88027866

FOR LIBRARY
USE ONLY

KCR
205
C.1

DENNY WAY/LAKE UNION CSO CONTROL PROJECT

SEDIMENT CHARACTERIZATION

King County

June 1998

BLACK & VEATCH LLP
720 Third Avenue, Suite 1100
Seattle, Washington 98104
Telephone (206) 682-1133

FOR LIBRARY
USE ONLY

King County Transportation &
Natural Resources Library
821 Second Avenue, M.S. 90
Seattle, WA 98104-1598

DENNY WAY/LAKE UNION CSO CONTROL PROJECT
PROPOSED MARINE OUTFALL
SEDIMENT CHARACTERIZATION

May 27, 1998

Submitted to:

King County
821 Second Avenue
Seattle, WA 98104

And

Black & Veatch
720 Third Avenue, Suite 1100
Seattle, Washington 98104

Prepared by:

Striplin Environmental Associates, Inc.
222 Kenyon St. NW
Olympia, Washington 98502

FOR LIBRARY
USE ONLY

King County Transportation &
Natural Resources Library
821 Second Avenue, M.S. 90
Seattle, WA 98104-1598

TABLE OF CONTENTS

1. INTRODUCTION 1
2. SAMPLING AND ANALYSIS APROACH 2
  2.1 OBJECTIVES 2
  2.2 SURFACE SEDIMENT SAMPLING AND ANALYSIS APPROACH 2
  2.3 SUBSURFACE SEDIMENT SAMPLING AND ANALYSIS APPROACH 3
3. METHODS 4
  3.1 FIELD SAMPLING METHODS 4
    3.1.1 Field Schedule 4
    3.1.2 Sample Locations and Positioning 4
    3.1.3 Sample Designations 4
    3.1.4 Equipment Decontamination 5
    3.1.5 Subtidal Surface Sediment Sampling 5
    3.1.6 Intertidal Surface Sediment Sampling 6
    3.1.7 Sediment Core Sampling 7
    3.1.8 Sediment Core Processing 7
    3.1.9 Field Quality Control 8
    3.1.10 Sample Handling, Storage and Transport 8
  3.2 LABORATORY ANALYTICAL METHODS 9
4. RESULTS 11
  4.1 SURFACE AND SUBSURFACE VISUAL DESCRIPTIONS 11
    4.1.1 Surface Sediment Descriptions 11
    4.1.2 Subsurface Sediment Descriptions 11
  4.2 SURFACE SEDIMENT TRENDS IN GRAIN SIZE AND TOTAL ORGANIC CARBON 12
    4.2.1 Grain Size Distribution 12
    4.2.2 Total Organic Carbon 12
  4.3 CHARACTERIZATION OF SEDIMENTS IN PROPOSED OUTFALL CORRIDOR 12
    4.3.1 Overview of the PSDDA Program 13
    4.3.2 Comparison to PSDDA Guidelines 13
  4.4 HORIZONTAL AND VERTICAL EXTENT OF CHEMICAL DISTRIBUTIONS 14
    4.4.1 Overview of the Washington State Sediment Management Standards 14
    4.4.2 Sediment Management Standards Detection Limits 15
    4.4.3 Surface Sediment Comparisons to SMS Guidelines 17
    4.4.4 Subsurface Sediment Comparisons to SMS Guidelines 18
5. PRELIMINARY SEDIMENT MANAGEMENT AREAS 20
  5.1 SEDIMENT EVALUATION GUIDELINES 20
  5.2 PRELIMINARY SEDIMENT REMEDIATION AREAS 21
  5.3 VERTICAL EXTENT OF CHEMICAL DISTRIBUTIONS 21
  5.4 PSDDA SEDIMENT CHEMICAL EVALUATION 21
  5.5 PRELIMINARY REMEDIATION PLAN 22
6. REFERENCES 23

Figures
Tables

Appendix A. Cruise Report
Appendix B. Chemical Data Summary Tables
Appendix C. Chemical Data Validation Reports
Appendix D. SMS Detection Limit Exceedances Evaluation

LIST OF FIGURES

Figure 1-1. Proposed Outfall Alignment, Denny Way/Lake Union CSO Control Project.....24
Figure 2-1. Denny Way/Lake Union CSO Control Project Surface and Subsurface Sediment Sampling Stations.....25
Figure 4-1. Broad Sediment Texture Categories in Surface Sediments Surrounding the Denny Way Sediment Cap.....26
Figure 4-2. Surface Sediment Trends in Percent Fines.....27
Figure 4-3. Surface Sediments Trends in Percent Total Organic Carbon.....28
Figure 4-4. Denny Way/Lake Union CSO Control Project Subsurface Sampling Stations Evaluated for Potential Disposal Options (i.e., PSDDA).....29
Figure 4-5. Detected Chemicals Exceeding PSDDA SLs in Subsurface Sediments Along the Proposed Denny Way/Lake Union CSO Control Project Outfall Alignment and Exceedance Factors.....30
Figure 4-6. Detected Chemicals Exceeding PSDDA MLs in Subsurface Sediments Along the Proposed Denny Way/Lake Union CSO Control Project Outfall Alignment and Exceedance Factors.....31
Figure 4-7. Denny Way/Lake Union CSO Control Project Surface Sediment Sampling Stations.....32
Figure 4-8. Detected Chemicals Exceeding SQS in Denny Way/Lake Union CSO Control Project Surface Sediments and Exceedance Factors.....33
Figure 4-9. Detected Chemicals Exceeding CSL in Denny Way/Lake Union CSO Control Project Surface Sediments and Exceedance Factors Washington.....34
Figure 4-10. Detected and Undetected Chemicals Exceeding SQS in Denny Way/Lake Union CSO Control Project Surface Sediments and Exceedance Factors Washington.....35
Figure 4-11. Detected and Undetected Chemicals Exceeding CSL in Denny Way/Lake Union CSO Control Project Surface Sediments and Exceedance Factors.....36
Figure 4-12. Denny Way/Lake Union CSO Control Project Subsurface Sediment Sampling Stations to Determine the Vertical Extent of Contamination.....37
Figure 4-13. Detected Chemicals Exceeding SQS in Denny Way/Lake Union CSO Control Project Subsurface Sediments and Exceedance Factors.....38
Figure 4-14. Detected Chemicals Exceeding CSL in Denny Way/Lake Union CSO Control Project Subsurface Sediments and Exceedance Factors.....39
Figure 5-1. Denny Way/Lake Union CSO Control Project Potential Sediment Remediation Areas.....40

LIST OF TABLES

Table 2-1. Summary of Sample Collection and Analysis 41
Table 3-1. Chemical Analytes and Methods 42
Table 4-1. PSDDA and SMS Analytes, Method Detection Limits, and Chemical Criteria 44
Table 4-2. Summary of Denny Way/Lake Union CSO Control Project Sediment Chemical Evaluation 46
Table 4-3. Summary of Chemicals with Detection Limits that Exceeded SMS Criteria 49
Table 4-4. Dry Weight Concentrations with Detection Limits (when TOC-normalized) that Exceeded SMS Criteria in Subsurface Sediment 50
Table 5-1. Summary of Denny Way/Lake Union CSO Control Project Surface Sediment Management Areas 51

LIST OF ACRONYMS

AET	Apparent Effects Threshold
ASTM	American Standard Testing Methods
CLP	Contract Laboratory Program
CSL	Cleanup Screening Level
CSO	Combined Sewer Overflow
CV	Cold Vapor Atomic Absorption Spectrometry
DGPS	Differential Global Positioning System
DNR	Washington Department of Natural Resources
DW	Denny Way
Ecology	Washington Department of Ecology
EPA	U.S. Environmental Protection Agency
GFAA	Graphic Furnace Atomic Absorption Spectrometry
HPAH	High Molecular Weight Polycyclic Aromatic Hydrocarbon
ICP	Inductively Coupled Plasma
KCWPCD	King County Water Pollution Control Division
LAET	Lowest Apparent Effects Threshold
LCS	Laboratory Control Samples
LPAH	Low Molecular Weight Polycyclic Aromatic Hydrocarbon
Metro	(formerly) Seattle Metropolitan Area
ML	Maximum Level
MLLW	Mean Lower Low Water
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MSS	Marine Sample Systems
NAD	North American Datum
PCB	Polychlorinated Biphenyls
PSDDA	Puget Sound Dredged Disposal Analysis
PSEP	Puget Sound Estuary Program
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percent Difference
SAD	Strong Acid Digestion
SAP	Sampling and Analysis Plan
Striplin	Striplin Environmental Associates, Inc.
SL	Screening Level
SMS	Sediment Management Standards
SQS	Sediment Quality Standards
TOC	Total Organic Carbon
VOA	Volatile Organics Analysis
WAC	Washington Administrative Code

1. INTRODUCTION

King County is proposing the construction of two outfalls to Elliott Bay, Seattle, Washington. The existing Denny Way Combined Sewer Overflow (CSO) outfall will be extended from its current location to the eastern limit of the Denny Way cap, and a new outfall will be constructed from the Elliott West CSO control facility across the Denny Way cap, extending to a water depth of approximately -60 feet mean lower low water (MLLW) (Figure 1-1). A characterization of sediments in the vicinity of the proposed outfalls was requested by the Washington State Department of Natural Resources (DNR) and the Washington State Department of Ecology (Ecology) to obtain baseline sediment chemical data needed for a DNR land use authorization. These data serve the ancillary purpose of providing information for 1) the determination of potential disposal options for sediments excavated during outfall construction and 2) the development of a follow-up, preliminary remediation plan in areas surrounding the Denny Way sediment cap.

This report provides the results of the Denny Way/Lake Union CSO Control Project sediment chemical characterization that took place in September, 1997. The sampling and analysis approach is provided in Section 2; sampling and analysis methods are provided in Section 3; the results of a sediment chemical evaluation relative to regional regulatory criteria are provided in Section 4; and preliminary sediment management areas are presented in Section 5.

2. SAMPLING AND ANALYSIS APROACH

2.1 OBJECTIVES

The objectives of the sediment chemistry sampling effort were:

- to identify the nature and extent (horizontal and vertical) of contaminants of concern in the area nearshore of the existing sediment cap, around the cap, and along the proposed outfall alignment;
- to delineate areas that exceed the Washington State Sediment Management Standards (Chapter 173-204 WAC) and are potential candidates for sediment remediation;
- to acquire information for evaluating remediation options and strategies for the alternatives assessment;
- to establish baseline sediment quality conditions at the proposed discharge locations of the future Elliott West Outfall and Denny Way CSO Outfall Extension.

Because extensive data already exists for parts of the project area and are available in published reports (Metro 1987, 1995; KCWPCD 1996), this sediment characterization sampling effort emphasized data collection in areas of the project site for which there were no recent data, including sediments beyond the limits of the existing sediment cap and subsurface sediments below the cap that may be dredged during outfall construction. Based on past cap monitoring, it was assumed that areas which have already been capped would not require remediation. Therefore, the only sampling conducted within the boundaries of the sediment cap was along the proposed outfall alignment.

2.2 SURFACE SEDIMENT SAMPLING AND ANALYSIS APPROACH

Surface sediment samples (0-10 cm depth) were collected to determine the horizontal extent of contamination. Twenty-eight surface sediment sampling stations were located in areas around the sediment cap and near the existing outfall (Figure 2-1). Surface sediments were analyzed for chemicals of concern listed in the Washington State Sediment Management Standards (SMS). The resulting chemical concentrations could then be compared to the Sediment Quality Standards (SQS) and the Cleanup Screening Levels (CSL) to identify areas that may be potential candidates for remediation. As stated in the project Sampling and Analysis Plan (SAP) (Black and Veatch 1997), Puget Sound Dredged Disposal Analysis (PSDDA) chemicals of concern were analyzed at nearshore stations that were anticipated to be disturbed or dredged during outfall construction (Table 2-1). (PSDDA analysis allows evaluation of suitability for unconfined open-water disposal). However, because these surface sediments are now considered unlikely to be disposed of at an open-water site based on sediment chemical of concern levels, these data are compared to SMS rather than PSDDA criteria in this report.

2.3 SUBSURFACE SEDIMENT SAMPLING AND ANALYSIS APPROACH

Subsurface sediment cores were collected to provide information on the vertical extent of contamination. Subsurface samples were collected at 13 locations (Figure 2-1). These locations were selected to provide information on the depth of sediment contamination in 1) areas that may require remediation and 2) areas where deeper sediments may be dredged during outfall construction activities. Four deep (target depth = 20 ft) cores were collected along the outfall alignment (DW-25, DW-26, DW-27, and DW-28); nine shallow (target depth = 10 ft) cores were collected around the existing sediment cap.

Subsurface sediment samples were analyzed for either SMS or PSDDA chemicals of concern (Table 2-1). Cores collected in potential remediation areas around the existing cap were analyzed for SMS chemicals to provide information on the vertical extent of sediments that could be candidates for remedial action. Cores in areas that might be disturbed or dredged during outfall construction were analyzed for PSDDA chemicals of concern (Table 2-1). Only the area directly along the outfall alignment is now being considered for potential dredging and possible disturbance, therefore, only the sediments data from the four cores along the alignment are compared to PSDDA criteria in this report. Although this SAP was not designed to meet all PSDDA requirements(i.e., numbers of surface and subsurface sediment samples and biological testing necessary for the Section 404 permit process), the analysis of PSDDA chemicals of concern allows preliminary evaluation of open-water disposal options for sediments along the alignment. Data from all other cores are compared to SMS criteria only.

3. METHODS

Sampling and analyses were conducted according to the methods described in the Denny Way/Lake Union CSO Control Project Sediment Characterization Sampling and Analysis Plan (SAP) (Black and Veatch 1997). These methods, as well as any deviations from the SAP, are described in the following sections.

3.1 FIELD SAMPLING METHODS

3.1.1 Field Schedule

Field operations began on September 9, 1997 and concluded on September 12, 1997. Sampling was performed by Striplin Environmental Associates (Striplin) onboard the *R/V Nancy Anne,* owned and operated by Marine Sampling Systems, or on foot from shore. Details of daily field activities are provided in the Cruise Report (Appendix A).

3.1.2 Sample Locations and Positioning

Station positioning was conducted by Blue Water Engineering using a Trimble Differential Global Positioning System (DGPS) with a positional accuracy of ±3 meters (10 feet). At each subtidal station, a positional fix was recorded when the sampling gear impacted the seafloor. Intertidal station locations were marked with weighted buoys while sampling onshore at low tide, and a positional fix on the buoy later taken from the sampling vessel. Positions of replicate grabs were averaged to determine the station position. Actual station locations are shown in Figure 2-1. Stations coordinates provided by Blue Water Engineering are included in the Cruise Report (Appendix A).

All stations were located within 10 ft of their target locations, with the following exceptions: DW-02, DW-05, DW-07, DW-09, DW-26, DW-30, DW-33. Nearly all of these stations were located nearshore, close to the riprap or on the slope. Samples could not be collected at these target locations due to obstructions (e.g. rock, rip rap), corer refusal, or difficulties collecting an acceptable sample. These stations were relocated to the nearest possible unobstructed location. Actual locations of the relocated stations were less than 30 ft from their target locations, except for Stations DW-02 and DW-05 which were moved 70 ft and 58 ft, respectively, from the original targets. Although these two stations were moved in order to collect acceptable samples, the original intent to collect nearshore, intertidal samples was achieved.

3.1.3 Sample Designations

Each sample was assigned a unique alpha-numeric number as follows. The station location which consists of two letters representing the project location, (i.e., "DW" equals Denny Way) followed by two numbers indicating the station number. A dash (-) separates each of the following items: The sample matrix (i.e., "SED" denotes sediment) and top and bottom depths

in feet. For example, sample "DW03-SED-3-7" would denote the sediment sample collected at Station DW03 from 3 to 7 feet below mudline. If no depth or a "0" is provided, then the sample was collected from the surface (i.e., top 10 cm of sediment).

3.1.4 Equipment Decontamination

All equipment was decontaminated prior to sampling and between samples as described in the project SAP (Black & Veatch 1997). Stainless steel bowls, utensils, core catcher and the intertidal sample corers were decontaminated before sampling and between each composite sample as follows:

- Rinse with tap water or water provided by the sampling vessel
- Wash with brush and Alconox™ detergent
- Double rinse with distilled water

Clean sample handling equipment was wrapped in aluminum foil, with the dull side facing the equipment.

The modified van Veen grab sampler was decontaminated between sampling stations by scrubbing with a brush and a phosphate-free detergent/water solution to remove excess sediment and then rinsing on board the vessel. This was followed with a thorough *in-situ* rinsing during deployment of the sampler.

New core tubes were used for each deployment. The core tubes were decontaminated before sampling by scrubbing with a brush and phosphate-free detergent/water solution and then rinsing. Extrusion equipment (e.g., plungers and trays) was scrubbed with a brush and water and lined with clean aluminum foil when possible.

Finally, additional precautions included the following:

- Samplers wore disposable gloves
- Sediment in contact with the sides of the core tubes or grab sampler was not sampled
- New glass sample containers were purchased from a manufacturer that provided certification of cleanliness.

3.1.5 Subtidal Surface Sediment Sampling

Surface sediment (0-10cm) samples for chemical analysis were collected at subtidal stations using a stainless steel modified 0.1 m^2 double van Veen grab sampler or hydraulically powered 0.3 m^2 van Veen grab sampler. (Use of the hydraulically powered van Veen allowed collection of acceptable samples in areas where the substrate did not allow adequate penetration by the modified double van Veen). In both cases, the grab sampler was attached to a hydrowire and deployed from the sampling vessel using an hydraulic crane. The sampler was lowered through the water column at a steady rate to prevent disturbance of the sediment surface on impact (Black and Veatch 1997). Once the sampler was brought on board, overlying water was siphoned off and sample acceptability was assessed.

A sample was determined to be acceptable if the following conditions, as described by PSEP (1986), were met:

- Sediment did not extrude from the upper surface of the sampler.
- Sediment surface was relatively flat and undisturbed.
- No water leaked from the sampler
- Overlying water was not excessively turbid.
- The penetration depth was at least 10.5 cm for a 10 cm deep sample.

If the sample was acceptable, penetration depth was measured and sediment characteristics recorded on field log sheets (Appendix A). Sediment samples were then processed as described in the project SAP (Black and Veatch 1997). The top 10 cm of surface sediment were collected using a clean stainless steel spoon and placed in a clean stainless steel bowl. Sediments in contact with the sides of the sampler were not collected. Two or more grabs were collected and sampled at each station to ensure adequate sediment volume and obtain a representative sample. Sediments were mixed until uniform in color and texture.

Samples for volatiles organics analysis (VOA) or sulfides analysis were collected from a single, randomly selected grab at each station. These samples were collected directly from the grab sampler, prior to sediment homogenization, and placed directly in laboratory sample jars. Sulfide samples were fixed with zinc acetate.

Samples for all other chemical analyses were collected from the homogenized sample. The sediments were placed in pre-labeled sample containers and sealed in a plastic bag. Large organisms or pieces of debris were not included in laboratory samples.

3.1.6 Intertidal Surface Sediment Sampling

Surface sediment (0-10 cm depth) samples (DW-05, DW-06, and DW-08) were collected by hand at stations that could be reached on foot from shore at low tide. This method allowed successful sediment sample collection among the rocks and riprap. Intertidal samples were collected using either a hand-held stainless steel corer or a stainless steel spoon.

Samples were collected with the hand corer as described in the project SAP (Black and Veatch 1997). The corer (4-inch outer diameter (O.D.)) was inserted in the sediment to a depth of 10 cm using a gentle twisting motion. The bottom retention plate was slid into position to contain the sediment, the valve was closed, and the corer was slowly extracted from the sediment. If the sample was acceptable (i.e., acceptable penetration depth, minimal water and no loss of sample), any overlying water was removed from the corer and the sediment was transferred into a stainless steel bowl. Multiple cores were collected to obtain adequate sample volume and a representative sample. The physical characteristics of the sediment were recorded on field log sheets, and sample descriptions are provided in the Cruise Report (Appendix A). Sediments in the bowl

were thoroughly homogenized and dispensed into pre-labeled sample container, as described in Section 3.1.4. Sediment samples for VOA or sulfides analysis were collected using a stainless steel spoon instead of the corer and placed directly in sample jars.

At many intertidal locations, the small areas of sediment among and mixed with rocks did not allow use of the hand-held corer. At these stations, surface sediments were sampled with a clean stainless steel spoon and placed in a stainless steel bowl or, for VOA and sulfides analysis, directly in sample jars. Sediments in the bowl were homogenized, sampled and stored using the same methods described above.

3.1.7 Sediment Core Sampling

Subsurface sediment cores were collected at 13 locations using a vibracorer operated by Mr. Bill Jaworski of Marine Sample Systems (MSS). The vibracorer uses a hydraulic system that vibrates and drives a length of 4-inch O.D. aluminum tubing into the sediment. A continuous sediment sample is retained within the tubing with the aid of a stainless steel core catcher. Core liners were not used. The vibracorer was equipped with transducers to monitor penetration and recovery. These measurements were recorded on field log sheets (Appendix A) and used to estimate compaction and recovery of the sediment sample.

As the core was brought on board, it was inspected for penetration, loss of sediment from the tube, and to confirm that overlying water was not excessively turbid. Caution was used to prevent disturbance of the sediment surface as the tube was oriented horizontally during removal from the coring tripod. The core was rejected if there was any doubt about its representativeness or acceptability, and a second core collected.

If the core was determined to be acceptable, the tube was cut to remove empty tubing. Long cores were divided into shorter lengths (i.e., 4-foot) for storage and transport. Sediment at the end of each section was characterized and descriptions recorded on core log sheets (Appendix A). The tube sections were labeled and core ends covered with foil, a protective cap and duct tape to prevent leakage. The tube sections were stored upright in a container chilled with ice.

At several core locations, obstructions or substrate type resulted in refusal before reaching the target depth. In most cases, this meant that the deepest section of the core which was to be archived was not collectedl. The affected stations and actual core depths achieved are listed in Table 2-1.

3.1.8 Sediment Core Processing

Core extrusion and sample processing were done at Striplin Environmental Associates, Inc., Olympia, WA. Intact cores were extruded onto clean, foil-covered trays by elevating the tube at an angle and vibrating the tube or tapping the tube with a mallet. A clean, foil-wrapped plunger was used to help push out the core.

The outer layer of sediment and core ends in contact with the core tube were removed by cutting or scraping with a clean stainless steel spoon and then discarded. Sediment descriptions were recorded on Core Log Descriptions and included observations of color, odor, texture, debris, etc. Sediment stratification was also noted. The intact core was sectioned into desired depth intervals for sampling and compositing. Core section lengths ranged from 2 to 4 ft, and are listed in Table 2-1. Core Log Description sheets are included in Appendix A.

Sediment sampling procedures were the same as for surface sediments. Samples for VOA and sulfides analysis were collected first. A clean stainless steel spoon was used to fill pre-labeled sample jars. The sulfide sample was preserved with 2 Normal zinc acetate. The remaining sediment from the desired depth interval was transferred to a clean, stainless steel bowl and mixed until the sample was uniform in color and texture. Large debris (e.g., shells, rocks) was removed. The remaining samples for chemical analysis were collected from the homogenized sediment and placed in sample jars in sealed plastic bags.

Sample from the bottom section of the 10 ft core tubes (i.e., the 6-8 ft sample interval) was archived for possible future analysis. As stated in the SAP, sediment samples archived at the base of each core were to be analyzed if elevated chemical concentrations were observed in the overlying sediment. Based on the outcome of the sediment chemistry results, samples collected from the bottom sections at two of the stations (DW-31 and DW-35) were removed from archive and analyzed for the suite of SMS chemicals of concern.

3.1.9 Field Quality Control

Field quality control (QC) samples included both replicate grabs and duplicate samples (i.e., splits from the same homogenized sample). The quality control samples were submitted "blind" to the analytical laboratory. QC sample designations are summarized below.

Field Quality Control Sample Designations

Station	Replicate	Duplicate
DW03	DW80	DW81
DW07	DW82	DW83
DW09	DW84	DW85
DW24	DW86	DW87
DW25		DW88
DW35		DW89

Concentrations at these stations as reported in Appendix B and used in data interpretation are means of station and QC sample results.

3.1.10 Sample Handling, Storage and Transport

Sample container types and volumes for each chemical parameter were as listed in the project SAP (Black and Veatch 1997). Samples were transferred from the vessel to secure storage on the same day as collected and stored on ice or refrigerated at approximately 4°C while in the custody of field staff. Once at the laboratory, samples were stored at 4°C or frozen, according to the project SAP (Black and Veatch 1997).

Standard chain-of-custody procedures were employed to ensure that the integrity of the samples was maintained during collection, transport, storage and analysis. The chain-of-custody also provided a written record of sample possession from the time of collection through completion of all analyses. Stored samples were inventoried and sample custody documented by the field sample custodian. On completion of sample inventory by the field staff, samples were packed on ice in coolers lined with large plastic bags. Samples were transported from the sampling vessel or core processing lab to the analytical laboratories by Striplin or Black and Veatch field personnel.

The laboratory sample custodian received the samples and confirmed that sample information on the chain-of-custody form was correct and that the form was properly completed, signed, and initialed. The laboratory project manager was responsible for tracking samples through the analytical process.

3.2 LABORATORY ANALYTICAL METHODS

All sediment samples were analyzed for the conventional parameters and SMS or PSDDA chemicals of concern (Table 3-1), as specified in the project SAP (Black and Veatch 1997). No biological testing was conducted. All chemical and conventional analyses were conducted by AmTest, Inc., Redmond, Washington. The King County Environmental Laboratory analyzed splits of surface sediments collected at Stations DW03, DW07, DW09 and DW23. The chemical results prepared by AmTest are described and interpreted in Section 4 of this report, and the validated laboratory data results are summarized in Appendix B.

Analytical methods are listed in Table 3-1. Methods followed those described in the project SAP (Black and Veatch 1997) and were based on current PSEP guidance and PSDDA requirements. Samples were analyzed for either PSDDA or SMS chemicals of concern, with the following modifications:

- Only one suite of metals was analyzed for all samples. This suite included all metals included in SMS or PSDDA chemical lists.
- VOAs were analyzed only in samples collected nearshore of the sediment cap in areas outside of the area to be dredged during outfall construction (Table 2-1). Samples at these stations were analyzed for chlorinated benzenes using SW-846 Method 8260. At all other stations the chlorinated benzenes were analyzed using method SW-846 Method 8270. (Past sampling efforts had not detected these compounds in areas other than nearshore of the sediment cap).

- 58% of the sediment samples were re-analyzed for hexachlorobenzene using Method 8081 (as opposed to Method 8270) to achieve levels of detection below the SMS sediment quality standard (SQS).

Laboratory QA/QC samples, including laboratory duplicates, matrix spikes and surrogate compounds were analyzed to assess data quality. QC sample analyses and frequencies were based on PSDDA and PSWQAT guidelines. The chemical data were validated by Floyd & Snider and the validation report is contained in Appendix C. Sediment samples removed from archive and analyzed following the outcome of the initial testing were validated by Striplin and reported in Appendix C. All data were determined to be acceptable as qualified.

4. RESULTS

Tabulated chemical results for surface and subsurface sediment samples are provided in Appendix B.

4.1 SURFACE AND SUBSURFACE VISUAL DESCRIPTIONS

4.1.1 Surface Sediment Descriptions

Surface sediment samples were collected at the 28 stations shown in Figure 2-1. Descriptions of sediment texture in surface grabs revealed three general zones of sediment types (Figure 4-1 and Appendix A). Inshore of the sediment cap, sediments were black or gray gravelly medium to coarse sand or sandy gravel. Sediments in this zone were sulfidic with variable amounts of shells and shell fragments. An oily sheen was observed at DW-06, an intertidal station located nearest the existing CSO.

The second zone consisted of subtidal sediments immediately surrounding the cap. Sediments were generally brown to gray silty sand or sandy silt. The surface of the sediment was covered with light colored, oxidized fine-grained sediments. A petroleum odor was noted at Station DW-20, and an oily sheen was noted at Station DW-14. The third zone encircled the inner two zones, as well as the cap, and consisted of brown or gray silty clay with some sand. Surface sediments were oxidized. Wood fragments were noted at Stations DW-10 and DW-11.

4.1.2 Subsurface Sediment Descriptions

Subsurface sediment cores were described in detail in Core Description Logs provided in Appendix A. Subsurface sediment sampling stations are shown in Figure 2-1. Characteristics of sediments cored within the sediment cap boundaries and inshore of the sediment cap were generally distinct from those flanking the cap to the north, south and west. Inshore sediments were heterogeneous, interbedded gray to black sand, silt, clay, gravel, and (rarely) cobble. Sulfides odors in these cores were moderate to strong, and petroleum odors were noted in each inshore core, generally at sediment depths greater than 2.5 feet. Station DW-31 was particularly noteworthy in its composition of anthropogenic materials, including hair, cigarettes, and fishing line, from sediment depths of approximately 4.5 to 5 feet. A moderate to strong petroleum odor was also noted in much of the core. Sediments located just below the sediment cap at Stations DW-26 and DW-27 were generally dark gray or black clayey silt with a petroleum odor.

The sediment cap consisted of dark gray to black medium to coarse sand with a thin veneer (approximately 3 inches) of silt and leaf litter. Sulfides odors were noted in the cap materials. At stations flanking the cap, sediments were generally gray to dark gray clayey silt with moderate to strong sulfides odors. At these stations, too, petroleum odors were noted, generally at depths between one and three or four feet.

Native sediments were encountered at five stations (DW-26, DW-27, DW-28, DW-29, and DW-35), generally between depths of 4.5 and 8 feet. Native sediments were gray, uniform silty sand or sandy silt with numerous shell fragments (*Compsomyax subdiaphana*, *Macoma sp.*, and *Spisula sp.*).

4.2 SURFACE SEDIMENT TRENDS IN GRAIN SIZE AND TOTAL ORGANIC CARBON

4.2.1 Grain Size Distribution

Grain size distribution analysis of surface sediment samples supported the observation that surface sediment types in the vicinity of the Denny Way CSO were of three broad categories. Coarse-grained materials of less than 13% fines (silt + clay) were located exclusively inshore of the Denny Way sediment cap (Figure 4-2). The percentage of fine-grained sediment was lowest at intertidal Stations DW-05 (1.8%) and DW-06 (3.6%). Subtidal surface sediments bayward of the sediment cap graded from an average of 27% fines in the second zone to greater than 50% fines in the third zone (Figure 4-2). Maximum percent fines were measured at Stations DW-17 and DW-18 (71% in each sample).

4.2.2 Total Organic Carbon

Percent total organic carbon (TOC) ranged from 0.79% to 4.1% in surface sediments (Figure 4-3). Unlike grain size distribution, percent TOC was patchy in its distribution. The two lowest percentages of TOC content occurred at intertidal Station DW-06 (0.79%) and subtidal Station DW-07 (0.9%), both located in the near vicinity of the existing CSO and both consisting of coarse-grained materials. Sediments with TOC exceeding 3% were located both inshore of the cap (DW-02, DW-03, DW-09, DW-10) and offshore from the cap (DW-22 and DW-18).

4.3 CHARACTERIZATION OF SEDIMENTS IN PROPOSED OUTFALL CORRIDOR

The results of samples collected from four subsurface coring stations were evaluated relative to PSDDA guidelines to support a preliminary assessment of sediments for potential unconfined disposal or beneficial use options. The four stations (DW-25, DW-26, DW-27, and DW-28) are located along the proposed Denny Way outfall alignment (Figure 4-4).

4.3.1 Overview of the PSDDA Program

PSDDA is an interagency program for dredged material management in Puget Sound. The PSDDA program provides standardized dredged material evaluation procedures that govern sampling, laboratory analysis, and test interpretation to ensure suitability of material authorized for disposal at a PSDDA site. Disposal guidelines prevent or minimize potential unacceptable, adverse impacts to the aquatic environment at the permitted unconfined, open-water PSDDA disposal sites in Puget Sound.

Sediment chemical concentrations are compared to PSDDA chemical screening levels (SLs) and maximum levels (MLs) (updated in 1997 and adopted in February, 1998) for each chemical of concern shown in Table 4-1. SL values identify chemical concentrations below which there is no reason to believe that dredged material disposal would result in unacceptable adverse biological effects. A chemical concentration that exceeds one or more SL value triggers further biological testing to confirm the potential toxicity of sediments. However, if chemical concentrations exceed one or more ML value, there is reason to believe that the material would be unacceptable for unconfined, open-water disposal. The exception to this rule is if only a single chemical exceeds an ML value by less than 100%, then standard biological testing is required (PSDDA 1989).

4.3.2 Comparison to PSDDA Guidelines

Cores collected at four stations (DW-25, DW-26, DW-27, and DW-28) were up to 14 feet in length and subsectioned vertically to produce 17 samples. Sampling intervals are shown in Table 4-2. Stations DW-26 and DW-27 were located within the boundaries of the Denny Way cap and were sectioned in 3 or 4 foot intervals. Stations DW-25 and DW-28, located off of but immediately adjacent to the sediment cap, were sectioned in 2 or 4 foot sampling intervals. The number of PSDDA SL and ML exceedances for the 17 samples are provided in Table 4-2. Numbers in parentheses are the number of exceedances that result from concentrations whose detection limits exceed the PSDDA guideline values (SL or ML).

Detected chemicals that exceed PSDDA SL values are shown in Figure 4-5. The chemical data in these figures are shown as exceedance factors of the SL (i.e., chemical concentration/SL). Currently, excavation associated with the construction of the two outfalls will occur inshore of the cap (see Figure 4-5), in the area characterized by Station DW-25. In addition, a small amount of excavation is needed to place a series of pile caps across the existing sediment cap. Total DDTs exceeded the PSDDA SL value in 8 of 17 samples analyzed and evaluated relative to PSDDA guidelines. DDTs were measured above the PSDDA SL in the top 7 to 8 feet of sediment collected at Stations DW-25, DW-26, and DW-27 and in the top 2 feet of sediment collected at Station DW-28. Sediments located just beneath the sediment cap at Station DW-26

also had detected concentrations of mercury, silver, dibenzofuran, and LPAH compounds detected above PSDDA SL values. Mercury was also detected above the PSDDA SL below the sediment cap at Station DW-27.

Exceedances of the PSDDA ML are displayed in Figure 4-6. Exceedances of PSDDA ML values for naphthalene, silver, and total DDTs were observed in sediments located just below the sediment cap at Station DW-26. . There were no other core samples with PSDDA ML exceedances.

4.4 HORIZONTAL AND VERTICAL EXTENT OF CHEMICAL DISTRIBUTIONS

Surface and subsurface sediment chemistry results were compared to SMS sediment quality standard (SQS) and cleanup screening level (CSL) values. Comparisons to criteria determine the horizontal and vertical extent of chemical distributions in the vicinity of the existing Denny Way CSO and surrounding the sediment cap.

4.4.1 Overview of the Washington State Sediment Management Standards

The purpose of the SMS is to reduce and ultimately eliminate adverse effects on biological resources and risks to human health from surface sediment contamination. The SMS provides both a method for designating sediment cleanup sites and a process for cleaning up those sites. The goal for SMS cleanup actions is to obtain levels below the SQS. A minimum cleanup level (MCUL or CSL) is defined as the maximum allowed chemical concentration and level of biological effects permissible at a cleanup site to be achieved by year ten after cleanup has been completed. The MCUL (CSL) is greater than the SQS. Achieving SQS and screening data for cleanup are described in Chapter 173-204-100 of the Washington Administrative Code (WAC) and can be evaluated using both chemical and biological data. Sediments involved in cleanup actions under WAC 173-204-100 are collected and analyzed using methods consistent with PSDDA (1989) and the Puget Sound Estuary Program (PSEP) guidelines (PSEP 1986).

Sediment chemical concentrations are compared to SMS SQS and CSL values for each chemical of concern shown in Table 4-1. Sediments with chemical concentrations that exceed any one applicable chemical SQS value or human health criteria are designated as having adverse effects on biological resources or posing significant human health threats, pending confirmatory biological testing. Confirmatory biological testing consists of two acute effects tests and one chronic effects test. Sediments that pass biological testing interpretive criteria are considered not to have adverse biological effects. Sediments with chemical concentrations that exceed CSL values are considered for cleanup and are the same as Puget Sound marine sediment minimum cleanup levels (MCUL) used in evaluation of cleanup alternatives. This represents a higher level of biological risk than SQS levels. At this time, Ecology is still developing human health criteria. Appropriate site investigations and the human health criteria needed to achieve the goals of the state standards are determined on a case-by-case basis.

Comparison of subsurface data to SMS guidelines provides an assessment of the future surface sediment quality once the existing surface sediment is removed and the subsurface sediment becomes exposed to biota. If the surface sediment is slated for cleanup, and the subsurface sediment passes SMS guidelines, then the surface contamination may be relatively recent, either from a historic or uncontrolled source. If the surface sediment is slated for cleanup and the subsurface sediment exceeds SMS guidelines, then subsurface sediment must be considered in the remediation plan for various remedial alternatives. If surface sediment passes SMS criteria and subsurface sediment exceeds cleanup criteria, there may be no need to remediate underlying sediment, providing that the subsurface sediment will not be disturbed and exposed to the biologically active zone. Defining the horizontal and vertical distribution of chemicals within the study area is one part of a cleanup study which considers all site conditions (i.e., property boundaries, topography, structures, land use, navigation lanes, water quality), sediment contaminant sources, human health issues, and ultimately various cleanup action alternatives (see WAC 173-204-100).

Typically, cleanup action alternatives are presented in a preliminary remediation plan. After cleanup alternatives have been defined, and if no other data gaps exist (including natural recovery analyses), site-specific sediment cleanup standards can be determined. These standards are defined in consideration of net environmental effects, a natural recovery analysis, cleanup cost, and engineering feasibility. Cleanup standards may range from the SQS to a maximum of the MCUL. A cost benefit analysis is integral to the selection of sediment cleanup standards. If the difference in costs and net environmental benefits between cleanup to the SQS and MCUL is small, the SQS becomes the cleanup standard. If the costs and benefits are significantly different between cleanup to SQS and MCUL concentrations, then data will be evaluated further to achieve appropriate cleanup standards.

4.4.2 Sediment Management Standards Detection Limits

The SMS chemical criteria were derived from the 1988 Puget Sound Lowest Apparent Thresholds (LAETs) for selected chemicals. The LAETs for nonionizable organic chemicals are expressed in values normalized to total organic carbon; metals and ionizable organic chemicals are expressed in terms of dry weight. To measure chemical concentrations at levels needed to designate sediment quality, chemical laboratories must achieve method detection limits at or below the SQS criteria. Difficulties in achieving these low levels of detection were encountered in this study due to the following factors:

- Matrix interferences limit data quality. The presence of numerous chemicals at significant concentrations mask the characteristic peaks displayed in chromatograms for other chemicals at the time of analysis. Using standard laboratory methods, some of the peaks interfering with the quantitation process can be eliminated (i.e., use of larger sample sizes, smaller extract volumes, and sample cleanup methods). If matrix interferences continue to impair

quantification, the remaining peaks may be resolved by diluting the sample. Unfortunately, the process of diluting the sample also increases detection limits for all analytes quantified using that method. A dilution of three increases the detection limit by a factor of three. Samples may only be diluted up to 4 or 5 times before the detection limits exceed SMS or PSDDA criteria. When dilution results in detection limits exceeding the criteria, this is referred to as "detection limit exceedances". The resulting detection limit exceedances are shown in parentheses in Table 4-2. All concentrations that were undetected at values greater than SMS chemical criteria in surface sediments were diluted samples. The SAP (Black and Veatch 1997) acknowledged the potential for analytical "interferences" in these Denny Way CSO samples that have elevated levels of numerous target analytes.

- The selection of analytical methods affect data quality. Amendment 1 of the SAP indicated that all chlorinated benzenes inshore of the sediment cap were to be analyzed using SW-846 Method 8260 (see Section 3.2). Thus, surface Stations DW-04, DW-05, DW-06, DW-07, DW-08, DW-09, DW-31, and DW-33 were analyzed using Method 8260. All other surface sediment samples were analyzed using Method 8270. The SAP acknowledged that the use of Method 8270 could potentially result in detection limits for the chlorinated benzenes that may be greater than the "cleanup standards". The SAP amendment justified the modification in analytical methods because historical sediment studies had not detected these compounds in areas other than nearshore of the sediment cap (see Black and Veatch 1997).

- Detection limit exceedances of SMS guideline values can also be caused by low TOC values. SMS chemical criteria for ionizable organic compounds are expressed in parts per million normalized to total organic carbon. TOC typically ranges from 0.5 to 3 percent in Puget Sound surface marine sediments. In subsurface sediments, TOC values can reach as low as 0.1%. If TOC values are less than 0.5 percent, it is possible that detection limits for ionizable compounds, especially chlorinated hydrocarbons, can exceed the SQS or CSL when normalized to organic carbon. At a TOC concentration of 2.5%, the recommended dry weight detection limit of 10 µg/kg for chlorinated hydrocarbons exceeds the SQS value once total organic carbon-normalized (Bragdon-Cook 1995). Low TOC content was observed primarily in project subsurface sediment samples, driving detection limits above chemical criteria in some instances.

Detection limits that exceed screening criteria are of concern when 1) the sample consists solely of undetected values that exceed criteria or 2) the sample has undetected concentrations exceeding criteria that determine a possible cleanup scenario (i.e., CSL exceedance) or, if elected, trigger more extensive biological testing (i.e., SQS exceedance). The chemicals whose detection limits exceed SMS criteria identified in Table 4-3 fall into both categories. Ecology provides guidance for reducing detection limits necessary to meet SQS criteria (see Bragdon-Cook 1995); however, Ecology also acknowledges that method detection limits for organic chemicals may not be reasonably attained in all cases. When SQS detection limits are not achieved, the following approach to evaluating sediment quality is recommended by Ecology:

- Historical data must be reviewed to become familiar with site specific total organic carbon levels and to determine the expected chemicals of concern and their concentrations. When chlorinated hydrocarbon contamination is not of concern, dry weight detection limits reported in the Sediment Source Control Standards User Manual (Ecology 1993) for these compounds should be met. Since the publication of Bragdon-Cook (1995), Ecology has published a draft list of target dry weight detection limits to be used when performing chemical analyses associated with SMS sediment evaluations (see Ecology 1996).
- Laboratories must take all necessary steps to reduce method detection limits, especially when chlorinated hydrocarbon contamination is expected. Larger sample sizes, smaller extract volumes for GC/MS, and sample cleanup methods should be used. When appropriate, Method 8260 should be used for di- and tri-chlorobenzenes and Method 8080/81 should be used for hexachlorobenzene and hexachlorobutadiene.
- When all reasonable measures are taken by the laboratory and SQS criteria detection limits are not achieved, Ecology will accept dry weight detection limits if justification is provided. To evaluate sediment toxicity, data may be evaluated using 1988 dry weight LAET criteria (Bragdon-Cook 1995). LAETs were updated in 1994 and published in 1997 (Ecology 1997).

Using these guidelines, the sediment chemical data were compared to SMS criteria in the next two sections.

4.4.3 Surface Sediment Comparisons to SMS Guidelines

Surface sediment chemical data were compared to the SMS criteria at the 28 stations shown in Figure 4-7. The number of SMS SQS and CSL exceedances for the 28 samples are provided in Table 4-2. Numbers in parentheses are the number of exceedances that result from concentrations whose detection limits exceed the guideline values (SQS or CSL). Detected chemicals exceeding SQS values in surface sediments are shown in Figure 4-8. Exceedances are displayed as factors of the SQS. SQS exceedances of detected chemicals were measured in 15 of the 28 stations. Stations with both the highest exceedance frequency and magnitude (an exceedance factor up to 5.4) occurred inshore of the sediment cap. The four chemicals most frequently exceeding SQS values were total PCBs (in 7 samples), bis(2-ethylhexyl) phthalate (in 5 samples), butylbenzyl phthalate (in 6 samples), and mercury (in 5 samples). LPAH and HPAH compounds were detected above SQS at only three stations (DW-05, DW-07, and DW-10).

Detected chemicals exceeding CSL values were benzyl alcohol, mercury, and bis(2-ethylhexyl) phthalate (Figure 4-9). CSL exceedances of detected chemicals were measured at only three stations (DW-04, DW-07, and DW-30) located just inshore of the sediment cap and just north of the proposed outfall construction area.

Exceedances of SQS criteria by both detected and undetected chemicals are shown in Figure 4-10. CSL comparisons are provided in Figure 4-11. Exceedances are also enumerated in Tables

4-2 and 4-3. For surface sediments, the chemical whose detection limit most frequently exceeded both SQS and CSL criteria was 2,4-dimethylphenol. Other chemicals with detection limit exceedances were hexachlorobenzene, 1,2,4-trichlorobenzene, benzyl alcohol, 1,4-dichlorobenzene, 1,2-dichlorobenzene, hexachlorobutadiene, benzoic acid, 2-methylphenol, and butyl benzyl phthalate. Surface sediments with detection limit exceedances were located inshore, south, and southwest of the sediment cap.

4.4.4 Subsurface Sediment Comparisons to SMS Guidelines

Subsurface sediment sampling stations evaluated relative to SMS guidelines are shown in Figure 4-12. Detected chemicals exceeding SQS criteria are summarized in Table 4-2 and are shown in Figure 4-13 and include bis(2-ethylhexyl) phthalate, butylbenzyl phthalate, silver, total PCBs, mercury, and PAH compounds. Both the highest frequency of chemical exceedances and the greatest magnitude of exceedance occurred at Station DW-31. The vertical extent of chemical contamination at this station has not been confirmed by the collection and analysis of samples deeper than 8 feet. North of the sediment cap, silver, mercury, and total PCBs were detected above SQS criteria in core depths up to 4 feet. South of the sediment cap, silver and mercury were detected above SQS criteria in core depths up to 6 feet below the surface. There were no exceedances of SQS values in core samples collected from Stations DW-30, DW-33, and DW-34.

Detected chemicals exceeding CSL chemical criteria (Figure 4-14 and Table 4-2) were observed at Stations DW-29, DW-35, and DW-31 and included silver, mercury, bis(2-ethylhexyl) phthalate and 2-methylnaphthalene. Bis(2-ethylhexyl)phthalate, 2-methylnaphthalene, and mercury were detected above CSL values at Station DW-31 between 0 and 7 feet. At Station DW-35, silver and mercury were measured above CSL values between 2 and 6 feet below the sediment's surface. Silver and mercury were also measured above CSL values at Station DW-29 in the top 4 feet. There were no exceedances of CSL criteria at Stations DW-30, DW-32, DW-33, DW-36, and DW-37.

Like the surface sediment samples, some organic chemicals were undetected at detection limits exceeding SQS and CSL chemical criteria. Stations with detection limit exceedances in subsurface sediments are identified in Table 4-3. Unfortunately, the detection limit exceedances identified in Table 4-3 are the only chemicals causing designation of these particular samples as either exceeding the SQS or CSL. Chemicals whose detection limit most frequently exceeded chemical criteria in subsurface sediments were hexachlorobenzene (9 times) and 1,2,4-trichlorobenzene (4 times).. Other chemicals were 2,4-dimethylphenol (Sample DW-37-SED-0-2), 1,4-dichlorobenzene (DW-37-SED-4-6), and butylbenzyl phthalate (Sample DW-37-SED-4-6).

Achieving SMS detection limits for chlorinated benzenes is hindered by low TOC levels (see Section 4.4.2). Low TOC concentrations were measured in most of the subsurface sediment samples, especially those located offshore from the existing CSO outfall. In samples with low

TOC content, carbon-normalized detection limits exceeded criteria for hexachlorobenzene, 1,2,4-trichlorobenzene, 1-4-dichlorobenzene, and butyl benzyl phthalate. Despite the use of Method 8081 to analyze hexachlorobenzene in these samples, carbon-normalized data exceeded SMS criteria. In accordance with Ecology's 1995 guidance (Bragdon-Cook 1995), the dry weight concentrations of these compounds for samples identified in Table 4-3 were compared to dry weight criteria. When dry weight detection limits for the chemicals whose carbon-normalized detection limits exceeded criteria and whose sample organic content was less than 1% were compared to the draft 1996 SMS target detection limits provided by Ecology, the 1988 LAET dry weight criteria, and the 1994 LAET dry weight criteria, the detection limits did not exceed the dry weight guidelines for those chemicals (Table 4-4).

