)		Carbon-Normalized Total PCB Estimates (ppm OC)			Sinclair Inlet OUB-Marine PCB (ppm OC)	Select for Quantitative?
	PCB (mg/Kg)	Q[b]	OUB-Marine Monitoring	WAC[a] Reference	Using WAC TOC	Using OUB TOC	Using 1% TOC		
OUBM-G 29	120	J	3.4	3.2	4	4	12	10	
OUBM-G 30	214		3.0	3.2	7	7	21	12	
OUBM-G 31	128	J	2.9	2.6	5	4	13	7	
OUBM-G 32	161	J	2.7	2.6	6	6	16	6	
OUBM-G 33	129	U	3.1	3.2	4	4	13	19	
OUBM-G 34	388		2.3	3.2	12	17	39	31	Y
OUBM-G 35	325		2.7	3.2	10.1	12	32	8	Y
OUBM-G 36	98	U	2.9	3.2	3	3	10	9	
OUBM-G 37	232		2.8	3.2	7	8	23	8	
OUBM-G 38	60	U	2.3	3.2	2	3	6	9	
OUBM-G 39	313		1.8	1.7	18	17	31	23	Y
OUBM-G 40	298		2.5	3.2	9	12	30	26	
OUBM-G 41	212		2.6	3.2	7	8	21	11	
OUBM-G 42	143	J	2.6	2.6	5	6	14	11	
OUBM-G 43	83	U	3.5	3.2	3	2	8	5	
OUBM-G 44	99	U	2.8	3.2	3	4	10	5	
OUBM-G 45	260		3.0	3.2	8	9	26	8	Y
OUBM-G 46	230		1.2	1.7	14	19	23	43	Y
OUBM-G 47	68	U	2.2	3.2	2	3	7	7	
OUBM-G 48	78	U	3.0	2.6	3	3	8	4	
OUBM-G 49	256		2.6	3.2	8	10	26	32	
OUBM-G 50	106	J	2.6	3.2	3	4	11	7	
OUBM-G 51	81	U	3.3	2.6	3	2	8	4	
OUBM-G 52	215		2.5	3.2	7	9	21	29	Y
OUBM-G 53	304		2.5	3.2	9	12	30	10	Y
OUBM-G 54	82	U	3.3	3.2	3	2	8	6	
OUBM-G 55	264		2.1	3.2	8	13	26	17	Y
OUBM-G 56	290		3.2	3.2	9	9	29	20	Y
OUBM-G 57	139	J	5.1	3.2	4	3	14	7	
OUBM-G 58	153	J	2.9	3.2	5	5	15	6	
OUBM-G 59	169	J	3.6	3.2	5	5	17	10	

Table A-2. PCB Screening Results (continued)

Station or OUB Grid	Total PCB Rapid Screening Result		TOC Values (% dry wt)		Carbon-Normalized Total PCB Estimates (ppm OC)			Sinclair Inlet OUB-Marine PCB (ppm OC)	Select for Quantitative?
	PCB (mg/Kg)	Q[b]	OUB-Marine Monitoring	WAC[a] Reference	Using WAC TOC	Using OUB TOC	Using 1% TOC		
OUBM-G 60	281		3.1	3.2	9	9	28	14	Y
OUBM-G 61	224		1.9	1.7	13	12	22	12	Y
OUBM-G 62	183		3.1	3.2	6	6	18	7	
OUBM-G 63	173	J	5.0	3.2	5	3	17	21	
OUBM-G 64	301		3.6	3.2	9	8	30	16	
OUBM-G 65	169	J	2.7	3.2	5	6	17	15	
OUBM-G 66	12965		3.3	3.2	405	396	1297	12	Y
OUBM-G 67	245		4.5	3.2	8	5	24	11	
OUBM-G 68	111	J	2.8	3.2	3	4	11	17	
OUBM-G 69	173	J	2.4	1.7	10.2	7	17	8	Y
OUBM-G 70	103	J	2.6	3.2	3	4	10	2	
OUBM-G 71	89	U	0.9	1.7	5	10	9	5	
OOUB-G 01	287		1.3	1.7	17	22	29	19	Y
OOUB-G 02	32	U	0.9	1.7	2	4	3	5	
OOUB-G 03	33	U	1.6	1.7	2	2	3	6	
OOUB-G 04	28	U	0.9	1.7	2	3	3	3	
OOUB-G 05	66	U	2.8	3.2	2	2	7	4	
OOUB-G 06	147	J	3.6	2.6	6	4	15	5	
OOUB-G 07	96	U	4.1	3.2	3	2	10	6	
OOUB-G 08	93	U	3.6	2.6	4	3	9	4	
OOUB-G 09	100	J	3.8	3.2	3	3	10	5	Y
OOUB-G 10	139	J	3.4	2.6	5	4	14	7	
OOUB-G 11	131	J	3.5	2.6	5	4	13	7	
OOUB-G 12	40	U	0.8	1.7	2	5	4	6	
OOUB-G 13	142	J	3.0	2.6	5	5	14	7	
OOUB-G 14	104	J	3.6	2.6	4	3	10	6	
OOUB-G 15	141	J	3.3	3.2	4	4	14	5	
OOUB-G 16	142	J	3.6	3.2	4	4	14	14	
OOUB-G 17	145	J	3.2	2.6	6	5	14	12	Y
OOUB-G 18	99	U	3.2	2.6	4	3	10	7	
OOUB-G 19	77	U	3.0	2.6	3	3	8	21	

Table A-2. PCB Screening Results (continued)

Station or OUB Grid	Total PCB Rapid Screening Result		TOC Values (% dry wt)		Carbon-Normalized Total PCB Estimates (ppm OC)			Sinclair Inlet OUB-Marine PCB (ppm OC)	Select for Quantitative?
	PCB (mg/Kg)	Q[b]	OUB-Marine Monitoring	WAC[a] Reference	Using WAC TOC	Using OUB TOC	Using 1% TOC		
OOUB-G 20	82	U	2.8	2.6	3	3	8	6	
OOUB-G 21	96	U	2.6	3.2	3	4	10	10	
OOUB-G 22	58	U	2.7	3.2	2	2	6	7	
OOUB-G 23	77	U	2.4	3.2	2	3	8	6	
OOUB-G 24	76	U	2.7	3.2	2	3	8	6	
OOUB-G 25	55	U	1.6	3.2	2	3	6	7	
OOUB-G 26	12	U	0.5	0.5	2	2	1	4	
OOUB-G 27	56	U	3.5	3.2	2	2	6	6	
OOUB-G 28	77	U	2.5	3.2	2	3	8	5	Y
OOUB-G 29	48	U	1.5	3.2	2	3	5	9	
OOUB-G 30	22	U	0.4	0.5	4	6	2	6	
OOUB-G 31	65	U	2.4	3.2	2	3	6	10	
OOUB-G 32	65	U	1.4	1.7	4	5	6	7	

a. Washington Administrative Code Reference TOC values based on grain size distribution are as follows:

% Fines	% TOC
0-20	0.5
20-50	1.7
50-80	3.2
80-100	2.6

b. Qualifier codes: U = None-Detect, J = Estimated, E = Outside Linear Range

c. NA Not available/not applicable.

Appendix B

Organics Verification Study:
PAH, Chlorobenzene, Phthalate, and PCB Data

PROJECT: Sinclair and Dyes Inlet - Sediment Organics Verification Study
PARAMETER: Organics – PAH, Phthalates, Chlorobenzenes
LABORATORY: Battelle Marine Sciences Laboratory (MSL), Sequim, Washington
MATRIX: Sediment

SAMPLE CUSTODY AND PROCESSING: Samples were received in two batches. Samples 2087*1-57 were received on September 3, 2003. The second batch, consisting of samples 2087*58-168, was received on January 30, 2004. In each instance, custody of samples was transferred from the MSL Ecotoxicology group to the MSL Environmental Chemistry group. Samples were hand delivered and received frozen. Samples were logged in by assigning a Battelle Central File (CF) identification number (2087) and were entered into Battelle's sample tracking system. The samples were then placed in the MSL Environmental Chemistry sample freezer (-20°C) until confirmatory subset was chosen. In March 2004, a subset of samples were prepped and analyzed for metals. In May 2005, a subset of samples were extracted in two separate batches and analyzed for organic contaminants in three analysis batches (see table below), which is the data set associated with this narrative.

Samples Batch	Extraction Dates	Analysis Dates
Batch 1	5/3/05	5/27/05
Batch 2	5/13/05	6/3/05
Dilutions	NA	6/14/05

QA/QC DATA QUALITY OBJECTIVES (DQOs):

Analyte	Analytical Method	MS Range of Recovery	Laboratory Control Sample	Surrogate Spike Recovery
PAH	GC-MS	40-120%	40-120%	40-120%
Phthalates	GC-MS	40-120%	40-120%	40-120%
Chlorobenzenes	GC-MS	40-120%	40-120%	40-120%

METHODS: All samples were analyzed in accordance with the following Battelle methods:

- *MSL-O-008 Operation and Maintenance of Gas Chromatographs (GC) and Gas Chromatograph/Mass Spectrometer (GC/MS) Systems.*
- *MSL-O-015 Identification and Quantification of Polynuclear Aromatic Hydrocarbons (PAHs) by Gas Chromatography/Mass Spectrometry Following EPA Method 8270B Quality Control Criteria.*

Results are reported in units of µg/kg for each sample.

HOLDING TIMES: The established holding time of 14 days from collection until extraction was met considering samples were at -20°C (in stasis) for the duration until samples were thawed and prepared. The holding time of 40 days from extraction until analyses was also achieved for all samples.

DETECTION LIMITS: Detection limits (DLs) were determined on a per-sample basis and data are flagged "U" using sample-specific DLs.

DATA QUALIFIERS:

#	Outside project DQO guidelines for SIS recovery (40-120%)
*	Associated surrogate recovery exceeded guidelines (40-120%)
&	Outside project DQOs for spike recovery (40-120% recovery) or replicate analysis (<30% RPD)
B	Analyte detected in the method blank above the RL, sample concentration <10 times detected blank value.
D	Results determined from dilution
E	Estimate, see narrative
J	Analyte concentration is less than the RL, but greater than the MDL
U	Not detected at or above DL shown
R	Data exceeds calibration range; see narrative for data use limits

EXTRACTION AND ANALYTICAL NOTES / DEVIATIONS:

The samples were extracted in two separate batches and analyzed in two separate batches. The extraction created sample extracts for PAH, phthalate, and chlorobenzene analysis, as well as PCB analysis. Therefore, the blank spikes and matrix spikes did not contain chlorobenzenes due to the interference they cause with polychlorinated biphenyl (PCB) analysis. Chlorobenezene data values are marked with an "E" to indicate they are estimations, since there is no batch quality control (QC) for determination of accuracy.

The spiking solution used to spike the blank spikes and matrix spikes was expired. The deviation from protocol was documented and a comparison evaluation was performed to a new spiking standard in which percentage differences were calculated. The expired spiking solution and subsequent affected data were deemed usable based on this evaluation.

Five samples were diluted and reanalyzed after several compound concentrations exceeded linear range of the original analysis. The specific analytes are flagged "D". Additionally, several analytes in the diluted sample 2087*110 and the undiluted sample 2087*157 were significantly over the instrument calibration range and are "R" flagged to indicate the specific analyte values are highly suspect and beyond the capability to estimate. The values are not to be used for validation or verification purposes but can be used for qualitative comparisons.

METHOD BLANKS:

Two method blanks are reported, because the samples were set up in two separate extraction batches. PAHs were not detected in the method blanks above the method detection limit (MDL), with the exception of acenaphthene, which was only detected in one blank and within 2 times the DL and less than the reporting limit. Four phthalate compounds (Diethyl Phthalate, Di N Butyl Phthalate, Butyl Benzyl Phthalate, and Bis (2-ethylhexyl) Phthalate) were detected in the both extraction batch blanks above the DLs and reporting limits. The data are "B" flagged accordingly.

BLANK SPIKES:

One blank spike and a blank spike/blank spike duplicate pair were analyzed with the samples. Blank spike samples were within the QC criterion of 40-120% for all compounds, except one blank spike recovery for di-n-butyl phthalate, which recovered 127%.

MATRIX SPIKE ACCURACY:

Two pairs of matrix spike/matrix spike duplicate (MS/MSD) samples were analyzed with the samples. The matrix spike recovery QC criterion is 40-120%. Out of the two MS/MSD pairs prepared with the samples, approximately 58% of the MS/MSDs were outside the project criterion of 40-120% recovery. However, our standard operating procedure (SOP) criterion is more conservative than the EPA 8270C PAH method criterion, which typically allows an MS recovery of 70-130% or 50-150% for laboratories that calculate control charts. Under the latter criterion, approximately 26% of the MSs are outside the criterion and mostly in the spiked 2087*55 (MVS-041) sample with exception of phthalates in 2087*42 (MVS-001). The matrix spikes in sample 2087*55 generally recovered high with poor precision between the spikes. Acceptable precision was demonstrated by the laboratory duplicates, blank spike duplicate, and the alternate MS/MSD pair. The high MS recovery and poor precision on sample MVS-041 would indicate sample heterogeneity, an insufficient spiking level, and/or potential matrix interferences.

LABORATORY PRECISION:

Precision was evaluated by the analysis of blank, MS duplicates, and laboratory duplicates. Precision was expressed as the relative percentage of difference (RPD) between replicate results and compared with the QC criterion of ≤30% RPD.

Blank Spike Duplicates

Batch one yielded only a blank spike. The blank spike duplicate was lost after clean up. Therefore, no RPD could be calculated and only accuracy is shown with this sample. Batch two contained a blank spike and a blank spike duplicate. The RPDs were calculated and within the criterion (≤30%).

Matrix Spike Duplicates

Approximately half (54%) of the RPD values for 2087*55 (MVS-041) were outside the QC criterion. It was noted the sample showed heterogeneity, insufficient spiking level, and potential matrix interference. The second matrix spike duplicate (MVS-038) indicated good precision with all analytes, yielding RPDs within criterion (≤30%).

Laboratory Duplicates

The RPD values were within the QC criterion for all compounds greater than 10 times the MDL, with the exception of fluoranthene (42%) in sample 2087*13 (MVS-001).

SURROGATE RECOVERIES:

Surrogates are used to determine extraction efficiency and can be used to indicate matrix impacts to samples. A suite of deuterated PAH compounds were spiked into both sample batches and carried through the entire preparation procedure. The QC criteria for surrogates for this project are (40-120%).

In the first batch of samples, recovery of d12 chrysene from sample 2087*149 was outside of criteria (131%). This result appeared to be caused by matrix saturation. Also in this batch, the d12 perylene peak for sample 2087*110 was lost due to a very large sample matrix problem and was not calculable. The result of 6% was considered imprecise to the actual concentration within the peak. This sample was diluted and rerun. Diluting the sample aids in removing matrix interferences. The corresponding diluted sample surrogate result for sample 2078*110 was 115%. For batch two, recovery of d12 chrysene from sample 2087*146 was outside of criteria (0%). The surrogate was lost within the very large sample matrix and was not calculable. Recovery of d10 phenanthrene from sample 2087*153 was outside of criteria (124%) due to matrix. The impact to data is negligible. In every sample noted, four other surrogates supporting the established analyte retention times were within acceptable criteria. It is normal to have outliers, which aids in detecting matrix effects.

PROJECT: Sinclair and Dyes Inlet - Sediment Organics Verification Study
PARAMETER: Organics – PCB congeners and Arochlor 1268
LABORATORY: Battelle Marine Sciences Laboratory, Sequim, Washington
MATRIX: Sediment

SAMPLE CUSTODY AND PROCESSING: Samples were received in two batches. Samples 2087*1-57 were received on September 3, 2003. The second batch, consisting of samples 2087*58-168, was received on January 30, 2004. In each instance, custody of samples was transferred from the MSL Ecotoxicology group to the MSL Environmental Chemistry group. Samples were hand delivered and received frozen. Samples were logged in by assigning a Battelle Central File (CF) identification number (2087) and were entered into Battelle's sample tracking system. The samples were then placed in the MSL Environmental Chemistry sample freezer (-20°C) until confirmatory subset was chosen. In March 2004, a subset of samples were prepared and analyzed for metals. In May 2005, a subset of samples were extracted in two separate batches and analyzed for organic contaminants in two analysis batches (see table below), which is the data set associated with this narrative.

Samples Batch	Extraction Dates	Analysis Dates
Batch 1	5/3/05	5/27/05
Batch 2	5/13/05	6/3/05

QA/QC DATA QUALITY OBJECTIVES:

Analyte	Analytical Method	MS Range of Recovery	Laboratory Control Sample	Surrogate Spike Recovery
PCB	GC-MS	40-120%	40-120%	40-120%

METHODS: All samples were extracted and analyzed in accordance with the following Battelle method; *MSL-O-016 Analysis of PCBs and Chlorinated Pesticides by Gas Chromatography with Electron Capture Detection Following EPA METHOD 8080A Quality Control Criteria.*

Results are reported as not blank corrected in units of µg/kg for each sample.

HOLDING TIMES: The established holding time of 14 days from collection until extraction was met considering samples were at -20°C (in stasis) for the duration until samples were thawed and prepared. The holding time of 40 days from extraction until analyses was also achieved for all samples.

DETECTION LIMITS: Detection limits were determined on a per-sample basis and data are flagged "U" using sample-specific DLs. In most cases, the target DL of 0.075 µg/kg was not met by at least a factor of 10. However, the bulk of the nondetects are near the 0.4 µg/kg reporting limit.

DATA QUALIFIERS:

#	Outside project DQO guidelines for SIS recovery (40-120%)
*	Associated surrogate recovery exceeded guidelines (40-120%)
&	Outside project DQOs for spike recovery (40-120% recovery) or replicate analysis (<30% RPD)
B	Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.
D	Results determined from dilution
E	Estimate, see narrative
J	Analyte concentration is less than the RL, but greater than the MDL
U	Not detected at or above DL shown

EXTRACTION AND ANALYTICAL NOTES / DEVIATIONS:

The samples were extracted and analyzed in two separate batches. The extraction created sample extracts for PAH, phthalate, and chlorobenzene analysis, as well as for PCB analysis.

In sample 2087*110 (MVS-112), the internal standard HBB recovered high (191%), which exceeds criteria of 50-150%. The affected analytes are marked with an "E" to indicate they are estimations.

The spiking solution used to spike the blank spikes and matrix spikes was expired. The deviation from protocol was documented and a comparison evaluation was performed to a new spiking standard in which percentage differences were calculated. The expired spiking solution and subsequent data affected were deemed usable based on this evaluation.

METHOD BLANKS:

Two method blanks are reported, because the samples were set up in two separate extraction batches. PCBs were not detected in the method blanks above the MDL with the exception of PCB 52, 44, and 206. All were detected within 10 times the DL. In the second extraction batch, the blank concentration of PCB 52 exceeded the reporting limit of 0.4 µg/kg (0.837 µg/kg) and all data are flagged accordingly.

BLANK SPIKES:

Two sets of blank spikes are reported, because the samples were set up in two separate extraction batches. Spike recoveries for both blank spikes A and B of set one were outside the criterion (40-120%) for PCBs 18, 52, 66, and 209. Additionally, set one blank spike A had unacceptable recoveries of PCBs 126, 187, 128, 200, and 123, and blank spike B had only one other unacceptable recovery of PCB 153. Set two blank spike recoveries were all within the acceptable range, except PCB 18 in spike B. In the case in which both the blank spike and blank spike duplicate were outside criteria (occurred only in set one for four analytes), the respective affected data were flagged with an "E" for estimation. The associated MS/MSDs did recover within criteria, so the ability to recover out of the matrix has been demonstrated. Please note that all blank spike recoveries were only slightly over the 120% limit (≤138%).

MATRIX SPIKE ACCURACY:

Two sets of MS/MSDs are reported, because the samples were set up in two separate extraction batches. Spike recoveries for just the MS of set one were outside the criterion (40-120%) for PCBs 44, 77, 118, 153, 105, 138, 126, 128, and 180, but only PCB 180 was outside of the criterion for the MSD. Spike recoveries for just the MS of set two were outside the criterion (40-120%) for PCBs 18, 101, 129, 187, 128, and 209, and recoveries of PCB 28, 66, 101, 77, 105, 126, 187, 128, 180, 195, and 209 were outside of criterion for the MSD. With the exception of set two MS recoveries of PCBs 77 (198%), 153 (162%), 105 (154%), 138 (155%), and 126 (154%), note that all other spike recoveries were only slightly over the 120% limit (146%); associated data are considered to be biased slightly high.

LABORATORY PRECISION:

Precision for this set of samples was evaluated by the analysis of MSDs and laboratory duplicates (a second aliquot of the sample carried through the laboratory sample extraction and analysis). Precision was expressed as the relative percentage of difference (RPD) between replicate results and was evaluated relative to the QC criterion of ≤30% RPD.

<u>Matrix Spike Duplicates</u>
The RPD values were not within the QC criterion for PCB congeners in set one for PCBs 77, 118, 153, 105, 138, 126, 128, and 200. These results were mainly driven by the large over recovery in the matrix spike. Set two MSD RPD values were all within the criterion.

Laboratory Duplicates

Two samples were duplicated in each extraction/analytical batch. Sample 2087*13 only had five PCB congeners detected in both replicates, and all values were either within 10 times of the DL or near the reporting limit. Considering the low native levels in the sample, only the RPD values for PCB 28 and 206 were outside criterion (44% and 60%). Sample 2087*23 was duplicated and yielded RPD values all within criterion.

SURROGATE RECOVERIES:

The surrogate recoveries for the PCB congeners were within the project QC criterion with the exception of sample 2087*127 for PCB 198 (134%), sample 2087*146 for PCB 103 (131%), sample 2087*148 for PCB 198, and sample 2087*153 for PCB 198 (129%). The data are flagged and may be an overestimate of the true concentration.

Table B-1. PAH Data

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Sediment PAH Concentration in µg/kg, dry weight			
						Naphthalene	2 Methyl Naphthalene	Acenaphthylene	Acenaphthene
					Surrogate:	*d8 naphthalene*	*d8 naphthalene*	*d10 Acenaphthene*	*d10 Acenaphthene*
2087-1	MVS-009	MVS-009	8/28/03	5/3/05	5/27/05	37.3	25.7	95.4	2.50 U
2087-10	MVS-024	MVS-024	8/28/03	5/3/05	5/27/05	14.1	8.95	16.8	2.96 J
2087-13 R-1	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	12.7	7.56	7.38	3.81 J
2087-13 R-2	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	10.6	6.62	7.26	2.32 J
2087-37	MVS-049	MVS-049	8/30/03	5/3/05	5/27/05	32.5	18.0	16.6	5.46
2087-52	MVS-034	MVS-034	8/31/03	5/3/05	5/27/05	2.44	1.29	1.50 J	1.32 U
2087-55	MVS-041	MVS-041	8/29/03	5/3/05	5/27/05	27.3	16.5	9.38	3.43 J
2087-58	MVS-060	OOUB-G 9	10/28/03	5/3/05	5/27/05	27.1	17.8	19.3	8.39
2087-73	MVS-075	OOUB-G 1	10/30/03	5/3/05	5/27/05	8.69	3.97 J	2.37 J	1.42 U
2087-83	MVS-085	OOUB-G 28	10/28/03	5/3/05	5/27/05	29.5	18.1	35.1	6.95
2087-92	MVS-094	OUBM-G 34	10/23/03	5/3/05	5/27/05	221	29.2	52.5	32.7
2087-110	MVS-112	OUBM-G 55	10/24/03	5/3/05	6/14/05	368	274	1456	20375 D
2087-132	MVS-134	OUBM-G 56	10/3/03	5/3/05	5/27/05	68.9	28.9	84.2	48.4
2087-133	MVS-135	OUBM-G 66	10/2/03	5/3/05	5/27/05	49.5	23.6	70.6	23.1
2087-134	MVS-136	OUBM-G 61	10/2/03	5/3/05	6/14/05	61.9	76.85	287	371
2087-140	MVS-142	OUBM-G 60	10/3/03	5/3/05	6/14/05	100	30.1	175	139
2087-149	MVS-151	OUBM-G 39	10/10/03	5/3/05	6/14/05	167	43.6	399	633
2087-157	MVS-159	OUBM-G 45	10/22/03	5/3/05	5/27/05	33.8	15.1	83.1	45.2
2087-163	MVS-165	OOUB-G 17	10/30/03	5/3/05	5/27/05	28.6	18.6	25.4	8.25
2087-12	MVS-026	MVS-026	8/28/03	5/13/05	6/3/05	14.8	9.42	17.6	5.53
2087-23 R-1	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	31.9	20.0	53.3	8.01
2087-23 R-2	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	24.0	15.8	39.7	7.17
2087-30	MVS-020	MVS-020	8/29/03	5/13/05	6/3/05	13.1	10.8	17.4	4.37
2087-42	MVS-038	MVS-038	8/30/03	5/13/05	6/3/05	1.84 J	1.85 J	1.63 J	1.94 J
2087-86	MVS-088	OOUB-G 21	10/30/03	5/13/05	6/3/05	43.6	26.0	46.2	12.8
2087-127	MVS-129	OUBM-G 63	10/13/03	5/13/05	6/3/05	79.0	54.0	314	132
2087-148	MVS-150	OUBM-G 71	10/10/03	5/13/05	6/3/05	25.8	34.1	328	8.06
2087-153	MVS-155	OUBM-G 41	10/22/03	5/13/05	6/3/05	50.0	25.2	61.3	61.8

Bold Italic type denotes samples with analytes over high std of cal curve, which are R flagged

***** Associated Surrogate recovery exceeded guidelines (40-120%)

D Results determined from dilution

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

R Data exceeds calibration range; see narrative for data use limits

Table B-1. PAH Data *(Continued)*

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Sediment PAH Concentration in µg/kg, dry weight				
						Fluorene	**Phenanthrene**	**Anthracene**	**Fluoranthene**	**Pyrene**
					Surrogate:	*d10 Acenaphthene*	*d10 phenanthrene*	*d10 phenanthrene*	*d12 chrysene*	*d12 chrysene*
2087-1	MVS-009	MVS-009	8/28/03	5/3/05	5/27/05	27.6	202	241	776	1088
2087-10	MVS-024	MVS-024	8/28/03	5/3/05	5/27/05	8.29	46.9	32.2	132	174
2087-13 R-1	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	6.10	51.7	18.5	202	182
2087-13 R-2	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	5.04	39.0	20.5	132	136
2087-37	MVS-049	MVS-049	8/30/03	5/3/05	5/27/05	13.4	79.4	34.9	137	153
2087-52	MVS-034	MVS-034	8/31/03	5/3/05	5/27/05	1.14 J	6.02	2.74 J	14.1	19.3
2087-55	MVS-041	MVS-041	8/29/03	5/3/05	5/27/05	6.80	49.2	25.8	105	129
2087-58	MVS-060	OOUB-G 9	10/28/03	5/3/05	5/27/05	17.0	91.0	48.3	299	14.2 U
2087-73	MVS-075	OOUB-G 1	10/30/03	5/3/05	5/27/05	2.92 J	19.2	6.01	45.2	45.9
2087-83	MVS-085	OOUB-G 28	10/28/03	5/3/05	5/27/05	18.8	102	74.8	287	10.3 U
2087-92	MVS-094	OUBM-G 34	10/23/03	5/3/05	5/27/05	50.3	242	191	723	1913
2087-110	MVS-112	OUBM-G 55	10/24/03	5/3/05	6/14/05	29165 D	***159071*** DR	***94230*** DR	***144865*** DR	***100476*** DR
2087-132	MVS-134	OUBM-G 56	10/3/03	5/3/05	5/27/05	88.0	447	373	1743	1933
2087-133	MVS-135	OUBM-G 66	10/2/03	5/3/05	5/27/05	51.4	265	229	836	10.8 U
2087-134	MVS-136	OUBM-G 61	10/2/03	5/3/05	6/14/05	348	1923	1170	7038 D*	7180 D*
2087-140	MVS-142	OUBM-G 60	10/3/03	5/3/05	6/14/05	213	946	1004	7931 D	9324 D
2087-149	MVS-151	OUBM-G 39	10/10/03	5/3/05	6/14/05	408	3343 D*	2000	14071 D*	13982 D*
2087-157	MVS-159	OUBM-G 45	10/22/03	5/3/05	5/27/05	125	699	623	***2391*** R	***2270*** R
2087-163	MVS-165	OOUB-G 17	10/30/03	5/3/05	5/27/05	17.8	103	52.6	249	319
2087-12	MVS-026	MVS-026	8/28/03	5/13/05	6/3/05	10.7	69.5	35.9	197	232
2087-23 R-1	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	21.7	149	112	445	600
2087-23 R-2	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	18.2	118	87.5	355	475
2087-30	MVS-020	MVS-020	8/29/03	5/13/05	6/3/05	9.17	49.3	29.4	135	186
2087-42	MVS-038	MVS-038	8/30/03	5/13/05	6/3/05	1.48 J	7.16	5.98	20.8	25.3
2087-86	MVS-088	OOUB-G 21	10/30/03	5/13/05	6/3/05	27.1	161	101	417	598
2087-127	MVS-129	OUBM-G 63	10/13/03	5/13/05	6/3/05	205	2067	958	15691 D	14572 D
2087-148	MVS-150	OUBM-G 71	10/10/03	5/13/05	6/3/05	32.6	90.6	128	228	462
2087-153	MVS-155	OUBM-G 41	10/22/03	5/13/05	6/3/05	86.7	417 *	311 *	1296	1397

Bold Italic type denotes samples with analytes over high std of cal curve, which are R flagged

***** Associated Surrogate recovery exceeded guidelines (40-120%)

D Results determined from dilution

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

R Data exceeds calibration range; see narrative for data use limits

Table B-1. PAH Data *(Continued)*

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Sediment PAH Concentration in µg/kg, dry weight				
						Benzo[a] Anthracene	Chrysene	Benzo [b] Fluoranthene	Benzo [k] Fluoranthene	Benzo [e] Pyrene
					Surrogate:	*d12 chrysene*	*d12 chrysene*	*d12 perylene*	*d12 perylene*	*d12 perylene*
2087-1	MVS-009	MVS-009	8/28/03	5/3/05	5/27/05	568	607	612	202	396
2087-10	MVS-024	MVS-024	8/28/03	5/3/05	5/27/05	90.9	106	156	49.7	93.1
2087-13 R-1	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	71.0	117	121	41.0	64.3
2087-13 R-2	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	58.6	88.7	111	36.8	61.6
2087-37	MVS-049	MVS-049	8/30/03	5/3/05	5/27/05	84.4	99.7	141	45.8	75.2
2087-52	MVS-034	MVS-034	8/31/03	5/3/05	5/27/05	8.84	8.14	15.1	4.68	10.9
2087-55	MVS-041	MVS-041	8/29/03	5/3/05	5/27/05	77.2	81.9	128	39.4	109
2087-58	MVS-060	OOUB-G 9	10/28/03	5/3/05	5/27/05	136	188	349	111	187
2087-73	MVS-075	OOUB-G 1	10/30/03	5/3/05	5/27/05	19.5	33.3	45.0	13.9	32.0
2087-83	MVS-085	OOUB-G 28	10/28/03	5/3/05	5/27/05	196	234	376	124	213
2087-92	MVS-094	OUBM-G 34	10/23/03	5/3/05	5/27/05	397	628	1326	457	646
2087-110	MVS-112	OUBM-G 55	10/24/03	5/3/05	6/14/05	***49183*** DI	***55950*** DR	***34025*** DR	14387 D	20737 D
2087-132	MVS-134	OUBM-G 56	10/3/03	5/3/05	5/27/05	657	1005	1296	441	668
2087-133	MVS-135	OUBM-G 66	10/2/03	5/3/05	5/27/05	493	700	1170	396	593
2087-134	MVS-136	OUBM-G 61	10/2/03	5/3/05	6/14/05	2340	4428 D*	3810	1315	1836
2087-140	MVS-142	OUBM-G 60	10/3/03	5/3/05	6/14/05	2332	3968 D	3080 D	1065	1397
2087-149	MVS-151	OUBM-G 39	10/10/03	5/3/05	6/14/05	5288 D*	8750 D*	6547 D	2505	3123 D
2087-157	MVS-159	OUBM-G 45	10/22/03	5/3/05	5/27/05	1073	1716	1850	634	951
2087-163	MVS-165	OOUB-G 17	10/30/03	5/3/05	5/27/05	153	172	299	96.2	169
2087-12	MVS-026	MVS-026	8/28/03	5/13/05	6/3/05	116	155	248	84.5	140
2087-23 R-1	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	284	318	420	141	259
2087-23 R-2	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	238	270	335	110	206
2087-30	MVS-020	MVS-020	8/29/03	5/13/05	6/3/05	87.6	104	167	53.1	103
2087-42	MVS-038	MVS-038	8/30/03	5/13/05	6/3/05	12.6	12.9	18.2	5.70	9.90
2087-86	MVS-088	OOUB-G 21	10/30/03	5/13/05	6/3/05	254	318	494	164	306
2087-127	MVS-129	OUBM-G 63	10/13/03	5/13/05	6/3/05	3757 D	7272 D	6579 D	2703	3592
2087-148	MVS-150	OUBM-G 71	10/10/03	5/13/05	6/3/05	214	289	1629	501	591
2087-153	MVS-155	OUBM-G 41	10/22/03	5/13/05	6/3/05	681	1300	1244	444	596

Bold Italic type denotes samples with analytes over high std of cal curve, which are R flagged