5. PRELIMINARY SEDIMENT MANAGEMENT AREAS

Evaluation of the sediment chemistry around the existing Denny Way sediment cap is used to identify areas that may require remediation. Preliminary sediment management areas are mapped in Figure 5-1 and are tabulated in Table 5-1.

5.1 SEDIMENT EVALUATION GUIDELINES

The tabulation of surface sediment chemistry resulted in five categories of sediments which defined preliminary sediment management areas in Table 5-1 and Figure 5-1.

1) Surface sediment samples with no SQS or CSL chemical exceedances pass SMS criteria and are considered "no action" areas.

2) Surface sediment samples with chemical concentrations exceeding CSL values are considered for active remediation.

3) For surface sediments with detected chemicals that exceed SQS but are less than CSL, biological testing may be performed to confirm the designation of the sediment. The biological tests - two acute toxicity tests and one chronic test - must be conducted on recently collected or fresh sediment samples. In the absence of this confirmatory biological testing, sediment management decisions are made based on the sediment chemical data presented in this report, except as discussed in 4) and 5) below.

4) Surface sediment samples with a single chemical exceeding an SQS value by less than 10 percent (i.e., less than an exceedance factor of 1.1) and with no SQS or CSL exceedances in adjacent sampling locations, then the sediment sample is considered a no action area. Due to variability inherent in laboratory analyses, an exceedance of SQS by 10% is not considered significant.

5) For surface samples with undetected values that exceed criteria, best professional judgment was used to evaluate sediment quality. Eight samples archived at the conclusion of sediment sampling in 1997 were re-analyzed in March and April of 1998 to attempt to reduce detection limits below SMS criteria. The laboratory was successful in reducing detection limits for phenolic compounds and chlorinated benzenes. For other samples, guidance provided in the SAP (Black & Veatch 1997) and by Ecology (Bragdon-Cooke 1995) was applied, eliminating several detection limit exceedances from the evaluation (see Appendix D). For still others, such as intertidal Samples DW-05 and DW-08, the sediment chemical testing results with detection limit exceedances were not further evaluated and refined because the

samples occur in an area that may be regraded and cleaned up in conjunction with the proposed outfall construction.

5.2 PRELIMINARY SEDIMENT REMEDIATION AREAS

Five potential remediation areas are mapped in Figure 5-1. Remediation Area A is the only area consisting of surface sediment chemical results with exceedances of CSL values. The remaining four areas (Areas B, C, D, and E) are defined by SQS sediment chemical exceedances only. All five areas will be evaluated relative to cleanup alternatives in a preliminary Remediation Plan.

5.3 VERTICAL EXTENT OF CHEMICAL DISTRIBUTIONS

As described in Section 4.4.1, the vertical extent of chemical distributions is an issue when surface sediments are removed and subsurface sediments become exposed to biota. Sediment chemical CSL exceedances in Remediation Area A, as represented by core samples collected from DW-31, extend up to and beyond 7 feet from the surface (Figure 5-1). At DW-31, the total thickness of impacted sediment has not been determined by the analysis of deeper samples.

5.4 PSDDA SEDIMENT CHEMICAL EVALUATION

A single sediment core (DW-25) was collected within the portion of the outfall extension corridor planned for substantial excavation. (Additional minor excavation is needed for the placement of pile caps within the sediment cap; excavation is limited to small, discrete areas only 3 feet in depth.) The results of the PSDDA sediment chemical evaluation at Station DW-25 indicate that the top eight feet had PSDDA SL exceedances of total DDTs. There were no ML exceedances. According to PSDDA dredged material evaluation guidelines (PSDDA 1989), biological testing would need to be conducted on these sediments to determine their suitability for unconfined, open-water disposal at the Elliott Bay disposal site. The sediments below the top eight feet of sediment, with agency approval, are suitable for unconfined, open-water disposal without further testing. If bioassay testing results indicate no adverse biological impacts, then the top eight feet of sediment in the vicinity of DW-25 may be suitable for unconfined, open-water disposal. However, prior to the collection and bioassay testing of sediments within the proposed area of excavation, a sampling and analysis plan prepared according to PSDDA guidelines would need approval by participating PSDDA agencies.

5.5 PRELIMINARY REMEDIATION PLAN

The results of this sediment chemical evaluation will be used to prepare a preliminary remediation plan for the sediments surrounding the Denny Way sediment cap. The remediation plan will identify all available technologies and remedial options capable of meeting cleanup goals at the Denny Way site, and preferred alternatives will be selected for detailed evaluation (i.e., compliance with applicable regulations, protection of human health and the environment, effectiveness, cost, etc.).

6. REFERENCES

Black and Veatch. 1997. Denny Way/Lake Union CSO Control Project Sampling and Analysis Plan: Sediment Characterization. Prepared for King County Department of Natural Resources. Seattle, WA.

Bragdon-Cook, Kathryn. 1995. Sediment Management Standards Detection Limits. Review of New Scientific Information for SMS Rule Triennial Review. Prepared for the PSDDA/SMS Agencies.

Washington State Department of Ecology (Ecology). 1993. Sediment Source Control Standards User Manual. Washington Department of Ecology, Olympia, WA.

Washington State Department of Ecology (Ecology). 1996. Recommended Sample Preparation Methods, Cleanup Methods, Analytical Methods, Detection Limits for Sediment Management Standards, Chapter 173-204 WAC - Draft. Washington State Department of Ecology, Olympia, WA.

King County Water Pollution Control Division (KCWPCD). 1996. The Denny Way Sediment Cap 1994 Data. King County Water Pollution Control Division, Seattle, WA.

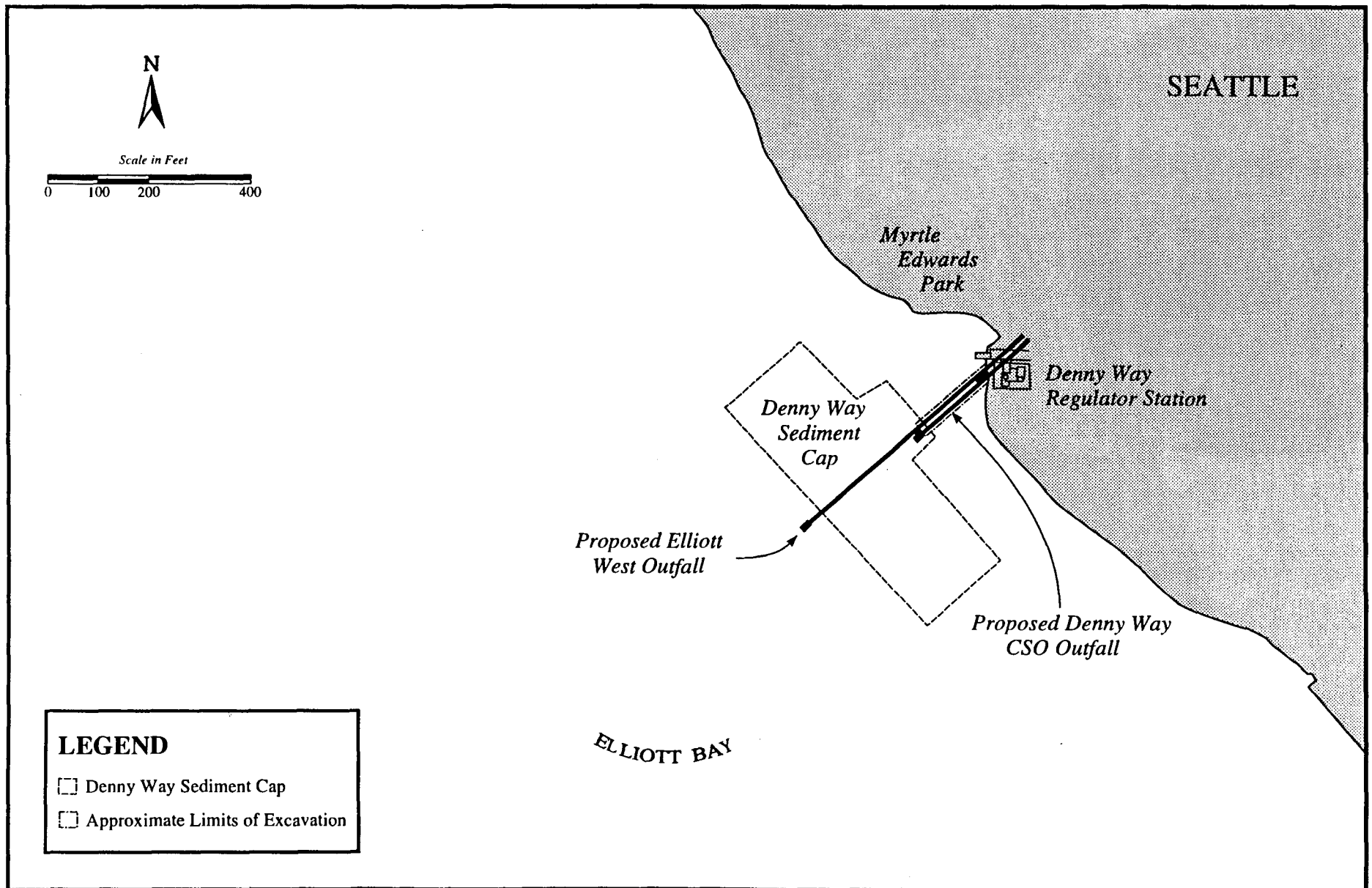
Municipality of Metropolitan Seattle (Metro). 1987. Toxicant Reduction in the Denny Way Combined Sewer System. Municipality of Metropolitan Seattle, Seattle, WA.

Municipality of Metropolitan Seattle (Metro). 1995. The Denny Way Sediment Cap 1990 - 1992 Data. Municipality of Metropolitan Seattle, Seattle, WA.

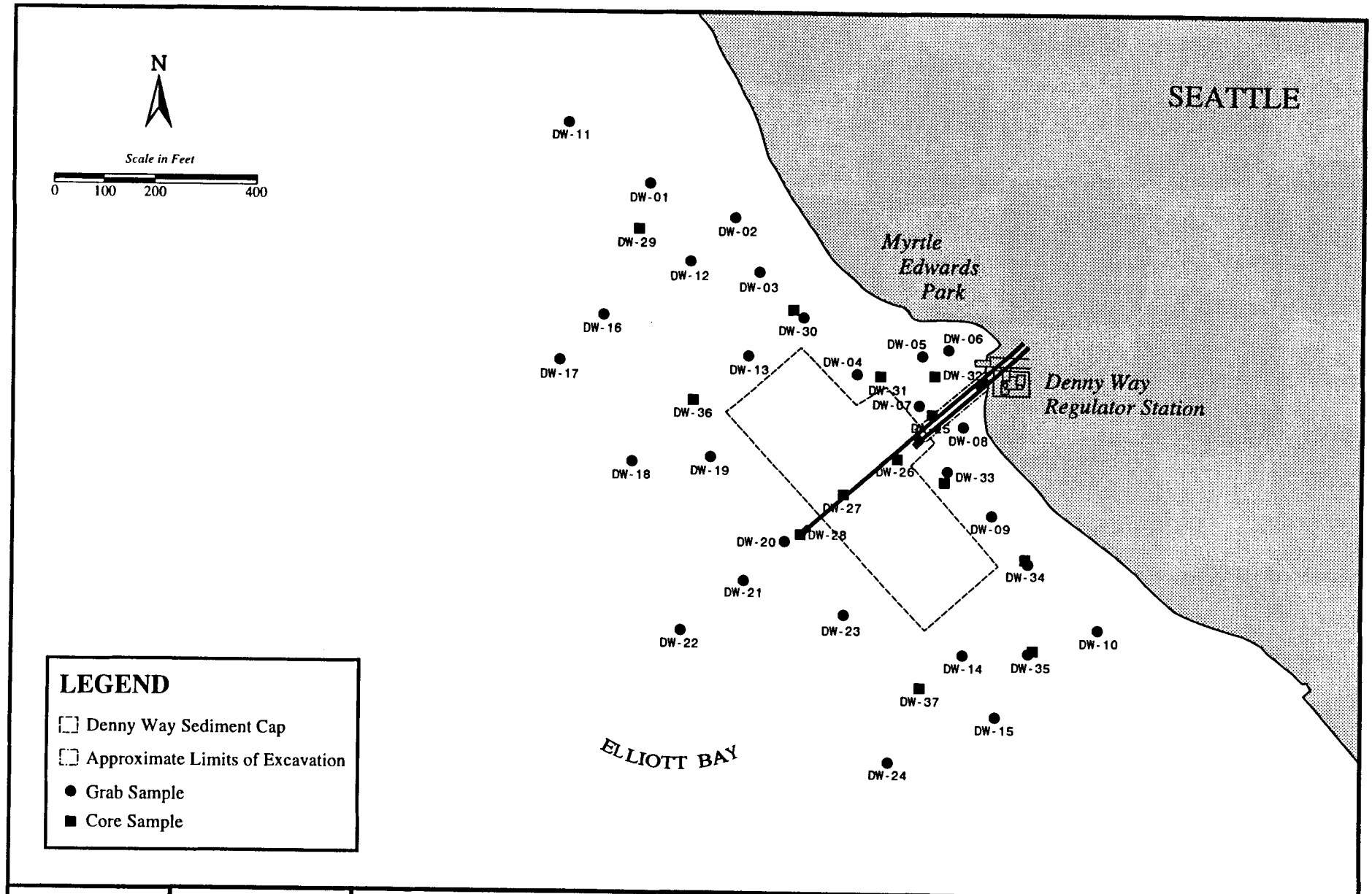
Puget Sound Dredged Disposal Analysis (PSDDA). 1989. Management plan report - unconfined open-water disposal of dredged material, Phase II (North and South Puget Sound). Puget Sound Dredged Disposal Analysis Reports Series. Cooperatively published by (in alphabetical order) U.S. Army Corps of Engineers, Seattle District; U.S. EPA, Region 10; Washington State Department of Ecology; and Washington State Department of Natural Resources.

Puget Sound Estuary Program (PSEP). 1986. Recommended Protocols for Measuring Selected Environmental Variables in Puget Sound. Final Report. TC-3991-04. Prepared for EPA, Region 10, Seattle, Washington. Tetra Tech, Inc., Bellevue, WA.

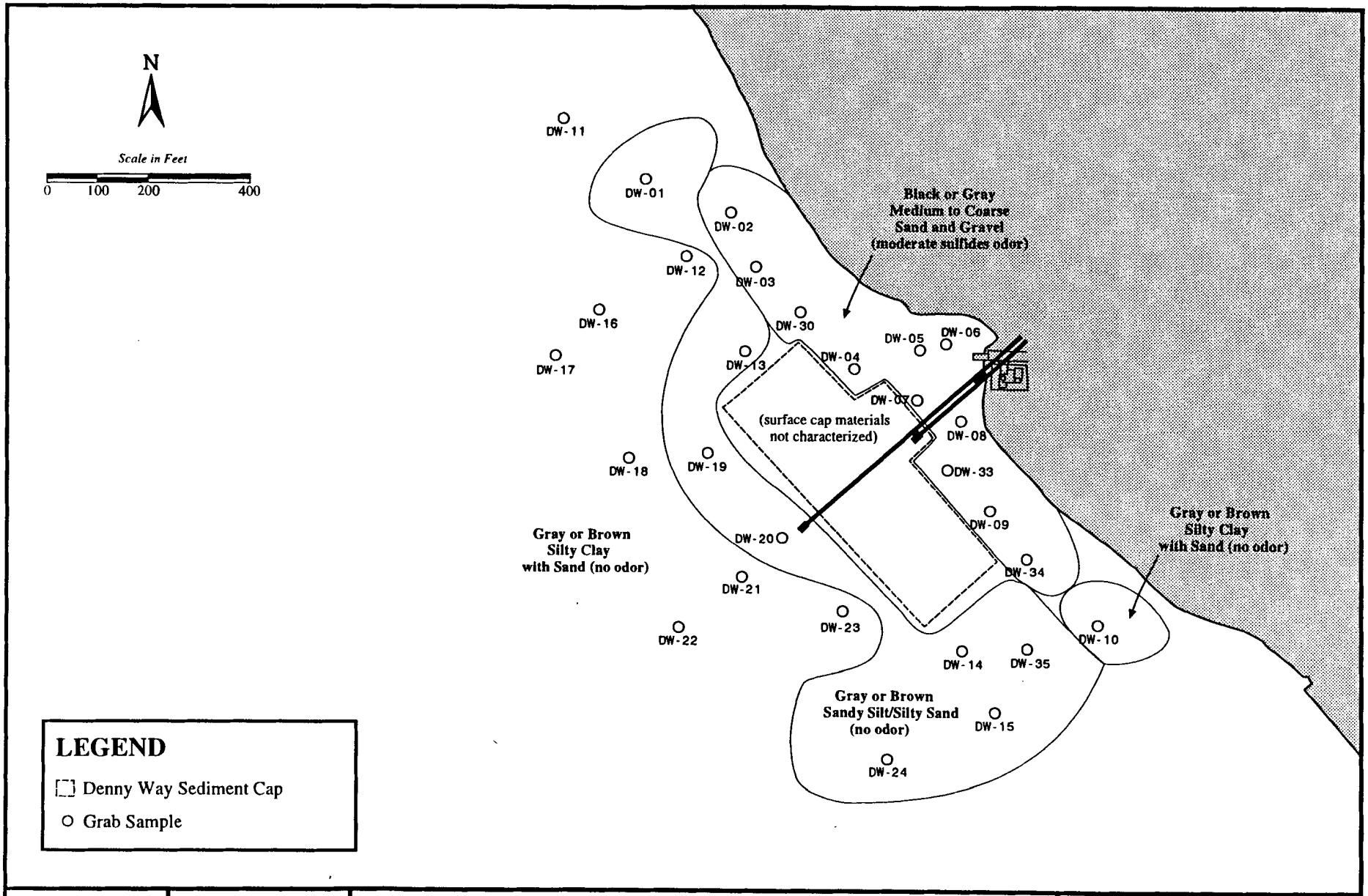
FIGURES



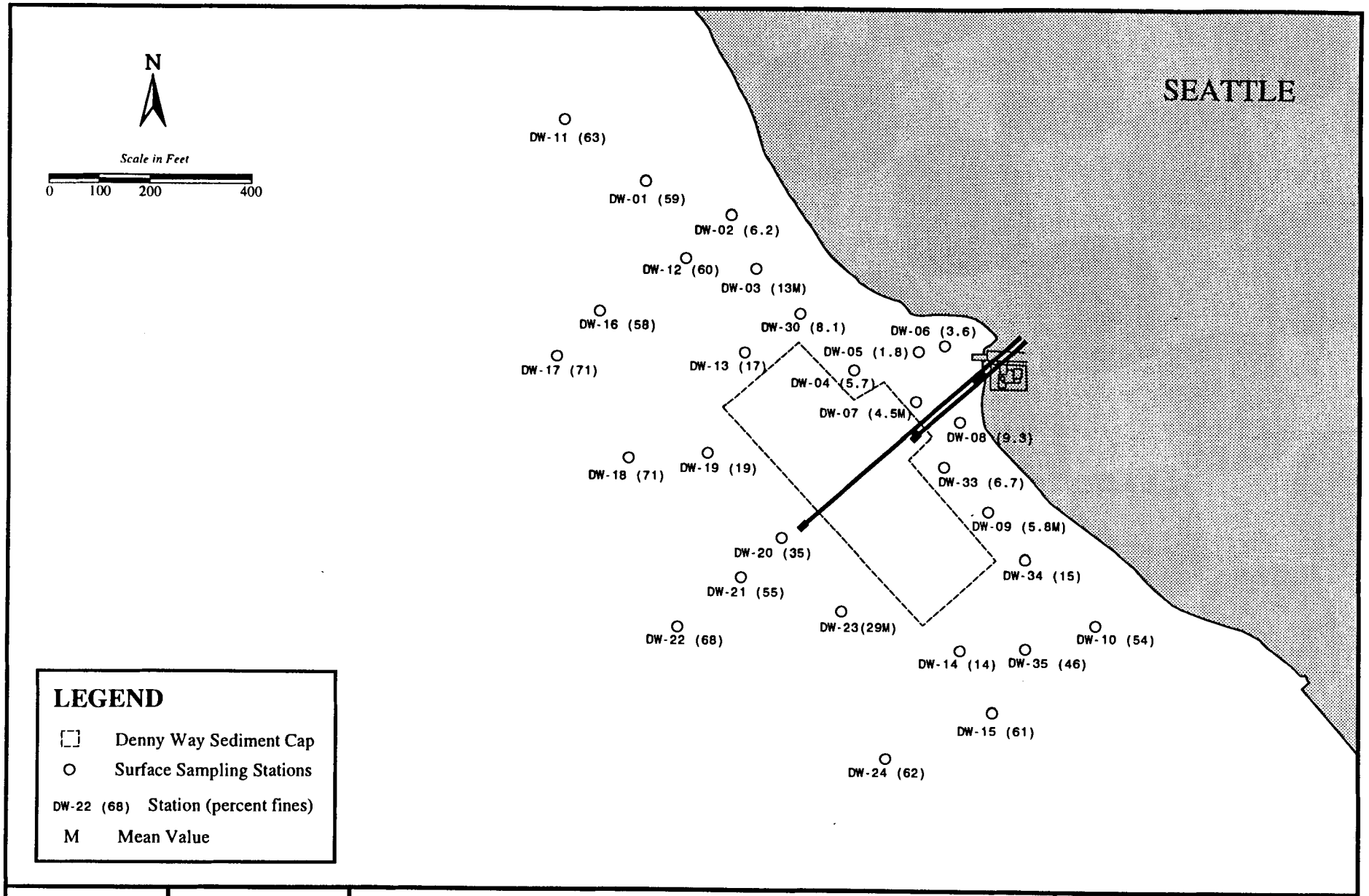
TRIPLIN Environmental Associates	Figure 1-1	Proposed Outfall Alignment, Denny Way/Lake Union CSO Control Project	Denny Way Sediment Characterization
			May 1998 / DWSC Figure 1-01.xar



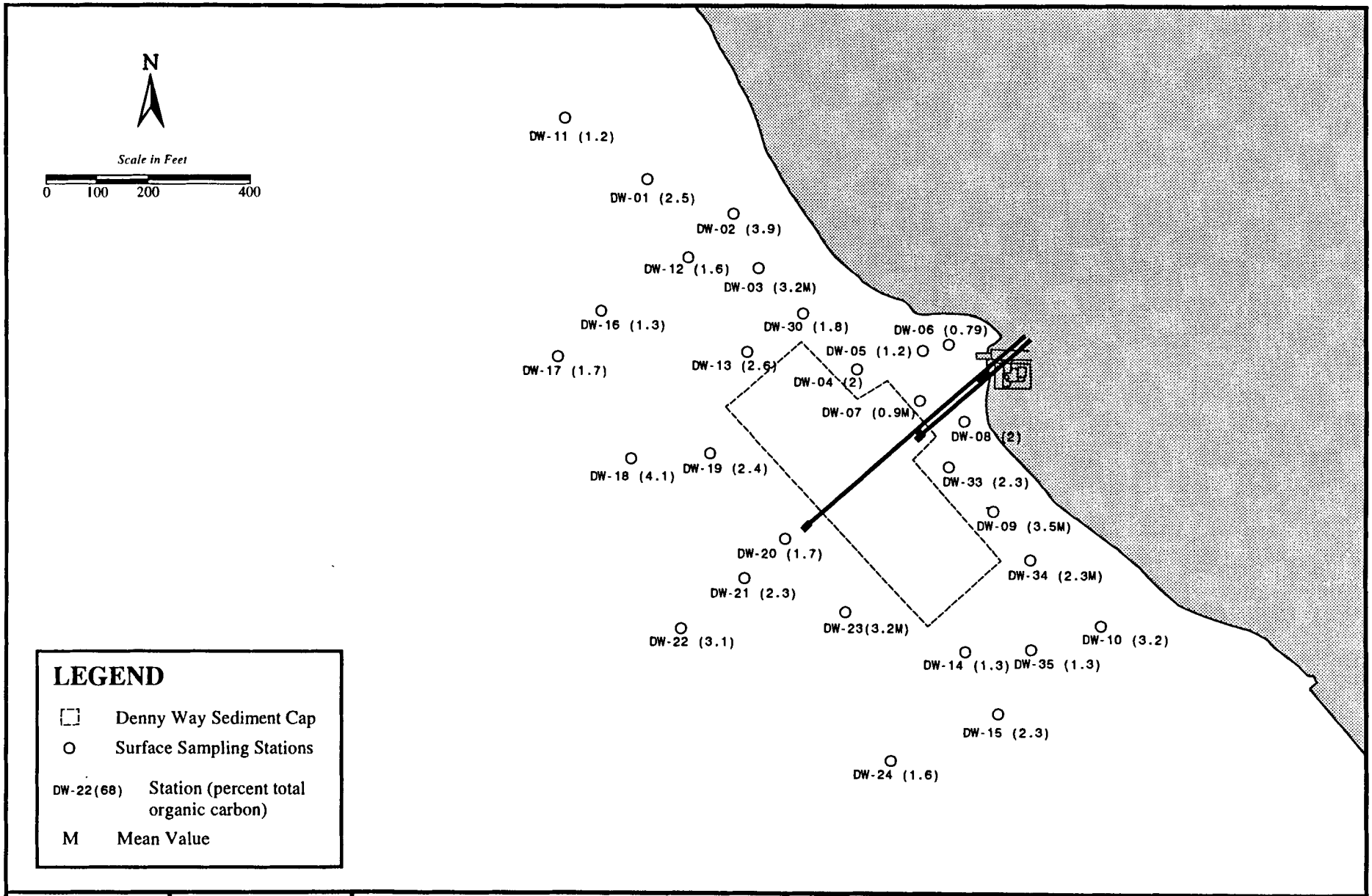
TRIPLIN Environmental Associates	Figure 2-1	Denny Way/Lake Union CSO Control Project Surface and Subsurface Sediment Sampling Locations	Denny Way Sediment Characterization
			May 1998 / DWSC Figure 2-01.xar



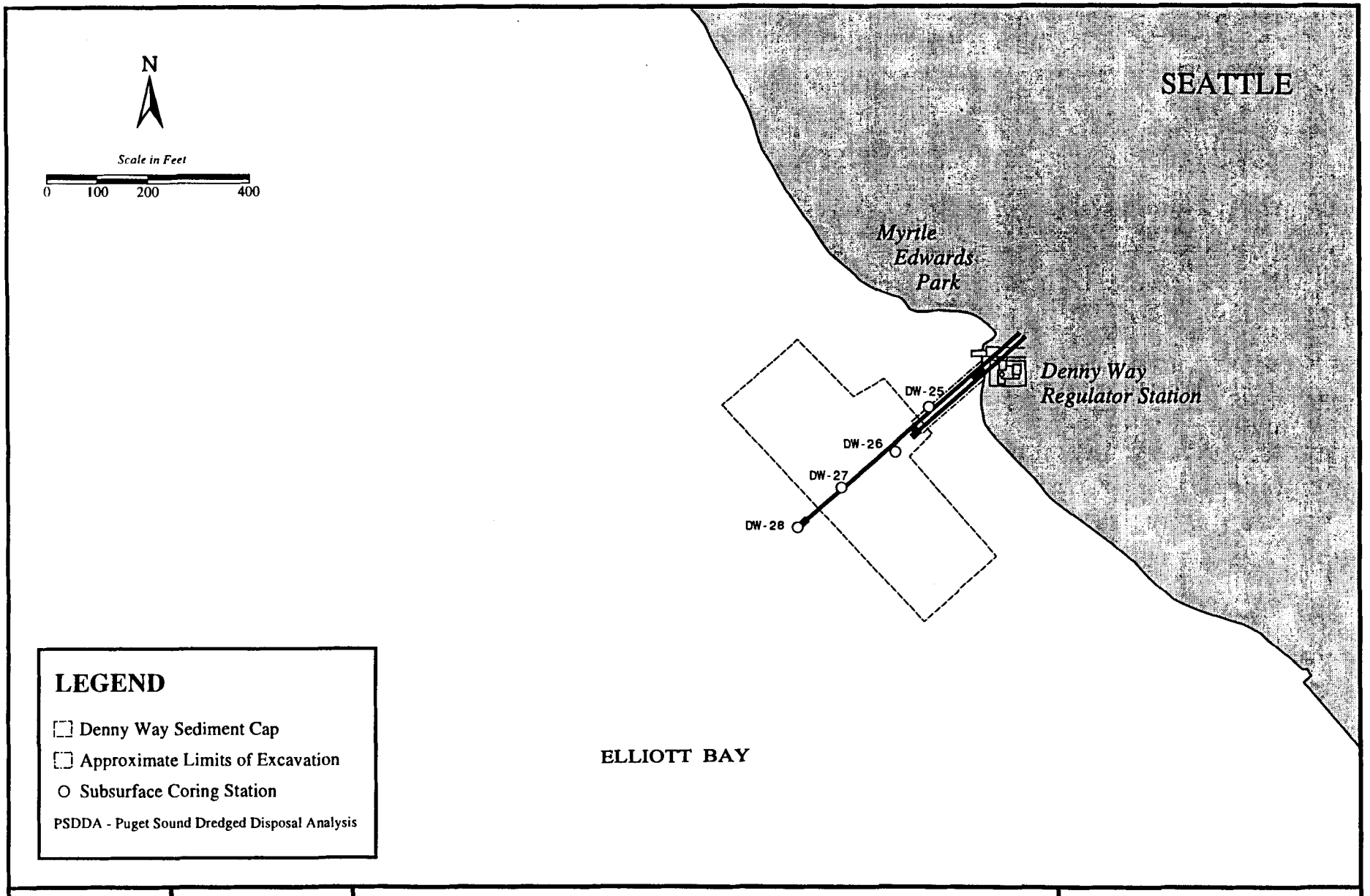
TRIPLIN Environmental Associates	Figure 4-1	Broad Sediment Texture Categories in Surface Sediments Surrounding the Denny Way Sediment Cap	Denny Way Sediment Characterization
			May 1998 / DWSC Figure 4-01.xar



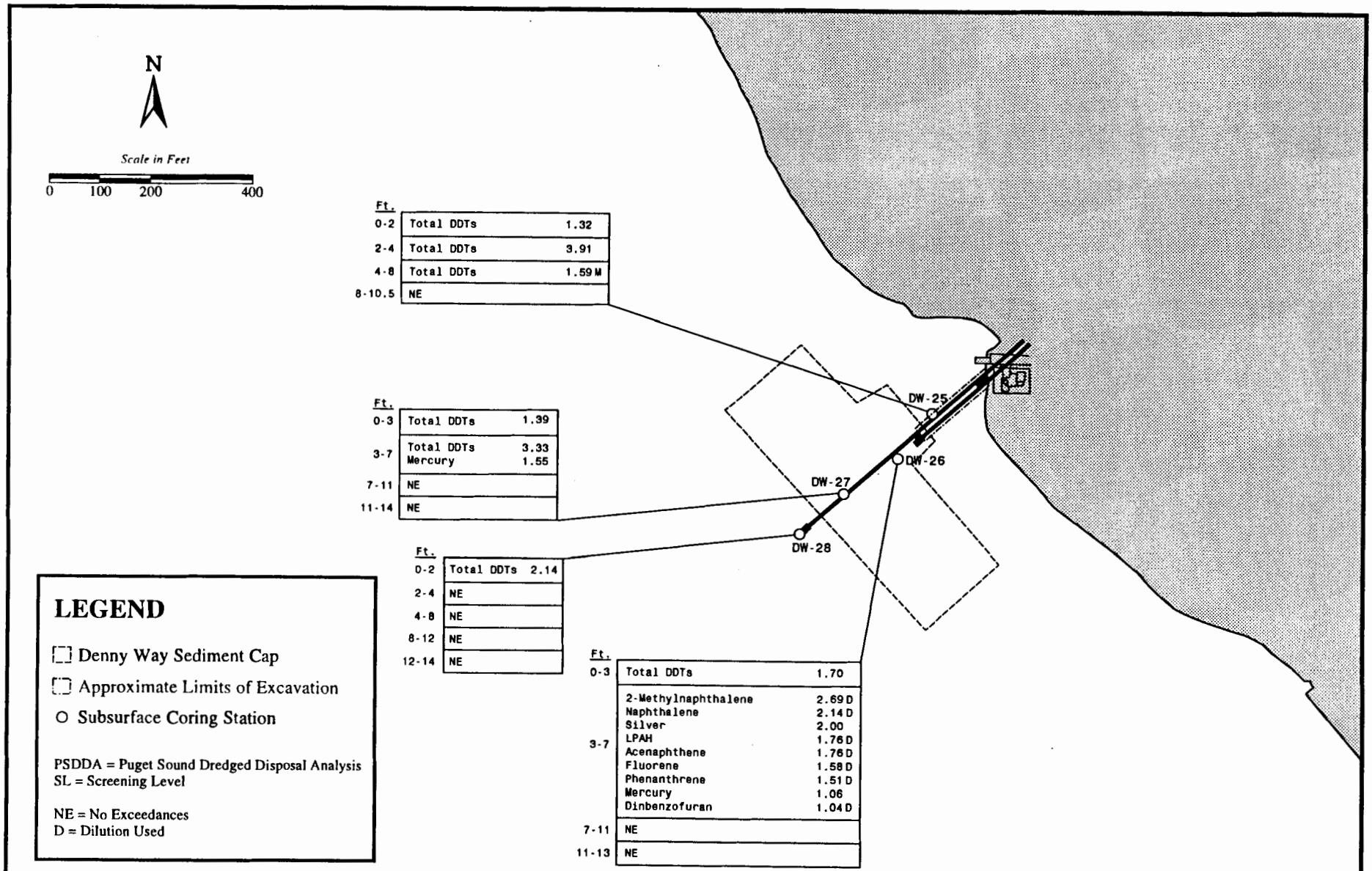
TRIPLIN Environmental Associates	Figure 4-2	Surface Sediment Trends in Percent Fines ( ).	Denny Way Sediment Characterization
			May 1998 / DWSC Figure 4-02.xar



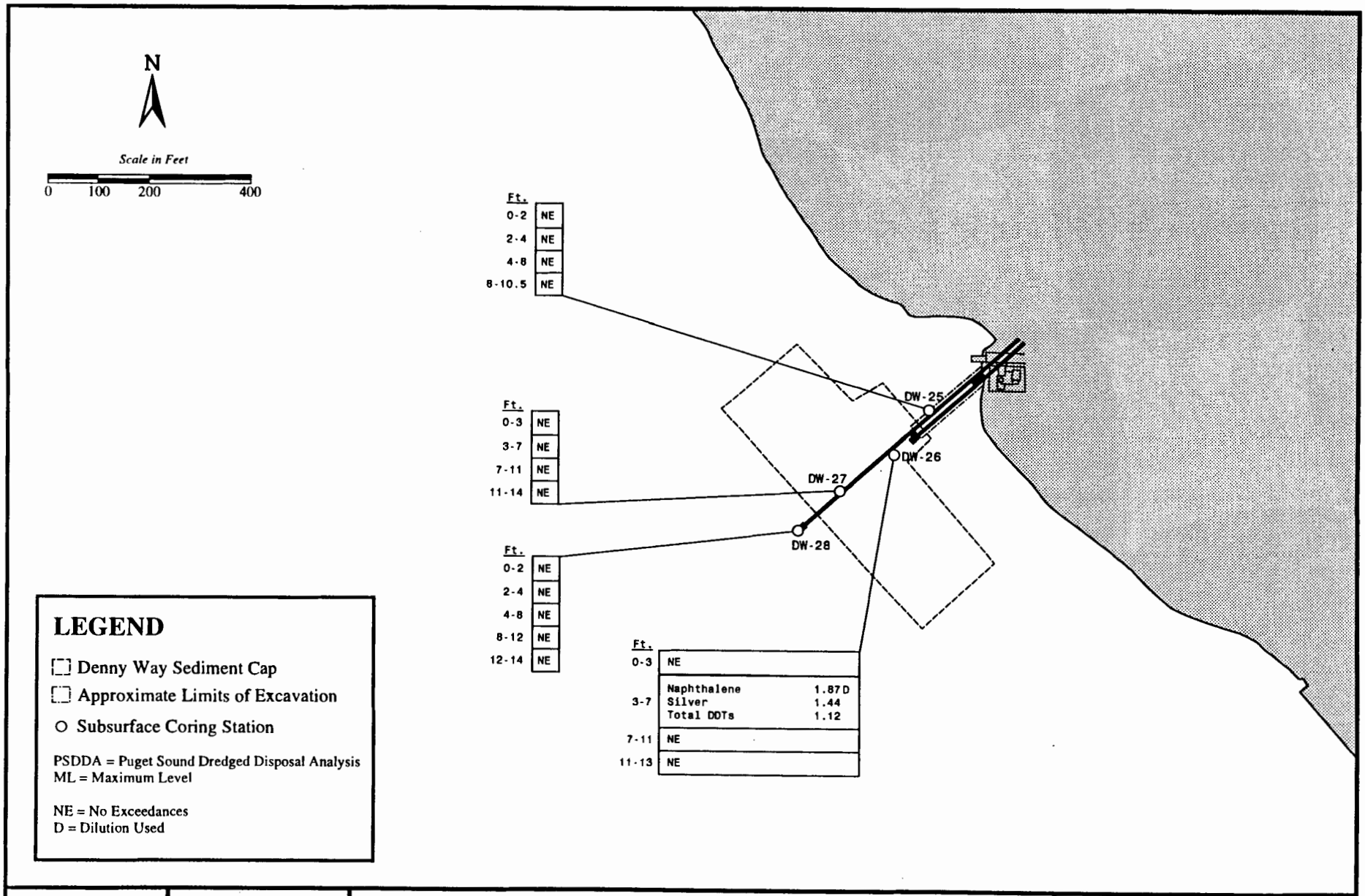
TRIPLIN Environmental Associates	Figure 4-3	Surface Sediment Trends in Percent Total Organic Carbon ( ).	Denny Way Sediment Characterization
			May 1998 / DWSC Figure 4-03.xar



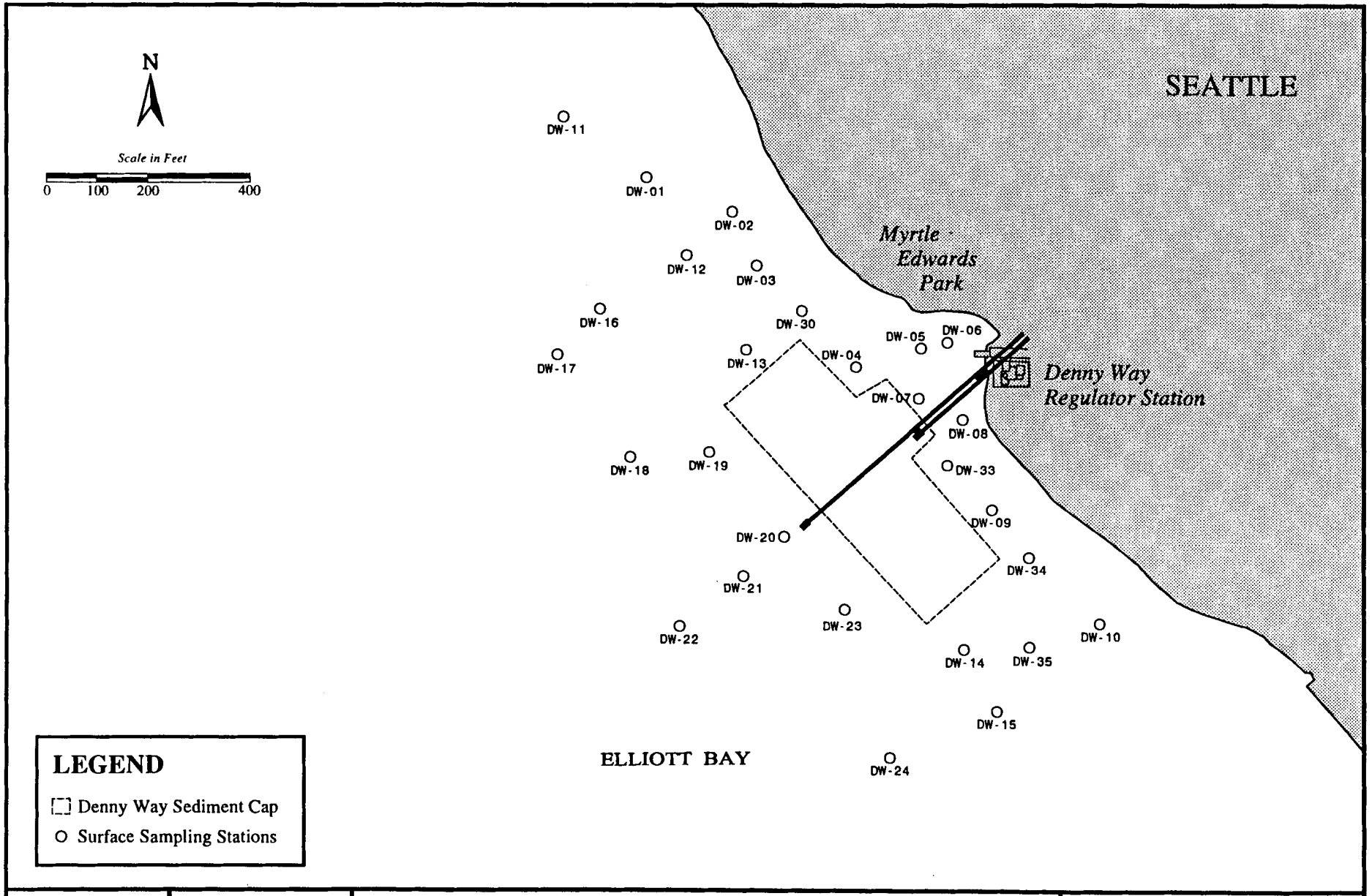
TRIPLIN Environmental Associates	Figure 4-4	Denny Way/Lake Union CSO Control Project Subsurface Sampling Stations Evaluated for Potential Disposal Options (i.e., PSDDA)	Denny Way Sediment Characterization
			May 1998 / DWSC Figure 4-04.xar



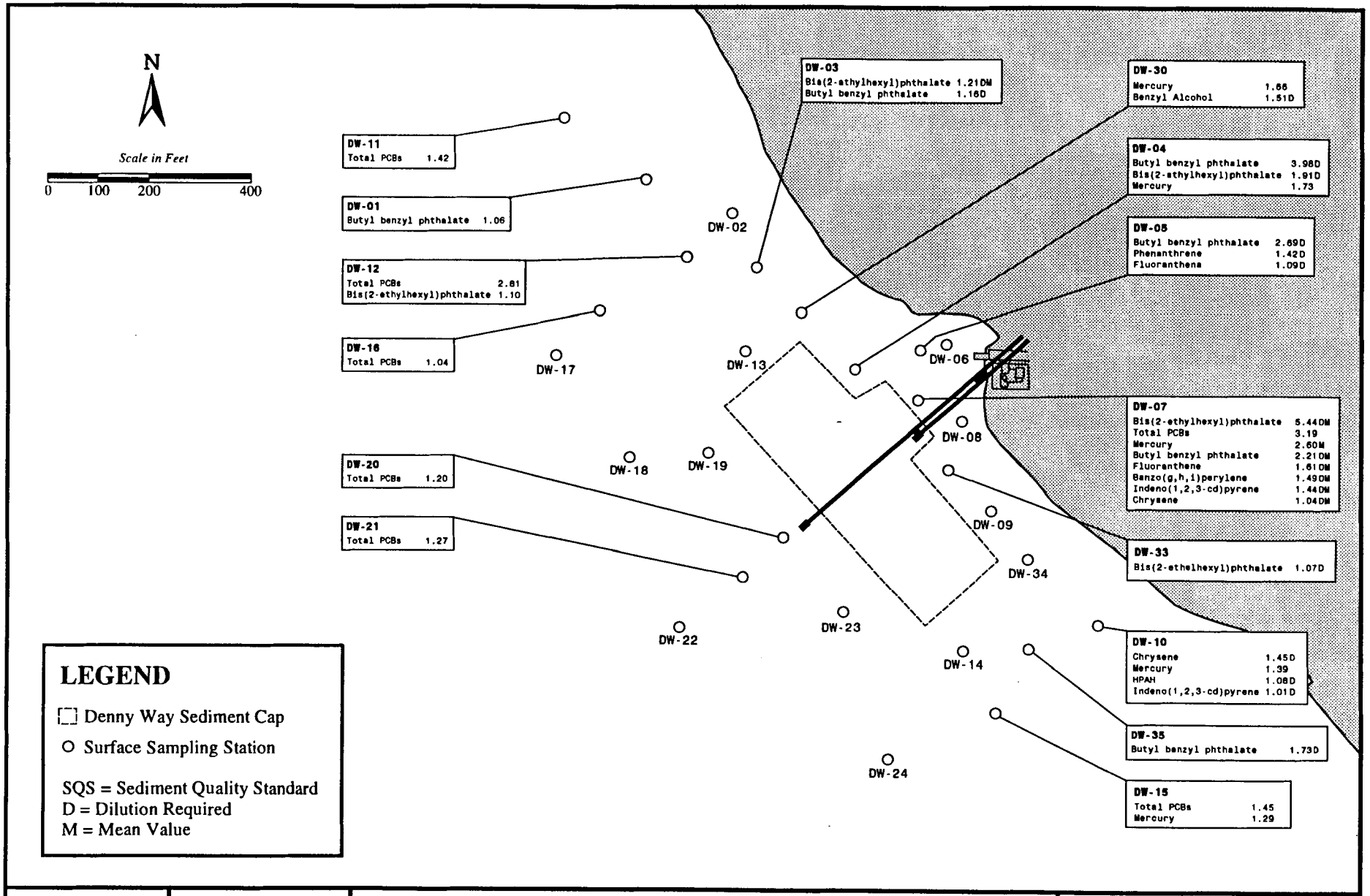
TRIPLIN Environmental Associates	Figure 4-5	Detected Chemicals Exceeding PSDDA SLs in Subsurface Sediment Along the Proposed Denny Way/Lake Union CSO Project Outfall Alignment and Exceedance Factors	Denny Way Sediment Characterization May 1998 | DWSC Figure 4-05.xar