***** Associated Surrogate recovery exceeded guidelines (40-120%)

D Results determined from dilution

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

R Data exceeds calibration range; see narrative for data use limits

Table B-1. PAH Data *(Continued)*

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Sediment PAH Concentration in µg/kg, dry weight				
						Benzo [a] Pyrene	Perylene	Indeno [1,2,3-c,d] Pyrene	Dibenzo [a,h] Anthracene	Benzo[g,h,i] Perylene
					Surrogate:	*d12 perylene*	*d12 perylene*	*d12 perylene*	*d12 perylene*	*d12 perylene*
2087-1	MVS-009	MVS-009	8/28/03	5/3/05	5/27/05	594	135	435	78.8	431
2087-10	MVS-024	MVS-024	8/28/03	5/3/05	5/27/05	110	37.8	106	18.4	100
2087-13 R-1	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	65.2	36.3	65.7	12.2	60.3
2087-13 R-2	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	62.5	36.1	62.8	11.5	58.5
2087-37	MVS-049	MVS-049	8/30/03	5/3/05	5/27/05	88.8	51.2	78.9	14.9	74.8
2087-52	MVS-034	MVS-034	8/31/03	5/3/05	5/27/05	11.2	3.72 J	14.5	2.25 J	21.3
2087-55	MVS-041	MVS-041	8/29/03	5/3/05	5/27/05	129	35.1	171	25.9	222
2087-58	MVS-060	OOUB-G 9	10/28/03	5/3/05	5/27/05	170	73.5	157	27.9	153
2087-73	MVS-075	OOUB-G 1	10/30/03	5/3/05	5/27/05	24.5	12.3	27.0	5.52	34.2
2087-83	MVS-085	OOUB-G 28	10/28/03	5/3/05	5/27/05	262	87.8	184	31.2	158
2087-92	MVS-094	OUBM-G 34	10/23/03	5/3/05	5/27/05	703	171	422	87.0	321
2087-110	MVS-112	OUBM-G 55	10/24/03	5/3/05	6/14/05	24061 D	6086 D	8691 D	3121 D	1119 *
2087-132	MVS-134	OUBM-G 56	10/3/03	5/3/05	5/27/05	765	220	444	89.6	513
2087-133	MVS-135	OUBM-G 66	10/2/03	5/3/05	5/27/05	702	187	427	83.3	332
2087-134	MVS-136	OUBM-G 61	10/2/03	5/3/05	6/14/05	1839	426	942	196	642
2087-140	MVS-142	OUBM-G 60	10/3/03	5/3/05	6/14/05	1637	358	898	216	648
2087-149	MVS-151	OUBM-G 39	10/10/03	5/3/05	6/14/05	3742 D	809	2075	534	1523
2087-157	MVS-159	OUBM-G 45	10/22/03	5/3/05	5/27/05	1071	278	717	164	538
2087-163	MVS-165	OOUB-G 17	10/30/03	5/3/05	5/27/05	183	74.2	170	32.0	157
2087-12	MVS-026	MVS-026	8/28/03	5/13/05	6/3/05	152	49.9	140	26.2	129
2087-23 R-1	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	345	98.0	276	48.8	270
2087-23 R-2	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	273	82.4	224	39.8	223
2087-30	MVS-020	MVS-020	8/29/03	5/13/05	6/3/05	116	42.5	108	18.0	105
2087-42	MVS-038	MVS-038	8/30/03	5/13/05	6/3/05	14.7	4.03	10.1	2.18 U	10.2
2087-86	MVS-088	OOUB-G 21	10/30/03	5/13/05	6/3/05	361	124	297	55.4	289
2087-127	MVS-129	OUBM-G 63	10/13/03	5/13/05	6/3/05	3198	691	1925	424	1416
2087-148	MVS-150	OUBM-G 71	10/10/03	5/13/05	6/3/05	1645	297	993	215	998
2087-153	MVS-155	OUBM-G 41	10/22/03	5/13/05	6/3/05	634	170	443	96.2	356

Bold Italic type denotes samples with analytes over high std of cal curve, which are R flagged

***** Associated Surrogate recovery exceeded guidelines (40-120%)

D Results determined from dilution

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

R Data exceeds calibration range; see narrative for data use limits

Table B-1. PAH Data *(Continued)*

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Surrogate Recovery				
					Surrogate:	d8 naphthalene	d10 acenaphthene	d10 phenanthrene	d12 chrysene	d12 perylene
2087-1	MVS-009	MVS-009	8/28/03	5/3/05	5/27/05	83%	94%	107%	99%	69%
2087-10	MVS-024	MVS-024	8/28/03	5/3/05	5/27/05	80%	94%	106%	111%	76%
2087-13 R-1	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	77%	85%	94%	97%	69%
2087-13 R-2	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	82%	89%	101%	95%	69%
2087-37	MVS-049	MVS-049	8/30/03	5/3/05	5/27/05	84%	92%	101%	92%	66%
2087-52	MVS-034	MVS-034	8/31/03	5/3/05	5/27/05	86%	93%	107%	110%	77%
2087-55	MVS-041	MVS-041	8/29/03	5/3/05	5/27/05	90%	96%	105%	112%	84%
2087-58	MVS-060	OOUB-G 9	10/28/03	5/3/05	5/27/05	77%	83%	85%	86%	71%
2087-73	MVS-075	OOUB-G 1	10/30/03	5/3/05	5/27/05	73%	83%	90%	89%	70%
2087-83	MVS-085	OOUB-G 28	10/28/03	5/3/05	5/27/05	78%	82%	82%	76%	68%
2087-92	MVS-094	OUBM-G 34	10/23/03	5/3/05	5/27/05	82%	85%	82%	75%	69%
2087-110	MVS-112	OUBM-G 55	10/24/03	5/3/05	6/14/05	79%	84%	52%	70%	6%
2087-132	MVS-134	OUBM-G 56	10/3/03	5/3/05	5/27/05	75%	78%	78%	74%	64%
2087-133	MVS-135	OUBM-G 66	10/2/03	5/3/05	5/27/05	74%	86%	91%	85%	84%
2087-134	MVS-136	OUBM-G 61	10/2/03	5/3/05	6/14/05	83%	93%	99%	96%	87%
2087-140	MVS-142	OUBM-G 60	10/3/03	5/3/05	6/14/05	74%	88%	99%	94%	79%
2087-149	MVS-151	OUBM-G 39	10/10/03	5/3/05	6/14/05	78%	96%	107%	131% #	87%
2087-157	MVS-159	OUBM-G 45	10/22/03	5/3/05	5/27/05	76%	91%	102%	105%	80%
2087-163	MVS-165	OOUB-G 17	10/30/03	5/3/05	5/27/05	71%	82%	93%	99%	76%
2087-12	MVS-026	MVS-026	8/28/03	5/13/05	6/3/05	102%	106%	115%	93%	81%
2087-23 R-1	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	99%	101%	107%	89%	77%
2087-23 R-2	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	76%	83%	90%	76%	64%
2087-30	MVS-020	MVS-020	8/29/03	5/13/05	6/3/05	54%	59%	65%	56%	47%
2087-42	MVS-038	MVS-038	8/30/03	5/13/05	6/3/05	94%	94%	101%	86%	80%
2087-86	MVS-088	OOUB-G 21	10/30/03	5/13/05	6/3/05	103%	108%	115%	92%	82%
2087-127	MVS-129	OUBM-G 63	10/13/03	5/13/05	6/3/05	94%	104%	107%	79%	80%
2087-148	MVS-150	OUBM-G 71	10/10/03	5/13/05	6/3/05	89%	95%	104%	86%	81%
2087-153	MVS-155	OUBM-G 41	10/22/03	5/13/05	6/3/05	106%	114%	124% #	92%	86%

Bold Italic type denotes samples with analytes over high std of cal curve, which are R flagged

***** Associated Surrogate recovery exceeded guidelines (40-120%)

D Results determined from dilution

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

R Data exceeds calibration range; see narrative for data use limits

Table B-2. Chlorobenzene Data

						Sediment Chlorobenzene Concentration (µg/kg dry weight)			
MSL Sample ID	**Client ID**		**Collection Date**	**Extraction Date**	**Analysis Date**	**1,2 Dichloro-benzene**	**1,4 Dichloro-benzene**	**1,2,4 Trichloro-benzene**	**Hexachloro-benzene**
					Surrogate:	*d8 naphthalene*	*d8 naphthalene*	*d8 naphthalene*	*d10 phenanthrene*
2087-1	MVS-009	MVS-009	8/28/03	5/3/05	5/27/05	4.85 UE	4.85 UE	4.85 UE	4.85 UE
2087-10	MVS-024	MVS-024	8/28/03	5/3/05	5/27/05	4.25 UE	4.25 UE	4.25 UE	4.25 UE
2087-13 R-1	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	3.55 UE	3.55 UE	3.55 UE	3.55 UE
2087-13 R-2	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	3.50 UE	3.50 UE	3.50 UE	3.50 UE
2087-37	MVS-049	MVS-049	8/30/03	5/3/05	5/27/05	4.67 UE	4.67 UE	4.67 UE	4.67 UE
2087-52	MVS-034	MVS-034	8/31/03	5/3/05	5/27/05	2.57 UE	2.67 E	2.57 UE	2.57 UE
2087-55	MVS-041	MVS-041	8/29/03	5/3/05	5/27/05	2.86 UE	2.86 UE	2.86 UE	2.86 UE
2087-58	MVS-060	OOUB-G 9	10/28/03	5/3/05	5/27/05	7.10 UE	7.10 UE	7.10 UE	7.10 UE
2087-73	MVS-075	OOUB-G 1	10/30/03	5/3/05	5/27/05	2.75 UE	2.75 UE	2.75 UE	2.75 UE
2087-83	MVS-085	OOUB-G 28	10/28/03	5/3/05	5/27/05	5.15 UE	5.15 UE	5.15 UE	5.15 UE
2087-92	MVS-094	OUBM-G 34	10/23/03	5/3/05	5/27/05	4.45 UE	4.45 UE	4.45 UE	4.45 UE
2087-110	MVS-112	OUBM-G 55	10/24/03	5/3/05	6/14/05	4.97 UE	4.97 UE	4.97 UE	4.97 UE
2087-132	MVS-134	OUBM-G 56	10/3/03	5/3/05	5/27/05	41.9 E	5.47 UE	5.47 UE	5.47 UE
2087-133	MVS-135	OUBM-G 66	10/2/03	5/3/05	5/27/05	37.1 E	5.40 UE	5.40 UE	5.40 UE
2087-134	MVS-136	OUBM-G 61	10/2/03	5/3/05	6/14/05	5.62 UE	5.62 UE	5.62 UE	5.62 UE
2087-140	MVS-142	OUBM-G 60	10/3/03	5/3/05	6/14/05	20.4 UE	4.32 UE	4.32 UE	4.30 UE
2087-149	MVS-151	OUBM-G 39	10/10/03	5/3/05	6/14/05	50.1 UE	54.2 UE	4.93 UE	4.90 UE
2087-157	MVS-159	OUBM-G 45	10/22/03	5/3/05	5/27/05	4.30 UE	4.30 UE	4.30 UE	4.30 UE
2087-163	MVS-165	OOUB-G 17	10/30/03	5/3/05	5/27/05	6.81 UE	6.81 UE	6.81 UE	6.81 UE
2087-12	MVS-026	MVS-026	8/28/03	5/13/05	6/3/05	4.89 UE	4.89 UE	4.89 UE	4.89 UE
2087-23 R-1	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	6.48 UE	6.48 UE	6.48 UE	6.48 UE
2087-23 R-2	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	6.48 UE	6.48 UE	6.48 UE	6.48 UE
2087-30	MVS-020	MVS-020	8/29/03	5/13/05	6/3/05	6.98 UE	6.98 UE	6.98 UE	6.98 UE
2087-42	MVS-038	MVS-038	8/30/03	5/13/05	6/3/05	2.56 UE	2.56 UE	2.56 UE	2.56 UE
2087-86	MVS-088	OOUB-G 21	10/30/03	5/13/05	6/3/05	6.78 UE	6.78 UE	6.78 UE	6.78 UE
2087-127	MVS-129	OUBM-G 63	10/13/03	5/13/05	6/3/05	47.1 E	5.95 UE	5.95 UE	5.95 UE
2087-148	MVS-150	OUBM-G 71	10/10/03	5/13/05	6/3/05	5.99 E	2.89 UE	2.89 UE	2.89 UE
2087-153	MVS-155	OUBM-G 41	10/22/03	5/13/05	6/3/05	45.7 E	5.59 E	5.46 UE	5.46 UE*

E Estimate; see narrative
U Analyte not detected at or above the laboratory achieved detection limit, MDL reported
* Associated Surrogate recovery exceeded guidelines (40-120%)

Table B-2. Chlorobenzene Data *(Continued)*

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Surrogate Recovery				
					Surrogate:	d8 naphthalene	d10 acenaphthene	d10 phenanthrene	d12 chrysene	d12 perylene
2087-1	MVS-009	MVS-009	8/28/03	5/3/05	5/27/05	83%	94%	107%	99%	69%
2087-10	MVS-024	MVS-024	8/28/03	5/3/05	5/27/05	80%	94%	106%	111%	76%
2087-13 R-1	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	77%	85%	94%	97%	69%
2087-13 R-2	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	82%	89%	101%	95%	69%
2087-37	MVS-049	MVS-049	8/30/03	5/3/05	5/27/05	84%	92%	101%	92%	66%
2087-52	MVS-034	MVS-034	8/31/03	5/3/05	5/27/05	86%	93%	107%	110%	77%
2087-55	MVS-041	MVS-041	8/29/03	5/3/05	5/27/05	90%	96%	105%	112%	84%
2087-58	MVS-060	OOUB-G 9	10/28/03	5/3/05	5/27/05	77%	83%	85%	86%	71%
2087-73	MVS-075	OOUB-G 1	10/30/03	5/3/05	5/27/05	73%	83%	90%	89%	70%
2087-83	MVS-085	OOUB-G 28	10/28/03	5/3/05	5/27/05	78%	82%	82%	76%	68%
2087-92	MVS-094	OUBM-G 34	10/23/03	5/3/05	5/27/05	82%	85%	82%	75%	69%
2087-110	MVS-112	OUBM-G 55	10/24/03	5/3/05	6/14/05	79%	84%	52%	70%	6%
2087-132	MVS-134	OUBM-G 56	10/3/03	5/3/05	5/27/05	75%	78%	78%	74%	64%
2087-133	MVS-135	OUBM-G 66	10/2/03	5/3/05	5/27/05	74%	86%	91%	85%	84%
2087-134	MVS-136	OUBM-G 61	10/2/03	5/3/05	6/14/05	83%	93%	99%	96%	87%
2087-140	MVS-142	OUBM-G 60	10/3/03	5/3/05	6/14/05	74%	88%	99%	94%	79%
2087-149	MVS-151	OUBM-G 39	10/10/03	5/3/05	6/14/05	78%	96%	107%	131% #	87%
2087-157	MVS-159	OUBM-G 45	10/22/03	5/3/05	5/27/05	76%	91%	102%	105%	80%
2087-163	MVS-165	OOUB-G 17	10/30/03	5/3/05	5/27/05	71%	82%	93%	99%	76%
2087-12	MVS-026	MVS-026	8/28/03	5/13/05	6/3/05	102%	106%	115%	93%	81%
2087-23 R-1	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	99%	101%	107%	89%	77%
2087-23 R-2	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	76%	83%	90%	76%	64%
2087-30	MVS-020	MVS-020	8/29/03	5/13/05	6/3/05	54%	59%	65%	56%	47%
2087-42	MVS-038	MVS-038	8/30/03	5/13/05	6/3/05	94%	94%	101%	86%	80%
2087-86	MVS-088	OOUB-G 21	10/30/03	5/13/05	6/3/05	103%	108%	115%	92%	82%
2087-127	MVS-129	OUBM-G 63	10/13/03	5/13/05	6/3/05	94%	104%	107%	79%	80%
2087-148	MVS-150	OUBM-G 71	10/10/03	5/13/05	6/3/05	89%	95%	104%	86%	81%
2087-153	MVS-155	OUBM-G 41	10/22/03	5/13/05	6/3/05	106%	114%	124% #	92%	86%

E Estimate; see narrative

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

* Associated Surrogate recovery exceeded guidelines (40-120%)

Table B-3. Phthalate Data

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Sediment Phthalate Concentration (µg/kg, dry weight)					
						Dimethyl Phthalate	Diethyl Phthalate	Di N Butyl Phthalate	Butyl Benzyl Phthalate	Bis (2-ethylhexyl) Phthalate	Di-N-Octyl Phthalate
					Surrogate:	*d8 naphthalene*	*d10 Acenaphthene*	*d10 phenanthrene*	*d12 chrysene*	*d12 chrysene*	*d12 chrysene*
2087-1	MVS-009	MVS-009	8/28/03	5/3/05	5/27/05	9.70 U	19.0 B	99.0 B	43.6 B	440	9.70 U
2087-10	MVS-024	MVS-024	8/28/03	5/3/05	5/27/05	8.50 U	20.8 B	91.2 B	36.6 B	131 B	13.4
2087-13 R-1	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	7.10 U	10.9 B	102 B	9.58 B	397	20.1
2087-13 R-2	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	7.00 U	25.1 B	103 B	45.6 B	309	19.7
2087-37	MVS-049	MVS-049	8/30/03	5/3/05	5/27/05	9.34 U	36.5 B	144 B	35.6 B	172 B	12.3
2087-52	MVS-034	MVS-034	8/31/03	5/3/05	5/27/05	5.14 U	19.6 B	63.7 B	13.8 B	96.6 B	5.78
2087-55	MVS-041	MVS-041	8/29/03	5/3/05	5/27/05	5.72 U	16.2 B	94.9 B	16.1 B	136 B	5.91
2087-58	MVS-060	OOUB-G 9	10/28/03	5/3/05	5/27/05	14.2 U	124	260 B	132	667	21.1
2087-73	MVS-075	OOUB-G 1	10/30/03	5/3/05	5/27/05	5.50 U	6.44 B	190 B	114	576	30.3
2087-83	MVS-085	OOUB-G 28	10/28/03	5/3/05	5/27/05	10.3 U	24.5 B	211 B	62.9 B	433	10.3 U
2087-92	MVS-094	OUBM-G 34	10/23/03	5/3/05	5/27/05	8.90 U	8.90 UB	137 B	226	2220	45.6
2087-110	MVS-112	OUBM-G 55	10/24/03	5/3/05	6/14/05	9.9 U	40.0 B	487 D	525	620 D	10.7
2087-132	MVS-134	OUBM-G 56	10/3/03	5/3/05	5/27/05	10.9 U	10.9 UB	319 B	154	779	35.3
2087-133	MVS-135	OUBM-G 66	10/2/03	5/3/05	5/27/05	15.8	10.8 UB	277 B	98.3	1087	37.9
2087-134	MVS-136	OUBM-G 61	10/2/03	5/3/05	6/14/05	11.2 U	15.0 B	151 B	139	763	30.4
2087-140	MVS-142	OUBM-G 60	10/3/03	5/3/05	6/14/05	8.6 U	12.5 B	187 B	118	585	25.6
2087-149	MVS-151	OUBM-G 39	10/10/03	5/3/05	6/14/05	57.0	19.1 B	194 B	314	2486	187
2087-157	MVS-159	OUBM-G 45	10/22/03	5/3/05	5/27/05	8.60 U	12.6 B	119 B	22.3 B	590	26.3
2087-163	MVS-165	OOUB-G 17	10/30/03	5/3/05	5/27/05	13.6 U	30.3 B	239 B	101	397	23.2
2087-12	MVS-026	MVS-026	8/28/03	5/13/05	6/3/05	9.78 U	13.6 B	180 B	42.4 B	223 B	10.1
2087-23 R-1	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	13.0 U	15.2 B	197 B	51.1 B	231 B	13.6
2087-23 R-2	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	13.0 U	13.0 UB	172 B	49.1 B	244 B	13.0 U
2087-30	MVS-020	MVS-020	8/29/03	5/13/05	6/3/05	14.0 U	14.0 UB	133 B	79.2 B	307 B	14.0 U
2087-42	MVS-038	MVS-038	8/30/03	5/13/05	6/3/05	5.12 U	6.83 B	85.6 B	11.0 B	54.8 B	5.12 U
2087-86	MVS-088	OOUB-G 21	10/30/03	5/13/05	6/3/05	13.6 U	13.6 UB	141 B	82.2 B	389	22.1
2087-127	MVS-129	OUBM-G 63	10/13/03	5/13/05	6/3/05	22.3	24.3 B	475 B	380	1523	53.0
2087-148	MVS-150	OUBM-G 71	10/10/03	5/13/05	6/3/05	5.78 U	6.23 B	87.4 B	5.78 UB	101 B	5.94
2087-153	MVS-155	OUBM-G 41	10/22/03	5/13/05	6/3/05	10.9 U	15.5 B	186 B*	88.1	725	19.9

***** Associated Surrogate recovery exceeded guidelines (40-120%)

D Results determined from dilution

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-3. Phthalate Data *(Continued)*

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Surrogate Recovery				
					Surrogate:	d8 naphthalene	d10 acenaphthene	d10 phenanthrene	d12 chrysene	d12 perylene
2087-1	MVS-009	MVS-009	8/28/03	5/3/05	5/27/05	83%	94%	107%	99%	69%
2087-10	MVS-024	MVS-024	8/28/03	5/3/05	5/27/05	80%	94%	106%	111%	76%
2087-13 R-1	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	77%	85%	94%	97%	69%
2087-13 R-2	MVS-001	MVS-001	8/29/03	5/3/05	5/27/05	82%	89%	101%	95%	69%
2087-37	MVS-049	MVS-049	8/30/03	5/3/05	5/27/05	84%	92%	101%	92%	66%
2087-52	MVS-034	MVS-034	8/31/03	5/3/05	5/27/05	86%	93%	107%	110%	77%
2087-55	MVS-041	MVS-041	8/29/03	5/3/05	5/27/05	90%	96%	105%	112%	84%
2087-58	MVS-060	OOUB-G 9	10/28/03	5/3/05	5/27/05	77%	83%	85%	86%	71%
2087-73	MVS-075	OOUB-G 1	10/30/03	5/3/05	5/27/05	73%	83%	90%	89%	70%
2087-83	MVS-085	OOUB-G 28	10/28/03	5/3/05	5/27/05	78%	82%	82%	76%	68%
2087-92	MVS-094	OUBM-G 34	10/23/03	5/3/05	5/27/05	82%	85%	82%	75%	69%
2087-110	MVS-112	OUBM-G 55	10/24/03	5/3/05	6/14/05	79%	84%	52%	70%	6%
2087-132	MVS-134	OUBM-G 56	10/3/03	5/3/05	5/27/05	75%	78%	78%	74%	64%
2087-133	MVS-135	OUBM-G 66	10/2/03	5/3/05	5/27/05	74%	86%	91%	85%	84%
2087-134	MVS-136	OUBM-G 61	10/2/03	5/3/05	6/14/05	83%	93%	99%	96%	87%
2087-140	MVS-142	OUBM-G 60	10/3/03	5/3/05	6/14/05	74%	88%	99%	94%	79%
2087-149	MVS-151	OUBM-G 39	10/10/03	5/3/05	6/14/05	78%	96%	107%	131% #	87%
2087-157	MVS-159	OUBM-G 45	10/22/03	5/3/05	5/27/05	76%	91%	102%	105%	80%
2087-163	MVS-165	OOUB-G 17	10/30/03	5/3/05	5/27/05	71%	82%	93%	99%	76%
2087-12	MVS-026	MVS-026	8/28/03	5/13/05	6/3/05	102%	106%	115%	93%	81%
2087-23 R-1	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	99%	101%	107%	89%	77%
2087-23 R-2	MVS-011	MVS-011	8/29/03	5/13/05	6/3/05	76%	83%	90%	76%	64%
2087-30	MVS-020	MVS-020	8/29/03	5/13/05	6/3/05	54%	59%	65%	56%	47%
2087-42	MVS-038	MVS-038	8/30/03	5/13/05	6/3/05	94%	94%	101%	86%	80%
2087-86	MVS-088	OOUB-G 21	10/30/03	5/13/05	6/3/05	103%	108%	115%	92%	82%
2087-127	MVS-129	OUBM-G 63	10/13/03	5/13/05	6/3/05	94%	104%	107%	79%	80%
2087-148	MVS-150	OUBM-G 71	10/10/03	5/13/05	6/3/05	89%	95%	104%	86%	81%
2087-153	MVS-155	OUBM-G 41	10/22/03	5/13/05	6/3/05	106%	114%	124% #	92%	86%

***** Associated Surrogate recovery exceeded guidelines (40-120%)

D Results determined from dilution

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-4. PCB Data

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Sediment PCB Concentration in µg/kg, dry weight					
						PCB 8	PCB 18	PCB 28	PCB 52	PCB 44	PCB 66
2087-1	MVS-009	MVS-009	*8/28/03*	*5/3/05*	5/28/05	0.891 U	0.316 UE	3.01	0.288 UE	0.0863 U	0.201 UE
2087-10	MVS-024	MVS-024	*8/28/03*	*5/3/05*	5/28/05	0.781 U	0.277 UE	0.151 U	0.571 E	0.0755 U	0.176 UE
2087-13 R-1	MVS-001	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.652 U	0.231 UE	1.09	0.210 UE	0.650	0.147 UE
2087-13 R-2	MVS-001	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.643 U	0.228 UE	1.70	0.207 UE	0.0622 U	0.145 UE
2087-37	MVS-049	MVS-049	*8/30/03*	*5/3/05*	5/28/05	0.858 U	0.304 UE	3.79	0.277 UE	0.0830 U	0.194 UE
2087-52	MVS-034	MVS-034	*8/31/03*	*5/3/05*	5/28/05	0.472 U	0.168 UE	0.597	0.152 UE	0.0457 U	0.107 UE
2087-55	MVS-041	MVS-041	*8/29/03*	*5/3/05*	5/28/05	0.526 U	0.187 UE	0.102 U	0.388 JE	0.0509 U	0.119 UE
2087-58	MVS-060	OOUB-G 9	*10/28/03*	*5/3/05*	5/28/05	1.31 U	0.463 UE	0.253 U	0.421 UE	0.126 U	0.295 UE
2087-70	MVS-072	OUBM-G 52	*10/24/03*	*5/13/05*	6/3/05	0.982 U	0.348 U	3.24	7.78 B	4.42	0.222 U
2087-73	MVS-075	OOUB-G 1	*10/30/03*	*5/3/05*	5/28/05	0.505 U	0.523 E	4.16	4.96 E	3.66	0.114 UE
2087-83	MVS-085	OOUB-G 28	*10/28/03*	*5/3/05*	5/28/05	0.946 U	0.376 JE	0.183 U	0.641 E	0.0916 U	0.214 UE
2087-87	MVS-089	OUBM-G 25	*10/27/03*	*5/13/05*	6/3/05	1.09 U	0.386 U	0.211 U	7.31 B	3.02	0.246 U
2087-92	MVS-094	OUBM-G 34	*10/23/03*	*5/3/05*	5/28/05	0.818 U	0.290 UE	0.158 U	10.86 E	6.01	0.185 UE
2087-110	MVS-112	OUBM-G 55	*10/24/03*	*5/3/05*	5/28/05	0.913 U	0.324 UE	2.53	0.295 UE	6.76	258 E
2087-111	MVS-113	OUBM-G 46	*10/23/03*	*5/13/05*	6/3/05	0.590 U	0.209 U	1.80	5.70 B	4.08	0.133 U
2087-131	MVS-133	OUBM-G 22	*10/27/03*	*5/13/05*	6/3/05	1.30 U	0.462 U	5.35	1.84 B	0.126 U	0.294 U
2087-132	MVS-134	OUBM-G 56	*10/3/03*	*5/3/05*	5/28/05	1.01 U	1.11 E	0.195 U	5.12 E	3.24	0.227 UE
2087-133	MVS-135	OUBM-G 66	*10/2/03*	*5/3/05*	5/28/05	0.992 U	0.352 UE	0.192 U	8.29 E	4.45	0.224 UE
2087-134	MVS-136	OUBM-G 61	*10/2/03*	*5/3/05*	5/28/05	1.03 U	0.366 UE	0.200 U	1.01 E	1.40	0.233 UE
2087-135	MVS-137	OUBM-G 69	*10/13/03*	*5/13/05*	6/3/05	0.678 U	0.240 U	1.58	0.504 B	0.0656 U	0.153 U
2087-140	MVS-142	OUBM-G 60	*10/3/03*	*5/3/05*	5/28/05	0.794 U	0.282 UE	0.154 U	3.98 E	0.0768 U	0.179 UE
2087-146	MVS-148	OUBM-G 1	*10/13/03*	*5/13/05*	6/3/05	0.940 U	4.42	6.90	0.303 BU	0.0910 U	8.63
2087-149	MVS-151	OUBM-G 39	*10/10/03*	*5/3/05*	5/28/05	0.907 U	0.570 E	0.175 U	4.85 E	3.39	0.205 UE
2087-157	MVS-159	OUBM-G 45	*10/22/03*	*5/3/05*	5/28/05	0.790 U	0.280 UE	0.153 U	1.26 E	0.0764 U	0.178 UE
2087-159	MVS-161	OUBM-G 35	*10/22/03*	*5/13/05*	6/3/05	1.19 U	0.423 U	0.231 U	3.40 B	0.115 U	0.269 U
2087-163	MVS-165	OOUB-G 17	*10/30/03*	*5/3/05*	5/28/05	1.25 U	0.444 UE	5.56	0.985 E	0.352 J	0.283 UE

Outside Project DQO guidelines for SIS recovery (40-120%)

E Estimate; see narrative

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Table B-4. PCB Data *(Continued)*

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Sediment PCB Concentration in µg/kg, dry weight					
						PCB 101	PCB 77	PCB 118	PCB 153	PCB 105	PCB 138
2087-1	MVS-009	MVS-009	*8/28/03*	*5/3/05*	5/28/05	0.201 U	0.121 U	0.121 U	3.73	0.173 U	3.05
2087-10	MVS-024	MVS-024	*8/28/03*	*5/3/05*	5/28/05	1.38	3.69	2.37	2.71	1.13	3.16
2087-13 R-1	MVS-001	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.820	0.0887 U	0.0887 U	1.55	0.778	0.0887 U
2087-13 R-2	MVS-001	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.859	0.0874 U	0.0874 U	0.104 U	0.124 U	0.0874 U
2087-37	MVS-049	MVS-049	*8/30/03*	*5/3/05*	5/28/05	8.62	0.117 U	8.26	9.51	7.06	11.6
2087-52	MVS-034	MVS-034	*8/31/03*	*5/3/05*	5/28/05	0.107 U	0.0642 U	0.0642 U	0.0762 U	0.281	0.246 J
2087-55	MVS-041	MVS-041	*8/29/03*	*5/3/05*	5/28/05	0.119 U	0.0715 U	0.0715 U	0.0848 U	0.333	0.334 J
2087-58	MVS-060	OOUB-G 9	*10/28/03*	*5/3/05*	5/28/05	0.295 U	0.178 U	3.68	8.37	0.253 U	7.85
2087-70	MVS-072	OUBM-G 52	*10/24/03*	*5/13/05*	6/3/05	25.0	0.134 U	13.0	23.1	2.51	34.9
2087-73	MVS-075	OOUB-G 1	*10/30/03*	*5/3/05*	5/28/05	15.4	0.0687 U	12.7	11.9	9.99	16.5
2087-83	MVS-085	OOUB-G 28	*10/28/03*	*5/3/05*	5/28/05	0.214 U	0.129 U	2.25	6.26	1.84	3.52
2087-87	MVS-089	OUBM-G 25	*10/27/03*	*5/13/05*	6/3/05	21.6	0.148 U	12.5	13.3	5.96	20.9
2087-92	MVS-094	OUBM-G 34	*10/23/03*	*5/3/05*	5/28/05	36.4	0.111 U	19.6	41.8	11.5	40.9
2087-110	MVS-112	OUBM-G 55	*10/24/03*	*5/3/05*	5/28/05	0.206 UE	0.124 UE	0.124 UE	0.147 UE	0.177 UE	13.7 E
2087-111	MVS-113	OUBM-G 46	*10/23/03*	*5/13/05*	6/3/05	23.7	0.0803 U	14.0	15.7	3.04	28.7
2087-131	MVS-133	OUBM-G 22	*10/27/03*	*5/13/05*	6/3/05	0.294 U	0.177 U	4.95	6.02	2.66	8.33
2087-132	MVS-134	OUBM-G 56	*10/3/03*	*5/3/05*	5/28/05	18.0	0.137 U	11.6	16.5	10.7	17.6
2087-133	MVS-135	OUBM-G 66	*10/2/03*	*5/3/05*	5/28/05	26.0	0.135 U	17.6	18.9	14.6	22.4
2087-134	MVS-136	OUBM-G 61	*10/2/03*	*5/3/05*	5/28/05	8.12	0.140 U	4.09	6.62	0.200 U	6.09
2087-135	MVS-137	OUBM-G 69	*10/13/03*	*5/13/05*	6/3/05	0.153 U	0.0922 U	2.80	3.14	0.131 U	4.55
2087-140	MVS-142	OUBM-G 60	*10/3/03*	*5/3/05*	5/28/05	14.8	0.108 U	8.97	11.0	7.92	12.5
2087-146	MVS-148	OUBM-G 1	*10/13/03*	*5/13/05*	6/3/05	0.212 U	0.128 U	0.128 U	0.152 U	0.182 U	19.9
2087-149	MVS-151	OUBM-G 39	*10/10/03*	*5/3/05*	5/28/05	28.6	0.123 U	13.6	36.2	11.9	32.3
2087-157	MVS-159	OUBM-G 45	*10/22/03*	*5/3/05*	5/28/05	9.62	0.107 U	4.39	12.5	5.25	10.9
2087-159	MVS-161	OUBM-G 35	*10/22/03*	*5/13/05*	6/3/05	13.1	0.162 U	7.53	9.45	0.231 U	12.9
2087-163	MVS-165	OOUB-G 17	*10/30/03*	*5/3/05*	5/28/05	5.76	0.170 U	3.91	7.67	3.46	7.16

Outside Project DQO guidelines for SIS recovery (40-120%)

E Estimate; see narrative

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Table B-4. PCB Data *(Continued)*