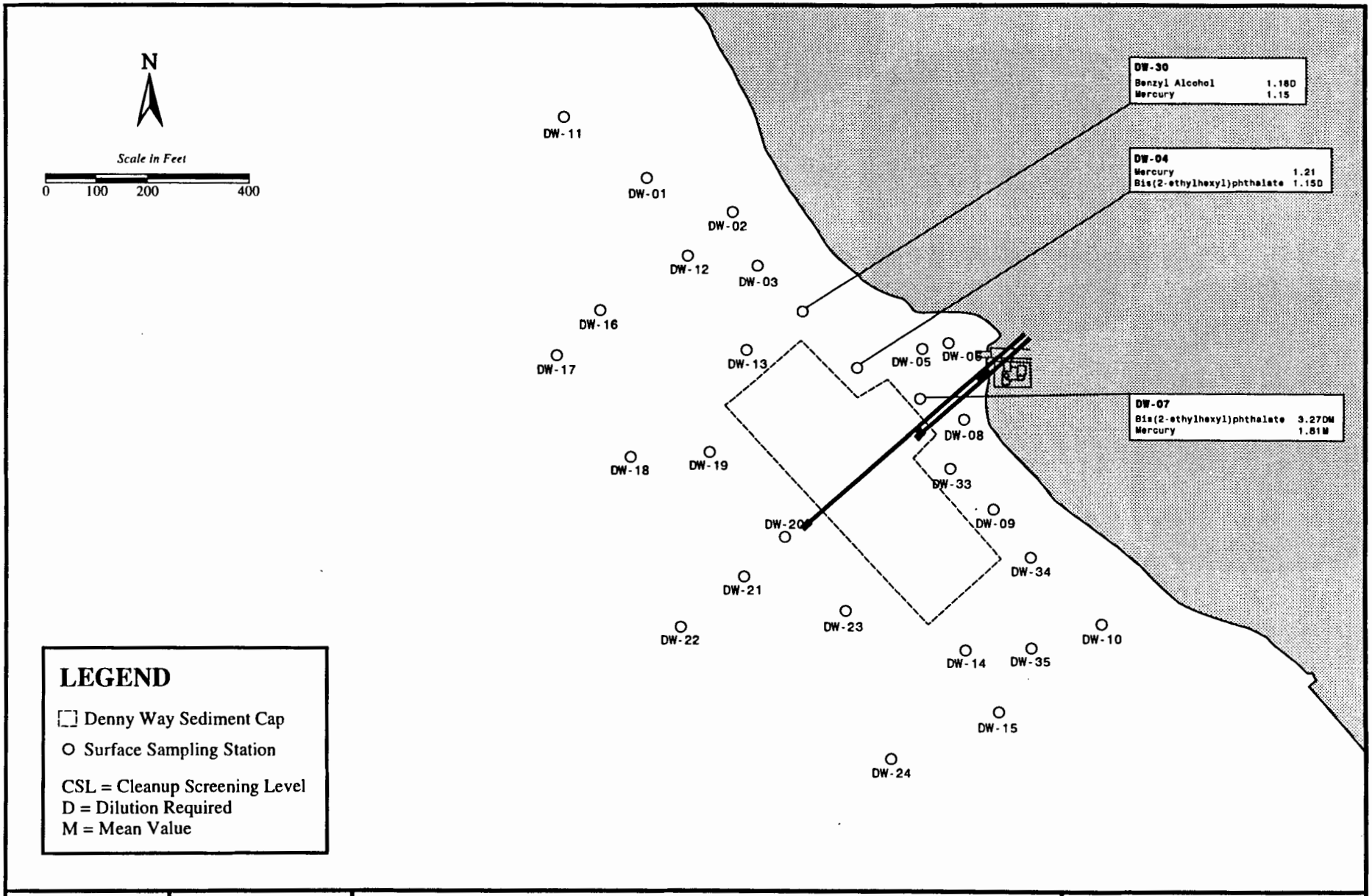
TRIPLIN Environmental Associates	Figure 4-6	Detected Chemicals Exceeding PSDDA MLs in Subsurface Sediment Along the Proposed Denny Way/Lake Union CSO Project Outfall Alignment and Exceedance Factors	Denny Way Sediment Characterization May 1998 | DWSC Figure 4-06.xar



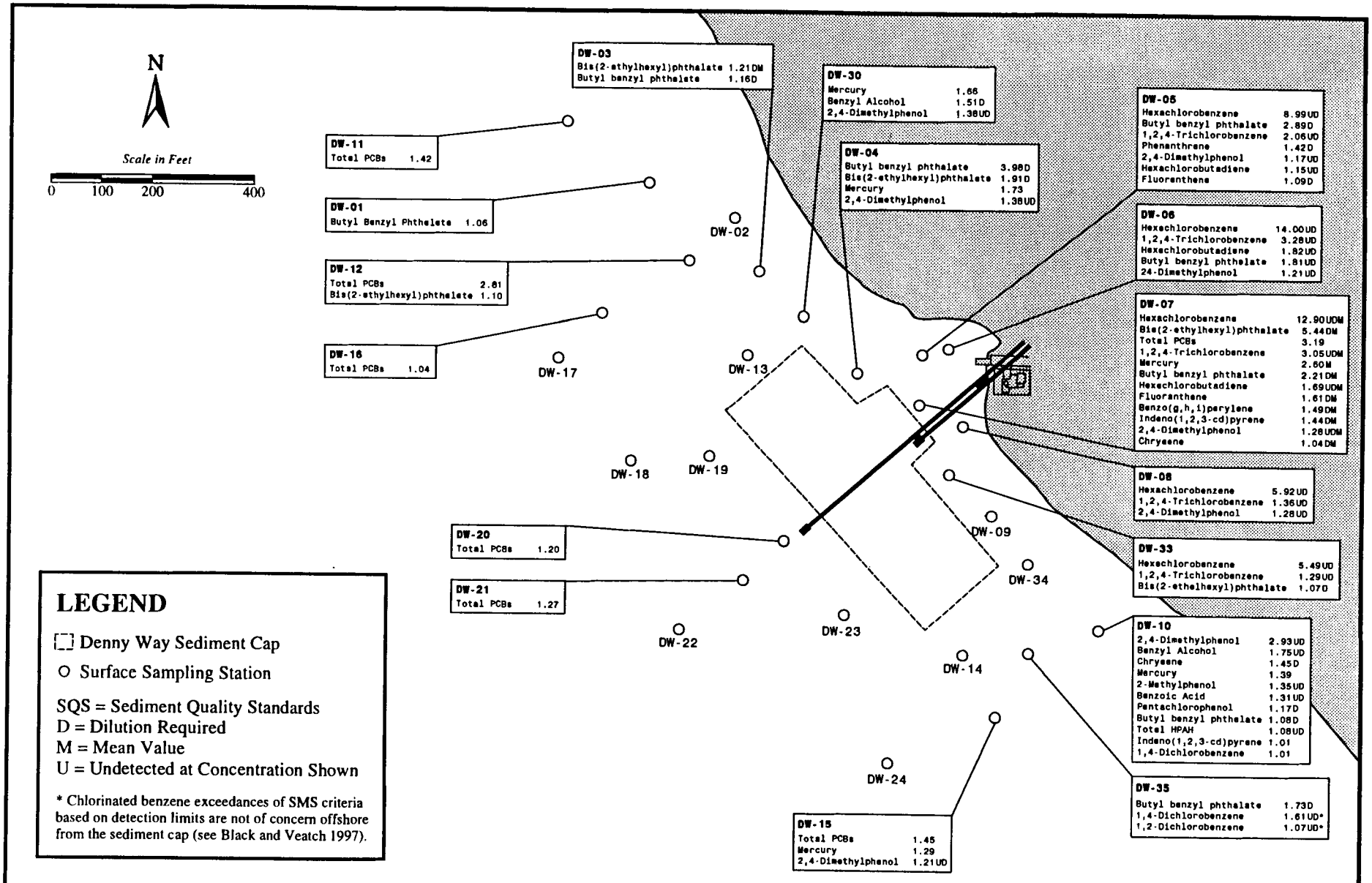
TRIPLIN Environmental Associates	Figure 4-7	Denny Way/Lake Union CSO Project Surface Sediment Sampling Stations (1997)	Denny Way Sediment Characterization
			May 1998 / DWSC Figure 4-07.xar



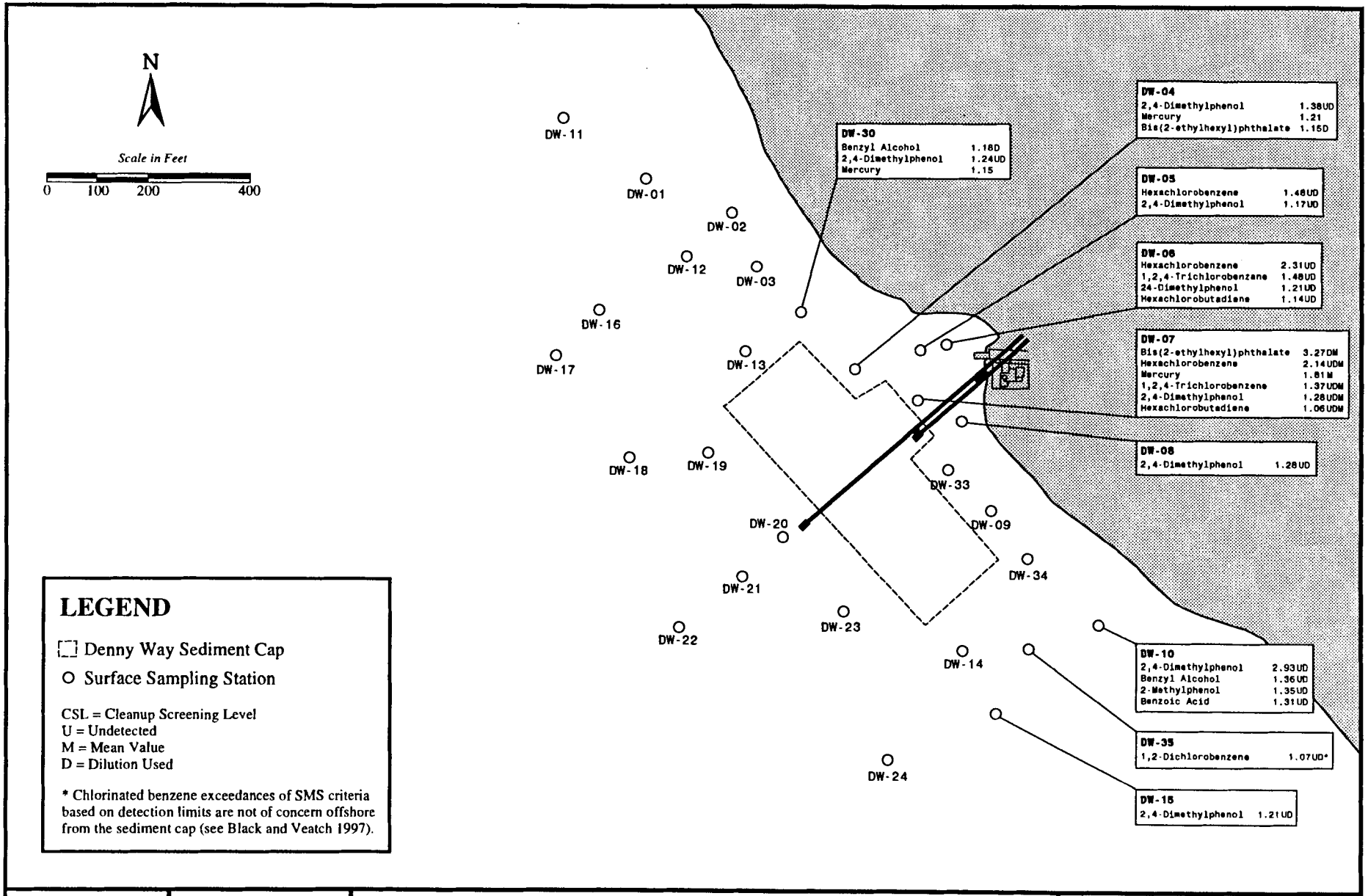
TRIPLIN Environmental Associates	Figure 4-8	Detected Chemicals Exceeding SQS in Denny Way/Lake Union CSO Project Surface Sediments and Exceedance Factors	Denny Way Sediment Characterization
			May 1998 / DWSC Figure 4-08.xar



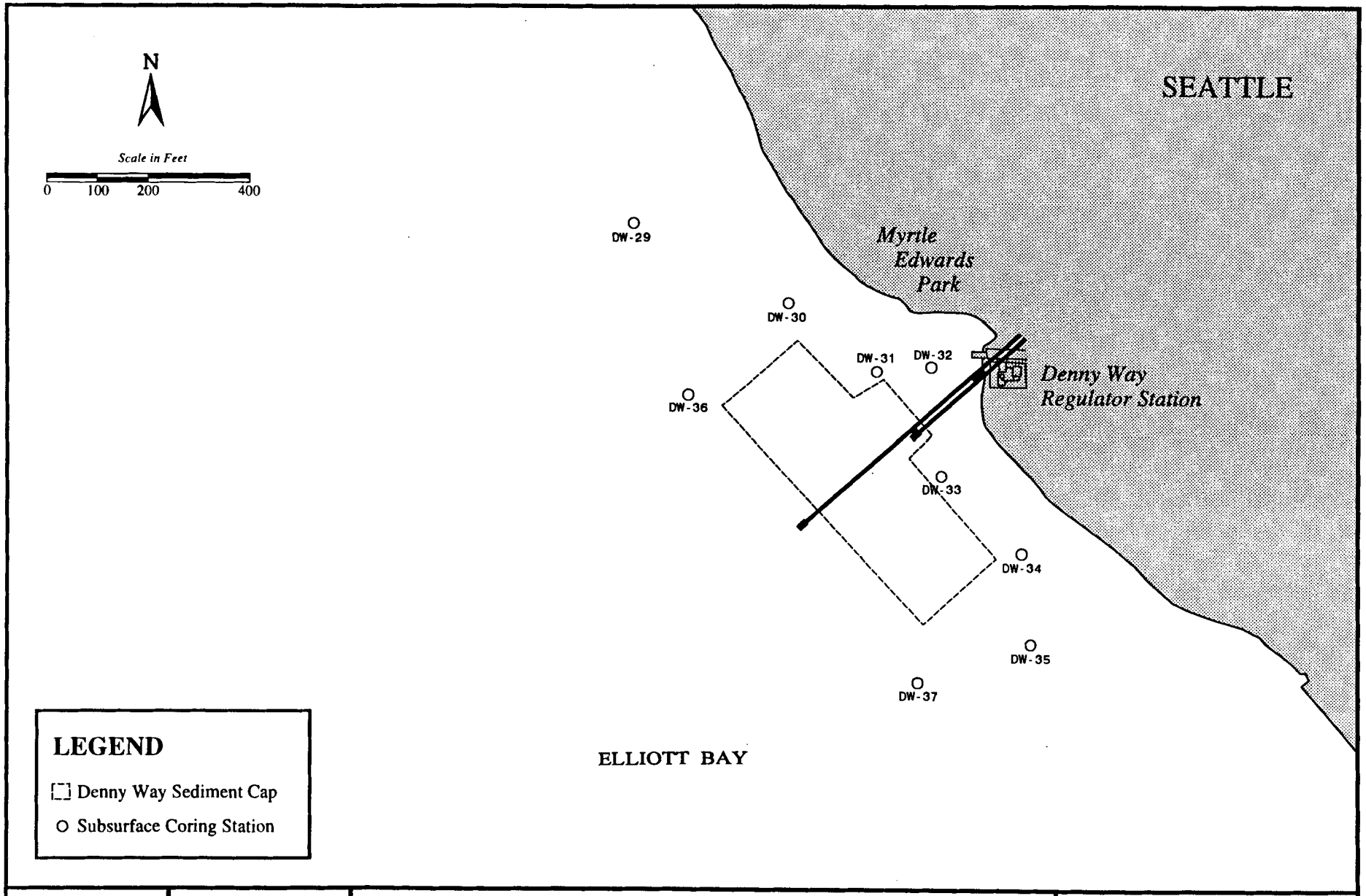
TRIPLIN Environmental Associates	Figure 4-9	Detected Chemicals Exceeding CSL in Denny Way/Lake Union CSO Control Project Surface Sediments and Exceedance Factors	Denny Way Sediment Characterization May 1998 | DWSC Figure 4-09.xar



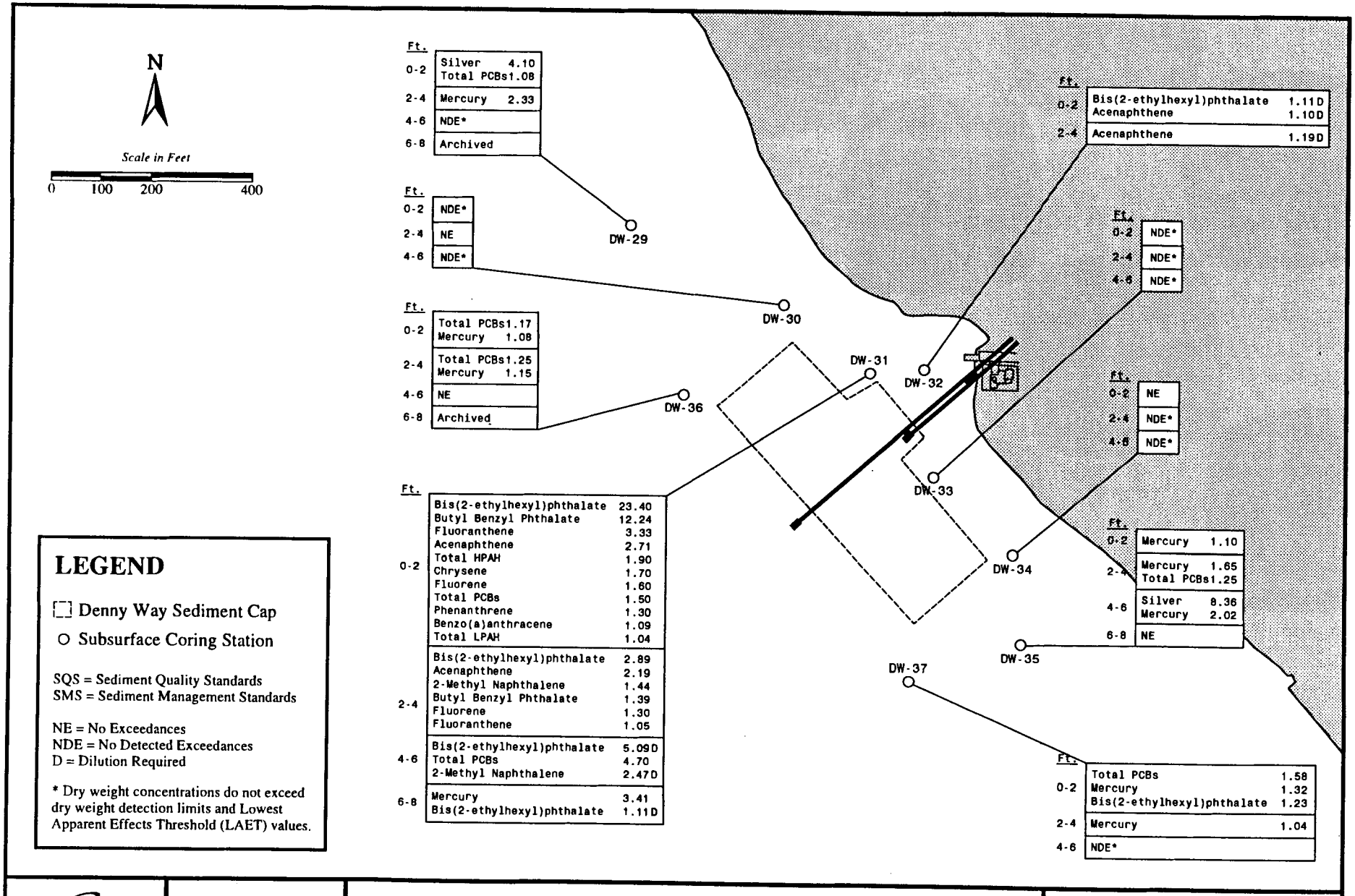
Striplin Environmental Associates	Figure 4-10	Detected and Undetected Chemicals Exceeding SQS in Denny Way/Lake Union CSO Control Project Surface Sediments and Exceedance Factors	Denny Way Sediment Characterization
			May 1998 / DWSC Figure 4-10.xar



TRIPLIN Environmental Associates	Figure 4-11	Detected and Undetected Chemicals Exceeding CSL in Denny Way/Lake Union CSO Control Project Surface Sediments and Exceedance Factors	Denny Way Sediment Characterization
			May 1998 / DWSC Figure 4-11.xar



TRIPLIN Environmental Associates	Figure 4-12	Denny Way/Lake Union CSO Control Project Subsurface Sediment Sampling Stations to Determine the Vertical Extent of Contamination	Denny Way Sediment Characterization May 1998 DWSC Figure 4-12.xar



TRIPLIN Environmental Associates

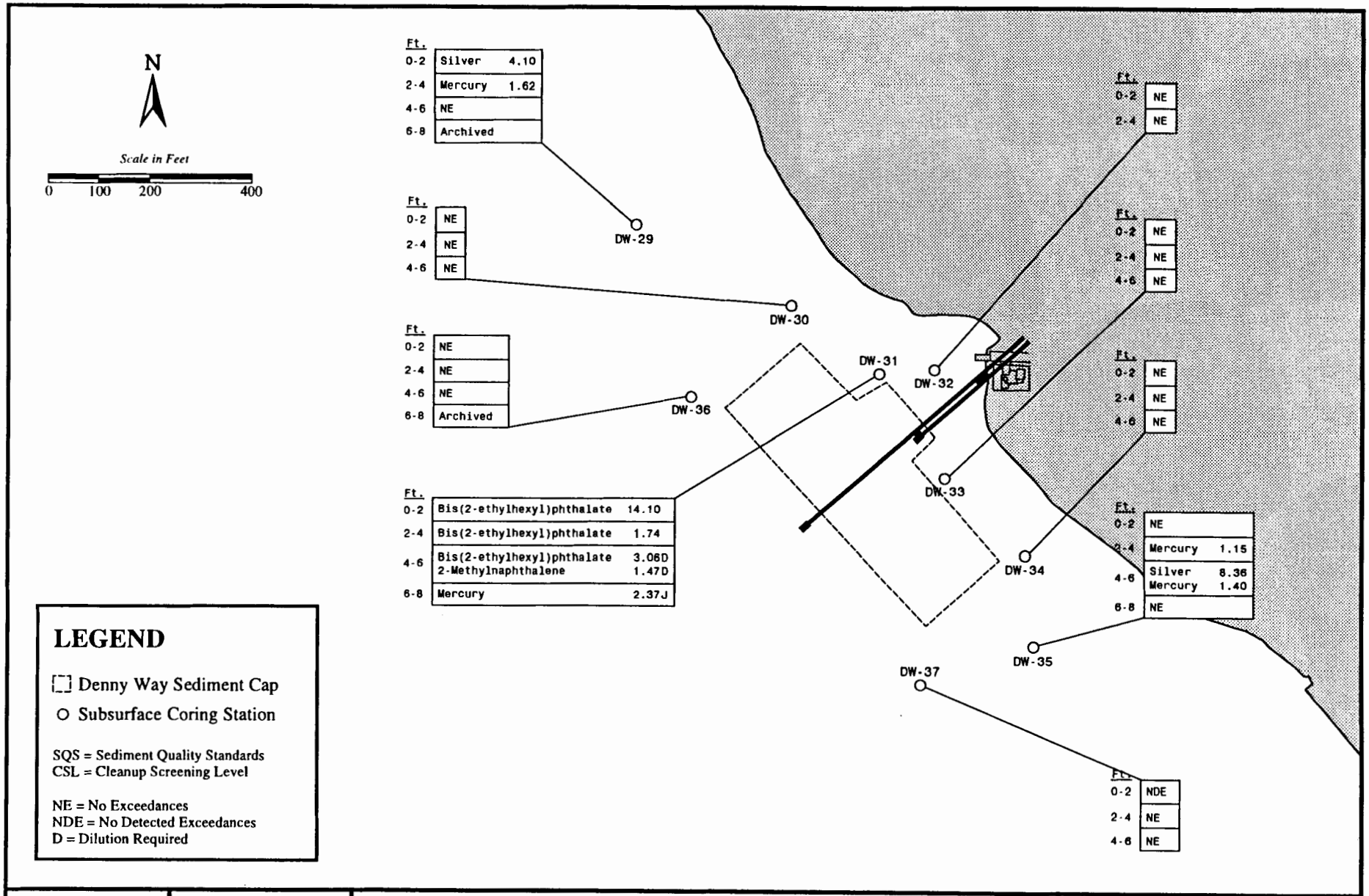
Figure 4-13

Detected Chemicals Exceeding SQS in Denny Way/Lake Union CSO Control Project
Subsurface Sediments and Exceedance Factors

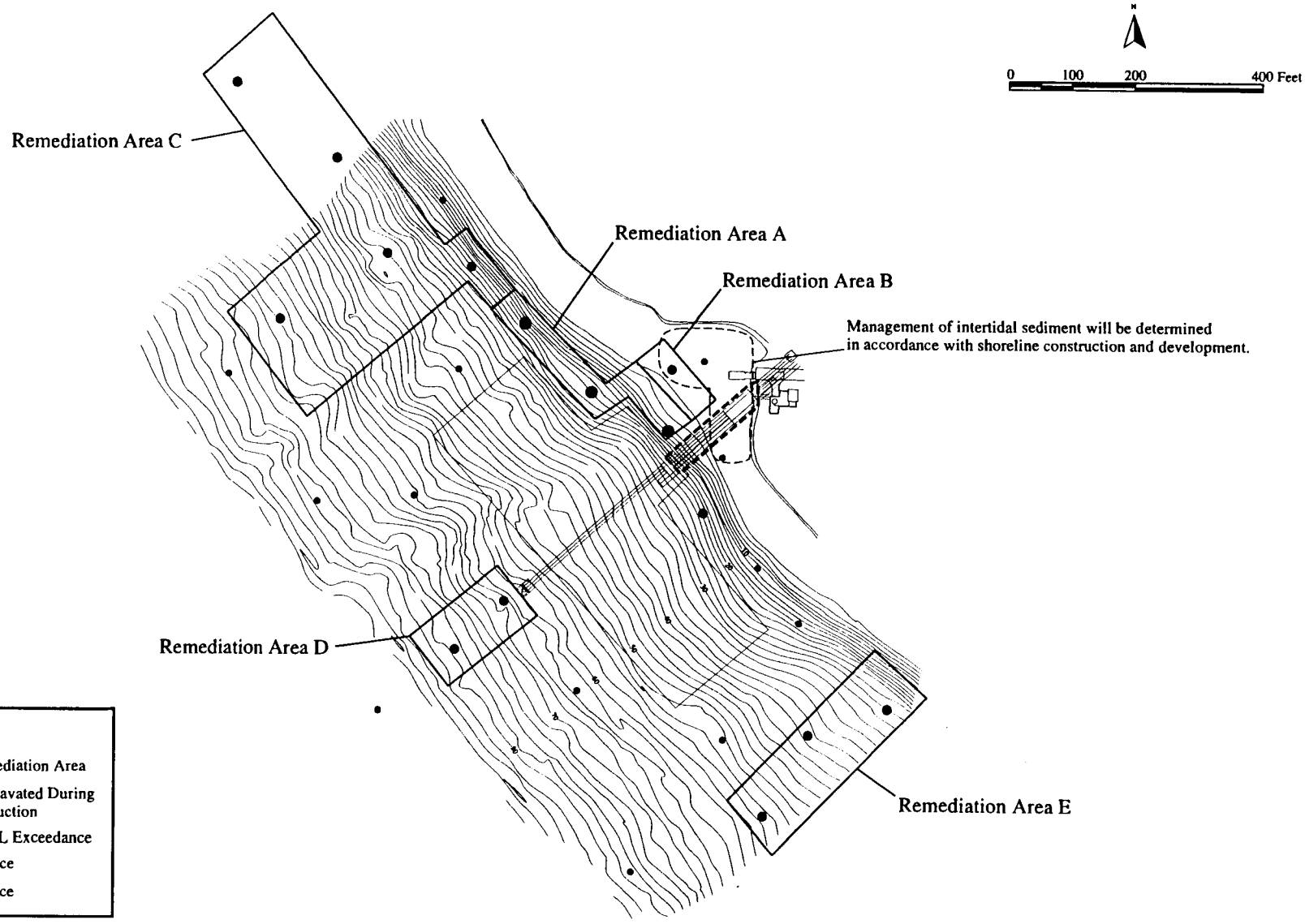
Denny Way Sediment Characterization

May 1998

DWSC Figure 4-13.xar



TRIPLIN Environmental Associates	Figure 4-14	Detected Chemicals Exceeding CSL in Denny Way/Lake Union CSO Control Project Subsurface Sediments and Exceedance Factors	Denny Way Sediment Characterization May 1998 | DWSC Figure 4-14.xar



TRIPLIN Environmental Associates	Figure 5-1	Denny Way / Lake Union CSO Control Project Potential Sediment Remediation Areas	Denny Way Sediment Characterization May 1998 / DWSC Figure 5-1.xar

TABLES

Table 2-1. Summary of Sample Collection and Analysis

Sample Type	Station	Actual Sample Depths	Target Depths Not Collected (due to corer refusal at shallower depths)	Analyses
Surface Grabs	DW01	0-10 cm		SMS*
	DW02	0-10 cm		SMS*
	DW03	0-10 cm		SMS*
	DW04	0-10 cm		SMS
	DW05	0-10 cm		PSDDA**
	DW06	0-10 cm		PSDDA**
	DW07	0-10 cm		PSDDA**
	DW08	0-10 cm		PSDDA**
	DW09	0-10 cm		SMS
	DW10	0-10 cm		SMS*
	DW11	0-10 cm		SMS*
	DW12	0-10 cm		SMS*
	DW13	0-10 cm		SMS*
	DW14	0-10 cm		SMS*
	DW15	0-10 cm		SMS*
	DW16	0-10 cm		SMS*
	DW17	0-10 cm		SMS*
	DW18	0-10 cm		SMS*
	DW19	0-10 cm		SMS*
	DW20	0-10 cm		SMS*
	DW21	0-10 cm		SMS*
	DW22	0-10 cm		SMS*
	DW23	0-10 cm		SMS*
	DW24	0-10 cm		SMS*
20-foot cores	DW25	0-2, 2-4, 4-8, 8-10.5 ft	8-12, 12-16, 16-20 ft	PSDDA*
	DW26	0-3, 3-7, 7-11, 11-13 ft	11-15, 15-19 ft	PSDDA*
	DW27	0-3, 3-7, 7-11, 11-14 ft	11-15, 15-19 ft	PSDDA*
	DW28	0-2, 2-4, 4-8, 8-12, 12-14 ft	12-16, 16-20 ft	PSDDA*
10-foot cores	DW29	0-2, 2-4, 4-6, 6-8 ft	8-10 ft	SMS*
	DW30	surface grab, 0-2, 2-4, 4-6 ft	6-8, 8-10 ft	SMS*
	DW31	0-2, 2-4, 4-6, 6-7 ft	6-8, 8-10 ft	PSDDA**
	DW32	0-2, 2-4 ft	4-6, 6-8, 8-10 ft	PSDDA**
	DW33	surface grab, 0-2, 2-4, 4-6, 6-8 ft	8-10 ft	PSDDA**
	DW34	surface grab, 0-2, 2-4, 4-6 ft	6-8, 8-10 ft	SMS*
	DW35	surface grab, 0-2, 2-4, 4-6, 6-8 ft	8-10 ft	SMS*
	DW36	0-2, 2-4, 4-6, 6-8 ft	8-10 ft	SMS*
	DW37	0-2, 2-4, 4-6 ft	6-8, 8-10 ft	SMS*

*Volatile organics were not analyzed in accordance with Amendment 1 of the SAP (Black and Veatch 1997). Volatile organics were only analyzed in samples collected nearshore of the existing sediment cap in areas outside of the area to be dredged during construction of the outfalls.

**Samples originally slated for a PSDDA analysis were evaluated relative to SMS chemical criteria.

Table 3-1. Chemical Analytes and Methods

	SMS Analyte List	PSDDA Analyte List	Methods
Metals			
Antimony	*[a]	X	PSEP/GFAA/SAD[b]
Arsenic	X	X	PSEP/GFAA/SAD
Cadmium	X	X	PSEP/GFAA/SAD
Chromium	X	*	PSEP/GFAA/SAD
Copper	X	X	PSEP/ICP/SAD
Lead	X	X	PSEP/GFAA/SAD
Mercury	X	X	EPA/7471/CV
Nickel	*	X	PSEP/ICP/SAD
Silver	X	X	PSEP/GFAA/SAD
Zinc	X	X	PSEP/ICP/SAD
Nonionizable Organics			
LPAH			
Naphthalene	X	X	3550/8270[c]
Acenaphthylene	X	X	3550/8270
Anthracene	X	X	3550/8270
Acenaphthene	X	X	3550/8270
Fluorene	X	X	3550/8270
Phenanthrene	X	X	3550/8270
2-Methylnaphthalene	X	X	3550/8270
HPAH			
Fluoranthene	X	X	3550/8270
Pyrene	X	X	3550/8270
Benzo(a)anthracene	X	X	3550/8270
Chrysene	X	X	3550/8270
Benzofluoranthenes	X	X	3550/8270
Benzo(a)pyrene	X	X	3550/8270
Indeno(1,2,3-c,d)pyrene	X	X	3550/8270
Dibenzo(a,h)anthracene	X	X	3550/8270
Benzo(g,h,i)perylene	X	X	3550/8270
Chlorinated Hydrocarbons			
1,3-Dichlorobenzene		X	8260 or 8270
1,4-Dichlorobenzene	X	X	8260 or 8270
1,2-Dichlorobenzene	X	X	8260 or 8270
1,2,4-Trichlorobenzene	X	X	3550/8270
Hexachlorobenzene	X	X	8270 or 8081
Phthalates			
Dimethyl phthalate	X	X	3550/8270
Diethyl phthalate	X	X	3550/8270
Di-n-butyl phthalate	X	X	3550/8270
Butyl benzyl phthalate	X	X	3550/8270
Bis(2-ethylhexyl)phthalate	X	X	3550/8270
Di-n-octyl phthalate	X	X	3550/8270
Miscellaneous Extractables			

Table 3-1. Chemical Analytes and Methods

	SMS Analyte List	PSDDA Analyte List	Methods
Dibenzofuran	X	X	3550/8270
Hexachloroethane		X	3550/8270
Hexachlorobutadiene	X	X	3550/8270
N-nitrosodiphenylamine	X	X	3550/8270
Volatiles			
Trichloroethene		X	8260
Tetrachloroethene		X	8260
Ethylbenzene		X	8260
Total Xylene		X	8260
Pesticides			
Total DDT		X	3540/8081
p,p'-DDE		X	3540/8081
p,p'-DDD		X	3540/8081
p,p'-DDT		X	3540/8081
Aldrin		X	3540/8081
Chlordane		X	3540/8081
Dieldrin		X	3540/8081
Heptachlor		X	3540/8081
Lindane		X	3540/8081
Total PCBs	X	X	3540/8081
Ionizable Organics			
Phenol	X	X	3550/8270
2-Methylphenol	X	X	3550/8270
4-Methylphenol	X	X	3550/8270
2,4-Dimethylphenol	X	X	3550/8270
Pentachlorophenol	X	X	3550/8270
Benzyl Alcohol	X	X	3550/8270
Benzoic Acid	X	X	3550/8270
Conventionals			
Total Solids			PSEP
Total Volatile Solids			PSEP
Total Organic Carbon			SM 5310B[d]
Ammonia			Plumb, 1981[e]
Total Sulfides			PSEP
Grain Size			PSEP

[a]Chemical is not a required analyte but was analyzed in all samples collected for the Denny Way sediment characterization.

[b]Puget Sound Estuary Program. 1986. Recommended Protocols for Measuring Conventional Sediment Variables in Puget Sound or Recommended Protocols for Measuring Metals in Puget Sound Water, Sediment and Tissues Samples. GFAA = Graphite Furnace Atomic Absorption Spectrometry, ICP = Inductively Coupled Plasma Emission Spectrometry SAD = Strong Acid Digestion

[c]Numbers refer to methods in EPA, 1986. Methods for Evaluating Solid Waste Physical/Chemical Methods. SW-846.

[d]Franson, 1992. Standard Methods for the Examination of Water and Wastes. American Public Health Association, American Water Works Association, and Water Environment Federation.

[e]Plumb, R. 1981. Procedures for Handling and Chemical Analysis of Sediment and Water Samples. EPA/COE.

Table 4-1. PSDDA and SMS Analytes, Method Detection Limits, and Chemical Criteria.

	PSDDA			SMS		
	DL	SL	ML	DL	SQS	CSL
Metals	(mg/kg, dry weight)			(mg/kg, dry weight)		
Antimony	2.5	150	200	--	--	--
Arsenic	2.5	57	700	19	57	93
Cadmium	0.3	5.1	14	1.7	5.1	6.7
Chromium	0.5	--	--	87	260	270
Copper	15	390	1300	130	390	390
Lead	0.5	450	1200	150	450	530
Mercury	0.02	0.41	2.3	0.14	0.41	0.59
Nickel	2.5	140	370	--	--	--
Silver	0.2	6.1	8.4	2	6.1	6.1
Zinc	15	410	3800	137	410	960
Nonionizable Organics	(ug/kg, dry weight)			(ug/kg, dry)	(mg/kg, OC)	(mg/kg, OC)
LPAH		5200	29000		370	780
Naphthalene	20	2100	2400	700	99	170
Acenaphthylene	20	560	1300	433	66	66
Anthracene	20	960	13000	320	220	1200
Acenaphthene	20	500	2000	167	16	57
Fluorene	20	540	3600	180	23	79
Phenanthrene	20	1500	21000	500	100	480
2-Methylnaphthalene	20	670	1900	223	38	64
HPAH		12000	69000		960	5300
Fluoranthene	20	1700	30000	567	160	1200
Pyrene	20	2600	16000	867	1000	1400
Benzo(a)anthracene	20	1300	5100	433	110	270
Chrysene	20	1400	21000	467	110	460
Benzofluoranthenes	20	3200	9900	1067	230	450
Benzo(a)pyrene	20	1600	3600	533	99	210
Indeno(1,2,3-c,d)pyrene	20	600	4400	200	34	88
Dibenzo(a,h)anthracene	20	230	1900	77	12	33
Benzo(g,h,i)perylene	20	670	3200	223	31	78
Chlorinated Hydrocarbons						
1,3-Dichlorobenzene	3.2	170	--	--	--	--
1,4-Dichlorobenzene	3.2	110	120	37	3.1	9
1,2-Dichlorobenzene	3.2	35	110	35	2.3	2.3
1,2,4-Trichlorobenzene	6	31	64	31	0.81	1.8
Hexachlorobenzene	12	22	230	22	0.38	2.3

Table 4-1. PSDDA and SMS Analytes, Method Detection Limits, and Chemical Criteria.

	PSDDA			SMS		
	DL	SL	ML	DL	SQS	CSL
Nonionizable Organics	(ug/kg, dry weight)			(ug/kg, dry)	(mg/kg, OC)	(mg/kg, OC)
Phthalates						
Dimethyl phthalate	20	1400	--	24	53	53
Diethyl phthalate	20	1200	--	67	61	110
Di-n-butyl phthalate	20	5100	--	467	220	1700
Butyl benzyl phthalate	20	970	--	21	4.9	64
Bis(2-ethylhexyl)phthalate	20	8300	--	433	47	78
Di-n-octyl phthalate	20	6200	--	2067	58	4500
Miscellaneous Extractables						
Dibenzofuran	20	540	1700	180	15	58
Hexachloroethane	20	1400	14000	--	--	--
Hexachlorobutadiene	20	29	270	11	3.9	6.2
N-nitrosodiphenylamine	12	28	130	28	11	11
Volatiles						
Trichloroethene	3.2	160	1600	--	--	--
Tetrachloroethene	3.2	57	210	--	--	--
Ethylbenzene	3.2	10	50	--	--	--
Total Xylene	3.2	40	160	--	--	--
Pesticides						
Total DDT	--	6.9	69	--	--	--
p,p'-DDE	2.3	--	--	--	--	--
p,p'-DDD	3.3	--	--	--	--	--
p,p'-DDT	6.7	--	--	--	--	--
Aldrin	1.7	10	--	--	--	--
Chlordane	1.7	10	--	--	--	--
Dieldrin	2.3	10	--	--	--	--
Heptachlor	1.7	10	--	--	--	--
Lindane	1.7	10	--	--	--	--
Total PCBs	67	130	3100	6	12	65
Ionizable Organics	(ug/kg, dry weight)			(ug/kg, dry weight)		
Phenol	20	420	1200	140	420	1200
2-Methylphenol	6	63	77	63	63	63
4-Methylphenol	20	670	3600	223	670	670
2,4-Dimethylphenol	6	29	210	29	29	29
Pentachlorophenol	61	400	690	120	360	690
Benzyl Alcohol	6	57	870	57	57	73
Benzoic Acid	100	650	760	217	650	650

PSDDA - Puget Sound Dredged Disposal Analysis
SMS - Sediment Management Standards
DL - Method Detection Limit
SL - 1998 PSDDA Screening Level
ML - 1998 PSDDA Maximum Level
SQS - SMS Sediment Quality Standard
CSL - SMS Cleanup Screening Level
OC - Organic Carbon

Table 4-2. Summary of Denny Way/Lake Union CSO Project Sediment Chemical Evaluation. Parentheses indicate exceedances of the detection limit.

				PSDDA			SMS	
Sample ID	Split/Duplicate	Analyses	Sample Depth	Number of SL Exceedances (<ML)	Number of ML Exceedances	TOC (%)	Number of SQS Exceedances (<CSL)	Number of CSL Exceedances
Grab Samples								
DW-01-SED-0		SMS	0-10 cm	x	x	2.5	2	0
DW-02-SED-0		SMS	0-10 cm	x	x	3.9	0	0
DW-03-SED-0	DW-80/DW-81	SMS	0-10 cm	x	x	3.2M	2	1(1)
DW-04-SED-0		SMS	0-10 cm	x	x	2	1	3(1)
DW-05		PSDDA/SMS	0-10 cm	6(4)	0	1.2	5(2)	2(2)
DW-06		PSDDA/SMS	0-10 cm	4(4)	0	0.79	1(1)	4(4)
DW-07-SED-0	DW-82/DW-83	PSDDA/SMS	0-10 cm	10(5)	0	0.9M	6	6(4)
DW-08		PSDDA/SMS	0-10 cm	4(4)	0	2	2(2)	1(1)
DW-09	DW-84/DW-85	SMS	0-10 cm	x	x	3.5M	0	0
DW-10-SED		SMS	0-10 cm	x	x	3.2	7(3)	4(4)
DW-11-SED-0		SMS	0-10 cm	x	x	1.2	1	0
DW-12-SED-0		SMS	0-10 cm	x	x	1.6	2	0
DW-13-SED-0		SMS	0-10 cm	x	x	2.6	0	0
DW-14-SED-0		SMS	0-10 cm	x	x	1.3	0	0
DW-15		SMS	0-10 cm	x	x	2.3	2	1(1)
DW-16-SED-0		SMS	0-10 cm	x	x	1.3	1	0
DW-17-SED-0		SMS	0-10 cm	x	x	1.7	0	0
DW-18-SED-0		SMS	0-10 cm	x	x	4.1	0	0
DW-19-SED-0		SMS	0-10 cm	x	x	2.4	0	0
DW-20-SED-0		SMS	0-10 cm	x	x	1.7	1	0
DW-21-SED-0		SMS	0-10 cm	x	x	2.3	1	0
DW-22-SED-0		SMS	0-10 cm	x	x	3.1	0	0
DW-23-SED-0	DW-86/DW-87	SMS	0-10 cm	x	x	3.2M	0	0
DW-24		SMS	0-10 cm	x	x	1.6	0	0
DW-30		SMS	0-10 cm	x	x	1.8	0	3(1)
DW-33		PSDDA/SMS	0-10 cm	6(4)	0	2.3	3(2)	0
DW-34		SMS	0-10 cm	x	x	2.3M	0	0
DW-35		SMS	0-10 cm	x	x	1.3	2(1)	1(1)

Table 4-2. Summary of Denny Way/Lake Union CSO Project Sediment Chemical Evaluation. Parentheses indicate exceedances of the detection limit.

				PSDDA			SMS	
Sample ID	Split/Duplicate	Analyses	Sample Depth	Number of SL Exceedances (<ML)	Number of ML Exceedances	TOC (%)	Number of SQS Exceedances (<CSL)	Number of CSL Exceedances
Core Samples								
DW-25-SED-0-2		PSDDA	0-2 ft	6(5)	0	0.32	x	x
DW-25-SED-2-4		PSDDA	2-4 ft	6(5)	0	6	x	x
DW-25-SED-4-8	DW-88/no dup.	PSDDA	4-8 ft	6(5)	0	0.52M	x	x
DW-25-SED-8-10.5		PSDDA	8-10.5 ft	0	0	0.48	x	x
DW-26-SED-0-3		PSDDA	0-3 ft	2(1)	0	1.4	x	x
DW-26-SED-3-7		PSDDA	3-7 ft	16(6)	3	1.7	x	x
DW-26-SED-7-11		PSDDA	7-11 ft	0	0	0.26	x	x
DW-26-SED-11-13		PSDDA	11-13 ft	0	0	2.5	x	x
DW-27-SED-0-3		PSDDA	0-3 ft	1	0	0.74	x	x
DW-27-SED-3-7		PSDDA	3-7 ft	2	0	1.7	x	x
DW-27-SED-7-11		PSDDA	7-11 ft	0	0	0.38	x	x
DW-27-SED-11-14		PSDDA	11-14 ft	0	0	0.09	x	x
DW-28-SED-0-2		PSDDA	0-2 ft	1	0	1.2	x	x
DW-28-SED-2-4		PSDDA	2-4 ft	0	0	0.74	x	x
DW-28-SED-4-8		PSDDA	4-8 ft	0	0	0.16	x	x
DW-28-SED-8-12		PSDDA	8-12 ft	0	0	0.07	x	x
DW-28-SED-12-14		PSDDA	12-14 ft	0	0	0.08	x	x
DW-29-SED-0-2		SMS	0-2 ft	x	x	1.5	2(1)	1
DW-29-SED-2-4		SMS	2-4 ft	x	x	1.8	0	1
DW-29-SED-4-6		SMS	4-6 ft	x	x	0.98	1(1)	0
DW-29-SED-6-8		Archive[1]	6-8 ft	x	x	x	x	x
DW-30-SED-0-2		SMS	0-2 ft	x	x	0.84	1(1)	0
DW-30-SED-2-4		SMS	2-4 ft	x	x	1.3	0	0
DW-30-SED-4-6		SMS	4-6 ft	x	x	0.91	1(1)	0
DW-31-SED-0-2		PSDDA/SMS	0-2 ft	28(6)	0	3	14(3)	2(1)
DW-31-SED-2-4		PSDDA/SMS	2-4 ft	17(5)	1	2.2	9(3)	2(1)
DW-31-SED-4-6		PSDDA/SMS	4-6 ft	23(14)	8(2)	3.3	12(9)	7(5)
DW-31-SED-6-8		PSDDA/SMS	6-7 ft	3	0	4.8	2	0

Table 4-2. Summary of Denny Way/Lake Union CSO Project Sediment Chemical Evaluation. Parentheses indicate exceedances of the detection limit.

				PSDDA			SMS	
Sample ID	Split/Duplicate	Analyses	Sample Depth	Number of SL Exceedances (<ML)	Number of ML Exceedances	TOC (%)	Number of SQS Exceedances (<CSL)	Number of CSL Exceedances
DW-32-SED-0-2		PSDDA/SMS	0-2 ft	9(5)	0	2.1	5(3)	0
DW-32-SED-2-4		PSDDA/SMS	2-4 ft	6(5)	0	2	4(3)	0
DW-33-SED-0-2		PSDDA/SMS	0-2 ft	0	0	1.1	1(1)	0
DW-33-SED-2-4		PSDDA/SMS	2-4 ft	0	0	0.6	2(2)	0
DW-33-SED-4-6		PSDDA/SMS	4-6 ft	0	0	0.49M	2(2)	0
DW-33-SED-6-8		Archive[2]	6-8 ft	x	x	x	x	x
DW-34-SED-0-2		SMS	0-2 ft	x	x	1.3	0	0
DW-34-SED-2-4		SMS	2-4 ft	x	x	0.42	1(1)	0
DW-34-SED-4-6		SMS	4-6 ft	x	x	0.37	2(2)	0
DW-35-SED-0-2		SMS	0-2 ft	x	x	3M	1	0
DW-35-SED-2-4		SMS	2-4 ft	x	x	1.8	1	2(1)
DW-35-SED-4-6		SMS	4-6 ft	x	x	2	0	3(1)
DW-35-SED-6-8		SMS	6-8 ft	x	x	0.44	0	0
DW-36-SED-0-2		SMS	0-2 ft	x	x	2.2	2	0
DW-36-SED-2-4		SMS	2-4 ft	x	x	2.1	2	0
DW-36-SED-4-6		SMS	4-6 ft	x	x	5.7	0	0
DW-36-SED-6-8		Archive[1]	6-8 ft	x	x	x	x	x
DW-37-SED-0-2		SMS	0-2 ft	x	x	1	6(3)	1(1)
DW-37-SED-2-4		SMS	2-4 ft	x	x	0.91	2(1)	0
DW-37-SED-4-6		SMS	4-6 ft	x	x	0.32	4(4)	0

[1] Sample analyzed for sulfides only; remaining sample jars archived.

[2] Sample analyzed for VOCs and sulfides; remaining sample jars archived.

TOC = Total Organic Carbon

PSDDA - Puget Sound Dredged Disposal Analysis

SMS - Sediment Management Standards

SL - PSDDA Screening Level, ML - PSDDA Maximum Level, SQS - SMS Sediment Quality Standards, CSL - SMS Cleanup Screening Level

Table 4-3. Summary of Chemicals With Detection Limits that Exceeded SMS Criteria. Parentheses indicate exceedances of the detection limit.

Sample ID	TOC (%)	Number of SQS Exceedances (<CSL)	Undetected Chemicals that Exceed SQS	Number of CSL Exceedances	Undetected Chemicals that Exceed CSL	Is Station Located Inshore of Cap?	Proposed Action For Evaluating Detection Limit Exceedances
DW-05	1.2	5(2)	NA	2(2)	HCB, 2,4-Dimethylphenol	yes	Intertidal Area[1]
DW-06	0.79	1(1)	Butylbenzyl phthalate	4(4)	HCB, HCBD, 1,2,4-Trichlorobenzene, 2,4-Dimethylphenol	yes	Intertidal Area[1]
DW-08	2	2(2)	HCB,1,2,4-Trichlorobenzene	1(1)	2,4-Dimethylphenol	yes	Intertidal Area[1]
DW-10-SED	3.2	7(3)	NA	4(4)	2,4-Dimethylphenol, Benzyl Alcohol, 2-Methylphenol, Benzoic Acid	no	Reference SAP guidance
DW-15	2.3	2	--	1(1)	2,4-Dimethylphenol	no	Reference SAP guidance
DW-35	1.3	2(1)	NA	1(1)	1,2-Dichlorobenzene	no	Reference SAP guidance
DW-29-SED-4-6	0.98	1(1)	HCB	0	--	no	Compare to dry weight criteria
DW-30-SED-0-2	0.84	1(1)	HCB	0	--	yes	Compare to dry weight criteria
DW-30-SED-4-6	0.91	1(1)	HCB	0	--	yes	Compare to dry weight criteria
DW-33-SED-0-2	1.1	1(1)	HCB	0	--	yes	Compare to dry weight criteria
DW-33-SED-2-4	0.6	2(2)	HCB, 1,2,4-Trichlorobenzene	0	--	yes	Compare to dry weight criteria
DW-33-SED-4-6	0.49M	2(2)	HCB, 1,2,4-Trichlorobenzene	0	--	yes	Compare to dry weight criteria
DW-34-SED-2-4	0.42	1(1)	HCB	0	--	no	Compare to dry weight criteria
DW-34-SED-4-6	0.37	2(2)	HCB, 1,2,4-Trichlorobenzene	0	--	no	Compare to dry weight criteria
DW-37-SED-0-2	1	6(3)	NA	1(1)	2,4-Dimethylphenol	no	Reference SAP guidance
DW-37-SED-4-6	0.32	4(4)	1,4-Dichlorobenzene, 1,2,4-Trichlorobenzene, HCB, Buthylbenzyl phthalate	0	--	no	Compare to dry weight criteria

SQS = Sediment Quality Standard, CSL = Cleanup Screening Level, TOC = Total Organic Carbon, HCB = Hexachlorobenzene, HCBD = Hexachlorobutadiene

NA = Not Applicable. Sediment quality determination is driven by detected chemicals that exceed criteria.

[1] Station occurs in an intertidal area that may be regraded and cleaned up in association with outfall construction. For this reason, samples were not re-analyzed to reduce detection limits below SMS criteria.

Table 4-4. Dry Weight Concentrations of Chemicals with Detection Limits (when TOC-Normalized) that Exceeded SMS Criteria in Subsurface Sediment.

Sample ID	Hexachloro-benzene	1,2,4-Trichloro-benzene	1,4-Dichloro-benzene	Butylbenzyl phthalate
Ecology D.L.:	22	31	37	21
1988/1994 LAET:	22	31	110	63
Core Samples				
DW-29-SED-4-6	3.6 UD	NE	NE	NE
DW-30-SED-0-2	3.6 UD	NE	NE	NE
DW-30-SED-4-6	4 UD	NE	NE	NE
DW-33-SED-0-2	12 U	NE	NE	NE
DW-33-SED-2-4	11 U	6 U	NE	NE
DW-33-SED-4-6	11 U	5 U	NE	NE
DW-34-SED-2-4	3.4 UD	NE	NE	NE
DW-34-SED-4-6	3.5 UD	3.5 U	NE	NE
DW-37-SED-4-6	3.5 UD	3.5 U	11 U	18 U

NE - Reported detection limit did not exceed criteria.

Table 5-1. Summary of Denny Way/Lake Union CSO Project Surface Sediment Management Areas.

Sample ID	TOC (%)	SMS		Chemical Conclusion	Cleanup Conclusion
		Number of SQS Exceedances (<CSL)	Number of CSL Exceedances		
DW-01-SED-0	2.5	2	0	SQS	Remediate[a]
DW-02-SED-0	3.9	0	0	Pass	No Action
DW-03-SED-0	3.2M	2	0	SQS	Remediate[a]
DW-04-SED-0	2	1	3(1)	CSL	Remediate[b]
DW-05	1.2	5(2)	2(2)	SQS	Remediate[a]
DW-06	0.79	1(1)	4(4)	Intertidal[c]	Intertidal Area[c]
DW-07-SED-0	0.9M	6	6(4)	CSL	Remediate[b]
DW-08	2	2(2)	1(1)	Intertidal[c]	Intertidal Area[c]
DW-09	3.5M	0	0	Pass	No Action
DW-10-SED	3.2	7(3)	4(4)	SQS[d]	Remediate[a]
DW-11-SED-0	1.2	1	0	SQS	Remediate[a]
DW-12-SED-0	1.6	2	0	SQS	Remediate[a]
DW-13-SED-0	2.6	0	0	Pass	No Action
DW-14-SED-0	1.3	0	0	Pass	No Action
DW-15	2.3	2	1(1)	SQS[d]	Remediate[a]
DW-16-SED-0	1.3	1	0	SQS	Remediate[a]
DW-17-SED-0	1.7	0	0	Pass	No Action
DW-18-SED-0	4.1	0	0	Pass	No Action
DW-19-SED-0	2.4	0	0	Pass	No Action
DW-20-SED-0	1.7	1	0	SQS	Remediate[a]
DW-21-SED-0	2.3	1	0	SQS	Remediate[a]
DW-22-SED-0	3.1	0	0	Pass	No Action
DW-23-SED-0	3.2M	0	0	Pass	No Action
DW-24	1.6	0	0	Pass	No Action
DW-30	1.8	0	3(1)	CSL	Remediate[b]
DW-33	2.3	3(2)	0	SQS	No Action[e]
DW-34	2.3M	0	0	Pass	No Action
DW-35	1.3	2(1)	1(1)	SQS[d]	Remediate[a]

TOC = Total Organic Carbon
SQS - SMS Sediment Quality Standards
SMS - Sediment Management Standards
CSL - SMS Cleanup Screening Level

[a] An exceedance of a chemical SQS value can be confirmed with additional acute and chronic biological testing. In the absence of confirmatory biological testing, sediment management decisions are based on the chemical results.

[b] An exceedance of one or more chemical CSL values dictates sediment remediation at these locations.

[c] Station occurs in an intertidal area that may be regraded and cleaned up in association with outfall construction. For this reason, samples were not re-analyzed to reduce detection limits below SMS criteria.

[d] Chemical conclusion based on detected SQS exceedances. Chemicals whose detection limits exceeded CSL values (2,4-dimethylphenol, benzyl alcohol, 2-methylphenol, benzoic acid, 1,2-dichlorobenzene) were set aside for this sample (see Appendix D).

[e] Only one chemical (butyl benzyl phthalate) exceeded SQS criteria by less than 10% (within the range of analytical variability). This low exceedance combined with the absence of chemical exceedances in adjacent stations suggests the sediment at this location is of low risk and does not require further evaluation.

APPENDIX A

CRUISE REPORT

CRUISE REPORT

DENNY WAY/LAKE UNION CSO CONTROL PROJECT SEDIMENT CHARACTERIZATION

1. SAMPLING APPROACH AND SCHEDULE

Sediment surface grab and subsurface core sampling took place in the vicinity of the Denny Way CSO sediment cap site from September 9, 1997 to September 12, 1997. Sampling was performed by Striplin Environmental Associates, Inc. of Olympia, Washington. Intertidal and subtidal surface sediments were collected from 28 stations located in areas surrounding the existing sediment cap. In addition, subsurface sediments were collected from 13 stations, 2 located on the sediment cap, and the remaining stations located in areas surrounding the cap. Sediment samples were collected primarily for chemical analysis. Bioassay samples were also collected from two stations (DW-07 and DW-12) and archived. Additional samples for chemical quality assurance were collected, including blind field splits and blind field replicates. The sampling schedule is provided in Table 1.

1.1 FIELD CREW

Members of the sampling and navigation crew are listed in Table 2.

2. EQUIPMENT AND METHODS

2.1 NAVIGATION

Navigation was provided by a Trimble 4000 Differential Global Positioning System (DGPS). The differential source was a coast guard beacon. A summary table of actual geodetic coordinates for all Denny Way stations is provided in Table 3. Table 3 also includes the distance between the target coordinate and the actual coordinate for each station. All stations were located within 10 ft of their target locations, with the following exceptions: DW-02, DW-05, DW-07, DW-09, DW-26, DW-30, DW-33. Nearly all of the relocated stations were located nearshore, close to the riprap or on the slope. Samples could not be collected at these target locations due to obstructions (e.g. rock, rip rap), corer refusal, or difficulties collecting an acceptable sample. These stations were relocated at the nearest possible unobstructed location. Actual locations of the relocated stations were less than 30 ft from their target locations, except for Stations DW-02 and DW-05 which were moved 70 ft and 58 ft, respectively, from the original targets.

2.2 SEDIMENT GRAB SAMPLES

All sampling and decontamination procedures followed prescribed PSEP protocols (PSEP 1986, 1991). Subtidal grab sampling at stations where accessibility by boat was possible was accomplished using a $0.1m^2$ stainless steel double van Veen grab. Sediment was collected from the top 10 cm of the sediment surface. In coarse-grained sediment, it was necessary to use the power grab sampler, provided by Marine Sampling Systems (MSS). A sufficient number of casts were deployed to ensure adequate volumes of sediment for chemical, and if appropriate, toxicity testing.

Sampling at stations that were inaccessible by boat was accomplished from shore by sampling personnel. Sediment was collected to a depth of 10 cm using hand-held coring devices or a spoon. Table 1 specifies the sampling method used for each station.

2.3 SEDIMENT CORE SAMPLES

Cores up to 14 feet in length were collected using a vibracorer provided by MSS. Cores were stored upright in an iced box until processing in the Striplin Environmental Associates, Inc. processing lab. Stations sampled using the vibracore are shown in Table 1.

3. FIELD LOG AND SAMPLE DESCRIPTION REPORTS

Field logs were compiled for the Denny Way sediment sampling and are provided as Attachment A. Field logs provide an account of the activities during the sampling.

Sample description logs for the grab samples are provided in Attachment B. Sample description logs provide information for each sediment grab, including sediment characteristic (type, odor and color) and presence/absence of fauna.

Core description logs are provided in Attachment C. Core description logs provide information for each core, including sediment characteristics (type, color and odor) for various intervals throughout the length of the core. It also includes sampling information, including total drive length, recovered length, and recovery efficiency for each core.

Table 1. Denny Way/Lake Union CSO Control Project Sediment Sampling Schedule.

Date	Sampling method	Samples Collected
September 9, 1997	Grab sampling (0.1 m^2 van Veen)	DW-17, DW-16, Dw-12, DW-13, DW-19, DW-18, DW-11, DW-01, DW-20, DW-21, DW-22, DW-23, DW-14
September 10, 1997	Core sampling (Vibracore)	DW-37, DW-36, DW-29, DW-35, DW-34, DW-33, DW-31
September 11, 1997	Core sampling (Vibracore)	DW-30, DW-32, DW-28, DW-25 DW-26
September 12, 1997	Shore sampling by hand Power grab	Collected by hand--DW-05, DW-06, DW-08 Collected by Power grab-DW-09, DW-10, DW-07, DW-04, DW-30, DW-03, DW-33 DW-34, DW-35, DW-15, DW-24, DW-02

Table 2. Members of the Denny Way/Lake Union CSO Control Project Sediment Characterization Field and Processing Laboratory Crew (1997).

Crew Member	Company	Responsibility	Date (s) in field
Bill Jaworski	Marine Sampling Systems	Captain, R/V Nancy Anne	September 9-12
Dale Dickinson	Marine Sampling Systems	R/V Nancy Anne	September 10-11
Tony Petrillo	Blue Water Engineering	Navigator	September 9-12
Dave Browning	Striplin Environmental Associates, Inc.	Team Leader, Sampler	September 9-12
Vicki Fagerness	Striplin Environmental Associates, Inc.	Sampler	September 9-10
Pete Striplin	Striplin Environmental Associates, Inc.	Sampler	September 11-12
Bruce McDonald	Black and Veatch	Sampling support	September 11-12
Vicki Fagerness	Striplin Environmental Associates, Inc.	Leader, Core Processor	September 11-13
Sandy Browning	Striplin Environmental Associates, Inc.	Core Processor	September 11-13
Desi Turner	Striplin Environmental Associates, Inc.	Core Processor	September 11-13

Table 3. Denny Way/Lake Union CSO Control Project Sediment Sampling Coordinates (NAD 1983).

Station	Replicate	Easting (x)	Northing (y)	Comments
DW-17	1	1262968	229355	7' SE of target
DW-17	2	1262964	229350	10' S of target
DW-16	1	1263050	229443	5' SW of target
DW-16	2	1263056	229445	3' SE of target
DW-12	1	1263228	229578	7' S of target
DW-12	2	1263228	229528	2' N of target
DW-13	1	1263343	229363	6' SSW of target
DW-13	2	1263346	229360	8' SSE of target
DW-19	1	1263275	229161	9' E of target
DW-19	2	1263268	229150	9'S of target
DW-18	1	1263108	229145	7' SE of target
DW-18	2	1263119	229147	9' SSE of target
DW-11	1	1262979	229831	on target
DW-11	2	1262978	229830	1' SW of target
DW-01	1	1263146	229712	7' ESE of target
DW-01	2	1263143	229703	5' S of target
DW-20	1	1263423	228983	8' E of target
DW-20	2	1263420	228989	7' NE of target
DW-21	1	1263339	228908	5' WNW of target
DW-21	2	1263343	228905	3' S of target
DW-22	1	1263215	228806	5' E of target
DW-22	2	1263214	228806	3' E of target
DW-23	1	1263545	228828	9' SE of target
DW-23	2	1263540	228836	4' W of target
DW-23	3	1263537	228842	8' NW of target
DW-23	4	1263546	228835	3' S of target
DW-14	1	1263778	228762	5' ENE of target
DW-14	2	1263780	228760	8' ESE of target
DW-37	1	1263694	228695	3' N of target
DW-36	1	1263236	229271	on target
DW-29	1	1263123	229617	1' N of target
DW-35	1	1263910	228765	1' NW of target
DW-34	1	1263908	228945	2' N of target
DW-33	1	1263741	229108	27' SSW of target
DW-31	1	1263611	229321	10' NNW of target
DW-30	1	1263436	229453	20' W of target
DW-32	1	1263720	229322	10' W of target
DW-28	1	1263453	228999	6' SW of target
DW-25	1	1263715	229244	9' N of target
DW-26	1	1263646	229153	14 ESE of target
DW-27	1	1263539	229081	5' WNW of target
DW-09	1	1263836	229047	16' W of target
DW-09	2	1263835	229035	24' SW of target

Table 3. Denny Way/Lake Union CSO Control Project Sediment Sampling Coordinates (NAD 1983).

Station	Replicate	Easting (x)	Northing (y)	Comments
DW-10	1	1264047	228813	8' SW of target
DW-02	1	1263317	229640	70 ' S of target
DW-05	1	1263695	229363	Position fix on shore sample- 58 ' ESE of target
DW-06	1	1263747	229376	Position fix on shore sample- 5' NE of target
DW-08	1	1263777	229220	Position fix on shore sample- 16' N of target
DW-07	1	1263688	229275	4' SE of target
DW-07	1	1263691	229250	28' S of targe
DW-04	1	1263565	229326	8' SSE of target
DW-30	1	1263456	229439	5' SSW of target
DW-03	1	1263359	229529	8' W of target
DW-03	2	1263372	229532	5' SSW of target
DW-33	1	1263747	229130	4' S of target
DW-34	1	1263903	228952	7' NW of target
DW-35	1	1263919	228770	10' NE of target
DW-15	1	1263846	228638	10' N of target
DW-24	1	1263631	228546	7' NW of target

ATTACHMENT A

FIELD LOG

FIELD LOG

Time	Event	Comments
September 9, 1997: Grab sampling using 0.1m^2 van Veen		
745	Arrive at Boat.	Arrive at Elliott Bay Marina. Mobilizing boat, rigging navigation system
900	Enroute to Denny Way site.	
920	On station DW-17.	
926	Grab 1, DW-17	Reject--van Veen tangled
932	Grab 2, DW-17	Accept, rep 1. Sample for SMS chemicals of concern.
945	Grab 3, DW-17	Accept , rep 2.
1010	Grab 1, DW-16	Accept, rep 1.
1015	Grab 2, DW16	Accept, rep 2. Sample for SMS.
1030	Grab 1, DW 12	Accept, rep 1.
1040	Grab 2, DW 12	Accept, rep 2. Sample for SMS and bioassays.
		High tide--heading inshore to shallow stations.
1100	Grab 1, DW02	Reject. Wash.
1103	Grab 2, DW02	Reject. Wash. Crab in jaws of Van Veen.
1105	Grab 3, DW02	Reject-wash. No sediment, kelp, rock bottom.
		Moving on to station Dw06. Will revisit DW02.
1110	Grab 1, DW06	Reject. Same as DW-06, with some gravel and shell.
		Will need to obtain samples from DW06 and DW02 from shore on foot.
1118	Grab 1, DW-05	Reject. Rock bottom--grab not getting sediment--will try again on foot or with power grab.
1130	Grab 1, DW-07	Accept, rep 1.
1133	Grab 2, DW-07	Accept, rep 2, minimal recovery.
1139	Grab 3, DW-07	Large Rocks, cobble.
		Aborting this attempt. Not getting adequate volume due to large rocks and cobbles and marginal penetration. Will return to this station with power grab.
1155	Grab 1, DW-13	Accept, rep 1.
1159	Grab 2, DW-13	Accept, rep 2. SMS samples collected
1210	Grab 1, DW-19	Accept, rep 1.
1225	Grab 2, DW-19	Accept, rep 2.

FIELD LOG

Time	Event	Comments
1240	Grab 1, DW-18	Reject--overpenetration
1243	Grab 2, DW-18	Accept, rep 1. Deep penetration but accepted
1257	Grab 3, DW-18	Accept, rep 2. Sample for SMS.
1300		Tying up near Grain Terminal for lunch break.
		Deconning equipment
1400		Enroute to station DW-11
1410	Grab 1, DW-11	Accept, rep 1.
1422	Grab 2, DW-11	Accept, rep 2. Sample for SMS.
1433	Grab 1, DW-01	Accept, rep 1.
1440	Grab 2, DW-01	Accept, rep 2. Sample for SMS.
1500	Grab 1, DW-03	Reject. 5 cm cobble and rock with kelp. No Sediment.
		Like all nearshore stations, will reevaluate or resample with different methods.
1505	Grab 1, DW-20	Accept, rep 1.
1515	Grab 2, DW-20	Accept, rep 2. Sample for SMS.
1532	Grab 1, DW-21	Accept, rep 1.
1543	Grab 2, DW-21	Accept, rep 2. Sample for SMS.
1600	Grab 1, DW-22	Accept, rep 1.
1610	Grab 2, DW-22	Accept, rep 2. Sample for SMS.
1622	Grab 1, DW-23	Accept, rep 1.
1635	Grab 2, DW-23	Accept, rep 2. Sample for SMS.
		DW-86 = split from homogenized sample, assigned time 18:22.
		Also collected split from same DW-23 homogenize sample for King County per their instructions.
	Grab 1, DW-23 (87)	Accept, rep 1
1700	Grab 2, DW-23 (87)	Accept, rep 2
1715	Grab 1, DW-14	Accept, rep 1.
1725	Grab 2, DW-14	Accept, rep 2. Sample for SMS.
1730		Enroute to marina

FIELD LOG

Time	Event	Comments
1745		Deconning equipment, completing sample custody forms and unloading at marina.
1810		Meet Bruce McDonald (Black and Veatch). Transfer samples under chain of custody to Bruce.

10 September 1997: Sediment coring (collected using Marine Sampling Systems Vibracore).

800	Arrive at boat	Getting gear, vessel loading, corer and equipment mobilization.
900		Pick up jars at Black and Veatch
1015		Enroute to Denny Way site.
1040		on Denny Way site.
1045	Core 1, DW-36	Reject. only 5' recovered from 10' core.
1130	Core 2, DW-36	Reject. only 4' recovered from 10' core.
		Problem is unclear (material or equipment?). Bill thinks piston timing is off--
		he is rerigging and will also try new tube at different location.
1205	Core 1, DW-37	Accept, rep 1. (Feet below mudline:) 3.8 feet debris; 8.5 feet harder layer; 10' very hard = 8.8' recovery.
		Working with post-rigging adjustment
1255	Core 1, DW-36	Accept, rep 1. Only 7' of recovery. Will accept-problem not clear.
1330	Core 1, DW-29	Accept, rep 1. 10'core--8.3' recovered.
1350		Lunch break
1410		Return to site.
1420	Core 1, DW-32	Reject. At outfall--rocky bottom. Refusal at 9' with 5' recovery
		Gravel, black sand, strong sulfides.
1450	Core 2, DW-32	Reject. Shackle pin came loose--dumped core.
		Will retry at higher tide tomorrow.
1520	Core 1, DW-35	Accept, rep 1. 11' penetration, 7' recovery.
1545	Core 1, DW-34	Accept, rep 1. On rocky slope, making adjustments. Refusal at 8.5 ft. With rock along shore,
		decided that recovery is unlikely to improve (re:DW-32).
1630	Core 1, DW-33	Reject. Refusal at 2.5 ft.
1700	Core 2, DW-33	Accept, rep 1. Recovery = 8.2', penetration 10.6 ft
1730	Core 1, DW-31	Reject. Plug of wood in end.
1740		Enroute to marina
1800		Arrive Elliott Bay Marina; offloading cores.

FIELD LOG

Time	Event	Comments
1830		Depart marina for Olympia to deliver cores to process lab
1945		Arrive in Olympia
1945-2015		Offload cores into iced containers.

September 11, 1997: Sediment Coring

800		Arrive at boat.
830		Leave dock for Denny Way site.
850	Core 1, DW-31	Accept, rep 1 Acquisition slowed at 4 ft of penetration, for 1 ft, then quick acquisition again.
930	Core 1, DW-30	Reject. bent core tube.
1004	Core 2, DW-30	Accept, rep 1. Refusal at 8.5 feet
1035	Core 1, DW-32	Reject. Refusal at 3 feet penetration
1100	Core 2, DW-32	Accept, rep 1. Full penetration , 4.5 ft recovery, consistent penetration
1100-1125		Rerigging coring device for 22 ft cores.
1140	Core 1, DW-28	Accept, rep 1. Refusal at 18 ft below mudline.
1230		
1300		Lunch break
1410		Rigging for DW-25.
1512	Core 1, DW-25	Accept, rep 1.
	Core 1, DW-26	Accept, rep 1.
1715		At dock, unloading.

September 12, 1997: Sampling from shore and subtidal surface sampling using power grab

630		P. Striplin and D. Browning arrive at Myrtle Edward's Park for shallow sampling.
645		Bruce McDonald (Black and veatch) arrives at park.
700		Begin shallow station sampling (by foot using hand cores or spoon)
700	Sampling DW-06	Cobbly substrate. Sampling with spoon. Sampling for SMS.
715	Sampling DW-05	Sampling at edge of riprap. Sampling for SMS.
745	Sampling DW-08	Station located in riprap, predominately shells, large epifauna present (crab, sea cucumber, sucker fish).
		Collecting for SMS
		Cannot get to DW-02. Will try with power grab.
830		Departing Myrtle Edward' Park
930		Arrive at vessel
945		Departing dock, enroute for Denny Way site (DW-09, rep DW-84 and split sample, DW-85).
		Using power grab to obtain surface (0-10 ft) samples

FIELD LOG

Time	Event	Comments
1015	Grab 1, DW-09	Reject--all water
1021	Grab 2, DW-09	Reject--all water
1035	Grab 3, DW-09	Accept, rep 1.
1057	Grab 4, DW-09	Accept, rep 2. Field reps named DW-84 and DW-85.
1120	Grab 1, DW-10	Accept, rep 1. SMS sample.
1150	Grab 1, DW-02	Reject--all water. Moving out from offshore.
1155	Grab 2, DW-02	Reject. Moving out 10 ft more.
1200	Grab 3, DW-02	Reject--rock in jaws, washed.
1206	Grab 4, DW-02	Reject--washed. 21 ft depth.
1212	Grab 5, DW-02	Reject--washed.
1224	Grab 6, DW-02	Reject-washed.
1229	Grab 7, DW-02	Accept, rep 1. SMS sample.
1240-1250		Obtaining fixes on morning samples.
1250		Lunch break
1320		Enroute to Station DW-07.
1325	Grab 1, DW-07	Accept, rep 1. King County samples. 17.5 cm penetration.
1400	Grab 2, DW-07	Reject.
1403	Grab 3, DW-07	Reject, rock in jaws
1405	Grab 4, DW-07	Accept, rep 2 (for field replicate DW-82 and field duplicate DW-83).
1425	Grab 1, DW-04	Accept, rep 1. SMS samples, penetration = 20 cm, depth = 31 ft.
1440	Grab 1, DW-30	Accept, rep 1. Penetration = 20 cm.
		Rain squall coming. Lost port engine for the rest of day.
1500	Grab 1, DW-03	Accept, rep 1. Collected King County samples too.
1525	Grab 2, DW-03	Accept, rep 2. QA samples (DW-80 and DW-81)
1555	Grab 1, DW-33	Reject, no sample.
1600	Grab 2, DW-33	Accept, rep 1. SMS samples. Sandy gravel, no odor
1620	Grab 1, DW-34	Accept, rep 1. SMS samples.
1635	Grab 1, DW-35	Accept, rep 1. SMS samples. Depth = 48 ft.
1055	Grab 1, DW-15	Accept, rep 1. SMS samples. Depth = 64 ft.
1715	Grab 1, DW-24	Accept, rep 1. SMS samples. Depth = 83 ft.
		Enroute to dock to offload
1745		Arrive at dock, fueling and offloading.
1900		Finished offloading
1945		Enroute to Olympia.

ATTACHMENT B

SAMPLE DESCRIPTION LOG

SAMPLE DESCRIPTION LOG

000001

SURVEY DW STATION DW01 SEGMENT — DATE Sept. 9, 1997

CREW D. Browning, V. Fogerness

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 1433 COORDINATES: 1263146 E 229712 N

BIO/CHEM: BOTTOM DEPTH: 391 PENETRATION DEPTH: 8.5cm RPD DEPTH: 0.5cm

SEDIMENT TYPE: COBBLE GRAVEL with SAND silty C M (F) SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. (GRAY) BLACK BROWN (BROWN SURFACE)

SEDIMENT ODOR: H_2S PETROLEUM (NONE:) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: kelp, brittlestar

REPLICATE NO: 2 TIME: ~~12~~ 1440 COORDINATES: 1263143 E 229703 N

BIO/CHEM: BOTTOM DEPTH: 391 PENETRATION DEPTH: 10 cm RPD DEPTH: 0.5cm

SEDIMENT TYPE: (few COBBLE) GRAVEL SAND C M (sandy SILT) CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. (dk GRAY) BLACK BROWN (BROWN SURFACE)

SEDIMENT ODOR: H_2S PETROLEUM (NONE:) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: Kelp

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG p. 2 000002

SURVEY DW STATION DW-02 SEGMENT — DATE 12 SEP 97

CREW BROWNING, STRIPLIN, MCDONALD

RADAR COORDINATES: —

REPLICATE NO: 5 TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: _____

REPLICATE NO: 6 TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: _____

REPLICATE NO: 7 TIME: 12:29 COORDINATES: 1263317E 229640N

BIO/CHEM: BOTTOM DEPTH: 6.9' PENETRATION DEPTH: 21 CM RPD DEPTH: IND

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: ALGAE

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: _____

SAMPLE DESCRIPTION LOG

000003

SURVEY DW STATION DW-02 SEGMENT — DATE 9/12/97

CREW Browning, Striplin, McDonald

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 11:50 COORDINATES:

BIO/CHEM: BOTTOM DEPTH: PENETRATION DEPTH: 0 RPD DEPTH: /

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: ALL WATER + ALGAE

REPLICATE NO: 2 TIME: 11:55 COORDINATES:

BIO/CHEM: BOTTOM DEPTH: PENETRATION DEPTH: RPD DEPTH:

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: 1 BIG ROCK

REPLICATE NO: 3 TIME: 12:00 COORDINATES:

BIO/CHEM: BOTTOM DEPTH: PENETRATION DEPTH: RPD DEPTH:

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: 1 BIG ROCK

REPLICATE NO: 4 TIME: 12:06 COORDINATES:

BIO/CHEM: BOTTOM DEPTH: PENETRATION DEPTH: RPD DEPTH:

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: BIG ROCK

Con'td

SAMPLE DESCRIPTION LOG

000004

SURVEY DW STATION DW-03 SEGMENT — DATE 12 SEP 97

CREW R. MacDonald, P. STRIPLIN, D. BROWNING

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 15:00 COORDINATES: 1263359 E 229529 N

BIO/CHEM: BOTTOM DEPTH: 25.6' PENETRATION DEPTH: 17 cm RPD DEPTH: IND

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: CUNACEANS, COBBLES @ SRE

REPLICATE NO: 2 TIME: 15:25 COORDINATES: 1263372 E 229532 N

BIO/CHEM: BOTTOM DEPTH: 22.8 FT PENETRATION DEPTH: RPD DEPTH:

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: MOSTLY GRAVELS, PARTICLE SIZE BY LAB WILL NOT BE REPRESENTATIVE

REPLICATE NO: TIME: COORDINATES:

BIO/CHEM: BOTTOM DEPTH: PENETRATION DEPTH: RPD DEPTH:

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: TIME: COORDINATES:

BIO/CHEM: BOTTOM DEPTH: PENETRATION DEPTH: RPD DEPTH:

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

000005

SURVEY DW STATION DW-04 SEGMENT — DATE 12 SEP 97

CREW B. MacDonald P. Stoplin, D Brownlee

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 14:25 COORDINATES: 1263565E 229326N

BIO/CHEM: BOTTOM DEPTH: 21 ft PENETRATION DEPTH: 20 cm RPD DEPTH: IND

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS SPIOCHAET

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: MGFC

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

HYLEBOS WATERWAY PRE-REMEDIAL DESIGN

SAMPLE DESCRIPTION LOG

000006

SURVEY DW STATION DW-05 SEGMENT — DATE 9/12/97

CREW B. MACDONALD, P. STRIPLIN, D. BROWNING (LOG)

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 07:15 COORDINATES: 1263695E 229363N

BIO/CHEM: BOTTOM DEPTH: -1 MLLW PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: SAMPLED ON FOOT, IN SURF ZONE (VESSEL UNABLE)

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY B&V STATION DW-06 SEGMENT — DATE 9/12/97

CREW B. MACDONALD, P. STRAUN, D. BROWNING (LOC)

RADAR COORDINATES: —

REPLICATE NO: 1 TIME: 09:00 COORDINATES: 1263747E 229,376N

BIO/CHEM: BOTTOM DEPTH: 11.3 PENETRATION DEPTH: 10cm RPD DEPTH: IND

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS NNS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: VERY LOUBLY, SHEEN, PIECES OF BRICK, SAMPLED ON FOOT

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW-07 SEGMENT — DATE 12 SEP 97

CREW B MacDonald, P. Stoplin, D. Browning

RADAR COORDINATES:

REPLICATE NO: 5 TIME: 14:05 COORDINATES: 1263691 E 229250 N

BIO/CHEM: BOTTOM DEPTH: 11 FT PENETRATION DEPTH: 18 CM RPD DEPTH: 0

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: DW-82, DW-83

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

000009

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW-07 SEGMENT — DATE 12 SEP 97

CREW B MacDonald, P STEIRUN, T. R. BROWNING

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 13:25 COORDINATES: 1263688E 229275N

BIO/CHEM: BOTTOM DEPTH: 55' PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: DW-07, KING COUNTY & BIO SAMPLES

REPLICATE NO: 2 TIME: 13: COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: NO GOOD ROCK IN JAWS

REPLICATE NO: 3 TIME: 1 COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: NO GOOD ROCK IN JAWS

REPLICATE NO: 4 TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: REJECT ROCK IN JAWS

con't

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW-08 SEGMENT — DATE 9/12/97

CREW B MACDONALD P STERLING D. BROWNING

RADAR COORDINATES: —

REPLICATE NO: 1 TIME: 07:45 COORDINATES: 1263777E 229220N

BIO/CHEM: BOTTOM DEPTH: 0MLLW PENETRATION DEPTH: 10 cm RPD DEPTH: 0

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS, SEA CUKES

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: AMONGST RIP-RAP, SMALL PATCH OF SED, SAMPLED ON FOOT

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW-09 SEGMENT — DATE 9/12/97

CREW D. BROWNING, P. STRIPLIN, B. MCDONALD

RADAR COORDINATES: —

REPLICATE NO: 1 TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: _____

REPLICATE NO: 2 TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: 3 TIME: 10:35 COORDINATES: 1263836E 229,047N

BIO/CHEM: BOTTOM DEPTH: 14 ft PENETRATION DEPTH: 20 cm RPD DEPTH: 0.5

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: Algae DW-09, KING COUNTY SAMPLES

REPLICATE NO: 4 2 TIME: 11:00 COORDINATES: 1263835E 229035N

BIO/CHEM: BOTTOM DEPTH: 15 ft PENETRATION DEPTH: 21 RPD DEPTH: IND

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS CLAMS, WORM

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: LAMINARIA, ULVA, 3 species of small bivalves

* DW-84 (19:00 TIME)
* DW-85 (11:00 TIME)

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW-10 SEGMENT — DATE 9/12/97 11:20

CREW D. BROWNING, P. STRIPUN, B. MCDONALD

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 11:20 COORDINATES: 1264047E 228813N

BIO/CHEM: BOTTOM DEPTH: 29.3ft PENETRATION DEPTH: 24 RPD DEPTH: 0.5

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: PS coarse fine 10% SAND 75% SILT 15% CLAY, ALGAE + ULVA SPIOCHAETOPTERUS, ONUPHIDS

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW11 SEGMENT — DATE Sept 9, 1997

CREW D. Browning, Fogerness

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 1210 COORDINATES: 1262979 E 229831 N

BIO/CHEM: BOTTOM DEPTH: 42.4' PENETRATION DEPTH: 19cm RPD DEPTH: 1cm

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILTY-CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: anemone

REPLICATE NO: 2 TIME: 1222 COORDINATES: 1262978 E 229830 N

BIO/CHEM: BOTTOM DEPTH: 42.5' PENETRATION DEPTH: 16 cm RPD DEPTH: 0.5cm

SEDIMENT TYPE: COBBLE GRAVEL trace SAND C M F SILTY-CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: spio chaetopterus

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW2 SEGMENT — DATE Sept 9, 1997

CREW D. Browning, V. Fagerness

RADAR COORDINATES: —

REPLICATE NO: 1 TIME: 1030 COORDINATES: 1263228 E 229518 N

BIO/CHEM: BOTTOM DEPTH: 42.2' PENETRATION DEPTH: 17cm RPD DEPTH: 0.5cm

SEDIMENT TYPE: COBBLE GRAVEL SANDY (trace) C M (F) SILTY-CLAY WOOD/SHELL FRAGMENTS (sparse)

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS Spiochaetopt Capetellids

SEDIMENT COLOR: D.O. GRAY BLACK (BROWN) (BROWN SURFACE)

SEDIMENT ODOR: H_2S PETROLEUM (NONE:) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: 2 TIME: 1040 COORDINATES: 1263228 E 229528 N

BIO/CHEM: BOTTOM DEPTH: 44.1' PENETRATION DEPTH: 14 RPD DEPTH: 1 cm

SEDIMENT TYPE: COBBLE GRAVEL SANDY (slightly) C M (F) SILTY-CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK (BROWN) (BROWN SURFACE)

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: spiochaetopterus

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

000015

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DN13 SEGMENT — DATE Sept 9, 1997

CREW D. Browning, V. Fagerness

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 1155 COORDINATES: 1263343E 229363N

BIO/CHEM: BOTTOM DEPTH: 42.9' PENETRATION DEPTH: 10cm RPD DEPTH: 1 cm

SEDIMENT TYPE: COBBLE GRAVEL SANDY (SANDY) C M (F) SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK (BROWN) (BROWN SURFACE)

SEDIMENT ODOR: H_2S PETROLEUM (NONE:) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: polychaetes, algae

REPLICATE NO: 2 TIME: 1159 COORDINATES: 1263346E 229360N

BIO/CHEM: BOTTOM DEPTH: 41.9' PENETRATION DEPTH: 11cm RPD DEPTH: 1 cm

SEDIMENT TYPE: COBBLE GRAVEL (SANDY) C M (F) SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK (BROWN) (BROWN SURFACE)

SEDIMENT ODOR: H_2S PETROLEUM (NONE:) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: slight sheen

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

King County Transportation &
Natural Resources Library
821 Second Avenue, M.S. 90
Seattle, WA 98104-1598

000016

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW14 SEGMENT — DATE 9/9/97

CREW Brownlow, Fogerness

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 1715 COORDINATES: 1263778E 228762N

BIO/CHEM: BOTTOM DEPTH: 52.8' PENETRATION DEPTH: 10.5 cm RPD DEPTH: 0.5 cm

SEDIMENT TYPE: COBBLE GRAVEL (SAND C M F) (silty) SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. (GRAY) BLACK BROWN (BROWN SURFACE)

SEDIMENT ODOR: H_2S PETROLEUM (NONE) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: spiochaetopterus, algae

REPLICATE NO: 2 TIME: 1725 COORDINATES: 1263780E 228760N

BIO/CHEM: BOTTOM DEPTH: 53.8' PENETRATION DEPTH: 10 cm RPD DEPTH: 0.5 cm

SEDIMENT TYPE: COBBLE GRAVEL (SAND) (silty) C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. (dark GRAY) BLACK BROWN (BROWN SURFACE)

SEDIMENT ODOR: (H_2S) PETROLEUM NONE: (SLIGHT) MODERATE STRONG OVERWHELMING

COMMENTS: kelp – very slight sheen

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW-15 SEGMENT — DATE 9/12/97

CREW B MacDonald, P. Stroplin, D. BROWNING

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 1655 COORDINATES: 1263846E 228638N

BIO/CHEM: BOTTOM DEPTH: 53 ft PENETRATION DEPTH: 25 cm RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL (SAND) C M F (SILT) CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: (D.O.) (GRAY) BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM (NONE:) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: Curvatulid, spionid

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW116 SEGMENT — DATE 9-9-97

CREW D Browning, V Fagerness

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 1010 COORDINATES: 1263050 E 229443 N

BIO/CHEM: BOTTOM DEPTH: 67.5 ft PENETRATION DEPTH: 13 cm RPD DEPTH: 1 cm

SEDIMENT TYPE: COBBLE GRAVEL SANDY C M F SILT CLAY WOOD/SHELL FRAGMENTS (Some)

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: 2 TIME: 1015 COORDINATES: 1263056 E 229445 N

BIO/CHEM: BOTTOM DEPTH: 66.4 ft PENETRATION DEPTH: 17 cm RPD DEPTH: 1 cm

SEDIMENT TYPE: COBBLE GRAVEL SANDY C M F SILT CLAY WOOD/SHELL FRAGMENTS (No)

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DN17 SEGMENT — DATE 9-9-97

CREW D. Browning, Fagerness

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 0936 COORDINATES: 1262968E 229355N

BIO/CHEM: BOTTOM DEPTH: 78' PENETRATION DEPTH: 17 cm RPD DEPTH: 1.5 cm

SEDIMENT TYPE: COBBLE GRAVEL SAND (slightly) C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS tubes

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: 2 TIME: 0945 COORDINATES: 1262964E 229350N

BIO/CHEM: BOTTOM DEPTH: 78 ft PENETRATION DEPTH: 16cm RPD DEPTH: 2 cm

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT - CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN (gray) BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: organics at sfc

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW18 SEGMENT — DATE Sept 9, 1997

CREW D. Browning, V. Fagerness

RADAR COORDINATES:

REPLICATE NO: 1 TIME: Reject COORDINATES:

BIO/CHEM: BOTTOM DEPTH: PENETRATION DEPTH: RPD DEPTH:

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ~~2~~ 1 TIME: 1243 COORDINATES: 1263108E 229145N

BIO/CHEM: BOTTOM DEPTH: 81.3 ft PENETRATION DEPTH: 19 cm RPD DEPTH: 3+cm

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ~~3~~ 2 TIME: 1254 COORDINATES: 1263119E 229147N

BIO/CHEM: BOTTOM DEPTH: 79.4 ft PENETRATION DEPTH: 18 cm RPD DEPTH: 3+cm

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F Silty-CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: TIME: COORDINATES:

BIO/CHEM: BOTTOM DEPTH: PENETRATION DEPTH: RPD DEPTH:

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW19 SEGMENT — DATE Sept 9, 1997

CREW D Browning, V. Fogerness

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 1210 COORDINATES: 1263275 E 229161 N

BIO/CHEM: BOTTOM DEPTH: 65' PENETRATION DEPTH: 13 cm RPD DEPTH: 0.5 cm

SEDIMENT TYPE: COBBLE GRAVEL (SAND) C (M) F (slightly SILTY) CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. (dark GRAY) BLACK (BROWN) BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM (NONE:) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: Spiochaetopterus

REPLICATE NO: 2 TIME: 1225 COORDINATES: 1263268 229,150 N

BIO/CHEM: BOTTOM DEPTH: 66' PENETRATION DEPTH: 16 cm RPD DEPTH: 0.5 cm

SEDIMENT TYPE: COBBLE GRAVEL (SAND) C M F (SILTY) CLAY (WOOD) SHELL FRAGMENTS twigs

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK (BROWN) BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM (NONE:) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW20 SEGMENT — DATE Sept 9, 1997

CREW Fagerness, Browning

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 1505 COORDINATES: 1263423E 228983N

BIO/CHEM: BOTTOM DEPTH: 65 ft PENETRATION DEPTH: 13 cm RPD DEPTH: 0.5cm

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F (sandy) SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. (GRAY) BLACK BROWN (BROWN SURFACE)

SEDIMENT ODOR: (H₂S) PETROLEUM NONE: SLIGHT (MODERATE) STRONG OVERWHELMING

COMMENTS: kelp, polychaetes

REPLICATE NO: 2 TIME: 1515 COORDINATES: 1263420E 228989N

BIO/CHEM: BOTTOM DEPTH: 65.2' PENETRATION DEPTH: 13 cm RPD DEPTH: 1 cm

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F (Sandy) SILT w/ CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. (dark GRAY) BLACK BROWN (BROWN SURFACE)

SEDIMENT ODOR: H_2S (PETROLEUM) NONE: (SLIGHT) MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW21 SEGMENT — DATE 9/9/97

CREW D Browning, Fogerness

RADAR COORDINATES: —

REPLICATE NO: 1 TIME: 1532 COORDINATES: 1263339E 228908N

BIO/CHEM: BOTTOM DEPTH: 79.4 Ft PENETRATION DEPTH: 19 cm RPD DEPTH: 1.5cm

SEDIMENT TYPE: COBBLE GRAVEL SANDY (slight) C M F SILTY - CLAY WOOD/SHELL FRAGMENTS (twigs)

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: spiochaetopterus

REPLICATE NO: 2 TIME: 1543 COORDINATES: 1263343E 228905N

BIO/CHEM: BOTTOM DEPTH: 77.5' PENETRATION DEPTH: 18 cm RPD DEPTH: 1 cm

SEDIMENT TYPE: COBBLE GRAVEL SAND (some) C M F SILTY - CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW22 SEGMENT — DATE 9/9/97

CREW Browning, Fagerness

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 1600 COORDINATES: 1263215 E 228806 N

BIO/CHEM: BOTTOM DEPTH: 96' PENETRATION DEPTH: 19 cm RPD DEPTH: 4+cm

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT (Silty-CLAY) WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK (BROWN) (BROWN SURFACE)

SEDIMENT ODOR: H_2S PETROLEUM (NONE:) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: 2 TIME: 1610 COORDINATES: 1263214 E 228806 N

BIO/CHEM: BOTTOM DEPTH: 96' PENETRATION DEPTH: 19 cm RPD DEPTH: 4+cm

SEDIMENT TYPE: (Few COBBLE) GRAVEL SAND C M F SILT (Silty-CLAY) WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK (BROWN) (BROWN SURFACE)

SEDIMENT ODOR: H_2S PETROLEUM (NONE:) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW23 SEGMENT — DATE 9/9/97

CREW Browning, Fagerness

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 1622 COORDINATES: 1263545E 228828N

BIO/CHEM: BOTTOM DEPTH: 63.8 ft PENETRATION DEPTH: 19cm RPD DEPTH: 3cm

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILTY-CLAY WOOD/SHELL FRAGMENTS (some)

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: 2 TIME: 1635 COORDINATES: 1263540E 228836N

BIO/CHEM: BOTTOM DEPTH: 62.9 ft PENETRATION DEPTH: 19 RPD DEPTH:

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILTY-CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: TIME: COORDINATES:

BIO/CHEM: BOTTOM DEPTH: PENETRATION DEPTH: RPD DEPTH:

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: TIME: COORDINATES:

BIO/CHEM: BOTTOM DEPTH: PENETRATION DEPTH: RPD DEPTH:

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

*split from bowl = "DW-86", time = "1822"
also King County split

SAMPLE DESCRIPTION LOG

SURVEY DW STATION 87 (replicate of 83) SEGMENT — DATE 9/9/97

CREW Browning, Fagerness

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 1653 COORDINATES: 1263537E 228842N

BIO/CHEM: BOTTOM DEPTH: 61.9' PENETRATION DEPTH: 19 cM RPD DEPTH: 1.5 cm

SEDIMENT TYPE: COBBLE GRAVEL with SAND C (M) F SILTy - CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. (GRAY) BLACK BROWN (BROWN SURFACE)

SEDIMENT ODOR: H_2S PETROLEUM (NONE:) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: 2 TIME: 1700 COORDINATES: 1263546E 228835N

BIO/CHEM: BOTTOM DEPTH: 63.9 ft PENETRATION DEPTH: 19 cM RPD DEPTH: 1 cM

SEDIMENT TYPE: COBBLE GRAVEL some SAND C (M) F (SILTy - CLAY) WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. (GRAY) BLACK BROWN (BROWN SURFACE)

SEDIMENT ODOR: H_2S PETROLEUM (NONE:) SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW-24 SEGMENT — DATE 9/12/97

CREW B MacDonald, P Stoplin, D. Browning

RADAR COORDINATES:

REPLICATE NO: 1 TIME: 1415 COORDINATES: 1263631E 228546N

BIO/CHEM: BOTTOM DEPTH: 74.1 ft PENETRATION DEPTH: 19 cm RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: cobbles (travel) @ surface, some shell

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW-30 SEGMENT — DATE 12 SEP 97

CREW B. MacDonald, P. STRIPLIN, D. BROWNING

RADAR COORDINATES: —

REPLICATE NO: 1 TIME: 14:40 COORDINATES: 1263456E 229439N

BIO/CHEM: BOTTOM DEPTH: 23' PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: SOME SHELL & SAND

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: _____ TIME: _____ COORDINATES: _____

BIO/CHEM: BOTTOM DEPTH: _____ PENETRATION DEPTH: _____ RPD DEPTH: _____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW-33 SEGMENT — DATE 12SEP97

CREW D. BROWNING, P. STRIPLIN, B. MCDONALD

RADAR COORDINATES:

—

REPLICATE NO: ____ TIME: 15:55 COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ~~24~~ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: AIR DEPTH

REPLICATE NO: ~~2~~ 1 TIME: 16:00 COORDINATES: 1263747E 229130N

BIO/CHEM: BOTTOM DEPTH: 24 ft PENETRATION DEPTH: 15cm RPD DEPTH: IND

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW-34 SEGMENT — DATE 12-SEP

CREW B. MACDONALD, P. STRIPUN, D. BROWNING

RADAR COORDINATES:

—

REPLICATE NO: 1 TIME: 16:00 COORDINATES: 1263903E 228952N

BIO/CHEM: BOTTOM DEPTH: 16.2ft PENETRATION DEPTH: 20cm RPD DEPTH: IND

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: ON UPHILL

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

SAMPLE DESCRIPTION LOG

SURVEY DW STATION DW-35 SEGMENT — DATE 9/12/97

CREW D. BROWNING, B MCDONALD, P. STRIPUN

RADAR COORDINATES:

REPLICATE NO: ____ TIME: 16:35 COORDINATES: 1263919E 228770N

BIO/CHEM: BOTTOM DEPTH: 38 ft PENETRATION DEPTH: 24 RPD DEPTH: 1cm

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS: fine sandy silt curvatubed

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BOWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

REPLICATE NO: ____ TIME: ____ COORDINATES: ____

BIO/CHEM: BOTTOM DEPTH: ____ PENETRATION DEPTH: ____ RPD DEPTH: ____

SEDIMENT TYPE: COBBLE GRAVEL SAND C M F SILT CLAY WOOD/SHELL FRAGMENTS

LARGE FAUNA: PACHYCERIANTHUS PHYLLOCHAETOPTERUS PTILOSARCUS CRABS ASTEROIDS

SEDIMENT COLOR: D.O. GRAY BLACK BROWN BROWN SURFACE

SEDIMENT ODOR: H_2S PETROLEUM NONE: SLIGHT MODERATE STRONG OVERWHELMING

COMMENTS:

ATTACHMENT C

CORE DESCRIPTION LOG

Striplin Environmental Associates, Inc.