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Sediment PCB Concentration in µg/kg, dry weight					
						PCB 126	PCB 187	PCB 128	PCB 200	PCB 180	PCB 170
2087-1	MVS-009	MVS-009	*8/28/03*	*5/3/05*	5/28/05	0.121 U	2.50	0.201 U	0.142 J	0.144 U	0.201 U
2087-10	MVS-024	MVS-024	*8/28/03*	*5/3/05*	5/28/05	0.106 U	1.31	0.176 U	0.106 U	0.126 U	0.176 U
2087-13 R-1	MVS-001	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.0887 U	0.0631 U	0.147 U	0.0887 U	0.105 U	0.206 J
2087-13 R-2	MVS-001	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.0874 U	0.0622 U	0.145 U	0.165 J	0.104 U	0.195 J
2087-37	MVS-049	MVS-049	*8/30/03*	*5/3/05*	5/28/05	0.117 U	0.444	3.04	0.117 U	0.138 U	0.539
2087-52	MVS-034	MVS-034	*8/31/03*	*5/3/05*	5/28/05	0.0642 U	0.0457 U	0.107 U	0.0642 U	0.0762 U	0.107 U
2087-55	MVS-041	MVS-041	*8/29/03*	*5/3/05*	5/28/05	0.0715 U	0.0509 U	0.119 U	0.0715 U	0.0848 U	0.119 U
2087-58	MVS-060	OOUB-G 9	*10/28/03*	*5/3/05*	5/28/05	0.178 U	0.997	1.41	0.178 U	0.211 U	0.295 U
2087-70	MVS-072	OUBM-G 52	*10/24/03*	*5/13/05*	6/3/05	0.134 U	22.8	6.42	3.23	30.1	12.1
2087-73	MVS-075	OOUB-G 1	*10/30/03*	*5/3/05*	5/28/05	0.0687 U	1.44	4.17	0.590	4.25	1.11
2087-83	MVS-085	OOUB-G 28	*10/28/03*	*5/3/05*	5/28/05	0.129 U	0.0916 U	0.896	0.129 U	0.153 U	0.214 U
2087-87	MVS-089	OUBM-G 25	*10/27/03*	*5/13/05*	6/3/05	0.148 U	9.05	3.92	0.148 U	11.5	2.88
2087-92	MVS-094	OUBM-G 34	*10/23/03*	*5/3/05*	5/28/05	0.111 U	10.7	6.42	2.27	32.8	6.78
2087-110	MVS-112	OUBM-G 55	*10/24/03*	*5/3/05*	5/28/05	0.124 UE	0.0884 UE	0.206 UE	0.124 UE	12.9 E	0.206 UE
2087-111	MVS-113	OUBM-G 46	*10/23/03*	*5/13/05*	6/3/05	0.0803 U	12.7	4.85	1.79	20.8	3.40
2087-131	MVS-133	OUBM-G 22	*10/27/03*	*5/13/05*	6/3/05	0.177 U	3.99	1.79	0.177 U	5.55	3.26
2087-132	MVS-134	OUBM-G 56	*10/3/03*	*5/3/05*	5/28/05	0.137 U	1.35	4.48	1.73	12.1	0.227 U
2087-133	MVS-135	OUBM-G 66	*10/2/03*	*5/3/05*	5/28/05	0.135 U	0.0960 U	4.56	0.135 U	0.160 U	0.224 U
2087-134	MVS-136	OUBM-G 61	*10/2/03*	*5/3/05*	5/28/05	0.140 U	0.0999 U	0.233 U	0.140 U	6.12	1.76
2087-135	MVS-137	OUBM-G 69	*10/13/03*	*5/13/05*	6/3/05	0.0922 U	0.0656 U	0.153 U	0.0922 U	3.78	0.803
2087-140	MVS-142	OUBM-G 60	*10/3/03*	*5/3/05*	5/28/05	0.108 U	0.0768 U	5.31	0.108 U	6.22	0.179 U
2087-146	MVS-148	OUBM-G 1	*10/13/03*	*5/13/05*	6/3/05	0.128 U	0.0910 U	0.212 U	0.128 U	3.30	8.33
2087-149	MVS-151	OUBM-G 39	*10/10/03*	*5/3/05*	5/28/05	0.123 U	0.0877 U	8.57	7.81	29.4	0.205 U
2087-157	MVS-159	OUBM-G 45	*10/22/03*	*5/3/05*	5/28/05	0.107 U	0.0764 U	2.79	2.50	8.40	1.87
2087-159	MVS-161	OUBM-G 35	*10/22/03*	*5/13/05*	6/3/05	0.162 U	5.77	2.75	0.162 U	9.67	4.74
2087-163	MVS-165	OOUB-G 17	*10/30/03*	*5/3/05*	5/28/05	0.170 U	0.867	1.65	0.364 J	5.64	0.283 U

Outside Project DQO guidelines for SIS recovery (40-120%)

E Estimate; see narrative

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Table B-4. PCB Data *(Continued)*

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Sediment PCB Concentration in µg/kg, dry weight			
						PCB 195	PCB 206	PCB 209	Arochlor 1268
2087-1	MVS-009	MVS-009	*8/28/03*	*5/3/05*	5/28/05	0.144 U	0.539	0.144 U	3.95 U
2087-10	MVS-024	MVS-024	*8/28/03*	*5/3/05*	5/28/05	0.126 U	0.374 J	0.126 U	3.46 U
2087-13 R-1	MVS-001	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.105 U	0.221 J	0.264 J	2.89 U
2087-13 R-2	MVS-001	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.104 U	0.410	0.290 J	2.85 U
2087-37	MVS-049	MVS-049	*8/30/03*	*5/3/05*	5/28/05	0.138 U	0.723	0.729	3.80 U
2087-52	MVS-034	MVS-034	*8/31/03*	*5/3/05*	5/28/05	0.0762 U	0.110 J	0.0762 U	2.09 U
2087-55	MVS-041	MVS-041	*8/29/03*	*5/3/05*	5/28/05	0.0848 U	0.219 J	0.214 J	2.33 U
2087-58	MVS-060	OOUB-G 9	*10/28/03*	*5/3/05*	5/28/05	0.211 U	1.36	0.211 U	5.79 U
2087-70	MVS-072	OUBM-G 52	*10/24/03*	*5/13/05*	6/3/05	0.158 U	14.1	8.06	182
2087-73	MVS-075	OOUB-G 1	*10/30/03*	*5/3/05*	5/28/05	0.0815 U	0.794	1.24	62.1
2087-83	MVS-085	OOUB-G 28	*10/28/03*	*5/3/05*	5/28/05	0.153 U	4.89	0.153 U	4.20 U
2087-87	MVS-089	OUBM-G 25	*10/27/03*	*5/13/05*	6/3/05	0.175 U	2.65	4.99	66.2
2087-92	MVS-094	OUBM-G 34	*10/23/03*	*5/3/05*	5/28/05	0.132 U	7.65	7.04	133
2087-110	MVS-112	OUBM-G 55	*10/24/03*	*5/3/05*	5/28/05	18.6 E	7.10 E	12.9 E	91.9
2087-111	MVS-113	OUBM-G 46	*10/23/03*	*5/13/05*	6/3/05	0.0952 U	3.74	3.01	83.0
2087-131	MVS-133	OUBM-G 22	*10/27/03*	*5/13/05*	6/3/05	0.210 U	1.20	3.52	5.77 U
2087-132	MVS-134	OUBM-G 56	*10/3/03*	*5/3/05*	5/28/05	0.162 U	3.53	5.20	134
2087-133	MVS-135	OUBM-G 66	*10/2/03*	*5/3/05*	5/28/05	0.160 U	2.76	6.32	72.0
2087-134	MVS-136	OUBM-G 61	*10/2/03*	*5/3/05*	5/28/05	0.167 U	35.4	14.5	179
2087-135	MVS-137	OUBM-G 69	*10/13/03*	*5/13/05*	6/3/05	0.109 U	0.756	2.07	3.00 U
2087-140	MVS-142	OUBM-G 60	*10/3/03*	*5/3/05*	5/28/05	0.128 U	4.51	7.62	133
2087-146	MVS-148	OUBM-G 1	*10/13/03*	*5/13/05*	6/3/05	0.152 U	2.17	3.16	4.17 U
2087-149	MVS-151	OUBM-G 39	*10/10/03*	*5/3/05*	5/28/05	0.146 U	8.88	11.0	324
2087-157	MVS-159	OUBM-G 45	*10/22/03*	*5/3/05*	5/28/05	0.127 U	1.37	3.14	70.1
2087-159	MVS-161	OUBM-G 35	*10/22/03*	*5/13/05*	6/3/05	0.192 U	2.04	4.88	50.2
2087-163	MVS-165	OOUB-G 17	*10/30/03*	*5/3/05*	5/28/05	0.202 U	1.09	2.12	48.5

Outside Project DQO guidelines for SIS recovery (40-120%)

E Estimate; see narrative

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Table B-4. PCB Data *(Continued)*

MSL Sample ID	Client ID		Collection Date	Extraction Date	Analysis Date	Surrogate Recovery PCB-103	Surrogate Recovery PCB-198
2087-1	MVS-009	MVS-009	*8/28/03*	*5/3/05*	5/28/05	82%	98%
2087-10	MVS-024	MVS-024	*8/28/03*	*5/3/05*	5/28/05	92%	98%
2087-13 R-1	MVS-001	MVS-001	*8/29/03*	*5/3/05*	5/28/05	85%	88%
2087-13 R-2	MVS-001	MVS-001	*8/29/03*	*5/3/05*	5/28/05	89%	93%
2087-37	MVS-049	MVS-049	*8/30/03*	*5/3/05*	5/28/05	87%	96%
2087-52	MVS-034	MVS-034	*8/31/03*	*5/3/05*	5/28/05	105%	112%
2087-55	MVS-041	MVS-041	*8/29/03*	*5/3/05*	5/28/05	97%	108%
2087-58	MVS-060	OOUB-G 9	*10/28/03*	*5/3/05*	5/28/05	78%	88%
2087-70	MVS-072	OUBM-G 52	*10/24/03*	*5/13/05*	6/3/05	78%	102%
2087-73	MVS-075	OOUB-G 1	*10/30/03*	*5/3/05*	5/28/05	82%	87%
2087-83	MVS-085	OOUB-G 28	*10/28/03*	*5/3/05*	5/28/05	74%	88%
2087-87	MVS-089	OUBM-G 25	*10/27/03*	*5/13/05*	6/3/05	81%	96%
2087-92	MVS-094	OUBM-G 34	*10/23/03*	*5/3/05*	5/28/05	68%	90%
2087-110	MVS-112	OUBM-G 55	*10/24/03*	*5/3/05*	5/28/05	41%	51%
2087-111	MVS-113	OUBM-G 46	*10/23/03*	*5/13/05*	6/3/05	74%	99%
2087-131	MVS-133	OUBM-G 22	*10/27/03*	*5/13/05*	6/3/05	84%	97%
2087-132	MVS-134	OUBM-G 56	*10/3/03*	*5/3/05*	5/28/05	60%	83%
2087-133	MVS-135	OUBM-G 66	*10/2/03*	*5/3/05*	5/28/05	75%	94%
2087-134	MVS-136	OUBM-G 61	*10/2/03*	*5/3/05*	5/28/05	83%	91%
2087-135	MVS-137	OUBM-G 69	*10/13/03*	*5/13/05*	6/3/05	74%	95%
2087-140	MVS-142	OUBM-G 60	*10/3/03*	*5/3/05*	5/28/05	70%	66%
2087-146	MVS-148	OUBM-G 1	*10/13/03*	*5/13/05*	6/3/05	131% #	96%
2087-149	MVS-151	OUBM-G 39	*10/10/03*	*5/3/05*	5/28/05	76%	78%
2087-157	MVS-159	OUBM-G 45	*10/22/03*	*5/3/05*	5/28/05	79%	97%
2087-159	MVS-161	OUBM-G 35	*10/22/03*	*5/13/05*	6/3/05	89%	115%
2087-163	MVS-165	OOUB-G 17	*10/30/03*	*5/3/05*	5/28/05	81%	91%

Outside Project DQO guidelines for SIS recovery (40-120%)

E Estimate; see narrative

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Table B-5. PCB QC

					Sediment PCB Concentration in µg/kg, dry weight						
MSL Sample ID	**Client ID**	**Collection Date**	**Extraction Date**	**Analysis Date**	**PCB 8**	**PCB 18**	**PCB 28**	**PCB 52**	**PCB 44**	**PCB 66**	**PCB 101**
Blanks											
Blank 052805	20871 blk 1	NA	*5/3/05*	5/28/05	0.735 U	0.261 U	0.142 U	0.237 U	0.0712 U	0.166 U	0.166 U
Blank 060305	20872 blk 2	NA	*5/13/05*	6/3/05	0.735 U	0.261 U	0.142 U	0.837	0.254	0.166 U	0.166 U
Reporting Limit					0.4	0.4	0.4	0.4	0.4	0.4	0.4
Blank Spike Results											
Blank 052805	20871 blk 1	NA	*5/3/05*	5/28/05	0.735 U	0.261 U	0.142 U	0.237 U	0.0712 U	0.166 U	0.166 U
Blank Spike A	20871 blk Spk A	NA	*5/3/05*	5/28/05	10.9	13.8	11.5	12.7	11.5	12.4	10.8
Blank Spike B	20871 blk Spk B	NA	*5/3/05*	5/28/05	11.5	13.6	11.4	12.4	11.5	12.6	9.32
	Spike Concentration				10.0	10.0	10.0	10.0	10.0	10.0	10.0
	Percent Recovery A				**109%**	**138% &**	**115%**	**127% &**	**115%**	**124% &**	**108%**
	Percent Recovery B				**115%**	**136% &**	**114%**	**124% &**	**115%**	**126% &**	**93%**
Blank 060305	20872 blk 2	NA	*5/13/05*	6/3/05	0.735 U	0.261 U	0.142 U	0.837	0.254	0.166 U	0.166 U
Blank Spike A	20872 blk Spk A	NA	*5/13/05*	6/3/05	7.95	10.7	8.85	9.38	8.98	9.41	11.5
Blank Spike B	20872 blk Spk B	NA	*5/13/05*	6/3/05	9.59	12.1	10.5	10.5	10.3	10.9	11.7
	Spike Concentration				10.0	10.0	10.0	10.0	10.0	10.0	10.0
	Percent Recovery A				**80%**	**107%**	**88%**	**85%**	**87%**	**94%**	**115%**
	Percent Recovery B				**96%**	**121% &**	**105%**	**97%**	**101%**	**109%**	**117%**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

E Estimate; see narrative

NA Not applicable/available

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Underlined samples indicate not originally intended for PCB analysis--part of PAH subset (samples were extracted/analyzed at same time)

Table B-5. PCB QC *(Continued)*

					Sediment PCB Concentration in µg/kg, dry weight						
MSL Sample ID	**Client ID**	**Collection Date**	**Extraction Date**	**Analysis Date**	**PCB 8**	**PCB 18**	**PCB 28**	**PCB 52**	**PCB 44**	**PCB 66**	**PCB 101**
MATRIX SPIKE RESULTS											
2087-55	MVS-041	*8/29/03*	*5/3/05*	5/28/05	0.526 U	0.187 UE	0.102 U	0.388 JE	0.0509 U	0.119 UE	0.119 U
2087-55 Spk A	MVS-041	*8/29/03*	*5/3/05*	5/28/05	8.27	6.80	7.41	6.40	9.31	8.28	7.72
2087-55 Spk B	MVS-041	*8/29/03*	*5/3/05*	5/28/05	6.61	5.92	6.97	6.11	6.94	6.06	6.61
	Spike A Concentration				7.20	7.20	7.20	7.20	7.20	7.20	7.20
	Spike B Concentration				7.11	7.11	7.11	7.11	7.11	7.11	7.11
	Percent Recovery MS				**115%**	**94%**	**103%**	**83%**	**129% &**	**115%**	**107%**
	Percent Recovery MSD				**93%**	**83%**	**98%**	**80%**	**98%**	**85%**	**93%**
	Relative Percent Difference				**21%**	**13%**	**5%**	**4%**	**28%**	**30%**	**14%**
2087-42	MVS-038	*8/30/03*	*5/13/05*	6/3/05	0.471 U	0.167 U	0.0911 U	0.537 B	0.473	0.106 U	0.106 U
2087-42 Spk A	MVS-038	*8/30/03*	*5/13/05*	6/3/05	6.91	7.98	7.64	6.98	7.52	6.74	7.90
2087-42 Spk B	MVS-038	*8/30/03*	*5/13/05*	6/3/05	7.12	7.59	7.90	7.11	7.78	8.95	7.91
	Spike A Concentration				6.37	6.37	6.37	6.37	6.37	6.37	6.37
	Spike B Concentration				6.38	6.38	6.38	6.38	6.38	6.38	6.38
	Percent Recovery MS				**109%**	**125% &**	**120%**	**101%**	**111%**	**106%**	**124% &**
	Percent Recovery MSD				**112%**	**119%**	**124% &**	**103%**	**115%**	**140% &**	**124% &**
	Relative Percent Difference				**3%**	**5%**	**3%**	**2%**	**3%**	**28%**	**0%**
Replicate Analysis Results											
2087-13 R-1	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.652 U	0.231 UE	1.09	0.210 UE	0.650	0.147 UE	0.820
2087-13 R-2	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.643 U	0.228 UE	1.70	0.207 UE	0.0622 U	0.145 UE	0.859
	Mean				NA	NA	1.39	NA	NA	NA	0.839
	Relative Percent Difference				**NA**	**NA**	**44% &**	**NA**	**NA**	**NA**	**5%**
2087-23 R-1	MVS-011	*8/29/03*	*5/13/05*	6/3/05	1.19 U	0.423 U	0.231 U	0.384 BU	0.115 U	0.269 U	2.45
2087-23 R-2	MVS-011	*8/29/03*	*5/13/05*	6/3/05	1.19 U	0.423 U	0.231 U	0.384 BU	0.115 U	0.269 U	2.00
	Mean				NA	NA	NA	NA	NA	NA	2.23
	Relative Percent Difference				**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**20%**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