Core Description and Sample Information

000001

STATION: DW-25

REPLICATE: (DW-88/4-8')

11 SEP 97

14:10 - 14:20

Field Log by: BROWNING	Processing by: SB/DT/VF	Coring by: STRIPLIN/BROWNING
Tide Level from MLLW: 9.8'	Date: 9.12.97	Total Drive Length: 20 ft
Depth to Mudline: 16.8 ft	Time:	Recovered Length: 10.5 ft
Mudline Elev.: 7 ft		Recovery Efficiency: 52%

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
		BLACK SILT/SAND, H_2S, SHEEN
1		
		COARSE SAND W/ SILT,
2		GRAVEL AND COBBLE
3		SLIGHT PETROLEUM ODOR
	LEAF DEBRIS	
4		COMPACT ~~SANDY~~ SILTY SAND
	TWIG DEBRIS	W/ SOME COBBLES - BLACK
5		
6		
		SLIGHT - MODERATE PETROLEUM ODOR
7		GRAVEL + COBBLE IN SAND
		DK GRAY GRAVELLY SAND
8	BRICK PIECE	COMPACT ~~GREY SANDY~~/SILT - BOTTOM 2 INCHES IS CLAYEY SILT
9		DK GRAY, COMPACT SANDY
		SILT W/ TRACE GRAVEL
10		
		END
11		• 1 LARGE ANGULAR COBBLE + PIECES OF WOOD DEBRIS
		• VERY BOTTOM IS COMPACT GRAY CLAY
12		
13		
14		
15		
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
1		
2		
3		SULFIDES STRONG
4		
5		
6		
7		SULFIDES STRONG
8		
9		NO SULFIDES ODOR
10		
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW25-SED-0-2	0-2
DW25-SED-2-4	2-4
DW25-SED-4-6	4-8
DW25-SED-8-10.5	8-10.5

Notes:

* Replicate DW88 = split from homogenized sample from 4-8' interval at DW25

Striplin Environmental Associates, Inc. **Core Description and Sample Information**

STATION: DW-26 11 SEP 97 000002

REPLICATE: 1 15:12

Field Log by: BROWNING	Processing by: DT/SB	Coring by: STRIPLIN, BROWNING
Tide Level from MLLW: 9.4 Depth to Mudline: 42' Mudline Elev.: 32.6 ft	Date: 9.12.97 Time:	Total Drive Length: 17.3 ft Recovered Length: 12' 7" Recovery Efficiency: 73%

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
		BLACK SILTY MED SAND H_2S sheen
1		COARSE-MED SAND W/ SULFIDES ODOR - BLACK
2		
3		BLACK SILT W/ CLAY + SAND SLIGHT - MODERATE PETROLEUM ODOR
4		
	2 in.	~~COHESIVE GRAY CLAY W/ GRAVEL~~
5		BLACK SILT W/ CLAY AND GRAVEL W/ MODERATE PETROLEUM ODOR
6		
7		
		GRAY SILTY CLAY
8		grey sandy silt, compact
9		
10		UNIFORM SILTY SAND/ SANDY SILT W/ NUMEROUS FRAGMENTED SHELLS
11		
12		
13		end of core, grey compact silt.
14		
15		
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
WORMS ON SURFACE >3" FINE SILT ATTOP		
1		
CAP		
2		
3		
4		
5		
6		
7		
8 SAND + SILT ≈ 50/50		
9		
10	NO TO SLIGHT SULFIDES ODOR NATIVE/REGRADE MATERIALS	
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW26-SED-0-3	0-3
DW26-SED-3-7	3-7
DW26-SED-7-11	7-11
DW26-SED-11-13	11-13

Notes:

Striplin Environmental Associates, Inc. **Core Description and Sample Information**

STATION: DW-27
REPLICATE: 1

11 SEP-97 000003
16:15

Field Log by: [illegible]	Processing by: DT/SB/VF	Coring by: STRIPLIN [illegible]
Tide Level from MLLW: 8.6 Depth to Mudline: 58' Mudline Elev.: 49.4 ft	Date: 9.12.97 Time: 1420	Total Drive Length: 21 FEET Recovered Length: 14'9" Recovery Efficiency: 70%

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
		OLIVE SANDY SILT W/ LEAF LITTER
1	8in★	H_2S
		DK. GRAY MED.-COARSE SAND
2		PETROLEUM ODOR SLIGHT @ 2 FT
	3-4 in	BLACK CLAYEY SILT W/ STRONG PETROLEUM ODOR
3	COBBLE	GRAY COHESIVE CLAY W/ TRACE GRAVEL
4		
	3in.	Black coarse sand w/ gravel
5		DK GRAY TO BLACK CLAY/SILT
		TRANSITIONS TO GRAY CLAY
6		+ SILT W/ SAND
		GRAY SILTY SAND/SANDY SILT W/ CLAY
7		ABUNDANT SHELL FRAGMENTS — Matawa
8		
9		
10	2 in.	SILTY SANDY CLAY W/ COBBLE
11		ABUNDANT CLAM SHELLS 2-3 inches
12		GREY COMPACT SILTY, CLAYEY
13		SAND W/ ABUNDANT SHELLS
		+ SHELL FRAGS
14		
15		COBBLE IN BOTTOM W/ SOME SAND
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
1		
CAP		
2		
ODOR		
3		
4		
5 — PETROLEUM ODOR		
6		
7		
8		
9		
10 — NATIVE OR REGRADE MATERIALS		
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW27-SED-0-3	0-3
DW27-SED-3-7	3-7
DW27-SED-7-11	7-11
DW27-SED-11-14	11-14.5

Notes:

★ SULFIDES ODOR IN THIN 1.5" LEAF DEBRIS LAYER

Striplin Environmental Associates, Inc. **Core Description and Sample Information**

STATION: DW-28 11 SEP97 000004

REPLICATE: 1 11:40

Field Log by: BROWNING	Processing by: DT/SB/VF	Coring by: STRIPLIN/BROWNING
Tide Level from MLLW: 8.1'	Date: 9.13.97	Total Drive Length: 18 ft
Depth to Mudline: 66'	Time: 1100	Recovered Length: 14.7 ft
Mudline Elev.: 57.9 ft		Recovery Efficiency: 82%

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
		OLIVE LOOSE SILT W/ SHELLS (SURFACE)
1		2" – Black silty sand
		3" – MOIST GRAY CLAY
2		2" – BLACK SILT, SAND, CLAY W/ GRAVEL
		4" – GRAY SAND + SILT
3		6" – GRAY CLAY
		2" – BLACK SILT W/ CLAY + PETROLEUM
		GRAY, COMPACT SANDY SILT W/ SOME SHELL FRAGS
4		TRANSITIONS TO MORE SAND
		THAN SILT (CLOSE - 50/50) W/ SMALL
5		CLAY COMPONENT
6		
7		
8		COMPACT SILTY MED SAND
		GREY W/ gravels (TRACE)
9		
		SAND, IN GENERAL, VERY
10		WELL SORTED. TRACE TO
		NO SHELL FRAGS AT
11		DEPTH (8FT+)
12		COMPACT SILTY MED SND
		GREY
13		
14		5 PEBBLE TO COBBLE
		SIZED ROCKS
15		
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
1		
2 AND GLASS	FRAGMENT	
3 ODOR		
4		
5		
6		NATIVE/REGRADE SAND
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW28-SED-0-2	0-2
DW28-SED-2-4	2-4
DW28-SED-4-8	4-8
DW28-SED-8-12	8-12
DW28-SED-12-14	12-14

Notes:

Striplin Environmental Associates, Inc. **Core Description and Sample Information**

STATION: DW29 9-10-97 000005

REPLICATE: 1 1330 hr

Field Log by: VF	Processing by: DT/SB	Coring by: DE/VF
Tide Level from MLLW: 9.2 Depth to Mudline: 56' Mudline Elev.: 46.8 ft	Date: 9.11.97 Time: 1000	Total Drive Length: 11' Recovered Length: 8.3' Recovery Efficiency: 75%

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
		[illegible] - Thin 2cm
1		GRAY TO DK. GRAY CLAYEY SILT - MOIST AND SULFIDIC
1.3		
2		DK. GRAY CLAYEY SILT W/ SULFIDIC ODOR AND HYDROCARBON ODOR
2.3		GRAY CLAYEY SILT
3		DK. GRAY - BLACK CLAYEY SILT - SULFIDES + HYDROCARBONS ODOR
4		GRY SILT/CLAY - STRONG SULFIDES + WEAK HYDROCARBONS
5 10"		TRANSITIONS TO GRAY SANDY SILT - WEAK SULFIDES
6		
7		GRAY SILTY SAND W/ SHELL HASH
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
1		
2		
3		
4		
5		
6		
7		NATIVE/REGRADE SAND
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW29 - SED - 0-2	0-2
DW29 - SED - 2-4	2-4
DW29 - SED - 4-6	4-6
DW29 - SED - 6-8	6-8

Notes: SULFIDES ODOR STRONG IN TOP 4-5 FT

Striplin Environmental Associates, Inc. **Core Description and Sample Information**

STATION: DW-30
REPLICATE: 1 FELLOWER

11 SEP-97 000006
09:30 / 10:04

Field Log by: BROWNING	Processing by: DT/SB/VF	Coring by: BROWNING/STRIPLIN
Tide Level from MLLW: 5.1'	Date: 9.12.97	Total Drive Length: 8.5 ft
Depth to Mudline: 22'	Time:	Recovered Length: 6.5 ft
Mudline Elev.: 16.9 ft		Recovery Efficiency: 76%

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
		Olive silt w/sm shell
1		2" LAYER, BLACK SILT - STRONG ODOR - ANTHROPOGENIC + SULFIDIC
		BROWN-DK GRAY COARSE SAND W/SILT, COBBLE, CLAY
2		DK. GRAY COBBLY SAND + GRAVEL
	GLASS FRAGS	TRANSITIONS TO BLACK COLOR
3		
		BLACK SILTY SAND/SANDY SILT - SULFIDIC
4	8 inches	blue to grey silt w/rocks
5	4 inches	~~BROWN SAND/SILT W/ GRAVEL~~
		GRAY COMPACT, COHESIVE
6	BRICK PIECE	CLAY W/ TRACE COBBLE
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW30-SSD-0-2	0-2
DW30-SSD-2-4	2-4
DW30-SSD-4-6	4-6

Notes:

Striplin Environmental Associates, Inc. **Core Description and Sample Information**

000007

STATION: DW 31
REPLICATE: 1

11 SEP 97
08:58

Field Log by: D. BROWNING	Processing by: DT/SB/VF	Coring by: BROWNING/STRIPLIN
Tide Level from MLLW: 3.2'	Date: 9.13.97	Total Drive Length: 11 ft.
Depth to Mudline: 12.6'	Time: 0900	Recovered Length: 7.2 ft
Mudline Elev.: 9.4 ft		Recovery Efficiency: 65 %

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
		BLACK SANDY SILT 1:23
1	Metal Shaving	+ 2in layer of twig + leaf debris
2		PETROLEUM ODOR
		DK. GRAY SILTY SAND
3		BLACK SILT/SAND W/CLAY + ORGANICS ★
4		PETROLEUM ODOR STRONG
2in		GRAY CLAY
5		BLACK SILT + CLAY W/ ABUNDANT DEBRIS - HAIR, CIGARETTES, LEAVES, FISHING LINE
		DK. GRAY TO BLACK SILTY CLAY
6		PETROLEUM ODOR MODERATE
7		
		NO OFFCUT, ~~UNBACK~~ ORGANIC SICT IN CUTTER
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
1		
2		
3	STRONG SULFIDES	
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW31-SED-0-2	0-2
DW31-SED-2-4	2-4
DW31-SED-4-6	4-6
DW31-SED-6-7	6-7

Notes: ★ 3 FT 8 IN - HUMAN HAIR, CIGARETTE BUTT

Striplin Environmental Associates, Inc. **Core Description and Sample Information**

STATION: DW-32 11 SEP 97 000008

REPLICATE: 1 10:35/11:00

Field Log by:	Processing by: DT / SB / VF	Coring by: [illegible] / BROWNING
Tide Level from MLLW: 7.0 Depth to Mudline: 8.5 ft Mudline Elev.: 1 ft	Date: 9.13.97 Time: 1800	Total Drive Length: ~~9.5 ft~~ 11 Recovered Length: 4.5 ft Recovery Efficiency: 41%

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
1		BLACK SULFIDIC SLIGHTLY SILTY SAND w/ SHEEN VERY MOIST
2		
3		BLACK SILTY SAND MATRIX W/ NUMEROUS COBBLES, BRICK PIECES - APPEARS TO BE FILL MATERIAL - MODERATE PETROLEUM ODOR
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW32-SED-0-2	0-2
DW32-SED-2-4	2-4

Notes:

Striplin Environmental Associates, Inc. **Core Description and Sample Information**

STATION: DW33 9-10-97 000003
REPLICATE: 1700hr

Field Log by: VF	Processing by: DT / SB	Coring by: DE/VF
Tide Level from MLLW: 6.8'	Date: 9.11.97	Total Drive Length: 10.6'
Depth to Mudline: 27'	Time: 1115	Recovered Length: 8.2'
Mudline Elev.: 20.2 ft		Recovery Efficiency: 77%

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
		SILT [illegible] SAND [illegible] GRAVEL
1		2 polychaetes
5"		Black clay/silt w/ petroleum odor
2		← 1" layer coarse sand
		← 6" heterogeneous gray sand, silt, clay + gravel
3		Gray clayey silt/clay w/ some gravel
4		grey silt ← pebbles + cobbles @ 4' and down 3-4"
5		thin black pocket - oil? creosote
6		
7		gray clay w/ silt - gravel interspersed. → wood chips w/ creosote odor
		- gravel + pebbles 5 or 6
8		petroleum odor strong at bottom
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW33 - SED - 0-2	0-2
DW33 - SED - 2-4	2-4
DW33 - SED - 4-6	4-6
DW33 - SED - 6-8	6-8

Notes: TOP 4 FT - SULFIDES
ODOR TRACE TO NONE
CLAY IS VERY COHESIVE

Striplin Environmental Associates, Inc. **Core Description and Sample Information**

STATION: DW34 9-10 070010

REPLICATE: 1545 hr

Field Log by: VF	Processing by: DT/SB	Coring by: DB/VF
Tide Level from MLLW: 7.5'	Date: 9.11.97	Total Drive Length: 8½' refusal
Depth to Mudline: 32'	Time: 1330	Recovered Length: 6.5'
Mudline Elev.: -24.5'		Recovery Efficiency: 76%

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
		SILT + GRAVEL w/ ROCKS
1		ABUNDANT BARNACLE HASH
		SULFIDES ODOR STRONG
2		TRANSITIONS TO GRAY
		SILTY CLAY AND THEN TO
3		CLAY. CLAY IS GRAY + VERY
		COHESIVE - NO SULFIDES ODOR
4		grey clay + silt
5		VERY COHESIVE, GRAY CLAY
		w/ SILT, SAND + TRACE
6		OF GRAVEL. PIECE OF BRICK
		@ 6FT - NO ODORS
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW34 - SED - 0-2	0-2
DW34 - SED - 2-4	2-4
DW34 - SED - 4-6	4-6

Notes:

Striplin Environmental Associates, Inc. **Core Description and Sample Information**

STATION: DW35 9-10-97 1520 hr 000011

REPLICATE: (DW89 (0-2'))

Field Log by: VE	Processing by: DT/SB	Coring by: DE/VF
Tide Level from MLLW: 8.2 Depth to Mudline: 46' Mudline Elev.: 37.8 ft	Date: 9.11.97 Time: 1500	Total Drive Length: 11' Recovered Length: 7.3' Recovery Efficiency: 66 %

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
	3in	Brown sandy silt - WORMS ON
1		SURFACE, 1 LIVE CLAM
		MOIST BROWN-GRAY SILT
2		W/ CLAY, SULFIDES STRONG/
		- PETROLEUM ODOR - MOD.
3		GRAY COHESIVE CLAY
	5 inches	BLACK SILT, STRONG PETROLEUM ODOR - SHEEN ON PEBBLE & 2", WOOD CHIP
4		gray silt + PEANUT SHELL
		- WOOD CHIPS - BLACK + PETROLEUM ODOR (slight to moderate)
5		GRAY CLAY W/ SILT + SAND
6		
		GRAY SANDY SILT / SILTY SAND
7		+ small amount of clay
		+ shell hash
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
1		
2		
3		
4		
5		
6		NATIVE/REGRADE SAND
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW35-SED-0-2	0-2
DW35-SED-2-4	2-4
DW35-SED-4-6	4-6
DW35-SED-6-8	6-7 *

Notes:

Replicate DW89 = split from homogenized sample (except sulfides) from 0-2' interval at DW35

Striplin Environmental Associates, Inc. **Core Description and Sample Information**

STATION: DW36 9-10-97 1255 000012

REPLICATE:

Field Log by: VF	Processing by: SB / DT	Coring by: DR/VF
Tide Level from MLLW: 9.4'	Date: 9.11.97	Total Drive Length: 10'
Depth to Mudline: 73'	Time: 1630	Recovered Length: 7'
Mudline Elev.: 63.6 ft		Recovery Efficiency: 70%

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
		2 in GRAY CLAYEY SILT
1		BLACK CLAYEY SILT W/SAND
2		DK GRAY TO BLACK CLAYEY SILT
		PETROLEUM ODOR (MODERATE)
3		
4		brown silt - sulfides odor
		SILT HAS A CLAY COMPONENT
5		
6		SULFIDES ODOR VERY STRONG IN BOTTOM 4 FT
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
1		
2	STRONG	SULFIDES
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW36-SED-0-2	0-2
DW36-SED-2-4	2-4
DW36-SED-4-6	4-6
DW36-SED-6-8	6-7 *

Notes:

Striplin Environmental Associates, Inc. **Core Description and Sample Information**

STATION: DW37
REPLICATE:

9-10 000013
1205 hr

Field Log by: VF	Processing by: SB/DT	Coring by: DB/VF
Tide Level from MLLW: 9.2' Depth to Mudline: 70' Mudline Elev.: 60.8 ft	Date: 9/11/97 Time:	Total Drive Length: 10.5' Recovered Length: 8.8' Recovery Efficiency: 84 %

Note: All elevations, depths, and distances in feet.

Core Description - Core Tube Lengths

Tube Length	Sample No.	Visual Description
	4 inches	brown sandy silt w/ clay
1		ALTERNATING GRAY AND GRAY TO BLACK CLAY/SILT
2		PETROLEUM ODOR
3	4 inches 2.8'	
4		brown sandy silt w/ CLAY TRANSITIONS TO HARD GRAY SAND W/ SHELL HASH WHICH CONTINUES TO THE BOTTOM
5		
6		
7		
8		grey sand - very hard
catch 9'		THIS BOTTOM FOOT NOT PROCESSED
10		
11		
12		
13		
14		
15		
16		
17		
18		

In-Situ Summary Log

Interpreted Summary	Sample No.	Acquisition Notes
SULFIDES ODOR		
1		
2		
3		
SLIGHT PETROLEUM ODOR + SHELL HASH		
4		
5		
6		
SULFIDES ODOR SLIGHT NATIVE/REGRADE SANDS		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Core Tube Field Cut Information

Sample No.	Tube Length Interval	Segment Length

Sample Test Information

Sample No./Tests	In-Situ Depth Int.
DW37-SED-0-2	0-2
DW37-SED-2-4	2-4
DW37-SED-4-6	4-6
DW37-SED-6-8	6-8

Notes:

* THE PREVIOUS 4 FT APPEARED TO BE NATIVE AND MOST PROBABLY CLEAN: DID NOT PROCESS BOTTOM FOOT

APPENDIX B

CHEMICAL DATA SUMMARY TABLES

DENNY WAY/LAKE UNION CSO CONTROL PROJECT

SEDIMENT CHARACTERIZATION
SUMMARY OF SAMPLE SPLITS AND DUPLICATES

Sample	Split	Duplicate
DW-03-SED-0	DW-80	DW-81
DW-07-SED-0	DW-82	DW-83
DW-09	DW-84	DW-85
DW-23-SED-0	DW-86	DW-87
DW-25-SED-4-8	DW-88	NA

Note: Mean value of split and duplicate concentrations calculated as follows: 1) calculate the average of the sample and split sample concentrations 2) Calculate the average of the result of 1) and the duplicate concentration.

DATA QUALIFIERS

D - Dilution used
J - Data is estimated
H - High bias is indicated
L - Low bias is indicated
M - Mean value of field split and duplicate
N - Bias is not known
U - Undetected at concentration shown
V - High replicate variability is indicated

DATA SUMMARY REPORT

Project: Denny Way

Analyses: CONVENTIONALS
Units: %

Location	Sample Number	Matrix	Sample Date	TOTAL ORGANIC CARBON	TOTAL SOLIDS	TOTAL VOLATILE SOLIDS
DW01	DW-01-SED-0	MSED	9/9/97	2.5	51	5.9
DW02	DW-02-SED-0	MSED	9/12/97	3.9	77	2.6
DW03	DW-03-SED-0	MSED	9/12/97	2.5	64	6.8 JV
DW03	DW-80	MSED	9/12/97	3.5	61	9.4
DW03	DW-81	MSED	9/12/97	3.4	58	7.3 JV
DW04	DW-04-SED-0	MSED	9/12/97	2	71	3.1
DW05	DW-05	MSED	9/12/97	1.2	79	1.2
DW06	DW-06	MSED	9/12/97	0.79	82	1.2
DW07	DW-07-SED-0	MSED	9/12/97	1.7	77	1.9
DW07	DW-82	MSED	9/12/97	0.55	75	1.7
DW07	DW-83	MSED	9/12/97	0.68	79	1.4
DW08	DW-08	MSED	9/12/97	2	75	1.8
DW09	DW-09	MSED	9/12/97	2.5	73	2.7
DW09	DW-84	MSED	9/12/97	4	71	2.9
DW09	DW-85	MSED	9/12/97	3.8	72	3.2
DW10	DW-10-SED-0	MSED	9/12/97	3.2	43	9.6
DW11	DW-11-SED-0	MSED	9/9/97	1.2	62	3.2
DW12	DW-12-SED-0	MSED	9/9/97	1.6	56	4.9
DW13	DW-13-SED-0	MSED	9/9/97	2.6	63	4.3
DW14	DW-14-SED-0	MSED	9/9/97	1.3	66	3.3
DW15	DW-15	MSED	9/12/97	2.3	52	6 JV
DW16	DW-16-SED-0	MSED	9/9/97	1.3	61	3.4
DW17	DW-17-SED-0	MSED	9/9/97	1.7	49	4.8
DW18	DW-18-SED-0	MSED	9/9/97	4.1	30	11
DW19	DW-19-SED-0	MSED	9/9/97	2.4	61	4.9
DW20	DW-20-SED-0	MSED	9/9/97	1.7	60	5
DW21	DW-21-SED-0	MSED	9/9/97	2.3	51	5.2
DW22	DW-22-SED-0	MSED	9/9/97	3.1	37	7.6
DW23	DW-23-SED-0	MSED	9/9/97	2.8	50	5.1

DATA SUMMARY REPORT

Project: Denny Way

Analyses: CONVENTIONALS
Units: %

Location	Sample Number	Matrix	Sample Date	TOTAL ORGANIC CARBON	TOTAL SOLIDS	TOTAL VOLATILE SOLIDS
DW23	DW-86-SED-0	MSED	9/9/97	3.9	49	5
DW23	DW-87-SED-0	MSED	9/9/97	3.1	50	5.1
DW24	DW-24	MSED	9/12/97	1.6	51	4.2
DW25	DW-25-SED-0-2	MSED	9/11/97	0.32	91	1.7
DW25	DW-25-SED-2-4	MSED	9/11/97	6	86	3.8
DW25	DW-25-SED-4-8	MSED	9/11/97	0.49	83	2.7
DW25	DW-25-SED-8-10.5	MSED	9/11/97	0.48	82	3
DW25	DW-88-SED-4-8	MSED	9/11/97	0.54	86	4.5
DW26	DW-26-SED-0-3	MSED	9/11/97	1.4	77	2.7
DW26	DW-26-SED-11-13	MSED	9/11/97	2.5	82	1.1
DW26	DW-26-SED-3-7	MSED	9/11/97	1.7	74	3.8
DW26	DW-26-SED-7-11	MSED	9/11/97	0.26	82	1.3
DW27	DW-27-SED-0-3	MSED	9/11/97	0.74	77	3.2
DW27	DW-27-SED-11-14	MSED	9/11/97	0.09	87	0.73
DW27	DW-27-SED-3-7	MSED	9/11/97	1.7	74	3.6
DW27	DW-27-SED-7-11	MSED	9/11/97	0.38	82	0.98
DW28	DW-28-SED-0-2	MSED	9/11/97	1.2	73	3.7
DW28	DW-28-SED-12-14	MSED	9/11/97	0.08	78	0.96
DW28	DW-28-SED-2-4	MSED	9/11/97	0.74	78	2
DW28	DW-28-SED-4-8	MSED	9/11/97	0.16	81	0.98
DW28	DW-28-SED-8-12	MSED	9/11/97	0.07	84	0.73
DW29	DW-29-SED-0-2	MSED	9/10/97	1.5	53	4.8
DW29	DW-29-SED-2-4	MSED	9/10/97	1.8	61	4.6
DW29	DW-29-SED-4-6	MSED	9/10/97	0.98	76	2
DW30	DW-30	MSED	9/12/97	1.8	77	2.3
DW30	DW-30-SED-0-2	MSED	9/11/97	0.84	84	2.5
DW30	DW-30-SED-2-4	MSED	9/11/97	1.3	86	1.7
DW30	DW-30-SED-4-6	MSED	9/11/97	0.91	75	3.5
DW31	DW-31-SED-0-2	MSED	9/11/97	3	69	9.8

DATA SUMMARY REPORT

Project: Denny Way

Analyses: CONVENTIONALS
Units: %

Location	Sample Number	Matrix	Sample Date	TOTAL ORGANIC CARBON	TOTAL SOLIDS	TOTAL VOLATILE SOLIDS
DW31	DW-31-SED-2-4	MSED	9/11/97	2.2	72	5.7
DW31	DW-31-SED-4-6	MSED	9/11/97	3.3	64	7.7
DW31	DW-31-SED-6-8	MSED	9/11/97	4.8J	56J	7.1J
DW32	DW-32-SED-0-2	MSED	9/11/97	2.1	76	4.2
DW32	DW-32-SED-2-4	MSED	9/11/97	2	84	2.8
DW33	DW-33	MSED	9/12/97	2.3	71	3.1
DW33	DW-33-SED-0-2	MSED	9/10/97	1.1	71	3.1
DW33	DW-33-SED-2-4	MSED	9/10/97	0.6	78	2.6
DW33	DW-33-SED-4-6	MSED	9/10/97	0.49	77	2.6
DW34	DW-34	MSED	9/12/97	2.3	75	3.5
DW34	DW-34-SED-0-2	MSED	9/10/97	1.3	62	3.5
DW34	DW-34-SED-2-4	MSED	9/10/97	0.42	77	2.6
DW34	DW-34-SED-4-6	MSED	9/10/97	0.37	81	2.4
DW35	DW-35	MSED	9/12/97	1.3	65	3.8
DW35	DW-35-SED-0-2	MSED	9/10/97	3	50	6.4
DW35	DW-35-SED-2-4	MSED	9/10/97	1.8	60	5
DW35	DW-35-SED-4-6	MSED	9/10/97	2	71	3.8
DW35	DW-35-SED-6-8	MSED	9/10/97	0.44J	83J	0.79J
DW35	DW-89-SED-0-2	MSED	9/10/97	2.9	46	7
DW36	DW-36-SED-0-2	MSED	9/10/97	2.2	43	7
DW36	DW-36-SED-2-4	MSED	9/10/97	2.1	43	6.8
DW36	DW-36-SED-4-6	MSED	9/10/97	5.7	31	15
DW37	DW-37-SED-0-2	MSED	9/10/97	1	68	3.7
DW37	DW-37-SED-2-4	MSED	9/10/97	0.91	78	1.9
DW37	DW-37-SED-4-6	MSED	9/10/97	0.32	82	0.76

DATA SUMMARY REPORT

Project: Denny Way

Analyses: CONVENTIONALS
Units: mg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	AMMONIA	TOTAL SULFIDES
DW01	DW-01-SED-0	MSED	9/9/97	8.1	140
DW02	DW-02-SED-0	MSED	9/12/97	14	200
DW03	DW-03-SED-0	MSED	9/12/97	18	420
DW03	DW-80	MSED	9/12/97	29	670
DW03	DW-81	MSED	9/12/97	22	820
DW04	DW-04-SED-0	MSED	9/12/97	5.6	400
DW05	DW-05	MSED	9/12/97	2.3	350
DW06	DW-06	MSED	9/12/97	1.9	49
DW07	DW-07-SED-0	MSED	9/12/97	5.3	550
DW07	DW-82	MSED	9/12/97	4.2	390
DW07	DW-83	MSED	9/12/97	2.3	310
DW08	DW-08	MSED	9/12/97	9.5	10 U
DW09	DW-09	MSED	9/12/97	14	210
DW09	DW-84	MSED	9/12/97	14	43
DW09	DW-85	MSED	9/12/97	19	70
DW10	DW-10-SED-0	MSED	9/12/97	24	310
DW11	DW-11-SED-0	MSED	9/9/97	5.2	25
DW12	DW-12-SED-0	MSED	9/9/97	7.6	54
DW13	DW-13-SED-0	MSED	9/9/97	8.6	13 U
DW14	DW-14-SED-0	MSED	9/9/97	5.2	12 U
DW15	DW-15	MSED	9/12/97	6.4	15 U
DW16	DW-16-SED-0	MSED	9/9/97	4.1	13 U
DW17	DW-17-SED-0	MSED	9/9/97	3.9	17 U
DW18	DW-18-SED-0	MSED	9/9/97	4.8	27 U
DW19	DW-19-SED-0	MSED	9/9/97	5.4	18 U
DW20	DW-20-SED-0	MSED	9/9/97	4.4	390
DW21	DW-21-SED-0	MSED	9/9/97	4.2	19
DW22	DW-22-SED-0	MSED	9/9/97	5.4	29 U

DATA SUMMARY REPORT

Project: Denny Way

Analyses: CONVENTIONALS
Units: mg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	AMMONIA	TOTAL SULFIDES
DW23	DW-23-SED-0	MSED	9/9/97	4.6	36
DW23	DW-86-SED-0	MSED	9/9/97	4.1	24
DW23	DW-87-SED-0	MSED	9/9/97	3.1	16 U
DW24	DW-24	MSED	9/12/97	7.6	29
DW25	DW-25-SED-0-2	MSED	9/11/97	4.1	86
DW25	DW-25-SED-2-4	MSED	9/11/97	7.8	190
DW25	DW-25-SED-4-8	MSED	9/11/97	13	110
DW25	DW-25-SED-8-10.5	MSED	9/11/97	8.5	37
DW25	DW-88-SED-4-8	MSED	9/11/97	17	100
DW26	DW-26-SED-0-3	MSED	9/11/97	12	290
DW26	DW-26-SED-11-13	MSED	9/11/97	4.3	10 U
DW26	DW-26-SED-3-7	MSED	9/11/97	78	440
DW26	DW-26-SED-7-11	MSED	9/11/97	7.1	10 U
DW27	DW-27-SED-0-3	MSED	9/11/97	6.6	18
DW27	DW-27-SED-11-14	MSED	9/11/97	1.2	12 U
DW27	DW-27-SED-3-7	MSED	9/11/97	32	32
DW27	DW-27-SED-7-11	MSED	9/11/97	5.9	9 U
DW28	DW-28-SED-0-2	MSED	9/11/97	21	150
DW28	DW-28-SED-12-14	MSED	9/11/97	1.3	10 U
DW28	DW-28-SED-2-4	MSED	9/11/97	18	15
DW28	DW-28-SED-4-8	MSED	9/11/97	3.3	10 U
DW28	DW-28-SED-8-12	MSED	9/11/97	0.9	10 U
DW29	DW-29-SED-0-2	MSED	9/10/97	15	41
DW29	DW-29-SED-2-4	MSED	9/10/97	48	1300
DW29	DW-29-SED-4-6	MSED	9/10/97	11	35
DW30	DW-30	MSED	9/12/97	10	220
DW30	DW-30-SED-0-2	MSED	9/11/97	3.8	46
DW30	DW-30-SED-2-4	MSED	9/11/97	4.2	160

DATA SUMMARY REPORT

Project: Denny Way

Analyses: CONVENTIONALS
Units: mg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	AMMONIA	TOTAL SULFIDES
DW30	DW-30-SED-4-6	MSED	9/11/97	11	42
DW31	DW-31-SED-0-2	MSED	9/11/97	24	460
DW31	DW-31-SED-2-4	MSED	9/11/97	190	850
DW31	DW-31-SED-4-6	MSED	9/11/97	540	1800
DW31	DW-31-SED-6-8	MSED	9/11/97	740	ND
DW32	DW-32-SED-0-2	MSED	9/11/97	9	230
DW32	DW-32-SED-2-4	MSED	9/11/97	15	150
DW33	DW-33	MSED	9/12/97	15	410
DW33	DW-33-SED-0-2	MSED	9/10/97	16	44
DW33	DW-33-SED-2-4	MSED	9/10/97	8.9	14
DW33	DW-33-SED-4-6	MSED	9/10/97	6.5	33
DW34	DW-34	MSED	9/12/97	9.3	280
DW34	DW-34-SED-0-2	MSED	9/10/97	5.8	290
DW34	DW-34-SED-2-4	MSED	9/10/97	5.2	10 U
DW34	DW-34-SED-4-6	MSED	9/10/97	4	10 U
DW35	DW-35	MSED	9/12/97	8.7	12 U
DW35	DW-35-SED-0-2	MSED	9/10/97	22	700
DW35	DW-35-SED-2-4	MSED	9/10/97	48	200
DW35	DW-35-SED-4-6	MSED	9/10/97	37	93
DW35	DW-35-SED-6-8	MSED	9/10/97	10	ND
DW35	DW-89-SED-0-2	MSED	9/10/97	31	260
DW36	DW-36-SED-0-2	MSED	9/10/97	20	1300
DW36	DW-36-SED-2-4	MSED	9/10/97	76	830
DW36	DW-36-SED-4-6	MSED	9/10/97	81	480
DW37	DW-37-SED-0-2	MSED	9/10/97	19	76
DW37	DW-37-SED-2-4	MSED	9/10/97	24	10 U
DW37	DW-37-SED-4-6	MSED	9/10/97	5.3	13 U

DATA SUMMARY REPORT

Project: Denny Way

Analyses: GRAIN SIZE DISTRIBUTION
Units: %

Station	Gravel < -1 phi		Very Coarse Sand -1 to 0 phi		Coarse Sand 0 to 1 phi		Medium Sand 1 to 2 phi		Fine Sand 2 to 3 phi		Very Fine Sand 3 to 4 phi		Silt 4 to 8 phi		Clay > 8 phi		Fines > 4 phi		Coarse < 4 phi		Total	
DW01	3.70		1.00		1.80		5.30		12.00		17.00		42.00		16.90		58.90		40.80		99.7	
DW02	54.50		6.80		8.40		13.00		8.70		3.00		2.70		3.50		6.20		94.40		100.6	
DW-03	33.08	M	1.98	M	4.18	M	19.25	M	18.50	M	9.95	M	7.00	M	5.58	M	12.58	M	86.93	M	99.5	M
DW04	0.80		1.40		14.00		46.00		25.00		6.70		2.80		2.90		5.70		93.90		99.6	
DW05	57.90		13.00		13.00		15.00		0.50		0.10		0.50		1.30		1.80		99.50		101.3	
DW06	42.50		16.00		18.00		17.00		3.30		0.70		2.80		0.80		3.60		97.50		101.1	
DW07	16.00	M	5.38	M	17.10	M	39.25	M	15.08	M	2.30	M	3.28	M	1.25	M	4.53	M	95.10	M	99.6	M
DW08	48.70		9.50		11.00		14.00		6.00		2.10		6.30		3.00		9.30		91.30		100.6	
DW09	57.75	M	10.38	M	7.68	M	7.80	M	6.13	M	3.98	M	1.63	M	4.20	M	5.83	M	93.70	M	99.5	M
DW10	12.10		1.40		2.50		4.40		9.40		16.00		35.60		18.10		53.70		45.80		99.5	
DW11	2.20		1.30		2.80		6.10		8.70		16.00		37.70		25.60		63.30		37.10		100.4	
DW12	0.90		0.50		0.90		2.90		8.80		27.00		41.40		18.60		60.00		41.00		101.0	
DW13	1.80		1.40		18.00		42.00		14.00		4.40		11.90		5.30		17.20		81.60		98.8	
DW14	1.30		2.40		32.00		38.00		9.50		2.70		10.10		4.10		14.20		85.90		100.1	
DW15	1.60		0.80		3.50		14.00		11.00		8.40		46.90		14.40		61.30		39.30		100.6	
DW16	4.90		1.80		2.60		9.70		9.20		14.00		44.10		14.10		58.20		42.20		100.4	
DW17	1.00		1.00		1.20		5.70		7.60		13.00		50.40		20.30		70.70		29.50		100.2	
DW18	0.30		0.30		1.00		4.40		9.00		15.00		52.80		18.30		71.10		30.00		101.1	
DW19	2.20		1.60		22.00		40.00		11.00		4.30		11.70		7.30		19.00		81.10		100.1	
DW20	3.30		1.50		10.00		29.00		13.00		8.80		22.50		12.30		34.80		65.60		100.4	
DW21	6.60		2.90		4.70		12.00		9.70		8.00		42.70		12.10		54.80		43.90		98.7	
DW22	4.60		1.30		1.90		5.10		8.60		12.00		49.70		17.90		67.60		33.50		101.1	
DW23	1.08	M	0.85	M	12.25	M	37.75	M	12.50	M	6.53	M	20.63	M	8.35	M	28.98	M	70.95	M	99.9	M
DW24	7.00		2.30		4.10		8.70		7.20		8.60		43.40		19.00		62.40		37.90		100.3	
DW-25-SED-0-2	9.60		7.20		24.00		40.00		13.00		1.80		3.50		0.90		4.40		95.60		100.0	
DW-25-SED-2-4	27.30		11.00		17.00		25.00		11.00		2.80		5.20		0.90		6.10		94.10		100.2	

DATA SUMMARY REPORT

Project: Denny Way

Analyses: GRAIN SIZE DISTRIBUTION
Units: %

Station	Gravel < -1 phi		Very Coarse Sand -1 to 0 phi		Coarse Sand 0 to 1 phi		Medium Sand 1 to 2 phi		Fine Sand 2 to 3 phi		Very Fine Sand 3 to 4 phi		Silt 4 to 8 phi		Clay > 8 phi		Fines > 4 phi		Coarse < 4 phi		Total	
DW-25-SED-4-8	12.80	M	6.70	M	13.00	M	28.00	M	17.00	M	6.30	M	11.40	M	3.90	M	15.30	M	83.80	M	99.1	M
DW-25-SED-8-10.5	5.80		4.90		9.50		22.00		12.00		9.50		27.00		10.60		37.60		63.70		101.3	
DW-26-SED-0-3	3.00		9.10		40.00		29.00		6.00		3.80		6.20		3.50		9.70		90.90		100.6	
DW-26-SED-11-13	2.20		1.80		2.20		32.00		36.00		5.10		13.60		6.00		19.60		79.30		98.9	
DW-26-SED-3-7	4.90		3.10		4.60		7.90		7.50		11.00		44.50		16.70		61.20		39.00		100.2	
DW-26-SED-7-11	2.00		1.70		2.30		30.00		38.00		4.70		14.20		7.20		21.40		78.70		100.1	
DW-27-SED-0-3	2.00		8.00		40.00		30.00		6.00		2.60		5.70		6.50		12.20		88.60		100.8	
DW-27-SED-11-14	27.40		6.70		3.40		30.00		26.00		4.90		1.10		0.30		1.40		98.40		99.8	
DW-27-SED-3-7	2.40		2.00		3.20		20.00		27.00		7.00		27.80		11.20		39.00		61.60		100.6	
DW-27-SED-7-11	4.80		2.20		2.90		31.00		36.00		4.60		14.00		4.10		18.10		81.50		99.6	
DW-28-SED-0-2	12.30		4.20		8.90		15.00		9.30		7.40		29.20		13.70		42.90		57.10		100.0	
DW-28-SED-12-14	10.50		3.20		1.50		34.00		35.00		7.80		6.50		0.80		7.30		92.00		99.3	
DW-28-SED-2-4	0.60		0.90		2.00		20.00		32.00		6.40		30.40		7.20		37.60		61.90		99.5	
DW-28-SED-4-8	0.80		1.00		2.60		28.00		43.00		4.90		14.80		4.20		19.00		80.30		99.3	
DW-28-SED-8-12	3.40		1.30		0.60		30.00		47.00		12.00		4.80		0.80		5.60		94.30		99.9	
DW-29-SED-0-2	7.90		0.80		1.50		2.90		4.80		9.50		45.00		27.90		72.90		27.40		100.3	
DW-29-SED-2-4	1.10		0.50		0.80		2.80		7.60		12.00		63.00		11.90		74.90		24.80		99.7	
DW-29-SED-4-6	0.30		0.30		1.10		18.00		32.00		5.10		34.60		8.60		43.20		56.80		100.0	
DW-30	38.10		5.70		11.00		22.00		12.00		3.20		3.30		4.80		8.10		92.00		100.1	
DW-30-SED-0-2	19.10		3.80		7.80		25.00		18.00		7.10		15.00		4.50		19.50		80.80		100.3	
DW-30-SED-2-4	31.40		5.80		8.40		20.00		13.00		5.10		13.10		3.20		16.30		83.70		100.0	
DW-30-SED-4-6	27.30		4.80		7.20		8.80		5.00		4.50		22.30		20.00		42.30		57.60		99.9	
DW-31-SED-0-2	7.70		3.80		6.70		32.00		37.00		5.00		6.20		1.60		7.80		92.20		100.0	
DW-31-SED-2-4	2.90		1.10		2.30		13.00		31.00		12.00		30.60		6.80		37.40		62.30		99.7	
DW-31-SED-4-6	1.20		1.10		2.30		6.70		4.30		6.70		60.60		17.10		77.70		22.30		100.0	
DW-31-SED-6-8	0.20	J	0.40	J	1.30	J	6.50	J	12.20	J	5.60	J	59.60	J	14.40	J	74.00	J	26.20	J	100.2	J

DATA SUMMARY REPORT

Project: Denny Way

Analyses: GRAIN SIZE DISTRIBUTION
Units: %

Station	Gravel < -1 phi		Very Coarse Sand -1 to 0 phi		Coarse Sand 0 to 1 phi		Medium Sand 1 to 2 phi		Fine Sand 2 to 3 phi		Very Fine Sand 3 to 4 phi		Silt 4 to 8 phi		Clay > 8 phi		Fines > 4 phi		Coarse < 4 phi		Total	
DW-32-SED-0-2	4.20		3.70		14.00		36.00		20.00		13.00		9.30		1.50		10.80		90.90		101.7	
DW-32-SED-2-4	27.80		12.00		18.00		21.00		10.00		4.50		5.70		1.40		7.10		93.30		100.4	
DW-33	34.80		3.90		16.00		26.00		9.30		3.50		2.30		4.40		6.70		93.50		100.2	
DW-33-SED-0-2	8.80		5.40		17.00		28.00		9.70		5.40		16.40		9.80		26.20		74.30		100.5	
DW-33-SED-2-4	11.80		3.90		7.20		11.00		6.90		4.10		36.10		19.00		55.10		44.90		100.0	
DW-33-SED-4-6	19.10		3.40		4.90		7.80		4.30		9.20		28.60		22.80		51.40		48.70		100.1	
DW-34	42.10		12.00		6.50		6.40		10.00		8.60		10.20		4.90		15.10		85.60		100.7	
DW-34-SED-0-2	13.50		3.20		3.70		4.30		3.00		7.20		42.00		22.60		64.60		34.90		99.5	
DW-34-SED-2-4	9.50		3.00		4.30		7.00		4.50		4.80		42.90		24.20		67.10		33.10		100.2	
DW-34-SED-4-6	9.60		4.20		7.10		12.00		7.70		7.10		37.30		15.70		53.00		47.70		100.7	
DW-35	3.60		1.50		4.00		14.00		14.00		17.00		32.10		14.00		46.10		54.10		100.2	
DW-35-SED-0-2	1.40		1.80		4.00		6.20		7.00		13.00		51.00		15.40		66.40		33.40		99.8	
DW-35-SED-2-4	3.50		0.90		1.50		2.90		3.60		6.90		65.60		15.10		80.70		19.30		100.0	
DW-35-SED-4-6	0.30		0.30		1.10		12.00		17.00		8.50		49.00		12.70		61.70		39.20		100.9	
DW-35-SED-6-8	1.20	J	1.30	J	3.50	J	47.00	J	22.80	J	2.80	J	16.00	J	5.50	J	21.50	J	78.60	J	100.1	J
DW-89-SED-0-2	2.90		1.50		3.70		6.90		7.40		11.00		51.00		15.80		66.80		33.40		100.2	
DW-36-SED-0-2	0.40		0.50		4.20		9.40		6.10		7.50		44.80		26.50		71.30		28.10		99.4	
DW-36-SED-2-4	0.30	U	0.20		0.10	U	0.50		1.40		4.90		54.90		38.10		93.00		7.40		100.4	
DW-36-SED-4-6	0.80		0.30		0.30		1.30		8.10		13.00		66.00		10.70		76.70		23.80		100.5	
DW-37-SED-0-2	0.30		0.10		0.10		0.60		3.70		5.90		74.30		15.30		89.60		10.70		100.3	
DW-37-SED-2-4	0.60		0.60		2.70		27.00		27.00		4.60		29.60		7.70		37.30		62.50		99.8	
DW-37-SED-4-6	1.80		1.20		4.50		43.00		28.00		3.20		13.70		4.70		18.40		81.70		100.1	