E Estimate; see narrative

NA Not applicable/available

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Underlined samples indicate not originally intended for PCB analysis--part of PAH subset (samples were extracted/analyzed at same time)

Table B-5. PCB QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment PCB Concentration in µg/kg, dry weight PCB 77	PCB 118	PCB 153	PCB 105	PCB 138	PCB 126
Blanks										
Blank 052805	20871 blk 1	NA	*5/3/05*	5/28/05	0.100 U	0.100 U	0.119 U	0.142 U	0.100 U	0.100 U
Blank 060305	20872 blk 2	NA	*5/13/05*	6/3/05	0.100 U	0.100 U	0.119 U	0.142 U	0.100 U	0.100 U
Reporting Limit					0.4	0.4	0.4	0.4	0.4	0.4
Blank Spike Results										
Blank 052805	20871 blk 1	NA	*5/3/05*	5/28/05	0.100 U	0.100 U	0.119 U	0.142 U	0.100 U	0.100 U
Blank Spike A	20871 blk Spk A	NA	*5/3/05*	5/28/05	10.1	11.0	12.0	12.0	10.9	12.2
Blank Spike B	20871 blk Spk B	NA	*5/3/05*	5/28/05	10.9	11.0	12.1	11.5	10.4	11.9
	Spike Concentration				10.0	10.0	10.0	10.0	10.0	10.0
	Percent Recovery A				**101%**	**110%**	**120%**	**120%**	**109%**	**122% &**
	Percent Recovery B				**109%**	**110%**	**121% &**	**115%**	**104%**	**119%**
Blank 060305	20872 blk 2	NA	*5/13/05*	6/3/05	0.100 U	0.100 U	0.119 U	0.142 U	0.100 U	0.100 U
Blank Spike A	20872 blk Spk A	NA	*5/13/05*	6/3/05	7.85	8.68	8.81	8.76	8.45	11.0
Blank Spike B	20872 blk Spk B	NA	*5/13/05*	6/3/05	9.33	9.52	9.85	10.4	9.21	11.7
	Spike Concentration				10.0	10.0	10.0	10.0	10.0	10.0
	Percent Recovery A				**78%**	**87%**	**88%**	**88%**	**84%**	**110%**
	Percent Recovery B				**93%**	**95%**	**99%**	**104%**	**92%**	**117%**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

E Estimate; see narrative

NA Not applicable/available

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Underlined samples indicate not originally intended for PCB analysis--part of PAH subset (samples were extracted/analyzed at same time)

Table B-5. PCB QC *(Continued)*

					Sediment PCB Concentration in µg/kg, dry weight					
MSL Sample ID	**Client ID**	**Collection Date**	**Extraction Date**	**Analysis Date**	**PCB 77**	**PCB 118**	**PCB 153**	**PCB 105**	**PCB 138**	**PCB 126**
MATRIX SPIKE RESULTS										
2087-55	MVS-041	*8/29/03*	*5/3/05*	5/28/05	0.0715 U	0.0715 U	0.0848 U	0.333	0.334 J	0.0715 U
2087-55 Spk A	MVS-041	*8/29/03*	*5/3/05*	5/28/05	14.2	10.5	11.6	11.4	11.4	11.2
2087-55 Spk B	MVS-041	*8/29/03*	*5/3/05*	5/28/05	8.37	6.73	7.85	7.35	6.60	7.24
	Spike A Concentration				7.20	7.20	7.20	7.20	7.20	7.20
	Spike B Concentration				7.11	7.11	7.11	7.11	7.11	7.11
	Percent Recovery MS				**198% &**	**146% &**	**162% &**	**154% &**	**154% &**	**155% &**
	Percent Recovery MSD				**118%**	**95%**	**110%**	**99%**	**88%**	**102%**
	Relative Percent Difference				**51% &**	**43% &**	**38% &**	**44% &**	**54% &**	**42% &**
2087-42	MVS-038	*8/30/03*	*5/13/05*	6/3/05	0.0640 U	0.0640 U	0.329 J	0.0911 U	0.0640 U	0.0640 U
2087-42 Spk A	MVS-038	*8/30/03*	*5/13/05*	6/3/05	8.19	7.27	7.15	7.48	6.62	7.57
2087-42 Spk B	MVS-038	*8/30/03*	*5/13/05*	6/3/05	8.43	7.35	7.62	7.98	6.88	8.00
	Spike A Concentration				6.37	6.37	6.37	6.37	6.37	6.37
	Spike B Concentration				6.38	6.38	6.38	6.38	6.38	6.38
	Percent Recovery MS				**129% &**	**114%**	**107%**	**117%**	**104%**	**119%**
	Percent Recovery MSD				**132% &**	**115%**	**114%**	**125% &**	**108%**	**125% &**
	Relative Percent Difference				**3%**	**1%**	**6%**	**6%**	**4%**	**5%**
Replicate Analysis Results										
2087-13 R-1	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.0887 U	0.0887 U	1.55	0.778	0.0887 U	0.0887 U
2087-13 R-2	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.0874 U	0.0874 U	0.104 U	0.124 U	0.0874 U	0.0874 U
	Mean				NA	NA	NA	NA	NA	NA
	Relative Percent Difference				**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
2087-23 R-1	MVS-011	*8/29/03*	*5/13/05*	6/3/05	0.162 U	3.73	3.24	1.482	3.49	0.162 U
2087-23 R-2	MVS-011	*8/29/03*	*5/13/05*	6/3/05	0.162 U	2.95	2.54	1.17	2.85	0.162 U
	Mean				NA	3.34	2.89	1.33	3.17	NA
	Relative Percent Difference				**NA**	**24%**	**24%**	**23%**	**20%**	**NA**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

E Estimate; see narrative

NA Not applicable/available

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Underlined samples indicate not originally intended for PCB analysis--part of PAH subset (samples were extracted/analyzed at same time)

Table B-5. PCB QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment PCB Concentration in µg/kg, dry weight PCB 187	PCB 128	PCB 200	PCB 180	PCB 170	PCB 195
Blanks										
Blank 052805	20871 blk 1	NA	*5/3/05*	5/28/05	0.0712 U	0.166 U	0.100 U	0.119 U	0.166 U	0.119 U
Blank 060305	20872 blk 2	NA	*5/13/05*	6/3/05	0.0712 U	0.166 U	0.100 U	0.119 U	0.166 U	0.119 U
Reporting Limit					0.4	0.4	0.4	0.4	0.4	0.4
Blank Spike Results										
Blank 052805	20871 blk 1	NA	*5/3/05*	5/28/05	0.0712 U	0.166 U	0.100 U	0.119 U	0.166 U	0.119 U
Blank Spike A	20871 blk Spk A	NA	*5/3/05*	5/28/05	13.4	12.9	12.4	12.3	11.1	11.7
Blank Spike B	20871 blk Spk B	NA	*5/3/05*	5/28/05	10.5	11.8	11.6	11.9	11.3	11.8
	Spike Concentration				10.0	10.0	10.0	10.0	10.0	10.0
	Percent Recovery A				**134% &**	**129% &**	**124% &**	**123% &**	**111%**	**117%**
	Percent Recovery B				**105%**	**118%**	**116%**	**119%**	**113%**	**118%**
Blank 060305	20872 blk 2	NA	*5/13/05*	6/3/05	0.0712 U	0.166 U	0.100 U	0.119 U	0.166 U	0.119 U
Blank Spike A	20872 blk Spk A	NA	*5/13/05*	6/3/05	10.7	10.4	9.80	9.22	8.62	9.18
Blank Spike B	20872 blk Spk B	NA	*5/13/05*	6/3/05	11.6	11.4	10.6	10.4	9.78	10.4
	Spike Concentration				10.0	10.0	10.0	10.0	10.0	10.0
	Percent Recovery A				**107%**	**104%**	**98%**	**92%**	**86%**	**92%**
	Percent Recovery B				**116%**	**114%**	**106%**	**104%**	**98%**	**104%**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

E Estimate; see narrative

NA Not applicable/available

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Underlined samples indicate not originally intended for PCB analysis--part of PAH subset (samples were extracted/analyzed at same time)

Table B-5. PCB QC *(Continued)*

					Sediment PCB Concentration in µg/kg, dry weight					
MSL Sample ID	**Client ID**	**Collection Date**	**Extraction Date**	**Analysis Date**	**PCB 187**	**PCB 128**	**PCB 200**	**PCB 180**	**PCB 170**	**PCB 195**
MATRIX SPIKE RESULTS										
2087-55	MVS-041	*8/29/03*	*5/3/05*	5/28/05	0.0509 U	0.119 U	0.0715 U	0.0848 U	0.119 U	0.0848 U
2087-55 Spk A	MVS-041	*8/29/03*	*5/3/05*	5/28/05	7.24	10.4	7.85	9.71	7.89	8.30
2087-55 Spk B	MVS-041	*8/29/03*	*5/3/05*	5/28/05	7.58	6.86	5.63	9.60	5.81	6.89
	Spike A Concentration				7.20	7.20	7.20	7.20	7.20	7.20
	Spike B Concentration				7.11	7.11	7.11	7.11	7.11	7.11
	Percent Recovery MS				**101%**	**145% &**	**109%**	**135% &**	**110%**	**115%**
	Percent Recovery MSD				**107%**	**96%**	**79%**	**135% &**	**82%**	**97%**
	Relative Percent Difference				**6%**	**40% &**	**32% &**	**0%**	**29%**	**17%**
2087-42	MVS-038	*8/30/03*	*5/13/05*	6/3/05	0.0456 U	0.106 U	0.0640 U	0.0759 U	0.106 U	0.0759 U
2087-42 Spk A	MVS-038	*8/30/03*	*5/13/05*	6/3/05	8.63	7.82	5.56	7.21	6.43	7.47
2087-42 Spk B	MVS-038	*8/30/03*	*5/13/05*	6/3/05	8.90	8.43	6.96	7.80	6.76	7.80
	Spike A Concentration				6.37	6.37	6.37	6.37	6.37	6.37
	Spike B Concentration				6.38	6.38	6.38	6.38	6.38	6.38
	Percent Recovery MS				**135% &**	**123% &**	**87%**	**113%**	**101%**	**117%**
	Percent Recovery MSD				**139% &**	**132% &**	**109%**	**122% &**	**106%**	**122% &**
	Relative Percent Difference				**3%**	**7%**	**22%**	**8%**	**5%**	**4%**
Replicate Analysis Results										
2087-13 R-1	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.0631 U	0.147 U	0.0887 U	0.105 U	0.206 J	0.105 U
2087-13 R-2	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.0622 U	0.145 U	0.165 J	0.104 U	0.195 J	0.104 U
	Mean				NA	NA	NA	NA	0.200	NA
	Relative Percent Difference				**NA**	**NA**	**NA**	**NA**	**6%**	**NA**
2087-23 R-1	MVS-011	*8/29/03*	*5/13/05*	6/3/05	2.17	1.19	0.162 U	0.192 U	0.269 U	0.192 U
2087-23 R-2	MVS-011	*8/29/03*	*5/13/05*	6/3/05	1.73	0.269 U	0.162 U	0.192 U	0.269 U	0.192 U
	Mean				1.95	NA	NA	NA	NA	NA
	Relative Percent Difference				**23%**	**NA**	**NA**	**NA**	**NA**	**NA**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

E Estimate; see narrative

NA Not applicable/available

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Underlined samples indicate not originally intended for PCB analysis--part of PAH subset (samples were extracted/analyzed at same time)

Table B-5. PCB QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment PCB Concentration in µg/kg, dry weight: PCB 206	PCB 209	Arochlor 1268	Surrogate Recovery: PCB-103	PCB-198
Blanks									
Blank 052805	20871 blk 1	NA	*5/3/05*	5/28/05	0.182	0.119 U	3.26 U	83%	81%
Blank 060305	20872 blk 2	NA	*5/13/05*	6/3/05	0.142	0.119 U	3.26 U	92%	91%
Reporting Limit					0.4	0.4	0.4		
Blank Spike Results									
Blank 052805	20871 blk 1	NA	*5/3/05*	5/28/05	0.182	0.119 U	3.26 U	83%	81%
Blank Spike A	20871 blk Spk A	NA	*5/3/05*	5/28/05	10.3	12.6	3.26 U	115%	118%
Blank Spike B	20871 blk Spk B	NA	*5/3/05*	5/28/05	10.7	12.4	3.26 U	108%	111%
	Spike Concentration				10.0	10.0	NA		
	Percent Recovery A				**101%**	**126% &**	**NA**		
	Percent Recovery B				**105%**	**124% &**	**NA**		
Blank 060305	20872 blk 2	NA	*5/13/05*	6/3/05	0.142	0.119 U	3.26 U	92%	91%
Blank Spike A	20872 blk Spk A	NA	*5/13/05*	6/3/05	7.48	9.84	3.26 U	83%	81%
Blank Spike B	20872 blk Spk B	NA	*5/13/05*	6/3/05	8.59	10.9	3.26 U	94%	95%
	Spike Concentration				10.0	10.0	NA		
	Percent Recovery A				**73%**	**98%**	**NA**		
	Percent Recovery B				**84%**	**109%**	**NA**		

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

E Estimate; see narrative

NA Not applicable/available

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Underlined samples indicate not originally intended for PCB analysis--part of PAH subset (samples were extracted/analyzed at same time)

Table B-5. PCB QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment PCB Concentration in µg/kg, dry weight: PCB 206	PCB 209	Arochlor 1268	Surrogate Recovery: PCB-103	PCB-198
MATRIX SPIKE RESULTS									
2087-55	MVS-041	*8/29/03*	*5/3/05*	5/28/05	0.219 J	0.214 J	2.33 U	97%	108%
2087-55 Spk A	MVS-041	*8/29/03*	*5/3/05*	5/28/05	5.11	7.18	2.35 U	81%	107%
2087-55 Spk B	MVS-041	*8/29/03*	*5/3/05*	5/28/05	6.20	7.26	2.32 U	82%	86%
	Spike A Concentration				7.20	7.20	NA		
	Spike B Concentration				7.11	7.11	NA		
	Percent Recovery MS				**68%**	**97%**	**NA**		
	Percent Recovery MSD				**84%**	**99%**	**NA**		
	Relative Percent Difference				**21%**	**2%**	**NA**		
2087-42	MVS-038	*8/30/03*	*5/13/05*	6/3/05	0.0456 U	0.0759 U	2.09 U	100%	105%
2087-42 Spk A	MVS-038	*8/30/03*	*5/13/05*	6/3/05	6.65	8.04	2.08 U	106%	112%
2087-42 Spk B	MVS-038	*8/30/03*	*5/13/05*	6/3/05	7.22	8.50	2.08 U	106%	119%
	Spike A Concentration				6.37	6.37	NA		
	Spike B Concentration				6.38	6.38	NA		
	Percent Recovery MS				**104%**	**126% &**	**NA**		
	Percent Recovery MSD				**113%**	**133% &**	**NA**		
	Relative Percent Difference				**8%**	**5%**	**NA**		
Replicate Analysis Results									
2087-13 R-1	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.221 J	0.264 J	2.89 U	85%	88%
2087-13 R-2	MVS-001	*8/29/03*	*5/3/05*	5/28/05	0.410	0.290 J	2.85 U	89%	93%
	Mean				0.315	0.277	NA		
	Relative Percent Difference				**60% &**	**9%**	**NA**		
2087-23 R-1	MVS-011	*8/29/03*	*5/13/05*	6/3/05	0.587	1.77	5.28 U	89%	109%
2087-23 R-2	MVS-011	*8/29/03*	*5/13/05*	6/3/05	0.507	0.192 U	5.28 U	72%	90%
	Mean				0.547	NA	NA		
	Relative Percent Difference				**15%**	**NA**	**NA**		

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

E Estimate; see narrative

NA Not applicable/available

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

J Analyte concentration is less than the RL, but greater than the MDL

Underlined samples indicate not originally intended for PCB analysis--part of PAH subset (samples were extracted/analyzed at same time)