DATA SUMMARY REPORT

Project: Denny Way

Analyses: TOTAL METALS
Units: mg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	ANTIMONY	ARSENIC	CADMIUM	CHROMIUM	COPPER	LEAD	MERCURY	NICKEL
DW01	DW-01-SED-0	MSED	9/9/97	1.4 U	7.4	0.51	48	60	120	0.074	40
DW02	DW-02-SED-0	MSED	9/12/97	2.5	2.9	0.11	21	14	29	0.221	21
DW03	DW-03-SED-0	MSED	9/12/97	0.99 U	7.7	0.56	29	32	72	0.188	28
DW03	DW-80	MSED	9/12/97	1.4 U	7	0.95	35	57	85	0.303	26
DW03	DW-81	MSED	9/12/97	1.1	8.9	1.1	32	55	100	0.306	30
DW04	DW-04-SED-0	MSED	9/12/97	1.4	3.5	1.1	28	78	110	0.711	23
DW05	DW-05	MSED	9/12/97	9.5	2.7	0.27	6.9	47	83	0.167	18
DW06	DW-06	MSED	9/12/97	2.7	2.6	0.56	27	55	150	0.101	32
DW07	DW-07-SED-0	MSED	9/12/97	12	4	0.8	47	280	220	0.393	36
DW07	DW-82	MSED	9/12/97	1.1 U	17	0.56	54	290	1300	2.37	46
DW07	DW-83	MSED	9/12/97	3.6	2.8	1.1	31	220	140	0.751	25
DW08	DW-08	MSED	9/12/97	2.8	3.7	0.56 U	0.77 U	78	44	0.074	18
DW09	DW-09	MSED	9/12/97	0.69	4.2	0.11	4	15	45	0.123	20
DW09	DW-84	MSED	9/12/97	1.2 U	5	0.67	0.76 U	14	38	0.102	17
DW09	DW-85	MSED	9/12/97	0.87 U	3.9	0.32	0.53 U	17	31	0.084	17
DW10	DW-10-SED-0	MSED	9/12/97	1.6 U	13	0.71	56	64	140	0.571	44
DW11	DW-11-SED-0	MSED	9/9/97	1.6	6.6	0.44	66	44	95	0.28	64
DW12	DW-12-SED-0	MSED	9/9/97	2 U	2.9	0.7	72	50	140	0.37	62
DW13	DW-13-SED-0	MSED	9/9/97	1.4 U	3.8	0.16	24	17	41	0.073	19
DW14	DW-14-SED-0	MSED	9/9/97	1 U	4.5	0.095	25	17	36	0.098	21
DW15	DW-15	MSED	9/12/97	1.4 U	7.9	0.84	38	41	93	0.53	41
DW16	DW-16-SED-0	MSED	9/9/97	1.3 U	5.9	0.26	56	39	82	0.19	53
DW17	DW-17-SED-0	MSED	9/9/97	1.9 U	6.6	0.29	62	42	78	0.2	61
DW18	DW-18-SED-0	MSED	9/9/97	2.7 U	7.7	0.43	57	37	74	0.2	49
DW19	DW-19-SED-0	MSED	9/9/97	1.4 U	4.8	0.16	29	18	44	0.077	21
DW20	DW-20-SED-0	MSED	9/9/97	1.3 U	10	0.35	36	33	76	0.2	32
DW21	DW-21-SED-0	MSED	9/9/97	2.1 U	6.6	0.29	46	52	99	0.35	46
DW22	DW-22-SED-0	MSED	9/9/97	3.5 U	9.4	0.54	66	65	120	0.39	57

DATA SUMMARY REPORT

Project: Denny Way

Analyses: TOTAL METALS
Units: mg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	ANTIMONY	ARSENIC	CADMIUM	CHROMIUM	COPPER	LEAD	MERCURY	NICKEL
DW23	DW-23-SED-0	MSED	9/9/97	2 U	5.2	0.24	27	21	49	0.13	27
DW23	DW-86-SED-0	MSED	9/9/97	2 U	6.4	0.15	33	25	50	0.14	28
DW23	DW-87-SED-0	MSED	9/9/97	2.2 U	5.6	0.26	39	22	57	0.13	31
DW24	DW-24	MSED	9/12/97	1.3 U	7.6	0.23	46	32	67	0.302	46
DW25	DW-25-SED-0-2	MSED	9/11/97	0.79	2	0.33	28	40	110	0.313	33
DW25	DW-25-SED-2-4	MSED	9/11/97	1.3	1.9	0.57	35	81	74	0.312	36
DW25	DW-25-SED-4-8	MSED	9/11/97	1 U	2.2	0.26	30	26	71	0.1	33
DW25	DW-25-SED-8-10.5	MSED	9/11/97	1 U	2.7	0.51 U	46	33	87	0.061	53
DW25	DW-88-SED-4-8	MSED	9/11/97	0.88 U	4.1	0.44 U	30	22	82	0.261	35
DW26	DW-26-SED-0-3	MSED	9/11/97	1.3 U	4.1	0.63 U	17	19	34	0.091	17
DW26	DW-26-SED-11-13	MSED	9/11/97	0.74 U	2.9	0.36 U	17	11	18	0.058	9.4
DW26	DW-26-SED-3-7	MSED	9/11/97	1.3	6	0.54	61	49	120	0.437	65
DW26	DW-26-SED-7-11	MSED	9/11/97	0.71 U	3.2	0.11	19	10	15	0.071	11
DW27	DW-27-SED-0-3	MSED	9/11/97	1.1 U	4.3	0.53 U	14	17	21	0.055	13
DW27	DW-27-SED-11-14	MSED	9/11/97	0.8 U	0.8	0.4 U	19	6	6.5	0.032	17
DW27	DW-27-SED-3-7	MSED	9/11/97	1.3	4.3	0.81	39	40	110	0.636	33
DW27	DW-27-SED-7-11	MSED	9/11/97	0.88 U	2.9	0.44 U	19	12	20	0.027	14
DW28	DW-28-SED-0-2	MSED	9/11/97	1.4 U	7.3	0.7 U	57	38	58	0.044	54
DW28	DW-28-SED-12-14	MSED	9/11/97	0.78 U	1.5	1.9	25	16	8.2	0.065	25
DW28	DW-28-SED-2-4	MSED	9/11/97	1 U	4.5	0.36	45	23	42	0.031	21
DW28	DW-28-SED-4-8	MSED	9/11/97	1.2 U	8.3	0.59 U	15	7.8	17	0.025 U	11
DW28	DW-28-SED-8-12	MSED	9/11/97	0.86 U	1.2	0.38	24	6	8.2	0.024 U	19
DW29	DW-29-SED-0-2	MSED	9/10/97	1.4 U	3.8	0.38	48	30	73	0.397	47
DW29	DW-29-SED-2-4	MSED	9/10/97	1.1	5.6	1.2	51	51	130	0.954	49
DW29	DW-29-SED-4-6	MSED	9/10/97	0.87 U	3.8	0.2	17	15	33	0.108	16
DW30	DW-30	MSED	9/12/97	1	3.2	0.25	13	26	46	0.68	22
DW30	DW-30-SED-0-2	MSED	9/11/97	1 U	3.1	0.13	23	4.1	25	0.087	22
DW30	DW-30-SED-2-4	MSED	9/11/97	0.71 U	2	0.07 U	16	16	29	0.044	19

DATA SUMMARY REPORT

Project: Denny Way

Analyses: TOTAL METALS
Units: mg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	ANTIMONY	ARSENIC	CADMIUM	CHROMIUM	COPPER	LEAD	MERCURY	NICKEL
DW30	DW-30-SED-4-6	MSED	9/11/97	0.82 U	4.5	0.086	37	21	37	0.089	45
DW31	DW-31-SED-0-2	MSED	9/11/97	16	9.2	6.9	120	410	730	0.781	100
DW31	DW-31-SED-2-4	MSED	9/11/97	5.9	5	1.4	66	110	300	0.644	57
DW31	DW-31-SED-4-6	MSED	9/11/97	4.5	6.5	2.3	69	160	300	3.23	69
DW31	DW-31-SED-6-8	MSED	9/11/97	3.4	5.4	1	60	75	180	1.4J	59
DW32	DW-32-SED-0-2	MSED	9/11/97	1.6	3	0.94	34	140	160	0.524	43
DW32	DW-32-SED-2-4	MSED	9/11/97	2.3	1.9	0.42	28	49	120	0.061	32
DW33	DW-33	MSED	9/12/97	1.2	5.1	0.29	24	41	67	0.181	23
DW33	DW-33-SED-0-2	MSED	9/10/97	0.9 U	5.1	0.45 U	36	30	56	0.056	39
DW33	DW-33-SED-2-4	MSED	9/10/97	1.1 U	3.2	0.53 U	53	35	57	0.066	60
DW33	DW-33-SED-4-6	MSED	9/10/97	0.94 U	4.4	0.47 U	61	43	36	0.052	67
DW34	DW-34	MSED	9/12/97	0.86 U	3.9	0.24	10	20	43	0.283	21
DW34	DW-34-SED-0-2	MSED	9/10/97	1.4 U	5.9	0.21	52	31	52	0.09	69
DW34	DW-34-SED-2-4	MSED	9/10/97	1.1 U	7.4	0.11 U	56	27	39	0.06	63
DW34	DW-34-SED-4-6	MSED	9/10/97	0.74 U	4.5	0.074 U	47	26	37	0.066	55
DW35	DW-35	MSED	9/12/97	0.82 U	7.4	0.31	43	34	89	0.373	33
DW35	DW-35-SED-0-2	MSED	9/10/97	1.8 U	6.8	0.36	57	36	110	0.349	61
DW35	DW-35-SED-2-4	MSED	9/10/97	1.2	6.3	0.88	63	66	170	0.676	62
DW35	DW-35-SED-4-6	MSED	9/10/97	1.4	7.2	2.4	35	140	120	0.827	36
DW35	DW-35-SED-6-8	MSED	9/10/97	0.98 U	2.4	0.04	20	9.1	19 U	0.054J	13
DW35	DW-89-SED-0-2	MSED	9/10/97	2.1 U	6.3	0.5	49	33	87	0.548	54
DW36	DW-36-SED-0-2	MSED	9/10/97	2.3 U	5.9	0.38	49	29	66	0.444	63
DW36	DW-36-SED-2-4	MSED	9/10/97	2.3 U	7.4	0.63	73	38	100	0.47	81
DW36	DW-36-SED-4-6	MSED	9/10/97	3.2 U	9.4	0.32 U	57	27	60	0.17	69
DW37	DW-37-SED-0-2	MSED	9/10/97	1 U	8.3	0.66	43	36	92	0.543	43
DW37	DW-37-SED-2-4	MSED	9/10/97	0.72 U	5	0.36	23	17	47	0.428	20
DW37	DW-37-SED-4-6	MSED	9/10/97	0.93 U	3.4	0.093 U	15	3.7	24	0.024 U	15

DATA SUMMARY REPORT

Project: Denny Way

Analyses: TOTAL METALS
Units: mg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	SILVER	ZINC
DW01	DW-01-SED-0	MSED	9/9/97	4.7	120
DW02	DW-02-SED-0	MSED	9/12/97	0.61	47
DW03	DW-03-SED-0	MSED	9/12/97	1.7	110
DW03	DW-80	MSED	9/12/97	7.2	140
DW03	DW-81	MSED	9/12/97	4.3	150
DW04	DW-04-SED-0	MSED	9/12/97	2.9	130
DW05	DW-05	MSED	9/12/97	1.3	79
DW06	DW-06	MSED	9/12/97	1.5	84
DW07	DW-07-SED-0	MSED	9/12/97	2.7	140
DW07	DW-82	MSED	9/12/97	5.1	170
DW07	DW-83	MSED	9/12/97	3.1	160
DW08	DW-08	MSED	9/12/97	0.62	60
DW09	DW-09	MSED	9/12/97	0.95	80
DW09	DW-84	MSED	9/12/97	1.2	75
DW09	DW-85	MSED	9/12/97	0.46	76
DW10	DW-10-SED-0	MSED	9/12/97	4.1	210
DW11	DW-11-SED-0	MSED	9/9/97	2.8	110
DW12	DW-12-SED-0	MSED	9/9/97	2.2	150
DW13	DW-13-SED-0	MSED	9/9/97	0.49	76
DW14	DW-14-SED-0	MSED	9/9/97	0.42	72
DW15	DW-15	MSED	9/12/97	3.1	140
DW16	DW-16-SED-0	MSED	9/9/97	2	97
DW17	DW-17-SED-0	MSED	9/9/97	1.3	110
DW18	DW-18-SED-0	MSED	9/9/97	1.8	110
DW19	DW-19-SED-0	MSED	9/9/97	0.82	79
DW20	DW-20-SED-0	MSED	9/9/97	1.4	96
DW21	DW-21-SED-0	MSED	9/9/97	3.5	120
DW22	DW-22-SED-0	MSED	9/9/97	4.3	170

DATA SUMMARY REPORT

Project: Denny Way

Analyses: TOTAL METALS
Units: mg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	SILVER	ZINC
DW23	DW-23-SED-0	MSED	9/9/97	1	84
DW23	DW-86-SED-0	MSED	9/9/97	1.2	90
DW23	DW-87-SED-0	MSED	9/9/97	1	89
DW24	DW-24	MSED	9/12/97	0.8	110
DW25	DW-25-SED-0-2	MSED	9/11/97	1.9	83
DW25	DW-25-SED-2-4	MSED	9/11/97	1.9	93
DW25	DW-25-SED-4-8	MSED	9/11/97	2	65
DW25	DW-25-SED-8-10.5	MSED	9/11/97	0.61	74
DW25	DW-88-SED-4-8	MSED	9/11/97	0.43	52
DW26	DW-26-SED-0-3	MSED	9/11/97	1.1	54
DW26	DW-26-SED-11-13	MSED	9/11/97	2.4	23
DW26	DW-26-SED-3-7	MSED	9/11/97	12	120
DW26	DW-26-SED-7-11	MSED	9/11/97	1.1	24
DW27	DW-27-SED-0-3	MSED	9/11/97	1.3	54
DW27	DW-27-SED-11-14	MSED	9/11/97	0.13	19
DW27	DW-27-SED-3-7	MSED	9/11/97	1.7	140
DW27	DW-27-SED-7-11	MSED	9/11/97	0.2	25
DW28	DW-28-SED-0-2	MSED	9/11/97	0.63	81
DW28	DW-28-SED-12-14	MSED	9/11/97	0.2	21
DW28	DW-28-SED-2-4	MSED	9/11/97	0.56	58
DW28	DW-28-SED-4-8	MSED	9/11/97	0.14	16
DW28	DW-28-SED-8-12	MSED	9/11/97	0.37	16
DW29	DW-29-SED-0-2	MSED	9/10/97	25	110
DW29	DW-29-SED-2-4	MSED	9/10/97	3.1	170
DW29	DW-29-SED-4-6	MSED	9/10/97	1.6	52
DW30	DW-30	MSED	9/12/97	4.9	72
DW30	DW-30-SED-0-2	MSED	9/11/97	1.8	48
DW30	DW-30-SED-2-4	MSED	9/11/97	0.38	44

DATA SUMMARY REPORT

Project: Denny Way

Analyses: TOTAL METALS
Units: mg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	SILVER	ZINC
DW30	DW-30-SED-4-6	MSED	9/11/97	0.56	72
DW31	DW-31-SED-0-2	MSED	9/11/97	0.98	530
DW31	DW-31-SED-2-4	MSED	9/11/97	12	230
DW31	DW-31-SED-4-6	MSED	9/11/97	11	330
DW31	DW-31-SED-6-8	MSED	9/11/97	5	220
DW32	DW-32-SED-0-2	MSED	9/11/97	4.6	160
DW32	DW-32-SED-2-4	MSED	9/11/97	1.8	73
DW33	DW-33	MSED	9/12/97	1.8	380
DW33	DW-33-SED-0-2	MSED	9/10/97	2.1	70
DW33	DW-33-SED-2-4	MSED	9/10/97	0.31	72
DW33	DW-33-SED-4-6	MSED	9/10/97	0.21	74
DW34	DW-34	MSED	9/12/97	1	81
DW34	DW-34-SED-0-2	MSED	9/10/97	1.2	96
DW34	DW-34-SED-2-4	MSED	9/10/97	2.3	75
DW34	DW-34-SED-4-6	MSED	9/10/97	0.33	68
DW35	DW-35	MSED	9/12/97	1.3	110
DW35	DW-35-SED-0-2	MSED	9/10/97	1.5	120
DW35	DW-35-SED-2-4	MSED	9/10/97	3.6	180
DW35	DW-35-SED-4-6	MSED	9/10/97	51	180
DW35	DW-35-SED-6-8	MSED	9/10/97	0.1 U	27
DW35	DW-89-SED-0-2	MSED	9/10/97	2.8	110
DW36	DW-36-SED-0-2	MSED	9/10/97	2.3	120
DW36	DW-36-SED-2-4	MSED	9/10/97	1.9	130
DW36	DW-36-SED-4-6	MSED	9/10/97	3.2	110
DW37	DW-37-SED-0-2	MSED	9/10/97	1.6	97
DW37	DW-37-SED-2-4	MSED	9/10/97	0.86	59
DW37	DW-37-SED-4-6	MSED	9/10/97	0.32	25

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	NAPHTHALENE	ACENAPH-THYLENE	ANTHRACENE	ACENAPHTHENE	FLUORENE	PHENANTHRENE
DW01	DW-01-SED-0	MSED	9/9/97	27 U	27 U	170	38	50	430
DW02	DW-02-SED-0	MSED	9/12/97	38 UD	38 UD	140 D	38 UD	38 UD	280 D
DW03	DW-03-SED-0	MSED	9/12/97	63 UD	63 UD	150 D	63 UD	63 UD	430 D
DW03	DW-80	MSED	9/12/97	120 UD	120 UD	3000 D	130 D	390 D	2100 D
DW03	DW-81	MSED	9/12/97	66 UD	66 UD	640 D	95 D	150 D	900 D
DW04	DW-04-SED-0	MSED	9/12/97	79 UD	79 UD	330 D	120 D	170 D	1500 D
DW05	DW-05	MSED	9/12/97	68 UD	68 UD	420 D	110 D	160 D	1700 D
DW06	DW-06	MSED	9/12/97	70 UD	70 UD	70 UD	70 UD	70 UD	72 D
DW07	DW-07-SED-0	MSED	9/12/97	75 UD	75 UD	180 D	120 D	90 D	1000 D
DW07	DW-82	MSED	9/12/97	74 UD	74 UD	210 D	74 UD	74 UD	800 D
DW07	DW-83	MSED	9/12/97	74 UD	74 UD	490 D	74 UD	99 D	900 D
DW08	DW-08	MSED	9/12/97	75 UD	75 UD	75 UD	75 UD	75 UD	140 D
DW09	DW-09	MSED	9/12/97	75 UD	75 UD	230 D	75 UD	75 UD	330 D
DW09	DW-84	MSED	9/12/97	75 UD	75 UD	320 D	75 UD	75 UD	460 D
DW09	DW-85	MSED	9/12/97	76 UD	76 UD	350 D	76 UD	76 UD	460 D
DW10	DW-10-SED-0	MSED	9/12/97	170 UD	170 UD	1800 D	170 UD	230 D	1300 D
DW11	DW-11-SED-0	MSED	9/9/97	22 U	22 U	34	22 U	22 U	100
DW12	DW-12-SED-0	MSED	9/9/97	24 U	24 U	56	24 U	24 U	170
DW13	DW-13-SED-0	MSED	9/9/97	22 U	22 U	50	22 U	22 U	200
DW14	DW-14-SED-0	MSED	9/9/97	21 U	21 U	42	21 U	21 U	110
DW15	DW-15	MSED	9/12/97	70 UD	70 UD	110 D	70 UD	70 UD	290 D
DW16	DW-16-SED-0	MSED	9/9/97	23 U	23 U	33	23 U	23 U	110
DW17	DW-17-SED-0	MSED	9/9/97	26 U	26 U	44	26 U	26 U	130
DW18	DW-18-SED-0	MSED	9/9/97	43 U	43 U	43 U	43 U	43 U	98
DW19	DW-19-SED-0	MSED	9/9/97	22 U	22 U	31	22 U	22 U	89
DW20	DW-20-SED-0	MSED	9/9/97	21 U	21 U	43	21 U	21 U	130
DW21	DW-21-SED-0	MSED	9/9/97	29 U	29 U	120	57	69	540
DW22	DW-22-SED-0	MSED	9/9/97	37 U	37 U	62	37 U	37 U	180

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	NAPHTHALENE	ACENAPH-THYLENE	ANTHRACENE	ACENAPHTHENE	FLUORENE	PHENANTHRENE
DW23	DW-23-SED-0	MSED	9/9/97	29 U	29 U	41	29 U	29 U	100
DW23	DW-86-SED-0	MSED	9/9/97	29 U	29 U	33	29 U	29 U	88
DW23	DW-87-SED-0	MSED	9/9/97	28 U	28 U	32	28 U	28 U	94
DW24	DW-24	MSED	9/12/97	100 UD	100 UD	100 UD	100 UD	100 UD	140 D
DW25	DW-25-SED-0-2	MSED	9/11/97	64 UD	64 UD	64 UD	64 UD	64 UD	95 D
DW25	DW-25-SED-2-4	MSED	9/11/97	67 UD	67 UD	82 D	67 UD	67 UD	210 D
DW25	DW-25-SED-4-8	MSED	9/11/97	66 UD	66 UD	630 D	230 D	150 D	1300 D
DW25	DW-25-SED-8-10.5	MSED	9/11/97	39	17 U	29	17 U	26	400
DW25	DW-88-SED-4-8	MSED	9/11/97	67 U	67 U	480	230	67 U	190
DW26	DW-26-SED-0-3	MSED	9/11/97	98	18 U	25	21	18	100
DW26	DW-26-SED-11-13	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	30
DW26	DW-26-SED-3-7	MSED	9/11/97	4500 D	98 UD	410 D	880 D	840 D	2300 D
DW26	DW-26-SED-7-11	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	17 U
DW27	DW-27-SED-0-3	MSED	9/11/97	18 U	18 U	18 U	18 U	18 U	52
DW27	DW-27-SED-11-14	MSED	9/11/97	16 U	16 U	16 U	16 U	16 U	16 U
DW27	DW-27-SED-3-7	MSED	9/11/97	56	25	120	51	61	390
DW27	DW-27-SED-7-11	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	17 U
DW28	DW-28-SED-0-2	MSED	9/11/97	20 U	20 U	23	20 U	20 U	81
DW28	DW-28-SED-12-14	MSED	9/11/97	18 U	18 U	18 U	18 U	18 U	18 U
DW28	DW-28-SED-2-4	MSED	9/11/97	22	18 U	34	18 U	18 U	90
DW28	DW-28-SED-4-8	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	17 U
DW28	DW-28-SED-8-12	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	17 U
DW29	DW-29-SED-0-2	MSED	9/10/97	29 U	29 U	54	29 U	29 U	130
DW29	DW-29-SED-2-4	MSED	9/10/97	52	27	130	55	67	390
DW29	DW-29-SED-4-6	MSED	9/10/97	21	28	52	19 U	19 U	130
DW30	DW-30	MSED	9/12/97	72 UD	72 UD	140 D	72 UD	72 UD	410 D
DW30	DW-30-SED-0-2	MSED	9/11/97	18 U	18 U	42	31	24	130
DW30	DW-30-SED-2-4	MSED	9/11/97	16 U	16 U	90	16 U	19	97

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	NAPHTHALENE	ACENAPH-THYLENE	ANTHRACENE	ACENAPHTHENE	FLUORENE	PHENANTHRENE
DW30	DW-30-SED-4-6	MSED	9/11/97	20 U	20 U	20 U	20 U	20 U	70
DW31	DW-31-SED-0-2	MSED	9/11/97	130	82 U	3200	1300	1100	3900
DW31	DW-31-SED-2-4	MSED	9/11/97	700	80 U	870	770	660	2200
DW31	DW-31-SED-4-6	MSED	9/11/97	2500 D	180 UD	240 D	260 D	440 D	1600 D
DW31	DW-31-SED-6-8	MSED	9/11/97	980 D	58 UD	160 D	82 D	160 D	700 D
DW32	DW-32-SED-0-2	MSED	9/11/97	500 D	72 UD	390 D	370 D	380 D	2000 D
DW32	DW-32-SED-2-4	MSED	9/11/97	980 D	67 UD	220 D	380 D	330 D	1200 D
DW33	DW-33	MSED	9/12/97	81 UD	81 UD	240 D	81 UD	81 UD	640 D
DW33	DW-33-SED-0-2	MSED	9/10/97	21 U	21 U	21 U	22	21 U	80
DW33	DW-33-SED-2-4	MSED	9/10/97	19 U	19 U	19 U	19 U	19 U	27
DW33	DW-33-SED-4-6	MSED	9/10/97	18 U	18 U	18 U	18 U	18 U	22
DW34	DW-34	MSED	9/12/97	76 UD	76 UD	240 D	76 UD	76 UD	640 D
DW34	DW-34-SED-0-2	MSED	9/10/97	23 U	23 U	27	23 U	23 U	82
DW34	DW-34-SED-2-4	MSED	9/10/97	17 U	17 U	17 U	17 U	17 U	23
DW34	DW-34-SED-4-6	MSED	9/10/97	17 U	17 U	17 U	17 U	17 U	57
DW35	DW-35	MSED	9/12/97	110 UD	110 UD	110 UD	110 UD	110 UD	330 D
DW35	DW-35-SED-0-2	MSED	9/10/97	27 U	27 U	50	27 U	31	240
DW35	DW-35-SED-2-4	MSED	9/10/97	69 UD	69 UD	76 D	81 D	69 UD	230 D
DW35	DW-35-SED-4-6	MSED	9/10/97	62 UD	62 UD	87 D	62 UD	62 UD	290 D
DW35	DW-35-SED-6-8	MSED	9/10/97	17 U	17 U	17 U	17 U	17 U	17 U
DW35	DW-89-SED-0-2	MSED	9/10/97	60	30 U	120	84	74	590
DW36	DW-36-SED-0-2	MSED	9/10/97	32 U	32 U	32 U	32 U	32 U	34
DW36	DW-36-SED-2-4	MSED	9/10/97	33 U	33 U	33 U	33 U	33 U	33 U
DW36	DW-36-SED-4-6	MSED	9/10/97	44 U	44 U	44 U	44 U	44 U	44 U
DW37	DW-37-SED-0-2	MSED	9/10/97	63 UD	63 UD	63 UD	63 UD	63 UD	200 D
DW37	DW-37-SED-2-4	MSED	9/10/97	19 U	19 U	28	19 U	19 U	72
DW37	DW-37-SED-4-6	MSED	9/10/97	18 U	18 U	18 U	18 U	18 U	18 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	2-METHYL-NAPHTHALENE	FLUORANTHENE	PYRENE	BENZO(A)-ANTHRACENE	CHRYSENE	BENZO(B)-FLUORANTHENE
DW01	DW-01-SED-0	MSED	9/9/97	27 U	650	840	380	650	590
DW02	DW-02-SED-0	MSED	9/12/97	38 UD	530 D	440 D	230 D	390 D	260 D
DW03	DW-03-SED-0	MSED	9/12/97	63 UD	920 D	840 D	400 D	630 D	530 D
DW03	DW-80	MSED	9/12/97	120 UD	5500 D	3800 D	2900 D	4900 D	3300 D
DW03	DW-81	MSED	9/12/97	66 UD	2400 D	1900 D	1000 D	1700 D	1300 D
DW04	DW-04-SED-0	MSED	9/12/97	79 UD	2700 D	2500 D	1000 D	1400 D	1100 D
DW05	DW-05	MSED	9/12/97	68 UD	2100 D	1300 D	670 D	690 D	480 D
DW06	DW-06	MSED	9/12/97	70 UD	150 D	97 D	70 UD	70 UD	70 UD
DW07	DW-07-SED-0	MSED	9/12/97	75 UD	2400 D	1700 D	660 D	880 D	610 D
DW07	DW-82	MSED	9/12/97	74 UD	1700 D	1200 D	600 D	840 D	650 D
DW07	DW-83	MSED	9/12/97	74 UD	2600 D	1900 D	950 D	1200 D	860 D
DW08	DW-08	MSED	9/12/97	75 UD	440 D	300 D	140 D	250 D	140 D
DW09	DW-09	MSED	9/12/97	75 UD	920 D	780 D	420 D	910 D	670 D
DW09	DW-84	MSED	9/12/97	75 UD	1400 D	1100 D	570 D	1000 D	830 D
DW09	DW-85	MSED	9/12/97	76 UD	1300 D	1100 D	640 D	1200 D	880 D
DW10	DW-10-SED-0	MSED	9/12/97	170 UD	4300 D	3700 D	2500 D	5100 D	3200 D
DW11	DW-11-SED-0	MSED	9/9/97	22 U	160	220	91	150	130
DW12	DW-12-SED-0	MSED	9/9/97	24 U	310	380	150	220	170
DW13	DW-13-SED-0	MSED	9/9/97	22 U	390	300	170	250	200
DW14	DW-14-SED-0	MSED	9/9/97	21 U	210	170	110	170	140
DW15	DW-15	MSED	9/12/97	70 UD	480 D	550 D	260 D	420 D	340 D
DW16	DW-16-SED-0	MSED	9/9/97	23 U	150	230	110	190	130
DW17	DW-17-SED-0	MSED	9/9/97	26 U	230	180	110	170	130
DW18	DW-18-SED-0	MSED	9/9/97	43 U	160	180	110	160	100
DW19	DW-19-SED-0	MSED	9/9/97	22 U	130	160	96	200	120
DW20	DW-20-SED-0	MSED	9/9/97	21 U	180	370	110	180	170
DW21	DW-21-SED-0	MSED	9/9/97	29 U	580	590	220	310	230
DW22	DW-22-SED-0	MSED	9/9/97	37 U	340	300	180	280	210

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	2-METHYL-NAPHTHALENE	FLUORANTHENE	PYRENE	BENZO(A)-ANTHRACENE	CHRYSENE	BENZO(B)-FLUORANTHENE
DW23	DW-23-SED-0	MSED	9/9/97	29 U	210	170	110	170	120
DW23	DW-86-SED-0	MSED	9/9/97	29 U	200	160	92	140	120
DW23	DW-87-SED-0	MSED	9/9/97	28 U	190	160	96	140	120
DW24	DW-24	MSED	9/12/97	100 UD	210 D	250 D	130 D	190 D	150 D
DW25	DW-25-SED-0-2	MSED	9/11/97	64 UD			76 D	100 D	80 D
DW25	DW-25-SED-2-4	MSED	9/11/97	67 UD	990 D	860 D	240 D	290 D	170 D
DW25	DW-25-SED-4-8	MSED	9/11/97	66 UD	1800 D	1500 D	600 D	810 D	360 D
DW25	DW-25-SED-8-10.5	MSED	9/11/97	22	450	380	100	210	130
DW25	DW-88-SED-4-8	MSED	9/11/97	67 U	1200	930	340	460	140
DW26	DW-26-SED-0-3	MSED	9/11/97	18 U	170	210	77	100	94
DW26	DW-26-SED-11-13	MSED	9/11/97	17 U	43	62	20	23	17 U
DW26	DW-26-SED-3-7	MSED	9/11/97	1800 D	1400 D	1100 D	280 D	370 D	180 D
DW26	DW-26-SED-7-11	MSED	9/11/97	17 U	27	41	17 U	18	17 U
DW27	DW-27-SED-0-3	MSED	9/11/97	18 U	81	80	35	53	42
DW27	DW-27-SED-11-14	MSED	9/11/97	16 U	16 U	16 U	16 U	16 U	16 U
DW27	DW-27-SED-3-7	MSED	9/11/97	40	550	790	200	300	210
DW27	DW-27-SED-7-11	MSED	9/11/97	17 U	29	36	17 U	17 U	17 U
DW28	DW-28-SED-0-2	MSED	9/11/97	20 U	120	160	60	87	78
DW28	DW-28-SED-12-14	MSED	9/11/97	18 U	18 U	18 U	18 U	18 U	18 U
DW28	DW-28-SED-2-4	MSED	9/11/97	18 U	130	210	58	70	65
DW28	DW-28-SED-4-8	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	17 U
DW28	DW-28-SED-8-12	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	17 U
DW29	DW-29-SED-0-2	MSED	9/10/97	29 U	220	390	110	170	160
DW29	DW-29-SED-2-4	MSED	9/10/97	40	510	850	230	300	240
DW29	DW-29-SED-4-6	MSED	9/10/97	19 U	190	330	97	120	100
DW30	DW-30	MSED	9/12/97	72 UD	690 D	670 D	290 D	470 D	330 D
DW30	DW-30-SED-0-2	MSED	9/11/97	18 U	210	310	70	110	110
DW30	DW-30-SED-2-4	MSED	9/11/97	16 U	710	800	310	290	180

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	2-METHYL-NAPHTHALENE	FLUORANTHENE	PYRENE	BENZO(A)-ANTHRACENE	CHRYSENE	BENZO(B)-FLUORANTHENE
DW30	DW-30-SED-4-6	MSED	9/11/97	20 U	85	85	33	41	27
DW31	DW-31-SED-0-2	MSED	9/11/97	160	16000	11000	3600	5600	3200
DW31	DW-31-SED-2-4	MSED	9/11/97	1200	3700	2700	770	870	470
DW31	DW-31-SED-4-6	MSED	9/11/97	3100 D	1400 D	780 D	230 D	270 D	180 UD
DW31	DW-31-SED-6-8	MSED	9/11/97	1100 D	850 D	910 D	370 D	460 D	300 D
DW32	DW-32-SED-0-2	MSED	9/11/97	260 D	2100 D	1600 D	710 D	860 D	620 D
DW32	DW-32-SED-2-4	MSED	9/11/97	330 D	750 D	810 D	250 D	300 D	180 D
DW33	DW-33	MSED	9/12/97	81 UD	2200 D	1100 D	640 D	1300 D	750 D
DW33	DW-33-SED-0-2	MSED	9/10/97	25	98	160	43	68	61
DW33	DW-33-SED-2-4	MSED	9/10/97	19 U	35	50	21	24	19 U
DW33	DW-33-SED-4-6	MSED	9/10/97	18 U	24	23	18 U	18 U	18 U
DW34	DW-34	MSED	9/12/97	76 UD	1300 D	1200 D	610 D	1300 D	870 D
DW34	DW-34-SED-0-2	MSED	9/10/97	23 U	110	120	60	130	65
DW34	DW-34-SED-2-4	MSED	9/10/97	17 U	21	27	17 U	17 U	17 U
DW34	DW-34-SED-4-6	MSED	9/10/97	17 U	49	66	23	28	18
DW35	DW-35	MSED	9/12/97	110 UD	490 D	570 D	260 D	430 D	380 D
DW35	DW-35-SED-0-2	MSED	9/10/97	27 U	270	290	110	140	99
DW35	DW-35-SED-2-4	MSED	9/10/97	69 UD	400 D	450 D	200 D	260 D	160 D
DW35	DW-35-SED-4-6	MSED	9/10/97	62 UD	440 D	640 D	190 D	280 D	200 D
DW35	DW-35-SED-6-8	MSED	9/10/97	17 U	17 U	21	17 U	17 U	17 U
DW35	DW-89-SED-0-2	MSED	9/10/97	35	560	580	230	280	190
DW36	DW-36-SED-0-2	MSED	9/10/97	32 U	48	64	32 U	35	32 U
DW36	DW-36-SED-2-4	MSED	9/10/97	33 U	37	51	33 U	33 U	33 U
DW36	DW-36-SED-4-6	MSED	9/10/97	44 U	44 U	52	44 U	44 U	44 U
DW37	DW-37-SED-0-2	MSED	9/10/97	63 UD	330 D	400 D	140 D	190 D	150 D
DW37	DW-37-SED-2-4	MSED	9/10/97	19 U	110	190	52	74	66
DW37	DW-37-SED-4-6	MSED	9/10/97	18 U	18 U	18 U	18 U	18 U	18 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	BENZO(K)-FLUORANTHENE	BENZO(A)-PYRENE	INDENO(1,2,3-CD)-PYRENE	DIBENZ(A,H)-ANTHRACENE	BENZO(G,H,I)-PERYLENE
DW01	DW-01-SED-0	MSED	9/9/97	390	490	240	52	200
DW02	DW-02-SED-0	MSED	9/12/97	180 D	230 D	110 D	38 UD	99 D
DW03	DW-03-SED-0	MSED	9/12/97	410 D	480 D	260 D	63 UD	250 D
DW03	DW-80	MSED	9/12/97	1900 D	2400 D	890 D	220 D	760 D
DW03	DW-81	MSED	9/12/97	880 D	1000 D	490 D	130 D	420 D
DW04	DW-04-SED-0	MSED	9/12/97	840 D	1000 D	500 D	95 D	420 D
DW05	DW-05	MSED	9/12/97	390 D	430 D	230 D	68 UD	200 D
DW06	DW-06	MSED	9/12/97	70 UD	70 UD	70 UD	70 UD	70 UD
DW07	DW-07-SED-0	MSED	9/12/97	560 D	620 D	410 D	88 D	390 D
DW07	DW-82	MSED	9/12/97	470 D	610 D	410 D	97 D	410 D
DW07	DW-83	MSED	9/12/97	700 D	780 D	470 D	98 D	430 D
DW08	DW-08	MSED	9/12/97	92 D	120 D	75 UD	75 UD	75 UD
DW09	DW-09	MSED	9/12/97	420 D	470 D	150 D	75 UD	110 D
DW09	DW-84	MSED	9/12/97	570 D	590 D	180 D	75 UD	140 D
DW09	DW-85	MSED	9/12/97	550 D	660 D	250 D	76 UD	210 D
DW10	DW-10-SED-0	MSED	9/12/97	2100 D	2700 D	1100 D	330 D	960 D
DW11	DW-11-SED-0	MSED	9/9/97	100	120	58	22 U	53
DW12	DW-12-SED-0	MSED	9/9/97	130	170	94	29	90
DW13	DW-13-SED-0	MSED	9/9/97	150	170	85	24	77
DW14	DW-14-SED-0	MSED	9/9/97	98	120	56	21 U	54
DW15	DW-15	MSED	9/12/97	320 D	340 D	170 D	70 UD	170 D
DW16	DW-16-SED-0	MSED	9/9/97	93	130	80	23 U	75
DW17	DW-17-SED-0	MSED	9/9/97	110	120	63	26 U	59
DW18	DW-18-SED-0	MSED	9/9/97	95	120	75	43 U	79
DW19	DW-19-SED-0	MSED	9/9/97	93	120	71	22 U	63
DW20	DW-20-SED-0	MSED	9/9/97	110	140	75	21 U	74
DW21	DW-21-SED-0	MSED	9/9/97	180	260	130	29 U	130
DW22	DW-22-SED-0	MSED	9/9/97	170	200	110	37 U	110

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	BENZO(K)-FLUORANTHENE	BENZO(A)-PYRENE	INDENO(1,2,3-CD)-PYRENE	DIBENZ(A,H)-ANTHRACENE	BENZO(G,H,I)-PERYLENE
DW23	DW-23-SED-0	MSED	9/9/97	100	120	60	29 U	53
DW23	DW-86-SED-0	MSED	9/9/97	83	100	63	29 U	57
DW23	DW-87-SED-0	MSED	9/9/97	93	110	61	28 U	55
DW24	DW-24	MSED	9/12/97	110 D	140 D	100 UD	100 UD	100 UD
DW25	DW-25-SED-0-2	MSED	9/11/97	64 UD	80 D	64 UD	64 UD	64 UD
DW25	DW-25-SED-2-4	MSED	9/11/97	150 D	210 D	100 D	67 UD	120 D
DW25	DW-25-SED-4-8	MSED	9/11/97	410 D	520 D	270 D	67 D	270 D
DW25	DW-25-SED-8-10.5	MSED	9/11/97	130	130	81	17 U	82
DW25	DW-88-SED-4-8	MSED	9/11/97	120	120	67 U	67 U	67 U
DW26	DW-26-SED-0-3	MSED	9/11/97	75	91	45	18 U	44
DW26	DW-26-SED-11-13	MSED	9/11/97	17 U	20	17 U	17 U	17 U
DW26	DW-26-SED-3-7	MSED	9/11/97	120 D	150 D	100 D	98 UD	110 D
DW26	DW-26-SED-7-11	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U
DW27	DW-27-SED-0-3	MSED	9/11/97	31	39	25	18 U	24
DW27	DW-27-SED-11-14	MSED	9/11/97	16 U	16 U	16 U	16 U	16 U
DW27	DW-27-SED-3-7	MSED	9/11/97	170	220	120	22	120
DW27	DW-27-SED-7-11	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U
DW28	DW-28-SED-0-2	MSED	9/11/97	56	80	48	20 U	50
DW28	DW-28-SED-12-14	MSED	9/11/97	18 U	18 U	18 U	18 U	18 U
DW28	DW-28-SED-2-4	MSED	9/11/97	60	80	47	18 U	54
DW28	DW-28-SED-4-8	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U
DW28	DW-28-SED-8-12	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U
DW29	DW-29-SED-0-2	MSED	9/10/97	110	150	69	29 U	66
DW29	DW-29-SED-2-4	MSED	9/10/97	170	230	89	24 U	85
DW29	DW-29-SED-4-6	MSED	9/10/97	97	130	48	19 U	44
DW30	DW-30	MSED	9/12/97	300 D	300 D	140 D	72 UD	130 D
DW30	DW-30-SED-0-2	MSED	9/11/97	80	91	30	18 U	27
DW30	DW-30-SED-2-4	MSED	9/11/97	150	150	33	16 U	28

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	BENZO(K)-FLUORANTHENE	BENZO(A)-PYRENE	INDENO(1,2,3-CD)-PYRENE	DIBENZ(A,H)-ANTHRACENE	BENZO(G,H,I)-PERYLENE
DW30	DW-30-SED-4-6	MSED	9/11/97	28	34	20 U	20 U	20 U
DW31	DW-31-SED-0-2	MSED	9/11/97	1700	2400	1000	190	910
DW31	DW-31-SED-2-4	MSED	9/11/97	400	390	170	80 U	180
DW31	DW-31-SED-4-6	MSED	9/11/97	180 UD	180 UD	180 UD	180 UD	180 UD
DW31	DW-31-SED-6-8	MSED	9/11/97	310 D	370 D	210 D	58 UD	210 D
DW32	DW-32-SED-0-2	MSED	9/11/97	530 D	780 D	480 D	72 UD	450 D
DW32	DW-32-SED-2-4	MSED	9/11/97	190 D	280 D	160 D	67 UD	170 D
DW33	DW-33	MSED	9/12/97	490 D	560 D	340 D	81 UD	310 D
DW33	DW-33-SED-0-2	MSED	9/10/97	47	59	36	21 U	39
DW33	DW-33-SED-2-4	MSED	9/10/97	19 U	24	19 U	19 U	19 U
DW33	DW-33-SED-4-6	MSED	9/10/97	18 U	18 U	18 U	18 U	18 U
DW34	DW-34	MSED	9/12/97	730 D	730 D	300 D	76 UD	250 D
DW34	DW-34-SED-0-2	MSED	9/10/97	58	71	38	23 U	36
DW34	DW-34-SED-2-4	MSED	9/10/97	17 U	17 U	17 U	17 U	17 U
DW34	DW-34-SED-4-6	MSED	9/10/97	18	24	17 U	17 U	18
DW35	DW-35	MSED	9/12/97	280 D	340 D	170 D	110 UD	170 D
DW35	DW-35-SED-0-2	MSED	9/10/97	98	120	63	27 U	68
DW35	DW-35-SED-2-4	MSED	9/10/97	120 D	160 D	83 D	69 UD	97 D
DW35	DW-35-SED-4-6	MSED	9/10/97	170 D	250 D	140 D	62 UD	150 D
DW35	DW-35-SED-6-8	MSED	9/10/97	17 U	17 U	17 U	17 U	17 U
DW35	DW-89-SED-0-2	MSED	9/10/97	180	240	110	30 U	100
DW36	DW-36-SED-0-2	MSED	9/10/97	32 U	33	32 U	32 U	32 U
DW36	DW-36-SED-2-4	MSED	9/10/97	33 U	33 U	33 U	33 U	33 U
DW36	DW-36-SED-4-6	MSED	9/10/97	44 U	44 U	44 U	44 U	44 U
DW37	DW-37-SED-0-2	MSED	9/10/97	120 D	160 D	96 D	63 UD	97 D
DW37	DW-37-SED-2-4	MSED	9/10/97	54	71	37	19 U	37
DW37	DW-37-SED-4-6	MSED	9/10/97	18 U	18 U	18 U	18 U	18 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	1,2,4-TRICHLORO-BENZENE	1,2-DICHLORO-BENZENE	1,3-DICHLORO-BENZENE	1,4-DICHLORO-BENZENE	HEXACHLORO-BENZENE	DIMETHYL-PHTHALATE
DW01	DW-01-SED-0	MSED	9/9/97	8 U	8 U	16 U	16 U	2.7 UD	27 U
DW02	DW-02-SED-0	MSED	9/12/97	11 UD	11 UD	23 UD	23 UD	3.6 UD	38 UD
DW03	DW-03-SED-0	MSED	9/12/97	19 UD	19 UD	38 UD	38 UD	4.3 UD	63 UD
DW03	DW-80	MSED	9/12/97	4.5 UD	35 UD	70 UD	70 UD	4.5 UD	120 UD
DW03	DW-81	MSED	9/12/97	20 UD	20 UD	40 UD	40 UD	4.4 UD	66 UD
DW04	DW-04-SED-0	MSED	9/12/97	4 UD	24 UD	48 UD	48 UD	4 UD	79 UD
DW05	DW-05	MSED	9/12/97	20 UD	3 UJN	3 UJN	3 UJN	41 UD	68 UD
DW06	DW-06	MSED	9/12/97	21 UD	3 UJN	3 UJN	3 UJN	42 UD	70 UD
DW07	DW-07-SED-0	MSED	9/12/97	23 UD	3 UJN	3 UJN	12 JN	45 UD	75 UD
DW07	DW-82	MSED	9/12/97	22 UD	3 UJN	3 UJN	3 UJN	44 UD	74 UD
DW07	DW-83	MSED	9/12/97	22 UD	3 UJN	3 UJN	3 UJN	44 UD	74 UD
DW08	DW-08	MSED	9/12/97	22 UD	3 UJN	3 UJN	3 UJN	45 UD	75 UD
DW09	DW-09	MSED	9/12/97	3.6 UD	22 UD	45 UD	45 UD	3.6 UD	75 UD
DW09	DW-84	MSED	9/12/97	22 UD	22 UD	45 UD	45 UD	3.6 UD	75 UD
DW09	DW-85	MSED	9/12/97	23 UD	23 UD	45 UD	45 UD	1.9 UD	76 UD
DW10	DW-10-SED-0	MSED	9/12/97	6.8 UD	51 UD	100 UD	100 UD	6.8 UD	170 UD
DW11	DW-11-SED-0	MSED	9/9/97	7 U	7 U	13 U	13 U	2.2 UD	22 U
DW12	DW-12-SED-0	MSED	9/9/97	7 U	7 U	14 U	14 U	2.3 UD	24 U
DW13	DW-13-SED-0	MSED	9/9/97	7 U	7 U	13 U	13 U	2.2 UD	22 U
DW14	DW-14-SED-0	MSED	9/9/97	6 U	6 U	13 U	13 U	2.1 UD	21 U
DW15	DW-15	MSED	9/12/97	4.7 UD	21 UD	42 UD	42 UD	4.7 UD	70 UD
DW16	DW-16-SED-0	MSED	9/9/97	7 U	7 U	14 U	14 U	2.3 UD	23 U
DW17	DW-17-SED-0	MSED	9/9/97	8 U	8 U	15 U	15 U	2.6 UD	26 U
DW18	DW-18-SED-0	MSED	9/9/97	13 U	13 U	26 U	26 U	4.3 UD	43 U
DW19	DW-19-SED-0	MSED	9/9/97	7 U	7 U	13 U	13 U	2.2 UD	22 U
DW20	DW-20-SED-0	MSED	9/9/97	6 U	6 U	13 U	13 U	2.1 UD	21 U
DW21	DW-21-SED-0	MSED	9/9/97	9 U	9 U	18 U	18 U	2.9 UD	29 U
DW22	DW-22-SED-0	MSED	9/9/97	11 U	11 U	22 U	22 U	3.7 UD	37 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	1,2,4-TRICHLORO-BENZENE	1,2-DICHLORO-BENZENE	1,3-DICHLORO-BENZENE	1,4-DICHLORO-BENZENE	HEXACHLORO-BENZENE	DIMETHYL-PHTHALATE
DW23	DW-23-SED-0	MSED	9/9/97	9 U	9 U	17 U	17 U	2.8 UD	29 U
DW23	DW-86-SED-0	MSED	9/9/97	9 U	9 U	17 U	17 U	2.9 UD	29 U
DW23	DW-87-SED-0	MSED	9/9/97	8 U	8 U	17 U	17 U	2.8 UD	28 U
DW24	DW-24	MSED	9/12/97	5.1 UD	31 UD	61 UD	61 UD	5.1 UD	100 UD
DW25	DW-25-SED-0-2	MSED	9/11/97	19 UD	3 U	3 U	3 U	38 UD	64 UD
DW25	DW-25-SED-2-4	MSED	9/11/97	20 UD	3 U	3 U	3 U	40 UD	67 UD
DW25	DW-25-SED-4-8	MSED	9/11/97	20 UD	3 U	3 U	3 U	40 UD	66 UD
DW25	DW-25-SED-8-10.5	MSED	9/11/97	5 U	3 U	3 U	3 U	10 U	17 U
DW25	DW-88-SED-4-8	MSED	9/11/97	20 U	3 U	3 U	3 U	40 U	67 U
DW26	DW-26-SED-0-3	MSED	9/11/97	5 U	3 U	3 U	3 U	11 U	18 U
DW26	DW-26-SED-11-13	MSED	9/11/97	5 U	3 U	3 U	3 U	10 U	17 U
DW26	DW-26-SED-3-7	MSED	9/11/97	29 UD	3 U	3 U	3 U	59 UD	98 UD
DW26	DW-26-SED-7-11	MSED	9/11/97	5 U	3 U	3 U	3 U	10 U	17 U
DW27	DW-27-SED-0-3	MSED	9/11/97	6 U	3 U	3 U	3 U	11 U	18 U
DW27	DW-27-SED-11-14	MSED	9/11/97	5 U	3 U	3 U	3 U	10 U	16 U
DW27	DW-27-SED-3-7	MSED	9/11/97	6 U	3 U	3 U	3 U	12 U	20 U
DW27	DW-27-SED-7-11	MSED	9/11/97	5 U	3 U	3 U	3 U	10 U	17 U
DW28	DW-28-SED-0-2	MSED	9/11/97	6 U	3 U	3 U	3 U	12 U	20 U
DW28	DW-28-SED-12-14	MSED	9/11/97	5 U	3 U	3 U	3 U	11 U	18 U
DW28	DW-28-SED-2-4	MSED	9/11/97	6 U	3 U	3 U	3 U	11 U	18 U
DW28	DW-28-SED-4-8	MSED	9/11/97	5 U	3 U	3 U	3 U	10 U	17 U
DW28	DW-28-SED-8-12	MSED	9/11/97	5 U	3 U	3 U	3 U	10 U	17 U
DW29	DW-29-SED-0-2	MSED	9/10/97	9 U	9 U	17 U	17 U	5.8 UD	29 U
DW29	DW-29-SED-2-4	MSED	9/10/97	7 U	7 U	14 U	14 U	4.8 UD	24 U
DW29	DW-29-SED-4-6	MSED	9/10/97	6 U	6 U	11 U	11 U	3.9 UD	19 U
DW30	DW-30	MSED	9/12/97	3.6 UD	22 UD	43 UD	43 UD	3.6 UD	72 UD
DW30	DW-30-SED-0-2	MSED	9/11/97	5 U	5 U	11 U	11 U	3.6 UD	18 U
DW30	DW-30-SED-2-4	MSED	9/11/97	5 U	5 U	10 U	10 U	3.3 UD	16 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	1,2,4-TRICHLORO-BENZENE	1,2-DICHLORO-BENZENE	1,3-DICHLORO-BENZENE	1,4-DICHLORO-BENZENE	HEXACHLORO-BENZENE	DIMETHYL-PHTHALATE
DW30	DW-30-SED-4-6	MSED	9/11/97	6 U	6 U	12 U	12 U	4 UD	20 U
DW31	DW-31-SED-0-2	MSED	9/11/97	25 U	4 U	4 U	53 JH	49 U	470
DW31	DW-31-SED-2-4	MSED	9/11/97	24 U	3 U	3 U	46 JH	48 U	80 U
DW31	DW-31-SED-4-6	MSED	9/11/97	53 UD	4 U	4 U	65 JH	110 UD	180 UD
DW31	DW-31-SED-6-8	MSED	9/11/97	2.9 UD	17 UD	35 UD	64 D	2.9 UD	58 UD
DW32	DW-32-SED-0-2	MSED	9/11/97	22 UD	3 U	3 U	6 JH	43 UD	72 UD
DW32	DW-32-SED-2-4	MSED	9/11/97	20 UD	3 U	3 U	3 U	40 UD	67 UD
DW33	DW-33	MSED	9/12/97	24 UD	4 U	4 U	4 U	48 UD	81 UD
DW33	DW-33-SED-0-2	MSED	9/10/97	6 U	3 U	3 U	3 U	12 U	21 U
DW33	DW-33-SED-2-4	MSED	9/10/97	6 U	3 U	3 U	3 U	11 U	19 U
DW33	DW-33-SED-4-6	MSED	9/10/97	5 U	3 U	3 U	3 U	11 U	18 U
DW34	DW-34	MSED	9/12/97	3.7 UD	23 UD	46 UD	46 UD	3.7 UD	76 UD
DW34	DW-34-SED-0-2	MSED	9/10/97	7 U	7 U	14 U	14 U	4.5 UD	23 U
DW34	DW-34-SED-2-4	MSED	9/10/97	3.4 U	5 U	10 U	10 U	3.4 UD	17 U
DW34	DW-34-SED-4-6	MSED	9/10/97	3.5 U	5 U	10 U	10 U	3.5 UD	17 U
DW35	DW-35	MSED	9/12/97	2.21U	32 UD	65 UD	65 UD	2.21 U	110 UD
DW35	DW-35-SED-0-2	MSED	9/10/97	8 U	8 U	16 U	16 U	5.6 UD	27 U
DW35	DW-35-SED-2-4	MSED	9/10/97	4.6 UD	21 UD	42 UD	42 UD	4.6 UD	69 UD
DW35	DW-35-SED-4-6	MSED	9/10/97	4.1 UD	19 UD	37 UD	37 UD	4.1 UD	62 UD
DW35	DW-35-SED-6-8	MSED	9/10/97	1.7 U	5 U	10 U	10 U	1.7 U	17 U
DW35	DW-89-SED-0-2	MSED	9/10/97	9 U	9 U	18 U	18 U	6 UD	30 U
DW36	DW-36-SED-0-2	MSED	9/10/97	10 U	10 U	19 U	19 U	6.5 UD	32 U
DW36	DW-36-SED-2-4	MSED	9/10/97	10 U	10 U	20 U	20 U	6.7 UD	33 U
DW36	DW-36-SED-4-6	MSED	9/10/97	13 U	13 U	27 U	27 U	8.9 UD	44 U
DW37	DW-37-SED-0-2	MSED	9/10/97	4.2 UD	19 UD	38 UD	38 UD	4.2 UD	63 UD
DW37	DW-37-SED-2-4	MSED	9/10/97	6 U	11 U	11 U	11 U	3.8 UD	19 U
DW37	DW-37-SED-4-6	MSED	9/10/97	3.5 U	5 U	11 U	11 U	3.5 UD	18 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	DIETHYL-PHTHALATE	DI-N-BUTYL-PHTHALATE	BUTYLBENZYL-PHTHALATE	BIS(2-ETHYLHEXYL-PHTHALATE	DI-N-OCTYL-PHTHALATE	PHENOL
DW01	DW-01-SED-0	MSED	9/9/97	27 U	41	130	1100	27 U	27 U
DW02	DW-02-SED-0	MSED	9/12/97	38 UD	38 UD	40 D	390 D	38 UD	38 UD
DW03	DW-03-SED-0	MSED	9/12/97	63 UD	63 UD	160 D	1600 D	63 UD	63 UD
DW03	DW-80	MSED	9/12/97	120 UD	120 UD	150 D	1900 D	120 UD	120 UD
DW03	DW-81	MSED	9/12/97	66 UD	66 UD	210 D	1900 D	66 UD	66 UD
DW04	DW-04-SED-0	MSED	9/12/97	79 UD	110 D	390 D	1800 D	140 D	79 UD
DW05	DW-05	MSED	9/12/97	68 UD	68 UD	170 D	430 D	68 UD	68 UD
DW06	DW-06	MSED	9/12/97	70 UD	70 UD	70 UD	110 D	70 UD	70 UD
DW07	DW-07-SED-0	MSED	9/12/97	75 UD	75 UD	75 UD	1100 D	75 UD	75 UD
DW07	DW-82	MSED	9/12/97	74 UD	74 UD	74 UD	1100 D	74 UD	74 UD
DW07	DW-83	MSED	9/12/97	74 UD	78 D	120 D	3500 D	74 UD	74 UD
DW08	DW-08	MSED	9/12/97	75 UD	75 UD	75 UD	75 UD	75 UD	75 UD
DW09	DW-09	MSED	9/12/97	75 UD	75 UD	75 UD	370 D	75 UD	75 UD
DW09	DW-84	MSED	9/12/97	75 UD	75 UD	75 UD	340 D	75 UD	75 UD
DW09	DW-85	MSED	9/12/97	76 UD	76 UD	77 D	610 D	76 UD	76 UD
DW10	DW-10-SED-0	MSED	9/12/97	170 UD	170 UD	170 UD	760 D	170 UD	170 UD
DW11	DW-11-SED-0	MSED	9/9/97	22 U	22 U	33	540	22 U	43
DW12	DW-12-SED-0	MSED	9/9/97	24 U	32	24 U	830	24 U	24 U
DW13	DW-13-SED-0	MSED	9/9/97	22 U	22 U	22 U	360	22 U	140
DW14	DW-14-SED-0	MSED	9/9/97	21 U	21 U	21 U	89	21 U	51
DW15	DW-15	MSED	9/12/97	70 UD	70 UD	70 UD	1000 D	70 UD	76 D
DW16	DW-16-SED-0	MSED	9/9/97	23 U	68	34	230	23 U	23 U
DW17	DW-17-SED-0	MSED	9/9/97	26 U	56	26 U	190	26 U	26 U
DW18	DW-18-SED-0	MSED	9/9/97	43 U	43 U	43 U	160	43 U	43 U
DW19	DW-19-SED-0	MSED	9/9/97	22 U	22 U	22 U	170	22 U	22 U
DW20	DW-20-SED-0	MSED	9/9/97	21 U	21 U	21 U	620	21 U	21 U
DW21	DW-21-SED-0	MSED	9/9/97	29 U	29 U	29 U	650	29 U	29 U
DW22	DW-22-SED-0	MSED	9/9/97	37 U	37 U	37 U	340	37 U	37 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	DIETHYL-PHTHALATE	DI-N-BUTYL-PHTHALATE	BUTYLBENZYL-PHTHALATE	BIS(2-ETHYLHEXYL-PHTHALATE	DI-N-OCTYL-PHTHALATE	PHENOL
DW23	DW-23-SED-0	MSED	9/9/97	29 U	29 U	29 U	210	29 U	66
DW23	DW-86-SED-0	MSED	9/9/97	29 U	29 U	29 U	180	29 U	29 U
DW23	DW-87-SED-0	MSED	9/9/97	28 U	28 U	28 U	220	28 U	28 U
DW24	DW-24	MSED	9/12/97	100 UD	100 UD	27 U	120 D	100 UD	100 UD
DW25	DW-25-SED-0-2	MSED	9/11/97	64 UD	64 UD	64 UD	270 D	64 UD	64 UD
DW25	DW-25-SED-2-4	MSED	9/11/97	67 UD	70 D	96 D	480 D	67 UD	67 UD
DW25	DW-25-SED-4-8	MSED	9/11/97	66 UD	66 UD	66 UD	270 D	66 UD	66 UD
DW25	DW-25-SED-8-10.5	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	17 U
DW25	DW-88-SED-4-8	MSED	9/11/97	67 U	67 U	67 U	250	67 U	67 U
DW26	DW-26-SED-0-3	MSED	9/11/97	18 U	18 U	52	510	18 U	18 U
DW26	DW-26-SED-11-13	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	17 U
DW26	DW-26-SED-3-7	MSED	9/11/97	98 UD	98 UD	98 UD	3200 D	98 UD	98 UD
DW26	DW-26-SED-7-11	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	17 U
DW27	DW-27-SED-0-3	MSED	9/11/97	18 U	18 U	18 U	93	18 U	18 U
DW27	DW-27-SED-11-14	MSED	9/11/97	16 U	16 U	16 U	16 U	16 U	16 U
DW27	DW-27-SED-3-7	MSED	9/11/97	20 U	25	20 U	120	20 U	20 U
DW27	DW-27-SED-7-11	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	17 U
DW28	DW-28-SED-0-2	MSED	9/11/97	20 U	20 U	20 U	160	20 U	20 U
DW28	DW-28-SED-12-14	MSED	9/11/97	18 U	18 U	18 U	18 U	18 U	18 U
DW28	DW-28-SED-2-4	MSED	9/11/97	18 U	18 U	18 U	20	18 U	18 U
DW28	DW-28-SED-4-8	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	17 U
DW28	DW-28-SED-8-12	MSED	9/11/97	17 U	17 U	17 U	17 U	17 U	17 U
DW29	DW-29-SED-0-2	MSED	9/10/97	29 U	29 U	29 U	490	29 U	29 U
DW29	DW-29-SED-2-4	MSED	9/10/97	24 U	24 U	59	550	24 U	24 U
DW29	DW-29-SED-4-6	MSED	9/10/97	19 U	19 U	19 U	230	19 U	19 U
DW30	DW-30	MSED	9/12/97	72 UD	72 UD	72 UD	810 D	72 UD	72 UD
DW30	DW-30-SED-0-2	MSED	9/11/97	18 U	38	34	230	18 U	18 U
DW30	DW-30-SED-2-4	MSED	9/11/97	16 U	16 U	16 U	23	16 U	16 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	DIETHYL-PHTHALATE	DI-N-BUTYL-PHTHALATE	BUTYLBENZYL-PHTHALATE	BIS(2-ETHYLHEXYL-PHTHALATE	DI-N-OCTYL-PHTHALATE	PHENOL
DW30	DW-30-SED-4-6	MSED	9/11/97	20 U	20 U	20 U	20 U	20 U	20 U
DW31	DW-31-SED-0-2	MSED	9/11/97	82 U	880	1800	33000	440	82 U
DW31	DW-31-SED-2-4	MSED	9/11/97	80 U	80 U	150	3000	80 U	80 U
DW31	DW-31-SED-4-6	MSED	9/11/97	180 UD	180 UD	180 UD	7900 D	180 UD	180 UD
DW31	DW-31-SED-6-8	MSED	9/11/97	58 UD	58 UD	58 UD	2500 D	58 UD	58 UD
DW32	DW-32-SED-0-2	MSED	9/11/97	72 UD	72 UD	72 UD	1100 D	72 UD	72 UD
DW32	DW-32-SED-2-4	MSED	9/11/97	67 UD	67 UD	67 UD	510 D	67 UD	67 UD
DW33	DW-33	MSED	9/12/97	81 UD	81 UD	81 UD	1300 D	81 UD	81 UD
DW33	DW-33-SED-0-2	MSED	9/10/97	21 U	250	21 U	220	21 U	21 U
DW33	DW-33-SED-2-4	MSED	9/10/97	19 U	19 U	19 U	19 U	19 U	19 U
DW33	DW-33-SED-4-6	MSED	9/10/97	18 U	18 U	18 U	18 U	18 U	18 U
DW34	DW-34	MSED	9/12/97	76 UD	76 UD	76 UD	710 D	76 UD	76 UD
DW34	DW-34-SED-0-2	MSED	9/10/97	23 U	23 U	23 U	180	23 U	23 U
DW34	DW-34-SED-2-4	MSED	9/10/97	17 U	17 U	17 U	17 U	17 U	17 U
DW34	DW-34-SED-4-6	MSED	9/10/97	17 U	17 U	17 U	17 U	17 U	17 U
DW35	DW-35	MSED	9/12/97	110 UD	110 UD	111 D	490 D	110 UD	110 UD
DW35	DW-35-SED-0-2	MSED	9/10/97	27 U	27 U	27 U	200	27 U	27 U
DW35	DW-35-SED-2-4	MSED	9/10/97	69 UD	69 UD	69 UD	250 D	69 UD	69 UD
DW35	DW-35-SED-4-6	MSED	9/10/97	62 UD	62 UD	62 UD	62 UD	62 UD	62 UD
DW35	DW-35-SED-6-8	MSED	9/10/97	17 U	17 U	17 U	17 U	17 U	17 U
DW35	DW-89-SED-0-2	MSED	9/10/97	30 U	30 U	30 U	220	30 U	30 U
DW36	DW-36-SED-0-2	MSED	9/10/97	32 U	32 U	32 U	240	32 U	32 U
DW36	DW-36-SED-2-4	MSED	9/10/97	33 U	33 U	33 U	310	33 U	33 U
DW36	DW-36-SED-4-6	MSED	9/10/97	44 U	44 U	44 U	67	44 U	44 U
DW37	DW-37-SED-0-2	MSED	9/10/97	63 UD	63 UD	63 UD	580 D	63 UD	63 UD
DW37	DW-37-SED-2-4	MSED	9/10/97	19 U	19 U	19 U	36	19 U	19 U
DW37	DW-37-SED-4-6	MSED	9/10/97	18 U	18 U	18 U	18 U	18 U	18 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	2-METHYL-PHENOL	4-METHYL-PHENOL	2,4-DIMETHYL-PHENOL	PENTA-CHLORO-PHENOL	BENZOIC ACID	BENZYL ALCOHOL
DW01	DW-01-SED-0	MSED	9/9/97	13 U	27 U	13 U	67 U	130 U	16 U
DW02	DW-02-SED-0	MSED	9/12/97	19 UD	38 UD	19 UD	94 UD	190 UD	23 UD
DW03	DW-03-SED-0	MSED	9/12/97	32 UD	63 UD	21 UD	160 UD	320 UD	38 UD
DW03	DW-80	MSED	9/12/97	59 UD	390 D	59 UD	290 UD	590 UD	70 UD
DW03	DW-81	MSED	9/12/97	33 UD	66 UD	33 UD	170 UD	330 UD	40 UD
DW04	DW-04-SED-0	MSED	9/12/97	40 UD	79 UD	40 UD	200 UD	400 UD	48 UD
DW05	DW-05	MSED	9/12/97	34 UD	68 UD	34 UD	170 UD	340 UD	41 UD
DW06	DW-06	MSED	9/12/97	35 UD	70 UD	35 UD	180 UD	350 UD	42 UD
DW07	DW-07-SED-0	MSED	9/12/97	38 UD	75 UD	38 UD	190 UD	380 UD	45 UD
DW07	DW-82	MSED	9/12/97	37 UD	74 UD	37 UD	190 UD	370 UD	44 UD
DW07	DW-83	MSED	9/12/97	37 UD	74 UD	37 UD	190 UD	370 UD	44 UD
DW08	DW-08	MSED	9/12/97	37 UD	75 UD	37 UD	190 UD	370 UD	45 UD
DW09	DW-09	MSED	9/12/97	37 UD	75 UD	18 UD	190 UD	370 UD	45 UD
DW09	DW-84	MSED	9/12/97	37 UD	75 UD	37 UD	190 UD	370 UD	45 UD
DW09	DW-85	MSED	9/12/97	38 UD	76 UD	38 UD	190 UD	380 UD	45 UD
DW10	DW-10-SED-0	MSED	9/12/97	85 UD	170 UD	85 UD	420 UD	850 UD	100 UD
DW11	DW-11-SED-0	MSED	9/9/97	11 U	22 U	11 U	55 U	110 U	13 U
DW12	DW-12-SED-0	MSED	9/9/97	12 U	24 U	12 U	59 U	120 U	14 U
DW13	DW-13-SED-0	MSED	9/9/97	11 U	22 U	11 U	56 U	110 U	13 U
DW14	DW-14-SED-0	MSED	9/9/97	10 U	21 U	10 U	52 U	100 U	13 U
DW15	DW-15	MSED	9/12/97	35 UD	70 UD	35 UD	180 UD	350 UD	42 UD
DW16	DW-16-SED-0	MSED	9/9/97	11 U	23 U	11 U	57 U	110 U	14 U
DW17	DW-17-SED-0	MSED	9/9/97	13 U	26 U	13 U	64 U	130 U	15 U
DW18	DW-18-SED-0	MSED	9/9/97	22 U	43 U	22 U	110 U	220 U	26 U
DW19	DW-19-SED-0	MSED	9/9/97	11 U	22 U	11 U	55 U	110 U	13 U
DW20	DW-20-SED-0	MSED	9/9/97	11 U	21 U	11 U	54 U	110 U	13 U
DW21	DW-21-SED-0	MSED	9/9/97	15 U	29 U	15 U	74 U	150 U	18 U
DW22	DW-22-SED-0	MSED	9/9/97	18 U	37 U	18 U	92 U	180 U	22 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	2-METHYL-PHENOL	4-METHYL-PHENOL	2,4-DIMETHYL-PHENOL	PENTA-CHLORO-PHENOL	BENZOIC ACID	BENZYL ALCOHOL
DW23	DW-23-SED-0	MSED	9/9/97	14 U	29 U	14 U	71 U	140 U	17 U
DW23	DW-86-SED-0	MSED	9/9/97	14 U	29 U	14 U	72 U	150 U	17 U
DW23	DW-87-SED-0	MSED	9/9/97	14 U	28 U	14 U	70 U	140 U	17 U
DW24	DW-24	MSED	9/12/97	51 UD	100 UD	13 U	260 UD	510 UD	16 U
DW25	DW-25-SED-0-2	MSED	9/11/97	32 UD	64 UD	32 UD	160 UD	320 UD	38 UD
DW25	DW-25-SED-2-4	MSED	9/11/97	33 UD	67 UD	33 UD	170 UD	330 UD	40 UD
DW25	DW-25-SED-4-8	MSED	9/11/97	33 UD	66 UD	33 UD	170 UD	330 UD	40 UD
DW25	DW-25-SED-8-10.5	MSED	9/11/97	9 U	17 U	9 U	43 U	85 U	10 U
DW25	DW-88-SED-4-8	MSED	9/11/97	33 U	67 U	33 U	170 U	330 U	40 U
DW26	DW-26-SED-0-3	MSED	9/11/97	9 U	18 U	9 U	46 U	92 U	11 U
DW26	DW-26-SED-11-13	MSED	9/11/97	9 U	17 U	9 U	44 U	87 U	10 U
DW26	DW-26-SED-3-7	MSED	9/11/97	49 UD	98 UD	49 UD	240 UD	490 UD	59 UD
DW26	DW-26-SED-7-11	MSED	9/11/97	9 U	17 U	9 U	43 U	87 U	10 U
DW27	DW-27-SED-0-3	MSED	9/11/97	9 U	18 U	9 U	46 U	92 U	11 U
DW27	DW-27-SED-11-14	MSED	9/11/97	8 U	16 U	8 U	41 U	82 U	10 U
DW27	DW-27-SED-3-7	MSED	9/11/97	10 U	29	10 U	50 U	99 U	12 U
DW27	DW-27-SED-7-11	MSED	9/11/97	9 U	17 U	9 U	43 U	86 U	10 U
DW28	DW-28-SED-0-2	MSED	9/11/97	10 U	20 U	10 U	49 U	98 U	12 U
DW28	DW-28-SED-12-14	MSED	9/11/97	9 U	18 U	9 U	45 U	90 U	11 U
DW28	DW-28-SED-2-4	MSED	9/11/97	9 U	18 U	9 U	46 U	92 U	11 U
DW28	DW-28-SED-4-8	MSED	9/11/97	9 U	17 U	9 U	43 U	86 U	10 U
DW28	DW-28-SED-8-12	MSED	9/11/97	8 U	17 U	8 U	42 U	85 U	10 U
DW29	DW-29-SED-0-2	MSED	9/10/97	14 U	29 U	14 U	72 U	140 U	17 U
DW29	DW-29-SED-2-4	MSED	9/10/97	12 U	24 U	12 U	60 U	120 U	14 U
DW29	DW-29-SED-4-6	MSED	9/10/97	10 U	19 U	10 U	48 U	95 U	11 U
DW30	DW-30	MSED	9/12/97	36 UD	72 UD	36 UD	180 UD	360 UD	86 D
DW30	DW-30-SED-0-2	MSED	9/11/97	9 U	18 U	9 U	45 U	90 U	11 U
DW30	DW-30-SED-2-4	MSED	9/11/97	8 U	16 U	8 U	41 U	82 U	10 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	2-METHYL-PHENOL	4-METHYL-PHENOL	2,4-DIMETHYL-PHENOL	PENTA-CHLORO-PHENOL	BENZOIC ACID	BENZYL ALCOHOL
DW30	DW-30-SED-4-6	MSED	9/11/97	10 U	20 U	10 U	50 U	99 U	12 U
DW31	DW-31-SED-0-2	MSED	9/11/97	41 U	82 U	41 U	200 U	410 U	49 U
DW31	DW-31-SED-2-4	MSED	9/11/97	40 U	90	40 U	200 U	400 U	48 U
DW31	DW-31-SED-4-6	MSED	9/11/97	88 UD	180 UD	88 UD	440 UD	880 UD	110 UD
DW31	DW-31-SED-6-8	MSED	9/11/97	29 UD	58 UD	29 UD	150 UD	290 UD	35 UD
DW32	DW-32-SED-0-2	MSED	9/11/97	36 UD	72 UD	18 UD	180 UD	360 UD	43 UD
DW32	DW-32-SED-2-4	MSED	9/11/97	34 UD	67 UD	17 UD	170 UD	340 UD	40 UD
DW33	DW-33	MSED	9/12/97	40 UD	81 UD	19 U	200 UD	400 UD	48 UD
DW33	DW-33-SED-0-2	MSED	9/10/97	10 U	21 U	10 U	52 U	100 U	12 U
DW33	DW-33-SED-2-4	MSED	9/10/97	9 U	19 U	9 U	46 U	93 U	11 U
DW33	DW-33-SED-4-6	MSED	9/10/97	9 U	18 U	9 U	44 U	89 U	11 U
DW34	DW-34	MSED	9/12/97	38 UD	76 UD	19 U	190 UD	380 UD	46 UD
DW34	DW-34-SED-0-2	MSED	9/10/97	11 U	23 U	11 U	57 U	110 U	14 U
DW34	DW-34-SED-2-4	MSED	9/10/97	8 U	17 U	8 U	42 U	84 U	10 U
DW34	DW-34-SED-4-6	MSED	9/10/97	9 U	17 U	9 U	43 U	87 U	10 U
DW35	DW-35	MSED	9/12/97	54 UD	110 UD	21 UD	270 UD	540 UD	26 UD
DW35	DW-35-SED-0-2	MSED	9/10/97	14 U	27 U	14 U	68 U	140 U	16 U
DW35	DW-35-SED-2-4	MSED	9/10/97	35 UD	69 UD	35 UD	170 UD	350 UD	42 UD
DW35	DW-35-SED-4-6	MSED	9/10/97	31 UD	62 UD	31 UD	150 UD	310 UD	37 UD
DW35	DW-35-SED-6-8	MSED	9/10/97	9 U	17 U	9 U	43 U	87 U	10 U
DW35	DW-89-SED-0-2	MSED	9/10/97	15 U	30 U	15 U	76 U	150 U	18 U
DW36	DW-36-SED-0-2	MSED	9/10/97	16 U	32 U	16 U	80 U	160 U	19 U
DW36	DW-36-SED-2-4	MSED	9/10/97	17 U	33 U	17 U	83 U	170 U	20 U
DW36	DW-36-SED-4-6	MSED	9/10/97	22 U	44 U	22 U	110 U	220 U	27 U
DW37	DW-37-SED-0-2	MSED	9/10/97	31 UD	63 UD	31 UD	160 UD	310 UD	38 UD
DW37	DW-37-SED-2-4	MSED	9/10/97	9 U	19 U	9 U	47 U	94 U	11 U
DW37	DW-37-SED-4-6	MSED	9/10/97	9 U	18 U	9 U	46 U	91 U	11 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	DIBENZOFURAN	HEXACHLORO-ETHANE	HEXACHLORO-BUTADIENE	N-NITROSO-DIPHENYLAMINE
DW01	DW-01-SED-0	MSED	9/9/97	27 U	27 U	21 U	16 U
DW02	DW-02-SED-0	MSED	9/12/97	38 UD	38 UD	30 UD	23 UD
DW03	DW-03-SED-0	MSED	9/12/97	63 UD	63 UD	51 UD	38 UD
DW03	DW-80	MSED	9/12/97	120 UD	120 UD	94 UD	70 UD
DW03	DW-81	MSED	9/12/97	66 UD	66 UD	53 UD	40 UD
DW04	DW-04-SED-0	MSED	9/12/97	80 D	79 UD	63 UD	48 UD
DW05	DW-05	MSED	9/12/97	90 D	68 UD	54 UD	41 UD
DW06	DW-06	MSED	9/12/97	70 UD	70 UD	56 UD	42 UD
DW07	DW-07-SED-0	MSED	9/12/97	75 UD	75 UD	60 UD	45 UD
DW07	DW-82	MSED	9/12/97	74 UD	74 UD	59 UD	44 UD
DW07	DW-83	MSED	9/12/97	74 UD	74 UD	59 UD	44 UD
DW08	DW-08	MSED	9/12/97	75 UD	75 UD	60 UD	45 UD
DW09	DW-09	MSED	9/12/97	75 UD	75 UD	60 UD	45 UD
DW09	DW-84	MSED	9/12/97	75 UD	75 UD	60 UD	45 UD
DW09	DW-85	MSED	9/12/97	76 UD	76 UD	61 UD	45 UD
DW10	DW-10-SED-0	MSED	9/12/97	170 UD	170 UD	6.8 UD	100 UD
DW11	DW-11-SED-0	MSED	9/9/97	22 U	22 U	18 U	13 U
DW12	DW-12-SED-0	MSED	9/9/97	24 U	24 U	19 U	14 U
DW13	DW-13-SED-0	MSED	9/9/97	22 U	22 U	18 U	13 U
DW14	DW-14-SED-0	MSED	9/9/97	21 U	21 U	17 U	13 U
DW15	DW-15	MSED	9/12/97	70 UD	70 UD	56 UD	42 UD
DW16	DW-16-SED-0	MSED	9/9/97	23 U	23 U	18 U	14 U
DW17	DW-17-SED-0	MSED	9/9/97	26 U	26 U	21 U	15 U
DW18	DW-18-SED-0	MSED	9/9/97	43 U	43 U	35 U	26 U
DW19	DW-19-SED-0	MSED	9/9/97	22 U	22 U	17 U	13 U
DW20	DW-20-SED-0	MSED	9/9/97	21 U	21 U	17 U	13 U
DW21	DW-21-SED-0	MSED	9/9/97	42	29 U	24 U	18 U
DW22	DW-22-SED-0	MSED	9/9/97	37 U	37 U	30 U	22 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	DIBENZOFURAN	HEXACHLORO-ETHANE	HEXACHLORO-BUTADIENE	N-NITROSO-DIPHENYLAMINE
DW23	DW-23-SED-0	MSED	9/9/97	29 U	29 U	23 U	17 U
DW23	DW-86-SED-0	MSED	9/9/97	29 U	29 U	23 U	17 U
DW23	DW-87-SED-0	MSED	9/9/97	28 U	28 U	23 U	17 U
DW24	DW-24	MSED	9/12/97	100 UD	100 UD	5.1 UD	61 UD
DW25	DW-25-SED-0-2	MSED	9/11/97	64 UD	64 UD	51 UD	38 UD
DW25	DW-25-SED-2-4	MSED	9/11/97	67 UD	67 UD	53 UD	40 UD
DW25	DW-25-SED-4-8	MSED	9/11/97	66 UD	66 UD	53 UD	40 UD
DW25	DW-25-SED-8-10.5	MSED	9/11/97	37	17 U	14 U	10 U
DW25	DW-88-SED-4-8	MSED	9/11/97	67 U	67 U	53 U	40 U
DW26	DW-26-SED-0-3	MSED	9/11/97	18 U	18 U	15 U	11 U
DW26	DW-26-SED-11-13	MSED	9/11/97	17 U	17 U	14 U	10 U
DW26	DW-26-SED-3-7	MSED	9/11/97	560 D	98 UD	78 UD	59 UD
DW26	DW-26-SED-7-11	MSED	9/11/97	17 U	17 U	14 U	10 U
DW27	DW-27-SED-0-3	MSED	9/11/97	18 U	18 U	15 U	11 U
DW27	DW-27-SED-11-14	MSED	9/11/97	16 U	16 U	13 U	10 U
DW27	DW-27-SED-3-7	MSED	9/11/97	28	20 U	16 U	12 U
DW27	DW-27-SED-7-11	MSED	9/11/97	17 U	17 U	14 U	10 U
DW28	DW-28-SED-0-2	MSED	9/11/97	20 U	20 U	16 U	12 U
DW28	DW-28-SED-12-14	MSED	9/11/97	18 U	18 U	14 U	11 U
DW28	DW-28-SED-2-4	MSED	9/11/97	18 U	18 U	15 U	11 U
DW28	DW-28-SED-4-8	MSED	9/11/97	17 U	17 U	14 U	10 U
DW28	DW-28-SED-8-12	MSED	9/11/97	17 U	17 U	14 U	10 U
DW29	DW-29-SED-0-2	MSED	9/10/97	29 U	29 U	23 U	17 U
DW29	DW-29-SED-2-4	MSED	9/10/97	25	24 U	19 U	14 U
DW29	DW-29-SED-4-6	MSED	9/10/97	19 U	19 U	15 U	11 U
DW30	DW-30	MSED	9/12/97	72 UD	72 UD	58 UD	43 UD
DW30	DW-30-SED-0-2	MSED	9/11/97	19	18 U	14 U	11 U
DW30	DW-30-SED-2-4	MSED	9/11/97	16 U	16 U	13 U	10 U

Project: Denny Way

DATA SUMMARY REPORT

Analyses: SEMI-VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	DIBENZOFURAN	HEXACHLORO-ETHANE	HEXACHLORO-BUTADIENE	N-NITROSO-DIPHENYLAMINE
DW30	DW-30-SED-4-6	MSED	9/11/97	20 U	20 U	16 U	12 U
DW31	DW-31-SED-0-2	MSED	9/11/97	320	82 U	66 U	49 U
DW31	DW-31-SED-2-4	MSED	9/11/97	300	80 U	64 U	48 U
DW31	DW-31-SED-4-6	MSED	9/11/97	180 UD	180 UD	140 UD	110 UD
DW31	DW-31-SED-6-8	MSED	9/11/97	58 UD	58 U	2.9 UD	23 UD
DW32	DW-32-SED-0-2	MSED	9/11/97	170 D	72 UD	58 UD	43 UD
DW32	DW-32-SED-2-4	MSED	9/11/97	200 D	67 UD	54 UD	40 UD
DW33	DW-33	MSED	9/12/97	81 UD	81 UD	65 UD	48 UD
DW33	DW-33-SED-0-2	MSED	9/10/97	21 U	21 U	17 U	12 U
DW33	DW-33-SED-2-4	MSED	9/10/97	19 U	19 U	15 U	11 U
DW33	DW-33-SED-4-6	MSED	9/10/97	18 U	18 U	14 U	11 U
DW34	DW-34	MSED	9/12/97	76 UD	76 UD	61 UD	46 UD
DW34	DW-34-SED-0-2	MSED	9/10/97	23 U	23 U	18 U	14 U
DW34	DW-34-SED-2-4	MSED	9/10/97	17 U	17 U	13 U	10 U
DW34	DW-34-SED-4-6	MSED	9/10/97	17 U	17 U	14 U	10 U
DW35	DW-35	MSED	9/12/97	110 UD	110 UD	2.21 U	65 UD
DW35	DW-35-SED-0-2	MSED	9/10/97	27 U	27 U	22 U	16 U
DW35	DW-35-SED-2-4	MSED	9/10/97	69 UD	69 UD	56 UD	42 UD
DW35	DW-35-SED-4-6	MSED	9/10/97	62 UD	62 UD	49 UD	37 UD
DW35	DW-35-SED-6-8	MSED	9/10/97	17 U	17 U	1.7 U	10 U
DW35	DW-89-SED-0-2	MSED	9/10/97	42	30 U	24 U	18 U
DW36	DW-36-SED-0-2	MSED	9/10/97	32 U	32 U	25 U	19 U
DW36	DW-36-SED-2-4	MSED	9/10/97	33 U	33 U	27 U	20 U
DW36	DW-36-SED-4-6	MSED	9/10/97	44 U	44 U	35 U	27 U
DW37	DW-37-SED-0-2	MSED	9/10/97	63 UD	63 UD	4.2 UD	38 UD
DW37	DW-37-SED-2-4	MSED	9/10/97	19 U	19 U	15 U	11 U
DW37	DW-37-SED-4-6	MSED	9/10/97	18 U	18 U	3.5 U	11 U

DATA SUMMARY REPORT

Project: Denny Way

Analyses: VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	ETHYLBENZENE	TETRACHLOROETHENE	TRICHLOROETHENE	XYLENE (TOTAL)
DW05	DW-05	MSED	9/12/97	3 U	3 U	3 U	3 U
DW06	DW-06	MSED	9/12/97	3 U	3 U	3 U	3 U
DW07	DW-07-SED-0	MSED	9/12/97	3 U	3 U	3 U	3 U
DW07	DW-82	MSED	9/12/97	3 U	3 U	3 U	3 U
DW07	DW-83	MSED	9/12/97	3 U	3 U	3 U	3 U
DW08	DW-08	MSED	9/12/97	3 U	3 U	3 U	3 U
DW25	DW-25-SED-0-2	MSED	9/11/97	3 U	3 U	3 U	3 U
DW25	DW-25-SED-2-4	MSED	9/11/97	3 U	3 U	3 U	3 U
DW25	DW-25-SED-4-8	MSED	9/11/97	3 U	3 U	3 U	3 U
DW25	DW-25-SED-8-10.5	MSED	9/11/97	3 U	3 U	3 U	3 U
DW25	DW-88-SED-4-8	MSED	9/11/97	3 U	3 U	3 U	3 U
DW26	DW-26-SED-0-3	MSED	9/11/97	3 U	3 U	3 U	3 U
DW26	DW-26-SED-11-13	MSED	9/11/97	3 U	3 U	3 U	3 U
DW26	DW-26-SED-3-7	MSED	9/11/97	3 U	3 U	3 U	3 U
DW26	DW-26-SED-7-11	MSED	9/11/97	3 U	3 U	3 U	3 U
DW27	DW-27-SED-0-3	MSED	9/11/97	3 U	3 U	3 U	3 U
DW27	DW-27-SED-11-14	MSED	9/11/97	3 U	3 U	3 U	3 U
DW27	DW-27-SED-3-7	MSED	9/11/97	3 U	3 U	3 U	3 U
DW27	DW-27-SED-7-11	MSED	9/11/97	3 U	3 U	3 U	3 U
DW28	DW-28-SED-0-2	MSED	9/11/97	3 U	3 U	3 U	3 U
DW28	DW-28-SED-12-14	MSED	9/11/97	3 U	3 U	3 U	3 U
DW28	DW-28-SED-2-4	MSED	9/11/97	3 U	3 U	3 U	3 U
DW28	DW-28-SED-4-8	MSED	9/11/97	3 U	3 U	3 U	3 U
DW28	DW-28-SED-8-12	MSED	9/11/97	3 U	3 U	3 U	3 U
DW31	DW-31-SED-0-2	MSED	9/11/97	4 U	4 U	4 U	4 U
DW31	DW-31-SED-2-4	MSED	9/11/97	25	3 U	3 U	97 JH
DW31	DW-31-SED-4-6	MSED	9/11/97	41	4 U	4 U	260 JH
DW32	DW-32-SED-0-2	MSED	9/11/97	3 U	3 U	3 U	3 U

DATA SUMMARY REPORT

Project: Denny Way

Analyses: VOLATILE ORGANICS
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	ETHYLBENZENE	TETRACHLOROETHENE	TRICHLOROETHENE	XYLENE (TOTAL)
DW32	DW-32-SED-2-4	MSED	9/11/97	3 U	3 U	3 U	3 U
DW33	DW-33	MSED	9/12/97	4 U	4 U	4 U	4 U
DW33	DW-33-SED-0-2	MSED	9/10/97	3 U	3 U	3 U	3 U
DW33	DW-33-SED-2-4	MSED	9/10/97	3 U	3 U	3 U	3 U
DW33	DW-33-SED-4-6	MSED	9/10/97	3 U	3 U	3 U	3 U

DATA SUMMARY REPORT

Project: Denny Way

Analyses: PESTICIDES & PCBs
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	AROCLOR-1016	AROCLOR-1221	AROCLOR-1232	AROCLOR-1242	AROCLOR-1248
DW01	DW-01-SED-0	MSED	9/9/97	13 U	53 U	13 U	120	13 U
DW02	DW-02-SED-0	MSED	9/12/97	9.1 U	36 U	9.1 U	9.1 U	9.1 U
DW03	DW-03-SED-0	MSED	9/12/97	11 U	43 U	11 U	15	11 U
DW03	DW-80	MSED	9/12/97	11 U	45 U	11 U	25	11 U
DW03	DW-81	MSED	9/12/97	11 U	44 U	11 U	11	11 U
DW04	DW-04-SED-0	MSED	9/12/97	9.9 U	40 U	9.9 U	18	9.9 U
DW05	DW-05	MSED	9/12/97	8.3 U	33 U	8.3 U	8.3 U	8.3 U
DW06	DW-06	MSED	9/12/97	8.6 U	34 U	8.6 U	8.6 U	8.6 U
DW07	DW-07-SED-0	MSED	9/12/97	9.1 UD	36 UD	9.1 UD	22 D	9.1 UD
DW07	DW-82	MSED	9/12/97	19 UD	76 UD	19 UD	25 D	19 UD
DW07	DW-83	MSED	9/12/97	18 UD	72 UD	18 UD	28 D	18 UD
DW08	DW-08	MSED	9/12/97	9.4 U	38 U	9.4 U	9.4 U	9.4 U
DW09	DW-09	MSED	9/12/97	9.1 U	37 U	9.1 U	51 JH	9.1 U
DW09	DW-84	MSED	9/12/97	9 U	36 U	9 U	17	9 U
DW09	DW-85	MSED	9/12/97	9.5 U	38 U	9.5 U	23	9.5 U
DW10	DW-10-SED-0	MSED	9/12/97	17 U	68 U	17 U	72 JH	17 U
DW11	DW-11-SED-0	MSED	9/9/97	11 U	43 U	11 U	74	11 U
DW12	DW-12-SED-0	MSED	9/9/97	12 UJL	48 UJL	12 UJL	220 JL	12 UJL
DW13	DW-13-SED-0	MSED	9/9/97	11 U	44 U	11 U	21	11 U
DW14	DW-14-SED-0	MSED	9/9/97	10 U	42 U	10 U	23	10 U
DW15	DW-15	MSED	9/12/97	12 U	47 U	12 U	130	12 U
DW16	DW-16-SED-0	MSED	9/9/97	11 U	46 U	11 U	76	11 U
DW17	DW-17-SED-0	MSED	9/9/97	13 U	52 U	13 U	29	13 U
DW18	DW-18-SED-0	MSED	9/9/97	22 U	87 U	22 U	99	22 U
DW19	DW-19-SED-0	MSED	9/9/97	11 U	46 U	11 U	22	11 U
DW20	DW-20-SED-0	MSED	9/9/97	11 U	43 U	11 U	85	11 U
DW21	DW-21-SED-0	MSED	9/9/97	15 U	59 U	15 U	120	15 U
DW22	DW-22-SED-0	MSED	9/9/97	18 U	74 U	18 U	55	18 U

DATA SUMMARY REPORT

Project: Denny Way

Analyses: PESTICIDES & PCBs
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	AROCLOR-1016	AROCLOR-1221	AROCLOR-1232	AROCLOR-1242	AROCLOR-1248
DW23	DW-23-SED-0	MSED	9/9/97	14 U	57 U	14 U	31	14 U
DW23	DW-86-SED-0	MSED	9/9/97	14 U	58 U	14 U	35	14 U
DW23	DW-87-SED-0	MSED	9/9/97	14 U	56 U	14 U	31	14 U
DW24	DW-24	MSED	9/12/97	13 U	51 U	13 U	15	13 U
DW25	DW-25-SED-0-2	MSED	9/11/97	7.7 U	31 U	7.7 U	43	7.7 U
DW25	DW-25-SED-2-4	MSED	9/11/97	8.2 U	33 U	8.2 U	120	8.2 U
DW25	DW-25-SED-4-8	MSED	9/11/97	8.2 U	33 U	8.2 U	100	8.2 U
DW25	DW-25-SED-8-10.5	MSED	9/11/97	8.6 U	35 U	8.6 U	8.6 U	8.6 U
DW25	DW-88-SED-4-8	MSED	9/11/97	8.1 U	32 U	8.1 U	87	8.1 U
DW26	DW-26-SED-0-3	MSED	9/11/97	9.2 U	37 U	9.2 U	59	9.2 U
DW26	DW-26-SED-11-13	MSED	9/11/97	8.7 U	35 U	8.7 U	8.7 U	8.7 U
DW26	DW-26-SED-3-7	MSED	9/11/97	39 U	160 U	39 U	2.6	39 U
DW26	DW-26-SED-7-11	MSED	9/11/97	8.4 U	34 U	8.4 U	8.4 U	8.4 U
DW27	DW-27-SED-0-3	MSED	9/11/97	9.3 U	37 U	9.3 U	19	9.3 U
DW27	DW-27-SED-11-14	MSED	9/11/97	8.2 U	33 U	8.2 U	8.2 U	8.2 U
DW27	DW-27-SED-3-7	MSED	9/11/97	9.9 U	40 U	9.9 U	20	9.9 U
DW27	DW-27-SED-7-11	MSED	9/11/97	8.6 U	35 U	8.6 U	8.6 U	8.6 U
DW28	DW-28-SED-0-2	MSED	9/11/97	9.7 U	39 U	9.7 U	9.7 U	9.7 U
DW28	DW-28-SED-12-14	MSED	9/11/97	8.8 U	35 U	8.8 U	8.8 U	8.8 U
DW28	DW-28-SED-2-4	MSED	9/11/97	9.1 U	37 U	9.1 U	9.1 U	9.1 U
DW28	DW-28-SED-4-8	MSED	9/11/97	8.3 U	33 U	8.3 U	8.3 U	8.3 U
DW28	DW-28-SED-8-12	MSED	9/11/97	8.4 U	34 U	8.4 U	8.4 U	8.4 U
DW29	DW-29-SED-0-2	MSED	9/10/97	14 U	58 U	14 U	81	14 U
DW29	DW-29-SED-2-4	MSED	9/10/97	12 U	48 U	12 U	34	12 U
DW29	DW-29-SED-4-6	MSED	9/10/97	9.7 U	39 U	9.7 U	9.7 U	9.7 U
DW30	DW-30	MSED	9/12/97	8.9 U	35 U	8.9 U	8.9 U	8.9 U
DW30	DW-30-SED-0-2	MSED	9/11/97	9.1 U	36 U	9.1 U	11	9.1 U
DW30	DW-30-SED-2-4	MSED	9/11/97	8.2 U	33 U	8.2 U	8.2 U	8.2 U