Table B-6. PAH QC

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment PAH Concentration µg/kg, dry weight: Naphthalene	2 Methyl Naphthalene	Acenaphthylene	Acenaphthene
				Surrogate:	*d8 naphthalene*	*d8 naphthalene*	*d10 Acenaphthene*	*d10 Acenaphthene*
Blanks								
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	1.65 U	1.65 U	1.85 U	2.06 U
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	1.65 U	1.65 U	1.85 U	2.91
Reporting Limt		NA	NA	NA	4	4	4	4
Blank Spike Results								
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	1.65 U	1.65 U	1.85 U	2.06 U
Blank Spike A	20871 Blk Spk A	NA	5/3/05	5/27/05	251	119	240	259
	Spike Concentration				250	NS	250	250
	Percent Recovery A				**101%**	**NA**	**96%**	**104%**
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	1.65 U	1.65 U	1.85 U	2.91
Blank Spike A	20872 Blk Spk A	NA	5/13/05	6/3/05	191	91.6	193	201
Blank Spike B	20872 Blk Spk B	NA	5/13/05	6/3/05	256	120	243	255
	Spike Concentration				250	NS	250	250
	Percent Recovery A				**76%**	**NA**	**77%**	**79%**
	Percent Recovery B				**102%**	**NA**	**97%**	**101%**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-6. PAH QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment PAH Concentration µg/kg, dry weight: Naphthalene	2 Methyl Naphthalene	Acenaphthylene	Acenaphthene
				Surrogate:	*d8 naphthalene*	*d8 naphthalene*	*d10 Acenaphthene*	*d10 Acenaphthene*
MATRIX SPIKE RESULTS								
2087-55	MVS-041	8/29/03	5/3/05	5/27/05	27.3	16.5	9.38	3.43 J
2087-55 Spk A	MVS-041	8/31/03	5/3/05	5/27/05	217	106	221	208
2087-55 Spk B	MVS-041	8/31/03	5/3/05	5/27/05	177	90.4	183	183
	Spike A Concentration				180	NS	180	180
	Spike B Concentration				178	NS	180	180
	Percent Recovery MS				**105%**	**NA**	**117%**	**114%**
	Percent Recovery MSD				**84%**	**NA**	**96%**	**100%**
	Relative Percent Difference				**22%**	**NA**	**20%**	**13%**
2087-42	MVS-038	8/30/03	5/13/05	6/3/05	1.84 J	1.85 J	1.63 J	1.94 J
2087-42 Spk A	MVS-038	8/30/03	5/13/05	6/3/05	164	81.1	167	168
2087-42 Spk B	MVS-038	8/30/03	5/13/05	6/3/05	189	91.1	184	187
	Spike A Concentration				159	NS	159	159
	Spike B Concentration				159	NS	159	159
	Percent Recovery MS				**102%**	**NA**	**104%**	**104%**
	Percent Recovery MSD				**118%**	**NA**	**114%**	**116%**
	Relative Percent Difference				**14%**	**NA**	**10%**	**11%**
Replicate Analysis Results								
2087-13 R-1	MVS-001	8/29/03	5/3/05	5/27/05	12.7	7.56	7.38	3.81 J
2087-13 R-2	MVS-001	8/29/03	5/3/05	5/27/05	10.6	6.62	7.26	2.32 J
	Mean				11.6	7.09	7.32	3.07
	Relative Percent Difference				**18%**	**13%**	**2%**	**49% &**
2087-23 R-1	MVS-011	8/29/03	5/13/05	6/3/05	31.9	20.0	53.3	8.01
2087-23 R-2	MVS-011	8/29/03	5/13/05	6/3/05	24.0	15.8	39.7	7.17
	Mean				28.0	17.9	46.5	7.59
	Relative Percent Difference				**29%**	**24%**	**29%**	**11%**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)
U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-6. PAH QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment PAH Concentration µg/kg, dry weight				
					Fluorene	**Phenanthrene**	**Anthracene**	**Fluoranthene**	**Pyrene**
				Surrogate:	*d10 Acenaphthene*	*d10 phenanthrene*	*d10 phenanthrene*	*d12 chrysene*	*d12 chrysene*
Blanks									
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	1.34 U	8.05 U	1.99 U	16.6 U	8.00 U
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	1.34 U	8.05 U	1.99 U	16.6 U	8.00 U
Reporting Limt		NA	NA	NA	4	4	4	4	4
Blank Spike Results									
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	1.34 U	8.05 U	1.99 U	16.6 U	8.00 U
Blank Spike A	20871 Blk Spk A	NA	5/3/05	5/27/05	261	272	267	261	256
	Spike Concentration				250	250	250	250	250
	Percent Recovery A				**104%**	**109%**	**107%**	**104%**	**102%**
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	1.34 U	8.05 U	1.99 U	16.6 U	8.00 U
Blank Spike A	20872 Blk Spk A	NA	5/13/05	6/3/05	214	228	228	235	237
Blank Spike B	20872 Blk Spk B	NA	5/13/05	6/3/05	264	265	265	268	264
	Spike Concentration				250	250	250	250	250
	Percent Recovery A				**86%**	**91%**	**91%**	**94%**	**95%**
	Percent Recovery B				**105%**	**106%**	**106%**	**107%**	**106%**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-6. PAH QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment PAH Concentration µg/kg, dry weight: Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene
				Surrogate:	*d10 Acenaphthene*	*d10 phenanthrene*	*d10 phenanthrene*	*d12 chrysene*	*d12 chrysene*
MATRIX SPIKE RESULTS									
2087-55	MVS-041	8/29/03	5/3/05	5/27/05	6.80	49.2	25.8	105	129
2087-55 Spk A	MVS-041	8/31/03	5/3/05	5/27/05	232	387	306	629	737
2087-55 Spk B	MVS-041	8/31/03	5/3/05	5/27/05	193	260	224	368	379
	Spike A Concentration				180	180	180	180	180
	Spike B Concentration				178	178	180	178	180
	Percent Recovery MS				**125% &**	**188% &**	**156% &**	**291% &**	**337% &**
	Percent Recovery MSD				**105%**	**119%**	**110%**	**148% &**	**139% &**
	Relative Percent Difference				**17%**	**45% &**	**34% &**	**65% &**	**83% &**
2087-42	MVS-038	8/30/03	5/13/05	6/3/05	1.48 J	7.16	5.98	20.8	25.3
2087-42 Spk A	MVS-038	8/30/03	5/13/05	6/3/05	175	191	191	238	239
2087-42 Spk B	MVS-038	8/30/03	5/13/05	6/3/05	195	205	207	227	223
	Spike A Concentration				159	159	159	159	159
	Spike B Concentration				159	159	159	159	159
	Percent Recovery MS				**109%**	**115%**	**116%**	**136% &**	**134% &**
	Percent Recovery MSD				**122% &**	**124% &**	**126% &**	**130% &**	**124% &**
	Relative Percent Difference				**11%**	**7%**	**8%**	**5%**	**8%**
Replicate Analysis Results									
2087-13 R-1	MVS-001	8/29/03	5/3/05	5/27/05	6.10	51.7	18.5	202	182
2087-13 R-2	MVS-001	8/29/03	5/3/05	5/27/05	5.04	39.0	20.5	132	136
	Mean				5.57	45.3	19.5	167	159
	Relative Percent Difference				**19%**	**28%**	**10%**	**42% &**	**29%**
2087-23 R-1	MVS-011	8/29/03	5/13/05	6/3/05	21.7	149	112	445	600
2087-23 R-2	MVS-011	8/29/03	5/13/05	6/3/05	18.2	118	87.5	355	475
	Mean				20.0	NA	99.8	400	538
	Relative Percent Difference				**17%**	**NA**	**25%**	**23%**	**23%**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)
U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-6. PAH QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment PAH Concentration µg/kg, dry weight: Benzo[a] Anthracene	Chrysene	Benzo [b] Fluoranthene	Benzo [k] Fluoranthene	Benzo [e] Pyrene
				Surrogate:	*d12 chrysene*	*d12 chrysene*	*d12 perylene*	*d12 perylene*	*d12 perylene*
Blanks									
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	3.01 U	2.90 U	2.79 U	2.90 U	3.01 U
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	3.01 U	2.90 U	2.79 U	2.90 U	3.01 U
Reporting Limt		NA	NA	NA	4	4	NA	NA	NA
Blank Spike Results									
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	3.01 U	2.90 U	2.79 U	2.90 U	3.01 U
Blank Spike A	20871 Blk Spk A	NA	5/3/05	5/27/05	266	256	272	274	3.01 U
	Spike Concentration				250	250	250	250	NS
	Percent Recovery A				**105%**	**102%**	**109%**	**109%**	**NA**
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	3.01 U	2.90 U	2.79 U	2.90 U	3.01 U
Blank Spike A	20872 Blk Spk A	NA	5/13/05	6/3/05	246	239	253	258	3.01 U
Blank Spike B	20872 Blk Spk B	NA	5/13/05	6/3/05	272	265	277	281	3.01 U
	Spike Concentration				250	250	250	250	NS
	Percent Recovery A				**97%**	**95%**	**101%**	**103%**	**NA**
	Percent Recovery B				**108%**	**106%**	**111%**	**112%**	**NA**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-6. PAH QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment PAH Concentration µg/kg, dry weight: Benzo[a] Anthracene	Chrysene	Benzo [b] Fluoranthene	Benzo [k] Fluoranthene	Benzo [e] Pyrene
				Surrogate:	*d12 chrysene*	*d12 chrysene*	*d12 perylene*	*d12 perylene*	*d12 perylene*
MATRIX SPIKE RESULTS									
2087-55	MVS-041	8/29/03	5/3/05	5/27/05	77.2	81.9	128	39.4	109
2087-55 Spk A	MVS-041	8/31/03	5/3/05	5/27/05	484	447	547	358	190
2087-55 Spk B	MVS-041	8/31/03	5/3/05	5/27/05	299	280	347	269	73.7
	Spike A Concentration				180	180	180	180	NS
	Spike B Concentration				178	180	178	178	NS
	Percent Recovery MS				**226% &**	**203% &**	**233% &**	**177% &**	**NA**
	Percent Recovery MSD				**125% &**	**110% &**	**124% &**	**129% &**	**NA**
	Relative Percent Difference				**57% &**	**59% &**	**61% &**	**31% &**	**NA**
2087-42	MVS-038	8/30/03	5/13/05	6/3/05	12.6	12.9	18.2	5.70	9.90
2087-42 Spk A	MVS-038	8/30/03	5/13/05	6/3/05	214	200	208	193	13.2
2087-42 Spk B	MVS-038	8/30/03	5/13/05	6/3/05	225	207	235	219	6.72
	Spike A Concentration				159	159	159	159	NS
	Spike B Concentration				159	159	159	159	NS
	Percent Recovery MS				**127% &**	**117%**	**119%**	**118%**	**NA**
	Percent Recovery MSD				**133% &**	**122% &**	**136% &**	**134% &**	**NA**
	Relative Percent Difference				**5%**	**4%**	**13%**	**13%**	**NA**
Replicate Analysis Results									
2087-13 R-1	MVS-001	8/29/03	5/3/05	5/27/05	71.0	117	121	41.0	64.3
2087-13 R-2	MVS-001	8/29/03	5/3/05	5/27/05	58.6	88.7	111	36.8	61.6
	Mean				64.8	103	116	38.9	63.0
	Relative Percent Difference				**19%**	**28%**	**9%**	**11%**	**4%**
2087-23 R-1	MVS-011	8/29/03	5/13/05	6/3/05	284	318	420	141	259
2087-23 R-2	MVS-011	8/29/03	5/13/05	6/3/05	238	270	335	110	206
	Mean				261	294	377	125	233
	Relative Percent Difference				**18%**	**16%**	**23%**	**25%**	**23%**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-6. PAH QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment PAH Concentration µg/kg, dry weight: Benzo [a] Pyrene	Perylene	Indeno [1,2,3-c,d] Pyrene	Dibenzo [a,h] Anthracene	Benzo[g,h,i] Perylene
				Surrogate:	*d12 perylene*	*d12 perylene*	*d12 perylene*	*d12 perylene*	*d12 perylene*
Blanks									
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	3.01 U	3.68 U	3.11 U	3.40 U	3.40 U
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	3.01 U	3.68 U	3.11 U	3.40 U	3.40 U
Reporting Limt		NA	NA	NA	4	NA	4	4	4
Blank Spike Results									
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	3.01 U	3.68 U	3.11 U	3.40 U	3.40 U
Blank Spike A	20871 Blk Spk A	NA	5/3/05	5/27/05	256	130	288	256	256
	Spike Concentration				250	250	250	250	250
	Percent Recovery A				**102%**	**52%**	**114%**	**102%**	**102%**
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	3.01 U	3.68 U	3.11 U	3.40 U	3.40 U
Blank Spike A	20872 Blk Spk A	NA	5/13/05	6/3/05	240	121	253	221	222
Blank Spike B	20872 Blk Spk B	NA	5/13/05	6/3/05	266	132	279	244	250
	Spike Concentration				250	250	250	250	250
	Percent Recovery A				**96%**	**49%**	**100%**	**89%**	**89%**
	Percent Recovery B				**106%**	**51%**	**110%**	**98%**	**100%**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-6. PAH QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment PAH Concentration µg/kg, dry weight: Benzo [a] Pyrene	Perylene	Indeno [1,2,3-c,d] Pyrene	Dibenzo [a,h] Anthracene	Benzo[g,h,i] Perylene
				Surrogate:	*d12 perylene*	*d12 perylene*	*d12 perylene*	*d12 perylene*	*d12 perylene*
MATRIX SPIKE RESULTS									
2087-55	MVS-041	8/29/03	5/3/05	5/27/05	129	35.1	171	25.9	222
2087-55 Spk A	MVS-041	8/31/03	5/3/05	5/27/05	510	183	466	247	458
2087-55 Spk B	MVS-041	8/31/03	5/3/05	5/27/05	320	135	282	184	216
	Spike A Concentration				180	180	180	180	180
	Spike B Concentration				178	178	178	178	178
	Percent Recovery MS				**212% &**	**82%**	**164% &**	**123% &**	**131% &**
	Percent Recovery MSD				**107%**	**57%**	**63%**	**89%**	**3% &**
	Relative Percent Difference				**65% &**	**37% &**	**89% &**	**32% &**	**190% &**
2087-42	MVS-038	8/30/03	5/13/05	6/3/05	14.7	4.03	10.1	2.18 U	10.2
2087-42 Spk A	MVS-038	8/30/03	5/13/05	6/3/05	196	99.0	211	176	191
2087-42 Spk B	MVS-038	8/30/03	5/13/05	6/3/05	214	111	227	191	206
	Spike A Concentration				159	159	159	159	159
	Spike B Concentration				159	159	159	159	159
	Percent Recovery MS				**114%**	**60%**	**126% &**	**109%**	**113%**
	Percent Recovery MSD				**125% &**	**67%**	**136% &**	**118%**	**123% &**
	Relative Percent Difference				**9%**	**12%**	**8%**	**8%**	**8%**
Replicate Analysis Results									
2087-13 R-1	MVS-001	8/29/03	5/3/05	5/27/05	65.2	36.3	65.7	12.2	60.3
2087-13 R-2	MVS-001	8/29/03	5/3/05	5/27/05	62.5	36.1	62.8	11.5	58.5
	Mean				63.8	36.2	64.2	11.9	59.4
	Relative Percent Difference				**4%**	**1%**	**5%**	**6%**	**3%**
2087-23 R-1	MVS-011	8/29/03	5/13/05	6/3/05	345	98.0	276	48.8	270
2087-23 R-2	MVS-011	8/29/03	5/13/05	6/3/05	273	82.4	224	39.8	223
	Mean				309	90.2	250	44.3	247
	Relative Percent Difference				**23%**	**17%**	**21%**	**20%**	**19%**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-6. PAH QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Surrogate Recovery				
				Surrogate:	d8 naphthalene	d10 acenaphthene	d10 phenanthrene	d12 chrysene	d12 perylene
Blanks									
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	79%	81%	89%	85%	64%
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	86%	88%	97%	103%	86%
Reporting Limt		NA	NA	NA					
Blank Spike Results									
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	79%	81%	89%	85%	64%
Blank Spike A	20871 Blk Spk A	NA	5/3/05	5/27/05	108%	110%	125%	131%	99%
	Spike Concentration								
	Percent Recovery A								
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	86%	88%	97%	103%	86%
Blank Spike A	20872 Blk Spk A	NA	5/13/05	6/3/05	72%	74%	84%	76%	68%
Blank Spike B	20872 Blk Spk B	NA	5/13/05	6/3/05	98%	95%	101%	89%	79%
	Spike Concentration								
	Percent Recovery A								
	Percent Recovery B								