DATA SUMMARY REPORT

Project: Denny Way

Analyses: PESTICIDES & PCBs
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	AROCLOR-1016	AROCLOR-1221	AROCLOR-1232	AROCLOR-1242	AROCLOR-1248
DW30	DW-30-SED-4-6	MSED	9/11/97	9.9 U	34 U	9.9 U	9.9 U	9.9 U
DW31	DW-31-SED-0-2	MSED	9/11/97	20 U	81 U	20 U	140	20 U
DW31	DW-31-SED-2-4	MSED	9/11/97	20 U	79 U	20 U	300	20 U
DW31	DW-31-SED-4-6	MSED	9/11/97	110 UD	440 UD	110 UD	760 D	110 UD
DW31	DW-31-SED-6-8	MSED	9/11/97	29 U	120 U	29 U	130	29 U
DW32	DW-32-SED-0-2	MSED	9/11/97	8.9 U	36 U	8.9 U	110	8.9 U
DW32	DW-32-SED-2-4	MSED	9/11/97	17 UD	66 UD	17 UD	100 D	17 UD
DW33	DW-33	MSED	9/12/97	20 UD	80 UD	20 UD	20 UD	20 UD
DW33	DW-33-SED-0-2	MSED	9/10/97	20 UD	81 UD	20 UD	34 D	20 UD
DW33	DW-33-SED-2-4	MSED	9/10/97	9.4 U	38 U	9.4 U	9.4 U	9.4 U
DW33	DW-33-SED-4-6	MSED	9/10/97	8.9 U	36 U	8.9 U	8.9 U	8.9 U
DW34	DW-34	MSED	9/12/97	9.2 U	37 U	9.2 U	85	9.2 U
DW34	DW-34-SED-0-2	MSED	9/10/97	11 U	45 U	11 U	29	11 U
DW34	DW-34-SED-2-4	MSED	9/10/97	8.6 U	34 U	8.6 U	8.6 U	8.6 U
DW34	DW-34-SED-4-6	MSED	9/10/97	8.7 U	35 U	8.7 U	8.7 U	8.7 U
DW35	DW-35	MSED	9/12/97	11 U	43 U	11 U	24	11 U
DW35	DW-35-SED-0-2	MSED	9/10/97	14 U	56 U	14 U	50	14 U
DW35	DW-35-SED-2-4	MSED	9/10/97	11 U	46 U	11 U	57	11 U
DW35	DW-35-SED-4-6	MSED	9/10/97	10 U	40 U	10 U	10 U	10 U
DW35	DW-35-SED-6-8	MSED	9/10/97	8.6 U	34 U	8.6 U	8.6 U	8.6 U
DW35	DW-89-SED-0-2	MSED	9/10/97	15 U	60 U	15 U	39	15 U
DW36	DW-36-SED-0-2	MSED	9/10/97	16 U	65	16 U	81	16 U
DW36	DW-36-SED-2-4	MSED	9/10/97	17 U	67	17 U	84	17 U
DW36	DW-36-SED-4-6	MSED	9/10/97	22 U	89 U	22 U	53	22 U
DW37	DW-37-SED-0-2	MSED	9/10/97	11 U	42 U	11 U	46	11 U
DW37	DW-37-SED-2-4	MSED	9/10/97	9.5 U	38 U	9.5 U	9.5 U	9.5 U
DW37	DW-37-SED-4-6	MSED	9/10/97	8.9 U	36 U	8.9 U	8.9 U	8.9 U

DATA SUMMARY REPORT

Project: Denny Way

Analyses: PESTICIDES & PCBs
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	AROCLOR-1254	AROCLOR-1260	CHLORDANE	DIELDRIN	GAMMA-BHC (LINDANE)	HEPTACHLOR
DW01	DW-01-SED-0	MSED	9/9/97	130	13 U				
DW02	DW-02-SED-0	MSED	9/12/97	40	9.1 U				
DW03	DW-03-SED-0	MSED	9/12/97	96	11 U				
DW03	DW-80	MSED	9/12/97	130	11 U				
DW03	DW-81	MSED	9/12/97	140	11 U				
DW04	DW-04-SED-0	MSED	9/12/97	220	9.9 U				
DW05	DW-05	MSED	9/12/97	20	8.3 U	5.3 UD	2.7 UD	2 UD	2 UD
DW06	DW-06	MSED	9/12/97	8.6 U	8.6 U	2.7 UD	1.4 UD	1 UD	1 UD
DW07	DW-07-SED-0	MSED	9/12/97	1000 D	9.1 UD	29 UD	15 UD	11 UD	11 UD
DW07	DW-82	MSED	9/12/97	99 D	19 UD	3.8 D	1.5 UD	1.1 UD	1.1 UD
DW07	DW-83	MSED	9/12/97	90 D	18 UD	5.8 UD	2.9 UD	2.2 UD	2.2 UD
DW08	DW-08	MSED	9/12/97	11	9.4 U	3 UD	1.5 UD	1.1 UD	1.1 UD
DW09	DW-09	MSED	9/12/97	88 JH	9.1 U				
DW09	DW-84	MSED	9/12/97	68	9 U				
DW09	DW-85	MSED	9/12/97	120	9.5 U				
DW10	DW-10-SED-0	MSED	9/12/97	260 JH	17 U				
DW11	DW-11-SED-0	MSED	9/9/97	130	11 U				
DW12	DW-12-SED-0	MSED	9/9/97	320 JL	12 UJL				
DW13	DW-13-SED-0	MSED	9/9/97	66	11 U				
DW14	DW-14-SED-0	MSED	9/9/97	69	10 U				
DW15	DW-15	MSED	9/12/97	270	12 U				
DW16	DW-16-SED-0	MSED	9/9/97	87	11 U				
DW17	DW-17-SED-0	MSED	9/9/97	100	13 U				
DW18	DW-18-SED-0	MSED	9/9/97	150	22 U				
DW19	DW-19-SED-0	MSED	9/9/97	71	11 U				
DW20	DW-20-SED-0	MSED	9/9/97	160	11 U				
DW21	DW-21-SED-0	MSED	9/9/97	230	15 U				
DW22	DW-22-SED-0	MSED	9/9/97	250	18 U				

DATA SUMMARY REPORT

Project: Denny Way

Analyses: PESTICIDES & PCBs
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	AROCLOR-1254	AROCLOR-1260	CHLORDANE	DIELDRIN	GAMMA-BHC (LINDANE)	HEPTACHLOR
DW23	DW-23-SED-0	MSED	9/9/97	65	14 U				
DW23	DW-86-SED-0	MSED	9/9/97	120	14 U				
DW23	DW-87-SED-0	MSED	9/9/97	100	14 U				
DW24	DW-24	MSED	9/12/97	100	13 U				
DW25	DW-25-SED-0-2	MSED	9/11/97	130	7.7 U	5 U	2.5 U	1.9 U	1.9 U
DW25	DW-25-SED-2-4	MSED	9/11/97	120	8.2 U	5.3 U	2.6 U	2 U	2 U
DW25	DW-25-SED-4-8	MSED	9/11/97	92	8.2 U	5.3 U	2.6 U	2 U	2 U
DW25	DW-25-SED-8-10.5	MSED	9/11/97	8.6 U	8.6 U	5.5 U	2.7 U	2.1 U	2.1 U
DW25	DW-88-SED-4-8	MSED	9/11/97	84	8.1 U	5.2 U	2.6 U	1.9 U	1.9 U
DW26	DW-26-SED-0-3	MSED	9/11/97	77	9.2 U	5.9 U	3 U	2.2 U	2.2 U
DW26	DW-26-SED-11-13	MSED	9/11/97	8.7 U	8.7 U	2.8 U	1.4 U	1 U	1 U
DW26	DW-26-SED-3-7	MSED	9/11/97	470	39 U	6.2 U	3.1 U	2.3 U	2.3 U
DW26	DW-26-SED-7-11	MSED	9/11/97	10	8.4 U	2.7 U	1.4 U	1 U	1 U
DW27	DW-27-SED-0-3	MSED	9/11/97	47	9.3 U	6 U	3 U	2.2 U	2.2 U
DW27	DW-27-SED-11-14	MSED	9/11/97	8.2 U	8.2 U	1.3 U	0.66 U	0.49 U	0.49 U
DW27	DW-27-SED-3-7	MSED	9/11/97	93	9.9 U	6.4 U	3.2 U	2.4 U	2.4 U
DW27	DW-27-SED-7-11	MSED	9/11/97	8.6 U	8.6 U	2.8 U	1.4 U	1 U	1 U
DW28	DW-28-SED-0-2	MSED	9/11/97	9.7 U	9.7 U	6.2 U	3.1 U	2.3 U	2.3 U
DW28	DW-28-SED-12-14	MSED	9/11/97	8.8 U	8.8 U	1.4 U	0.7 U	0.53 U	0.53 U
DW28	DW-28-SED-2-4	MSED	9/11/97	9.1 U	9.1 U	2.9 U	1.5 U	1.1 U	1.1 U
DW28	DW-28-SED-4-8	MSED	9/11/97	8.3 U	8.3 U	1.3 U	0.67 U	0.5 U	0.5 U
DW28	DW-28-SED-8-12	MSED	9/11/97	8.4 U	8.4 U	1.4 U	0.68 U	0.51 U	0.51 U
DW29	DW-29-SED-0-2	MSED	9/10/97	120	14 U				
DW29	DW-29-SED-2-4	MSED	9/10/97	100	12 U				
DW29	DW-29-SED-4-6	MSED	9/10/97	9.7 U	9.7 U				
DW30	DW-30	MSED	9/12/97	140	8.9 U				
DW30	DW-30-SED-0-2	MSED	9/11/97	24	9.1 U				
DW30	DW-30-SED-2-4	MSED	9/11/97	11	8.2 U				

DATA SUMMARY REPORT

Project: Denny Way

Analyses: PESTICIDES & PCBs
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	AROCLOR-1254	AROCLOR-1260	CHLORDANE	DIELDRIN	GAMMA-BHC (LINDANE)	HEPTACHLOR
DW30	DW-30-SED-4-6	MSED	9/11/97	9.9 U	9.9 U				
DW31	DW-31-SED-0-2	MSED	9/11/97	400	20 U	22	8.1 U	6.1 U	6.1 U
DW31	DW-31-SED-2-4	MSED	9/11/97	320	20 U	7.9 U	3 U	3 U	3 U
DW31	DW-31-SED-4-6	MSED	9/11/97	1100 D	110 UD	35 UD	62 D	13 UD	13 UD
DW31	DW-31-SED-6-8	MSED	9/11/97	260	29 U				
DW32	DW-32-SED-0-2	MSED	9/11/97	140	8.9 U	5.7 UD	2.9 UD	2.1 UD	2.1 UD
DW32	DW-32-SED-2-4	MSED	9/11/97	96 D	17 UD	5.3 UD	2.7 UD	2 UD	2 UD
DW33	DW-33	MSED	9/12/97	80 D	20 UD	6.4 UD	2.4 UD	2.4 UD	2.4 UD
DW33	DW-33-SED-0-2	MSED	9/10/97	57 D	20 UD	3.3 UD	1.6 UD	1.2 UD	1.2 UD
DW33	DW-33-SED-2-4	MSED	9/10/97	9.4 U	9.4 U	1.5 U	0.75 U	0.56 U	0.56 U
DW33	DW-33-SED-4-6	MSED	9/10/97	8.9 U	8.9 U	1.4 U	0.71 U	0.53 U	0.53 U
DW34	DW-34	MSED	9/12/97	190	9.2 U				
DW34	DW-34-SED-0-2	MSED	9/10/97	57	11 U				
DW34	DW-34-SED-2-4	MSED	9/10/97	8.6 U	8.6 U				
DW34	DW-34-SED-4-6	MSED	9/10/97	17	8.7 U				
DW35	DW-35	MSED	9/12/97	130	11 U				
DW35	DW-35-SED-0-2	MSED	9/10/97	140	140 U				
DW35	DW-35-SED-2-4	MSED	9/10/97	210	11 U				
DW35	DW-35-SED-4-6	MSED	9/10/97	30	10 U				
DW35	DW-35-SED-6-8	MSED	9/10/97	8.6 U	8.6 U				
DW35	DW-89-SED-0-2	MSED	9/10/97	130	15 U				
DW36	DW-36-SED-0-2	MSED	9/10/97	160	16 U				
DW36	DW-36-SED-2-4	MSED	9/10/97	170	17 U				
DW36	DW-36-SED-4-6	MSED	9/10/97	98	22 U				
DW37	DW-37-SED-0-2	MSED	9/10/97	140	11 U				
DW37	DW-37-SED-2-4	MSED	9/10/97	59	9.5 U				
DW37	DW-37-SED-4-6	MSED	9/10/97	8.9 U	8.9 U				

DATA SUMMARY REPORT

Project: Denny Way

Analyses: PESTICIDES & PCBs
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	ALDRIN
DW01	DW-01-SED-0	MSED	9/9/97				
DW02	DW-02-SED-0	MSED	9/12/97				
DW03	DW-03-SED-0	MSED	9/12/97				
DW03	DW-80	MSED	9/12/97				
DW03	DW-81	MSED	9/12/97				
DW04	DW-04-SED-0	MSED	9/12/97				
DW05	DW-05	MSED	9/12/97	6 D	2.7 UD	6.7 UD	2 UD
DW06	DW-06	MSED	9/12/97	1.9 D	1.4 UD	3.4 UD	1 UD
DW07	DW-07-SED-0	MSED	9/12/97	18 UD	15 UD	36 UD	11 UD
DW07	DW-82	MSED	9/12/97	5.1 D	1.5 UD	3.8 UD	1.1 UD
DW07	DW-83	MSED	9/12/97	6.1 D	6.9 D	7.2 UD	2.2 UD
DW08	DW-08	MSED	9/12/97	3.8 D	1.8 D	3.8 UD	1.1 UD
DW09	DW-09	MSED	9/12/97				
DW09	DW-84	MSED	9/12/97				
DW09	DW-85	MSED	9/12/97				
DW10	DW-10-SED-0	MSED	9/12/97				
DW11	DW-11-SED-0	MSED	9/9/97				
DW12	DW-12-SED-0	MSED	9/9/97				
DW13	DW-13-SED-0	MSED	9/9/97				
DW14	DW-14-SED-0	MSED	9/9/97				
DW15	DW-15	MSED	9/12/97				
DW16	DW-16-SED-0	MSED	9/9/97				
DW17	DW-17-SED-0	MSED	9/9/97				
DW18	DW-18-SED-0	MSED	9/9/97				
DW19	DW-19-SED-0	MSED	9/9/97				
DW20	DW-20-SED-0	MSED	9/9/97				
DW21	DW-21-SED-0	MSED	9/9/97				
DW22	DW-22-SED-0	MSED	9/9/97				

DATA SUMMARY REPORT

Project: Denny Way

Analyses: PESTICIDES & PCBs
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	ALDRIN
DW23	DW-23-SED-0	MSED	9/9/97				
DW23	DW-86-SED-0	MSED	9/9/97				
DW23	DW-87-SED-0	MSED	9/9/97				
DW24	DW-24	MSED	9/12/97				
DW25	DW-25-SED-0-2	MSED	9/11/97	9.1	2.5 U	6.2 U	1.9 U
DW25	DW-25-SED-2-4	MSED	9/11/97	27	2.6 U	6.6 U	2 U
DW25	DW-25-SED-4-8	MSED	9/11/97	3.3 U	3.8	6.6 U	2 U
DW25	DW-25-SED-8-10.5	MSED	9/11/97	3.4 U	2.7 U	6.9 U	2.1 U
DW25	DW-88-SED-4-8	MSED	9/11/97	10	4.4	6.5 U	1.9 U
DW26	DW-26-SED-0-3	MSED	9/11/97	7.4	4.3	7.4 U	2.2 U
DW26	DW-26-SED-11-13	MSED	9/11/97	1.7 U	1.4 U	3.5 U	1 U
DW26	DW-26-SED-3-7	MSED	9/11/97	60	17	7.8 U	2.3 U
DW26	DW-26-SED-7-11	MSED	9/11/97	1.7 U	1.4 U	3.4 U	1 U
DW27	DW-27-SED-0-3	MSED	9/11/97	6.1	3.5	7.5 U	2.2 U
DW27	DW-27-SED-11-14	MSED	9/11/97	0.82 U	0.66 U	1.6 U	0.49 U
DW27	DW-27-SED-3-7	MSED	9/11/97	17	6	7.9 U	2.4 U
DW27	DW-27-SED-7-11	MSED	9/11/97	1.7 U	1.4 U	3.5 U	1 U
DW28	DW-28-SED-0-2	MSED	9/11/97	9.4	5.4	7.8 U	2.4 U
DW28	DW-28-SED-12-14	MSED	9/11/97	0.88 U	0.7 U	1.8 U	0.53 U
DW28	DW-28-SED-2-4	MSED	9/11/97	1.8 U	1.5 U	3.7 U	1.1 U
DW28	DW-28-SED-4-8	MSED	9/11/97	0.83 U	0.67 U	1.7 U	0.5 U
DW28	DW-28-SED-8-12	MSED	9/11/97	0.84 U	0.68 U	1.7 U	0.51 U
DW29	DW-29-SED-0-2	MSED	9/10/97				
DW29	DW-29-SED-2-4	MSED	9/10/97				
DW29	DW-29-SED-4-6	MSED	9/10/97				
DW30	DW-30	MSED	9/12/97				
DW30	DW-30-SED-0-2	MSED	9/11/97				
DW30	DW-30-SED-2-4	MSED	9/11/97				

DATA SUMMARY REPORT

Project: Denny Way

Analyses: PESTICIDES & PCBs
Units: µg/kg, dry weight

Location	Sample Number	Matrix	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	ALDRIN
DW30	DW-30-SED-4-6	MSED	9/11/97				
DW31	DW-31-SED-0-2	MSED	9/11/97	10 U	17	20 U	6.1 U
DW31	DW-31-SED-2-4	MSED	9/11/97	48	12	9.9 U	3 U
DW31	DW-31-SED-4-6	MSED	9/11/97	130 D	40 D	44 UD	13 UD
DW31	DW-31-SED-6-8	MSED	9/11/97				
DW32	DW-32-SED-0-2	MSED	9/11/97	16 D	5 D	7.1 UD	2.1 UD
DW32	DW-32-SED-2-4	MSED	9/11/97	19 D	4.1 D	6.6 UD	2 UD
DW33	DW-33	MSED	9/12/97	7.2 D	4.2 D	8 UD	2.4 UD
DW33	DW-33-SED-0-2	MSED	9/10/97	3.7 D	3.1 D	4.1 UD	1.2 UD
DW33	DW-33-SED-2-4	MSED	9/10/97	0.94 U	1.1	1.9 U	0.56 U
DW33	DW-33-SED-4-6	MSED	9/10/97	4.1	0.71 U	1.8 U	0.53 U
DW34	DW-34	MSED	9/12/97				
DW34	DW-34-SED-0-2	MSED	9/10/97				
DW34	DW-34-SED-2-4	MSED	9/10/97				
DW34	DW-34-SED-4-6	MSED	9/10/97				
DW35	DW-35	MSED	9/12/97				
DW35	DW-35-SED-0-2	MSED	9/10/97				
DW35	DW-35-SED-2-4	MSED	9/10/97				
DW35	DW-35-SED-4-6	MSED	9/10/97				
DW35	DW-35-SED-6-8	MSED	9/10/97				
DW35	DW-89-SED-0-2	MSED	9/10/97				
DW36	DW-36-SED-0-2	MSED	9/10/97				
DW36	DW-36-SED-2-4	MSED	9/10/97				
DW36	DW-36-SED-4-6	MSED	9/10/97				
DW37	DW-37-SED-0-2	MSED	9/10/97				
DW37	DW-37-SED-2-4	MSED	9/10/97				
DW37	DW-37-SED-4-6	MSED	9/10/97				

APPENDIX C

CHEMICAL DATA VALIDATION REPORTS

Floyd & Snider Inc.
Strategy and Technical Solutions for Contaminated Properties
83 South King Street Suite 614 Seattle, Washington 98104 206.292.2078 fax 682.7867

DATA VALIDATION REPORT

Denny Way/Lake Union CSO Control Project

Prepared For:
Black & Veatch
215 Columbia Street
Seattle, WA 98104

Prepared By:
Floyd & Snider Inc.
83 South King Street
Suite 614
Seattle, WA 98104

December 3, 1997

Data Validation Report
Sediment Management Samples

Fifteen sediment samples were collected by Black and Veatch on September 9, 1997 for the Denny Way Lake Union CSO Control project. Analyses were performed by AMTEST Laboratories. Laboratory ID numbers 97-A012468 through 97-A012482 were assigned to these samples.

Thirty-three sediment samples were collected by Black and Veatch on September 10, 11, and 12, 1997 for the Denny Way Lake Union CSO Control project. Analyses were performed by AMTEST Laboratories. Laboratory ID Numbers 97-A012867 through 97-A012899 were assigned to these samples.

A summary evaluation was performed on the analytical results. Numeric quality control criteria for the requirements listed below are presented in the project SAP and quality control sections of the data package. Qualified sample results are listed in table 1.

SEMI-VOLATILES

Semi-volatile analysis was performed by EPA method 8270.

The following data requirements were evaluated:

- √ Extraction and analysis holding times;
- √ Blank analysis frequency and contamination;
- √ Standard reference material analysis frequency and recoveries;
- √ Matrix spike/matrix spike duplicate analysis frequency and recoveries;
- √ Surrogate recoveries; and
- √ Matrix spike duplicate RPDs.

All data are acceptable.

PCBS

PCB analysis was performed by EPA method 8081.

The following data requirements were evaluated:

- Extraction and analysis holding times;
- √ Blank analysis frequency and contamination;
- √ Standard reference material analysis frequency and recoveries;

- Matrix spike/matrix spike duplicate analysis frequency and recoveries;
- Surrogate recoveries; and
- √ Matrix spike duplicate RPDs.

Sample DW12-SED-0 was extracted 21 days after sampling, exceeding the 14 day holding time by 7 days. Additionally, the aroclor 1260 recoveries (28% and 40%) were below control limits in QC samples DW12-SED-0 MS and DW12-SED-0 MSD, indicating a potential low bias. All positive and non-detect PCB results for the sample are qualified as estimated (J-L and UJ-L).

The hexabromobenzene surrogate recoveries in samples DW-10-SED and DW-09 (175% and 189%) exceeded the control limits of 26-162%, indicating a potential high bias. All positive PCB results in these two samples are qualified as estimated (J-H).

All other data are acceptable.

TOTAL METALS

Analysis for chromium, copper, lead, and zinc was performed by EPA method 6010 (PSEP protocols/ICP). Analyses for arsenic, cadmium, and silver were performed by EPA methods 7060, 7131, and 7760, respectively (PSEP protocols/GFAA). Analysis for mercury was performed by EPA method 7471 (Cold Vapor).

The following data requirements were evaluated:

- √ Preparation and analysis holding times;
- √ Blank analysis frequency and contamination;
- √ Standard reference material analysis frequency and recoveries;
- √ Matrix spike analysis frequency and recoveries; and
- √ Sample duplicate analysis frequency and RPDs.

All data are acceptable.

AMMONIA

Analysis for Ammonia was performed by method Plumb 1981.

The following data requirements were evaluated:

- √ Preparation and analysis holding times;
- √ Blank analysis frequency and contamination;
- √ Check standard analysis frequency and recoveries; and
- √ Sample triplicate analysis frequency and RPDs.

All data are acceptable.

TOC

Analysis for TOC was performed by Standard Methods SM5310B.

The following data requirements were evaluated:

- √ Preparation and analysis holding times;
- √ Blank analysis frequency and contamination;
- √ Standard reference material analysis frequency and recoveries;
- √ Matrix spike analysis frequency and recoveries; and
- √ Sample triplicate analysis frequency and RPDs.

All data are acceptable.

TOTAL SULFIDES

Analysis for Total Sulfides was performed using PSEP protocols (PSEP 1986b).

The following data requirements were evaluated:

- √ Preparation and analysis holding times;
- √ Blank analysis frequency and contamination;
- √ Matrix spike analysis frequency and recoveries; and
- • Sample triplicate analysis frequency and RPDs.

The %RSD for triplicate sample DW-24-SED-0-2 (23%) exceeded the control limit of 20%. All other data requirements were met and no qualifiers are assigned.

All data are acceptable.

TOTAL VOLATILE SOLIDS

Analysis for Total Volatile Solids was performed using PSEP protocols (PSEP 1986b).

The following data requirement was evaluated:

- √ Analysis holding times
- • Sample triplicate analysis frequency and RSD

The % RSDs for triplicate samples DW-81A and DW-81B (26% and 30%) exceeded the control limit of 20% indicating variability. Total volatile solid results for samples DW-81, DW-03-SED-0, and DW-15 are qualified as estimated (J-V).

All other data are acceptable.

TOTAL SOLIDS

Analysis for Total Solids was performed using ASTM method 2540B (ASTM 1992).

The following data requirement was evaluated:

- √ Analysis holding times
- √ Sample triplicate analysis frequency and RSD

All data are acceptable.

GRAINSIZE

Analysis for Grain Size was performed using ASTM method 422-63.

The following data requirement was evaluated:

- √ Analysis holding times
- • Sample triplicate analysis frequency and RSD

Sample triplicate data was not provided with the samples collected September 9. However, triplicate results from the remaining samples were within the 20% control limit and no qualifiers are assigned.

All data are acceptable.

DEFINITIONS

Code	Definition
√	Data requirement was met.
•	Data requirement was not met.
J-H	Data is estimated due to high surrogate, blank spike, or matrix spike recoveries. High bias is indicated.
J-L	Data is estimated due to low surrogate, blank spike, or matrix spike recoveries. Low bias is indicated.
J-V	Data is estimated due to field or matrix spike duplicate variability.

UJ-L	Reporting limit is estimated due to low surrogate, blank spike, or matrix spike recoveries. Low bias is indicated.

REFERENCES

National Functional Guidelines for Organic Data Review, USEPA, December 1990, Revised June 1991

National Functional Guidelines for Inorganic Data Review, USEPA, February 1994

Puget Sound Estuary Program (PSEP) Recommended Protocols for Measuring Selected Environmental Variables in Puget Sound, March 1996 and April 1997.

SIGNATURE

[illegible] FOR:
Cari Sayler
Project Chemist

12/3/97
Date

TABLE 1

Sample Number	Analyte	Qualifier	Comments
DW12-SED-0	Aroclor 1016	UJ-L	Exceeded holding times and low spike recovery
DW12-SED-0	Aroclor 1221	UJ-L	Exceeded holding times and low spike recovery
DW12-SED-0	Aroclor 1232	UJ-L	Exceeded holding times and low spike recovery
DW12-SED-0	Aroclor 1242	J-L	Exceeded holding times and low spike recovery
DW12-SED-0	Aroclor 1248	UJ-L	Exceeded holding times and low spike recovery
DW12-SED-0	Aroclor 1254	J-L	Exceeded holding times and low spike recovery
DW12-SED-0	Aroclor 1260	UJ-L	Exceeded holding times and low spike recovery
DW-10-SED-0	Aroclor 1242	J-H	High surrogate recovery
DW-10-SED-0	Aroclor 1254	J-H	High surrogate recovery
DW-09	Aroclor 1242	J-H	High surrogate recovery
DW-09	Aroclor 1254	J-H	High surrogate recovery
DW-81	Total volatile solid	J-V	High triplicate RSD
DW-03-SED-0	Total volatile solid	J-V	High triplicate RSD
DW-15	Total volatile solid	J-V	High triplicate RSD

Data Validation Report
PSDDA Samples

Thirty-three sediment samples were collected by Black and Veatch on September 10, 11, and 12, 1997 for the Denny Way Lake Union CSO Control project. Analyses were performed by AMTEST Laboratories. Laboratory ID Numbers 97-A012835 through 97-A012866 and 97-A012900 were assigned to these samples. A summary evaluation was performed on the analytical results. Numeric quality control criteria for the requirements listed below are presented in the project SAP and quality control sections of the data package. Qualified sample results are listed in table 2.

SEMI-VOLATILES

Semi-volatile analysis was performed by EPA method 8270.

The following data requirements were evaluated:

- √ Extraction and analysis holding times;
- √ Blank analysis frequency and contamination;
- √ Standard reference material analysis frequency and recoveries;
- √ Matrix spike/matrix spike duplicate analysis frequency and recoveries;
- √ Surrogate recoveries; and
- √ Matrix spike duplicate RPDs.

All data are acceptable.

PESTICIDE/PCBS

PCB analysis was performed by EPA method 8081.

The following data requirements were evaluated:

- √ Extraction and analysis holding times;
- √ Blank analysis frequency and contamination;
- √ Standard reference material analysis frequency and recoveries;
- √ Matrix spike/matrix spike duplicate analysis frequency and recoveries;
- √ Surrogate recoveries; and
- √ Matrix spike duplicate RPDs.

All data are acceptable.

VOLATILES

Volatile analysis was performed by EPA method 8260.

The following data requirements were evaluated:

- √ Analysis holding times;
- √ Blank analysis frequency and contamination;
- • Matrix spike/matrix spike duplicate analysis frequency and recoveries;
- √ Surrogate recoveries; and
- √ Matrix spike duplicate RPDs.

The laboratory noted the internal standard associated with the Dichlorobenzenes was outside of control limits in several samples. Associated positive and non-detect data are qualified as estimated with unknown bias (J-N and UJ-N).

Matrix spike recoveries exceeded the control limits in two matrix spike/matrix spike duplicate pairs as shown below:

Analyte	QC Sample	Recovery	Control Limit
Total Xylene	DW31-SED-4-6 MS	273	87-128
	DW31-SED-4-6 MSD	369	
1,3-Dichlorobenzene	DW31-SED-4-6 MS	137	55-126
	DW-08 MS	188	
1,4-Dichlorobenzene	DW31-SED-4-6 MS	152	56-116
	DW31-SED-4-6 MSD	143	
	DW-08 MS	175	
1,2-Dichlorobenzene	DW31-SED-4-6 MS	177	52-123
	DW31-SED-4-6 MSD	144	
	DW-08 MS	175	
	DW-08 MSD	137	

Positive results associated with QC samples DW31-SED-4-6 MS/MSD are qualified as estimated with a potential high bias (J-H). Because of the compounding affect of the internal standard problem, positive results associated with QC samples DW08 MS/MSD are qualified as estimated with an unknown bias (J-N).

All other data are acceptable.

TOTAL METALS

Analyses for chromium, copper, lead, and zinc were performed by EPA method 6010 (PSEP protocols/ICP). Analyses for arsenic, cadmium, and silver were performed by EPA methods 7060, 7131, and 7760, respectively (PSEP protocols/GFAA). Analysis for mercury was performed by EPA method 7471 (Cold Vapor).

The following data requirements were evaluated:

- √ Preparation and analysis holding times;
- √ Blank analysis frequency and contamination;
- √ Standard reference material analysis frequency and recoveries;
- √ Matrix spike analysis frequency and recoveries; and
- √ Sample duplicate analysis frequency and RPDs.

All data are acceptable.

AMMONIA

Analysis for Ammonia was performed by method Plumb 1981.

The following data requirements were evaluated:

- √ Preparation and analysis holding times;
- √ Blank analysis frequency and contamination;
- √ Check standard analysis frequency and recoveries; and
- √ Sample triplicate analysis frequency and RPDs.

All data are acceptable.

TOC

Analysis for TOC was performed by Standard Methods SM5310B.

The following data requirements were evaluated:

- √ Preparation and analysis holding times;
- √ Blank analysis frequency and contamination;
- √ Standard reference material analysis frequency and recoveries;
- √ Matrix spike analysis frequency and recoveries; and
- √ Sample triplicate analysis frequency and RPDs.

All data are acceptable.

TOTAL SULFIDES

Analysis for Total Sulfides was performed using PSEP protocols (PSEP 1986b).

The following data requirements were evaluated:

- √ Preparation and analysis holding times;
- √ Blank analysis frequency and contamination;
- √ Matrix spike analysis frequency and recoveries; and
- √ Sample triplicate analysis frequency and RPDs.

All data are acceptable.

TOTAL VOLATILE SOLIDS

Analysis for Total Volatile Solids was performed using PSEP protocols (PSEP 1986b).

The following data requirement was evaluated:

- √ Analysis holding times
- √ Sample triplicate analysis frequency and RSD

All data are acceptable.

TOTAL SOLIDS

Analysis for Total Solids was performed using ASTM method 2540B (ASTM 1992).

The following data requirement was evaluated:

- √ Analysis holding times
- √ Sample triplicate analysis frequency and RSD

All data are acceptable.

GRAINSIZE

Analysis for Grain Size was performed using ASTM method 422-63.

The following data requirement was evaluated:

- √ Analysis holding times
- √ Sample triplicate analysis frequency and RSD

All data are acceptable.

DEFINITIONS

Code	Definition
√	Data requirement was met.
•	Data requirement was not met.
J-H	Data is estimated due to high surrogate, blank spike, or matrix spike recoveries. High bias is indicated.
J-L	Data is estimated due to low surrogate, blank spike, or matrix spike recoveries. Low bias is indicated.
J-V	Data is estimated due to field or matrix spike duplicate variability.
J-N	Data is estimated. Bias is not known.
UJ-L	Reporting limit is estimated due to low surrogate, blank spike, or matrix spike recoveries. Low bias is indicated.

REFERENCES

National Functional Guidelines for Organic Data Review, USEPA, December 1990, Revised June 1991

National Functional Guidelines for Inorganic Data Review, USEPA, February 1994

Puget Sound Estuary Program (PSEP) Recommended Protocols for Measuring Selected Environmental Variables in Puget Sound, March 1996 and April 1997.

SIGNATURE

Christy M Schmidt FOR:
Cari Sayler
Project Chemist

12/3/97
Date

TABLE 2

Sample Number	Analyte	Qualifier	Comments
DW-31-SED-0-2	1,4-Dichlorobenzene	J-H	High matrix spike recoveries
DW-31-SED-2-4	1,4-Dichlorobenzene	J-H	High matrix spike recoveries
DW-31-SED-2-4	Total Xyenes	J-H	High matrix spike recoveries
DW-31-SED-4-6	1,4-Dichlorobenzene	J-H	High matrix spike recoveries
DW-31-SED-4-6	Total Xyenes	J-H	High matrix spike recoveries
DW-32-SED-0-2	1,4-Dichlorobenzene	J-H	High matrix spike recoveries
DW-82	1,3-Dichlorobenzene	UJ-N	Internal standard areas
DW-82	1,4-Dichlorobenzene	UJ-N	Internal standard areas
DW-82	1,2-Dichlorobenzene	UJ-N	Internal standard areas
DW-83	1,3-Dichlorobenzene	UJ-N	Internal standard areas
DW-83	1,4-Dichlorobenzene	UJ-N	Internal standard areas
DW-83	1,2-Dichlorobenzene	UJ-N	Internal standard areas
DW-08	1,3-Dichlorobenzene	UJ-N	Internal standard areas
DW-08	1,4-Dichlorobenzene	UJ-N	Internal standard areas
DW-08	1,2-Dichlorobenzene	UJ-N	Internal standard areas
DW-07-SED-0	1,3-Dichlorobenzene	UJ-N	Internal standard areas
DW-07-SED-0	1,4-Dichlorobenzene	J-N	Internal standard areas, high matrix spike recoveries
DW-07-SED-0	1,2-Dichlorobenzene	UJ-N	Internal standard areas
DW-06	1,3-Dichlorobenzene	UJ-N	Internal standard areas
DW-06	1,4-Dichlorobenzene	UJ-N	Internal standard areas
DW-06	1,2-Dichlorobenzene	UJ-N	Internal standard areas
DW-05	1,3-Dichlorobenzene	UJ-N	Internal standard areas
DW-05	1,4-Dichlorobenzene	UJ-N	Internal standard areas
DW-05	1,2-Dichlorobenzene	UJ-N	Internal standard areas

Chemistry
Validation Report
Denny Way/Lake Union CSO Control Project
A97-07-04

This validation report covers the analytical data resulting from sediment samples submitted to AM Test Laboratories of Redmond originally submitted during September 1997, but frozen in sample archive until authorized for on March 25, 1998. Two samples (DW-31-SED-6-8 and DW-35-SED-6-8) were submitted for the following Sediment Management Standards (SMS) analyses: Semivolatiles, PCBs, Metals, Grain Size, Total Volatile Solids, Total Solids, Ammonia and Total Organic Carbon. Eight samples (DW-03-SED-0, DW-09,DW-24, DW-33, DW-34, DW-35, DW-32-SED-0-2, DW-32-SED-2-4) were submitted for the Semivolatiles analysis only.

Data reports were received by hard copy 34 days after authorization to analyze the archived environmental samples.

Data were reviewed for completeness, accuracy, precision and compliance with the Sampling and Analysis Plan (SAP). AM Test was required to provide sample results and Quality Assurance/Quality Control (QA/QC) information that included summaries of surrogate, method/trip blank, Laboratory Control Samples (LCS), matrix spikes and other QA measures. The review was performed using the Contract Laboratory Program (CLP) Functional Guidelines for the Evaluation of Organic and Inorganics as a benchmark, with modifications consistent with analytical techniques used for sediment studies. An example of the Data Validation Checklist that used for the review is attached. A review of a representative set of raw data was performed for each of the analytical parameters as verification of the reports provided by AM Test.

Comments and actions resulting from the validation are separated in analyte groups. A thorough review of the following areas was performed: Chain of Custody, Holding Times (extraction and analysis), Calibrations (where available), Method and Trip Blanks, Surrogates, Matrix Spikes, Sampler Duplicates, Reporting Limits, Units of Measure, Calculations (when available), Field duplicates, LCS. Please note that only major observations or specific actions by the validator are presented in this summary.

Semivolatiles (abbreviated list) by EPA Method 8270 (Modified using PSEP Protocols)

Benzoic Acid recovery was low (12-14%) in the MS/MSD set concurrently extracted and analyzed with the environmental samples. However, recoveries were acceptable for all

other compounds in the MS/MSD and associated reference material and because of the difficult nature of this compound, no data qualification is recommended.

Dilutions were required based on matrix interferences and analyte concentrations; however, the laboratory correctly reported the sample-specific reporting limits.

All data for this parameter are acceptable.

PCBs by EPA Method 8081 Modified
PCB analysis was performed without any observed problems. All verifiable quality assurance criteria were successfully met. Data are acceptable.

Hexachlorobenzene and Trichlorobenzene by EPA Method 8081 modified
In order to achieve lower reporting limits, this technique was chosen due to the sensitivity of the Electron Capture Detector. The original data package did not provide actual spike results, however additional information submitted by the laboratory shows the analysis is under control. All data are acceptable without qualification.

Metals by EPA Method 200.8 mod. ICP/MS and CVAA
Metals analysis was acceptable. Mercury results for the two frozen samples were qualified as estimates (with the J qualifier) because samples exceeded the 28-day holding time for this parameter.

Grain Size by ASTM D422 (PSEP modifications)
Grain Size determination was performed without any observed problems. All verifiable quality assurance criteria were successfully met however, since the samples were frozen before analysis, all sample data is qualified with the "J" data qualifier.

Total Volatile Solids by PSEP Method
Total volatile solids results for the two frozen samples were qualified as estimates (with the J qualifier) because samples exceeded the 6 month holding time for this parameter.

Total Solids by PSEP Method
Total solids results for the two frozen samples were qualified as estimates (with the J qualifier) because samples exceeded the 6 month holding time for this parameter.

Total Organic Carbon by ASTM D4122-89M Method
Total organic carbon results for the two frozen samples were qualified as estimates (with the J qualifier) because samples exceeded the 6 month holding time for this parameter.

Overall Comments:

Overall, the data quality was acceptable with the exception of the grain size data. Documentation sufficient for an extended PSDDA Level 1 data review was provided along with raw data and calibrations.

Definitions

J Data is estimated. Bias has not been established.

References

National Functional Guidelines for Organic Data Review, USEPA, December 1990, Revised June 1991

National Functional guidelines for Inorganic data Review, USEPA, February 1994

Puget Sound Estuary Program (PSEP) Recommended Protocols for measuring Selected Environmental Variables in Puget Sound, March 1996 and April 1997

APPENDIX D

SMS DETECTION LIMIT EXCEEDANCES EVALUATION

APPENDIX D

DENNY WAY/LAKE UNION CSO CONTROL PROJECT SMS DETECTION LIMIT EXCEEDANCES EVALUATION

Best professional judgment has been exercised in designating surface sediment samples with the few detection limit exceedances of SMS criteria. Chemicals whose detection limits exceed SMS criteria in Table D-1 (and Table 4-3 in the main text) are restricted to four chemical groups: chlorinated benzenes, phenolic compounds, miscellaneous extractable compounds, and phthalates. The analytical laboratory who performed the chemical testing (AmTest) took all necessary steps within the parameters of the SAP to reduce method detection limits below SMS criteria. Samples with detection limit exceedances have been evaluated relative to SMS according to the following:

- Two phenolic compounds (2,4-dimethylphenol and 2-methylphenol) and two miscellaneous extractable compounds (benzyl alcohol and benzoic acid) were detected above CSL criteria in surface sediment samples DW-10-SED and DW-15. The SMS SQS values for these compounds are very close to the routinely achievable analytical detection limits. In 1991, Ecology prepared an issue paper for the PSDDA Annual Review Meeting that acknowledged the difficulties laboratories were having detecting certain organic chemicals (those listed above and two other chemicals) below criteria during the first three years of PSDDA implementation (Gries 1991). Since that time, PSDDA SLs for three of the four compounds and PSDDA MLs for the four compounds listed above were increased using updated AET information (published in 1998). However, revisions to the SMS have not yet been adopted.

  In Samples DW-10-SED and DW-15, the SMS exceedances were caused by the analytical dilution process (which increases detection limits). The analytical process of dilution increased detection limits above the SQS as well as the CSL. Eight samples archived at the conclusion of sediment sampling in 1997 were re-analyzed in March and April of 1998 to potentially reduce detection limits below SMS criteria. The laboratory was successful in reducing detection limits for phenolic compounds, hexachlorobenzene, and 1,2,4-trichlorobenzene below SMS criteria (see Table D-2). Because 1) dilution artificially increased detection limits; 2) stations are located away from the immediate vicinity of the existing CSO; 3) these compounds have not been a historical chemicals of concern; and 4) the re-analysis of eight samples from this project succeeded in lowering detection limits for these same compounds below SMS criteria, conclusions about the sediment quality of DW-10-SED and DW-15 are based on detected SQS exceedances.

- 1,2-dichlorobenzene was detected above the CSL value in surface sediment sample DW-35. Because this sample was not located inshore of the sediment cap, dichlorobenzenes were not analyzed using Method 8260, the method commonly used in this region to lower detection limits below SMS criteria for this parameter. In accordance with the SAP (Black and Veatch 1997), the CSL detection limit exceedance measured at this location is set aside and sediment quality is based on the detected SQS exceedance.

- Several detection limit exceedances were measured in samples DW-05, DW-06, and DW-08, all of which were collected intertidally in the near vicinity of the existing CSO outfall and the planned area of outfall construction. Again, exceedances were primarily caused by analytical dilution processes. Because the stations are located inshore of the sediment cap, the results can not be set aside. These intertidal samples were not re-analyzed because the samples occur in an area that may be regraded and cleaned up in conjunction with the proposed outfall construction. At this time, Station DW-05 is designated as exceeding SQS, based on detected SQS exceedances.

REFERENCES

Black and Veatch. 1997. Denny Way/Lake Union CSO Control Project Sampling and Analysis Plan: Sediment Characterization. Prepared for King County Department of Natural Resources. Seattle, WA.

Gries, Tom. 1991. Changes to the PSDDA Screening and Maximum Level Values. Issue Paper presented at the 1991 PSDDA Annual Review Meeting. Prepared for the PSDDA Agencies.

Table D-1. Summary of Chemicals With Detection Limits that Exceeded SMS Criteria. Parentheses indicate exceedances of the detection limit.

Sample ID	TOC (%)	Number of SQS Exceedances (<CSL)	Undetected Chemicals that Exceed SQS	Number of CSL Exceedances	Undetected Chemicals that Exceed CSL	Is Station Located Inshore of Cap?	Proposed Action For Evaluating Detection Limit Exceedances
DW-05	1.2	5(2)	NA	2(2)	HCB, 2,4-Dimethylphenol	yes	Intertidal Area[1]
DW-06	0.79	1(1)	Butylbenzyl phthalate	4(4)	HCB, HCBD, 1,2,4-Trichlorobenzene, 2,4-Dimethylphenol	yes	Intertidal Area[1]
DW-08	2	2(2)	HCB,1,2,4-Trichlorobenzene	1(1)	2,4-Dimethylphenol	yes	Intertidal Area[1]
DW-10-SED	3.2	7(3)	NA	4(4)	2,4-Dimethylphenol, Benzyl Alcohol, 2-Methylphenol, Benzoic Acid	no	Reference SAP guidance
DW-15	2.3	2	--	1(1)	2,4-Dimethylphenol	no	Reference SAP guidance
DW-35	1.3	2(1)	NA	1(1)	1,2-Dichlorobenzene	no	Reference SAP guidance
DW-29-SED-4-6	0.98	1(1)	HCB	0	--	no	Compare to dry weight criteria
DW-30-SED-0-2	0.84	1(1)	HCB	0	--	yes	Compare to dry weight criteria
DW-30-SED-4-6	0.91	1(1)	HCB	0	--	yes	Compare to dry weight criteria
DW-33-SED-0-2	1.1	1(1)	HCB	0	--	yes	Compare to dry weight criteria
DW-33-SED-2-4	0.6	2(2)	HCB, 1,2,4-Trichlorobenzene	0	--	yes	Compare to dry weight criteria
DW-33-SED-4-6	0.49M	2(2)	HCB, 1,2,4-Trichlorobenzene	0	--	yes	Compare to dry weight criteria
DW-34-SED-2-4	0.42	1(1)	HCB	0	--	no	Compare to dry weight criteria
DW-34-SED-4-6	0.37	2(2)	HCB, 1,2,4-Trichlorobenzene	0	--	no	Compare to dry weight criteria
DW-37-SED-0-2	1	6(3)	NA	1(1)	2,4-Dimethylphenol	no	Reference SAP guidance
DW-37-SED-4-6	0.32	4(4)	1,4-Dichlorobenzene, 1,2,4-Trichlorobenzene, HCB, Buthylbenzyl phthalate	0	--	no	Compare to dry weight criteria

SQS = Sediment Quality Standard, CSL = Cleanup Screening Level, TOC = Total Organic Carbon, HCB = Hexachlorobenzene, HCBD = Hexachlorobutadiene

NA = Not Applicable. Sediment quality determination is driven by detected chemicals that exceed criteria.

[1] Station occurs in an intertidal area that may be regraded and cleaned up in association with outfall construction. For this reason, samples were not re-analyzed to reduce detection limits below SMS criteria.

Table D-2. Comparison of Sediment Chemical Testing Results From 1st Round to 2nd Round.

Sample	Chemicals Re-Analyzed	Units	SQS	1st Round Testing Results	2nd Round Testing Results
DW-03-SED-0	2,4-dimethylphenol	µg/kg, dry	29	39 UD	21 UD
DW-09	2,4-dimethylphenol	µg/kg, dry	29	37 UD	18 UD
DW-24	2,4-dimethylphenol	µg/kg, dry	29	51 UD	13 U
	butyl benzyl phthalate	mg/kg, OC	4.9	6.3 UD	1.7 U
	benzyl alcohol	µg/kg, dry	57	61 UD	16 U
DW-33	2,4-dimethylphenol	µg/kg, dry	29	40 UD	19 UD
DW-34	2,4-dimethylphenol	µg/kg, dry	29	38 UD	19 UD
DW-35	hexachlorobenzene	mg/kg, OC	0.38	5 UD	0.17 U
	2,4-dimethylphenol	µg/kg, dry	29	54 UD	21 UD
	1,2,4-trichlorobenzene	mg/kg, OC	0.81	2.5 UD	0.17 U
	hexachlorobutadiene	mg/kg, OC	3.9	6.7 UD	0.17 U
	butyl benzyl phthalate	mg/kg, OC	4.9	8.5 UD	8.5 D
	benzyl alcohol	µg/kg, dry	57	65 UD	26 UD
DW-32-SED-0-2	2,4-dimethylphenol	µg/kg, dry	29	36 UD	18 UD
DW-32-SED-2-4	2,4-dimethylphenol	µg/kg, dry	29	34 UD	17 UD