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-6. PAH QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Surrogate Recovery				
				Surrogate:	d8 naphthalene	d10 acenaphthene	d10 phenanthrene	d12 chrysene	d12 perylene
MATRIX SPIKE RESULTS									
2087-55	MVS-041	8/29/03	5/3/05	5/27/05	90%		96%		105%
2087-55 Spk A	MVS-041	8/31/03	5/3/05	5/27/05	72%	79%	89%	82%	63%
2087-55 Spk B	MVS-041	8/31/03	5/3/05	5/27/05	79%	80%	84%	76%	61%
	Spike A Concentration								
	Spike B Concentration								
	Percent Recovery MS								
	Percent Recovery MSD								
	Relative Percent Difference								
2087-42	MVS-038	8/30/03	5/13/05	6/3/05	94%		94%		101%
2087-42 Spk A	MVS-038	8/30/03	5/13/05	6/3/05	96%	97%	105%	96%	81%
2087-42 Spk B	MVS-038	8/30/03	5/13/05	6/3/05	107%	105%	112%	99%	87%
	Spike A Concentration								
	Spike B Concentration								
	Percent Recovery MS								
	Percent Recovery MSD								
	Relative Percent Difference								
Replicate Analysis Results									
2087-13 R-1	MVS-001	8/29/03	5/3/05	5/27/05	77%		85%		94%
2087-13 R-2	MVS-001	8/29/03	5/3/05	5/27/05	82%		89%		101%
	Mean								
	Relative Percent Difference								
2087-23 R-1	MVS-011	8/29/03	5/13/05	6/3/05	99%		101%		107%
2087-23 R-2	MVS-011	8/29/03	5/13/05	6/3/05	76%		83%		90%
	Mean								
	Relative Percent Difference								

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-7. Chlorobenzene QC

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment Chlorobenzene Concentration (µg/kg, dry weight) 1,2 Dichloro-benzene	1,4 Dichloro-benzene	1,2,4 Trichloro-benzene	Hexachloro-benzene
				Surrogate:	*d8 naphthalene*	*d8 naphthalene*	*d8 naphthalene*	*d10 phenanthrene*
Blanks								
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	4.00 UE	4.00 UE	4.00 UE	4.00 U
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	4.00 UE	4.00 UE	4.00 UE	4.00 U
Reporting Limt		NA	NA	NA	4	4	4	4
Blank Spike Results								
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	4.00 UE	4.00 UE	4.00 UE	4.00 U
Blank Spike A	20871 Blk Spk A	NA	5/3/05	5/27/05	4.00 UE	4.00 UE	4.00 UE	4.00 U
	Spike Concentration				NS	NS	NS	NS
	Percent Recovery A				**NA**	**NA**	**NA**	**NA**
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	4.00 UE	4.00 UE	4.00 UE	4.00 U
Blank Spike A	20872 Blk Spk A	NA	5/13/05	6/3/05	4.00 UE	4.00 UE	4.00 UE	4.00 U
Blank Spike B	20872 Blk Spk B	NA	5/13/05	6/3/05	4.00 UE	4.00 UE	4.00 UE	4.00 U
	Spike Concentration				NS	NS	NS	NS
	Percent Recovery A				**NA**	**NA**	**NA**	**NA**
	Percent Recovery B				**NA**	**NA**	**NA**	**NA**
MATRIX SPIKE RESULTS								
2087-55	MVS-041	8/29/03	5/3/05	5/27/05	2.86 UE	2.86 UE	2.86 UE	2.86 UE
2087-55 Spk A	MVS-041	8/31/03	5/3/05	5/27/05	2.88 UE	2.88 UE	2.88 UE	2.88 U
2087-55 Spk B	MVS-041	8/31/03	5/3/05	5/27/05	2.84 UE	2.84 UE	2.84 UE	2.84 U
	Spike A Concentration				NS	NS	NS	NS
	Spike B Concentration				NS	NS	NS	NS
	Percent Recovery MS				**NA**	**NA**	**NA**	**NA**
	Percent Recovery MSD				**NA**	**NA**	**NA**	**NA**
	Relative Percent Difference				**NA**	**NA**	**NA**	**NA**

E Estimate; see narrative

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-7. Chlorobenzene QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment Chlorobenzene Concentration (µg/kg, dry weight) 1,2 Dichloro-benzene	1,4 Dichloro-benzene	1,2,4 Trichloro-benzene	Hexachloro-benzene
				Surrogate:	*d8 naphthalene*	*d8 naphthalene*	*d8 naphthalene*	*d10 phenanthrene*
MATRIX SPIKE RESULTS (continued)								
2087-42	MVS-038	8/30/03	5/13/05	6/3/05	2.56 UE	2.56 UE	2.56 UE	2.56 UE
2087-42 Spk A	MVS-038	8/30/03	5/13/05	6/3/05	2.55 UE	2.55 UE	2.55 UE	2.55 U
2087-42 Spk B	MVS-038	8/30/03	5/13/05	6/3/05	2.55 UE	2.55 UE	2.55 UE	2.55 U
	Spike A Concentration				NS	NS	NS	NS
	Spike B Concentration				NS	NS	NS	NS
	Percent Recovery MS				**NA**	**NA**	**NA**	**NA**
	Percent Recovery MSD				**NA**	**NA**	**NA**	**NA**
	Relative Percent Difference				**NA**	**NA**	**NA**	**NA**
Replicate Analysis Results								
2087-13 R-1	MVS-001	8/29/03	5/3/05	5/27/05	3.55 UE	3.55 UE	3.55 UE	3.55 UE
2087-13 R-2	MVS-001	8/29/03	5/3/05	5/27/05	3.50 UE	3.50 UE	3.50 UE	3.50 UE
	Mean				NA	NA	NA	NA
	Relative Percent Difference				**NA**	**NA**	**NA**	**NA**
2087-23 R-1	MVS-011	8/29/03	5/13/05	6/3/05	6.48 UE	6.48 UE	6.48 UE	6.48 UE
2087-23 R-2	MVS-011	8/29/03	5/13/05	6/3/05	6.48 UE	6.48 UE	6.48 UE	6.48 UE
	Mean				NA	NA	NA	NA
	Relative Percent Difference				**NA**	**NA**	**NA**	**NA**

E Estimate; see narrative

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-7. Chlorobenzene QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Surrogate Recovery				
				Surrogate:	d8 naphthalene	d10 acenaphthene	d10 phenanthrene	d12 chrysene	d12 perylene
Blanks									
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	79%	81%	89%	85%	64%
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	86%	88%	97%	103%	86%
Reporting Limt		NA	NA	NA					
Blank Spike Results									
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	79%	81%	89%	85%	64%
Blank Spike A	20871 Blk Spk A	NA	5/3/05	5/27/05	108%	110%	125%	131%	99%
	Spike Concentration								
	Percent Recovery A								
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	86%	88%	97%	103%	86%
Blank Spike A	20872 Blk Spk A	NA	5/13/05	6/3/05	72%	74%	84%	76%	68%
Blank Spike B	20872 Blk Spk B	NA	5/13/05	6/3/05	98%	95%	101%	89%	79%
	Spike Concentration								
	Percent Recovery A								
	Percent Recovery B								
MATRIX SPIKE RESULTS									
2087-55	MVS-041	8/29/03	5/3/05	5/27/05	90%		96%		105%
2087-55 Spk A	MVS-041	8/31/03	5/3/05	5/27/05	72%	79%	89%	82%	63%
2087-55 Spk B	MVS-041	8/31/03	5/3/05	5/27/05	79%	80%	84%	76%	61%
	Spike A Concentration								
	Spike B Concentration								
	Percent Recovery MS								
	Percent Recovery MSD								
	Relative Percent Difference								

E Estimate; see narrative

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-7. Chlorobenzene QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Surrogate Recovery				
				Surrogate:	d8 naphthalene	d10 acenaphthene	d10 phenanthrene	d12 chrysene	d12 perylene
MATRIX SPIKE RESULTS (continued)									
2087-42	MVS-038	8/30/03	5/13/05	6/3/05	94%		94%		101%
2087-42 Spk A	MVS-038	8/30/03	5/13/05	6/3/05	96%	97%	105%	96%	81%
2087-42 Spk B	MVS-038	8/30/03	5/13/05	6/3/05	107%	105%	112%	99%	87%
	Spike A Concentration								
	Spike B Concentration								
	Percent Recovery MS								
	Percent Recovery MSD								
	Relative Percent Difference								
Replicate Analysis Results									
2087-13 R-1	MVS-001	8/29/03	5/3/05	5/27/05	77%		85%		94%
2087-13 R-2	MVS-001	8/29/03	5/3/05	5/27/05	82%		89%		101%
	Mean								
	Relative Percent Difference								
2087-23 R-1	MVS-011	8/29/03	5/13/05	6/3/05	99%		101%		107%
2087-23 R-2	MVS-011	8/29/03	5/13/05	6/3/05	76%		83%		90%
	Mean								
	Relative Percent Difference								

E Estimate; see narrative

U Analyte not detected at or above the laboratory achieved detection limit, MDL

Table B-8. Phthalate QC

					Sediment Phthalate Concentration in µg/kg, dry weight					
MSL Sample ID	**Client ID**	**Collection Date**	**Extraction Date**	**Analysis Date**	**Dimethyl Phthalate**	**Diethyl Phthalate**	**Di N Butyl Phthalate**	**Butyl Benzyl Phthalate**	**Bis (2-ethylhexyl) Phthalate**	**Di-N-Octyl Phthalate**
				Surrogate:	*d8 naphthalene*	*d10 Acenaphthene*	*d10 phenanthrene*	*d12 chrysene*	*d12 chrysene*	*d12 chrysene*
Blanks										
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	8.00 U	10.3	53.2	9.54	29.8	8.00 U
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	8.00 U	58.3	73.4	8.51	32.4	8.00 U
Reporting Limt		NA	NA	NA	NA	NA	8	8	8	NA
Blank Spike Results										
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	8.00 U	10.3	53.2	9.54	29.8	8.00 U
Blank Spike A	20871 Blk Spk A	NA	5/3/05	5/27/05	557	600	689	567	625	575
	Spike Concentration				500	500	500	500	500	500
	Percent Recovery A				**111%**	**118%**	**127% &**	**111%**	**119%**	**115%**
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	8.00 U	58.3	73.4	8.51	32.4	8.00 U
Blank Spike A	20872 Blk Spk A	NA	5/13/05	6/3/05	483	560	617	546	578	542
Blank Spike B	20872 Blk Spk B	NA	5/13/05	6/3/05	540	641	670	601	622	592
	Spike Concentration				500	500	500	500	500	500
	Percent Recovery A				**97%**	**100%**	**109%**	**108%**	**109%**	**108%**
	Percent Recovery B				**108%**	**116%**	**119%**	**119%**	**118%**	**118%**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)
B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.
U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-8. Phthalate QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Sediment Phthalate Concentration in µg/kg, dry weight: Dimethyl Phthalate	Diethyl Phthalate	Di N Butyl Phthalate	Butyl Benzyl Phthalate	Bis (2-ethylhexyl) Phthalate	Di-N-Octyl Phthalate
				Surrogate:	*d8 naphthalene*	*d10 Acenaphthene*	*d10 phenanthrene*	*d12 chrysene*	*d12 chrysene*	*d12 chrysene*
MATRIX SPIKE RESULTS										
2087-55	MVS-041	8/29/03	5/3/05	5/27/05	5.72 U	16.2 B	94.9 B	16.1 B	136 B	5.91
2087-55 Spk A	MVS-041	8/31/03	5/3/05	5/27/05	479	599	711	794	885	881
2087-55 Spk B	MVS-041	8/31/03	5/3/05	5/27/05	394	483	600	691	790	751
	Spike A Concentration				360	360	360	360	360	360
	Spike B Concentration				360	355	355	360	355	355
	Percent Recovery MS				**132% &**	**162% &**	**171% &**	**216% &**	**208% &**	**243% &**
	Percent Recovery MSD				**108%**	**131% &**	**142% &**	**187% &**	**184% &**	**210% &**
	Relative Percent Difference				**20%**	**21%**	**18%**	**14%**	**12%**	**15%**
2087-42	MVS-038	8/30/03	5/13/05	6/3/05	5.12 U	6.83 B	85.6 B	11.0 B	54.8 B	5.12 U
2087-42 Spk A	MVS-038	8/30/03	5/13/05	6/3/05	374	406	512	523	565	586
2087-42 Spk B	MVS-038	8/30/03	5/13/05	6/3/05	417	456	542	580	617	610
	Spike A Concentration				319	319	319	319	319	319
	Spike B Concentration				319	319	319	319	319	319
	Percent Recovery MS				**116%**	**125% &**	**134% &**	**161% &**	**160% &**	**182% &**
	Percent Recovery MSD				**129% &**	**141% &**	**143% &**	**178% &**	**176% &**	**190% &**
	Relative Percent Difference				**11%**	**12%**	**7%**	**10%**	**10%**	**4%**
Replicate Analysis Results										
2087-13 R-1	MVS-001	8/29/03	5/3/05	5/27/05	7.10 U	10.9 B	102 B	9.58 B	397	20.1
2087-13 R-2	MVS-001	8/29/03	5/3/05	5/27/05	7.00 U	25.1 B	103 B	45.6 B	309	19.7
	Mean				NA	18.0	103	27.6	353	19.9
	Relative Percent Difference				**NA**	**79% &**	**1%**	**131% &**	**25%**	**2%**
2087-23 R-1	MVS-011	8/29/03	5/13/05	6/3/05	13.0 U	15.2 B	197 B	51.1 B	231 B	13.6
2087-23 R-2	MVS-011	8/29/03	5/13/05	6/3/05	13.0 U	13.0 UB	172 B	49.1 B	244 B	13.0 U
	Mean				NA	NA	184	50.1	237	NA
	Relative Percent Difference				**NA**	**NA**	**14%**	**4%**	**6%**	**NA**

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-8. Phthalate QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Surrogate Recovery				
				Surrogate:	d8 naphthalene	d10 acenaphthene	d10 phenanthrene	d12 chrysene	d12 perylene
Blanks									
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	79%	81%	89%	85%	64%
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	86%	88%	97%	103%	86%
Reporting Limt		NA	NA	NA					
Blank Spike Results									
Blank 05272005	20871 Blk	NA	5/3/05	5/27/05	79%	81%	89%	85%	64%
Blank Spike A	20871 Blk Spk A	NA	5/3/05	5/27/05	108%	110%	125%	131%	99%
	Spike Concentration								
	Percent Recovery A								
Blank 06032005	20872 Blk	NA	5/13/05	6/3/05	86%	88%	97%	103%	86%
Blank Spike A	20872 Blk Spk A	NA	5/13/05	6/3/05	72%	74%	84%	76%	68%
Blank Spike B	20872 Blk Spk B	NA	5/13/05	6/3/05	98%	95%	101%	89%	79%
	Spike Concentration								
	Percent Recovery A								
	Percent Recovery B								

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)
B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.
U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Table B-8. Phthalate QC *(Continued)*

MSL Sample ID	Client ID	Collection Date	Extraction Date	Analysis Date	Surrogate Recovery				
				Surrogate:	d8 naphthalene	d10 acenaphthene	d10 phenanthrene	d12 chrysene	d12 perylene
MATRIX SPIKE RESULTS									
2087-55	MVS-041	8/29/03	5/3/05	5/27/05	90%		96%		105%
2087-55 Spk A	MVS-041	8/31/03	5/3/05	5/27/05	72%	79%	89%	82%	63%
2087-55 Spk B	MVS-041	8/31/03	5/3/05	5/27/05	79%	80%	84%	76%	61%
	Spike A Concentration								
	Spike B Concentration								
	Percent Recovery MS								
	Percent Recovery MSD								
	Relative Percent Difference								
2087-42	MVS-038	8/30/03	5/13/05	6/3/05	94%		94%		101%
2087-42 Spk A	MVS-038	8/30/03	5/13/05	6/3/05	96%	97%	105%	96%	81%
2087-42 Spk B	MVS-038	8/30/03	5/13/05	6/3/05	107%	105%	112%	99%	87%
	Spike A Concentration								
	Spike B Concentration								
	Percent Recovery MS								
	Percent Recovery MSD								
	Relative Percent Difference								
Replicate Analysis Results									
2087-13 R-1	MVS-001	8/29/03	5/3/05	5/27/05	77%		85%		94%
2087-13 R-2	MVS-001	8/29/03	5/3/05	5/27/05	82%		89%		101%
	Mean								
	Relative Percent Difference								
2087-23 R-1	MVS-011	8/29/03	5/13/05	6/3/05	99%		101%		107%
2087-23 R-2	MVS-011	8/29/03	5/13/05	6/3/05	76%		83%		90%
	Mean								
	Relative Percent Difference								

& Outside Project DQOs for Spike Recovery (40-120% recovery) or Replicate Analysis (<30% RPD)

B Analyte detected in the method blank above the RL, sample concentration < 10 times detected blank value.

U Analyte not detected at or above the laboratory achieved detection limit, MDL reported

Appendix C

Organics Verification Study:
Total Organic Carbon Data

QA/QC NARRATIVE

PROJECT:	Sinclair and Dyes Inlet - Sediment Organics Verification Study
PARAMETER:	Organics –Total Organic Carbon Data
LABORATORY:	Columbia Analytical Services, Inc. (CAS) for Battelle Marine Sciences Laboratory (MSL), Sequim
MATRIX:	Sediment
SAMPLE CUSTODY AND PROCESSING:	Sample Receipt - 72 sediment samples were received for analysis at CAS on 5/3/2005 The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.
CASE NARRATIVE:	All analyses were performed consistent with the quality assurance program of CAS. This report contains analytical results for samples designated for Tier III validation deliverables, including summary forms and all of the associated row data for each of the analyses. When appropriate to the method, method blank results have been reported with each analytical test.

Total Organic Carbon by ASTM D4129M

No anomalies associated with the analysis of these samples were observed.