Report

Phase 1 Data Evaluation Report and Phase 2 Work Planning for City of Portland Outfall M-1

Source Control Pilot Project

Prepared for

City of Portland
Bureau of Environmental Services

April 2003

Prepared by

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USR/023400004.DOC

Printed on Recycled and Recyclable Paper

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Abbreviations and Acronyms

BES	Bureau of Environmental Services
BNA	base, neutral, acid (extractable)
CAS	Columbia Analytical Services, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
City	City of Portland
cm	centimeter(s)
COC	chain-of-custody
CRL	Confirmed Release Lists
CSO	combined sewer overflow
DEQ	Oregon Department of Environmental Quality
DGPS	Differential Global Positioning System
DQO	data quality objective
ECSI	Environmental Cleanup Site Inventory
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
gpm	gallons per minute
GPS	Global Positioning System
Hg	mercury
HPAH	high polynuclear aromatic hydrocarbon
IDEP	Illicit Discharge Elimination Program
LPAH	low polynuclear aromatic hydrocarbon
LQG	Large Quantity Generator
LUST	leaking underground storage tank
mg/kg	milligrams per kilogram
mg/L	milligram(s) per liter
MRL	method reporting limit
MS4	municipal separate storm sewer system
MSO	Marine Safety Office
N/A	not available
NA	not analyzed
NPDES	National Pollutant Discharge Elimination System
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
ppm	parts per million
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
SIC	Standard Industrial Classification
SPCC	Spill Prevention, Control, and Countermeasure Plan
SPCR	Spill Protection and Citizen Response
STL	Severn Trent Laboratories

SWPCP	Stormwater Pollution Control Plan
SVOC	semivolatile organic compound
TOC	total organic carbon
TPH	total petroleum hydrocarbon
TSD	treatment, storage, and disposal
TSS	total suspended solids
USCG	U.S. Coast Guard
UST	underground storage tank

SECTION 1

Introduction

This document presents the findings for Phase 1 of the City of Portland (City) Source Control Pilot Project and recommendations for follow-on Phase 2 source control activities at Outfall M-1. The purpose of the Pilot Project is to develop a process for the following activities:

- Evaluate the impacts of discharge from the City stormwater outfalls on sediment quality in the Willamette River
- Identify upland sources of contaminants within the outfall basins
- Guide subsequent source control efforts

Source control is defined as those actions taken to identify and reduce the release of contaminants to Portland Harbor, to the extent needed to be protective of human health and the environment. The driver for this Pilot Project was the December 2000 designation of Portland Harbor as a Superfund site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

Both the City's Bureau of Environmental Services (BES) and Oregon Department of Environmental Quality (DEQ) have implemented programs to investigate and control sources of contamination to the Willamette River and are working together through this interagency Pilot Project to coordinate efforts.

The Pilot Project consists of two distinct phases, as described in the following subsections.

1.1 Phase 1

Phase 1 of the Pilot Project consisted of collecting sediment samples adjacent to and in the vicinity of two outfalls, and conducting an assessment of potential upland sources of sediment contamination within the two outfall drainage basins. This report provides the Phase 1 results for Outfall M-1. Results for Outfall 18 will be provided in a subsequent report.

The purpose of Phase 1 was to determine if Outfall M-1 is a current source of contamination to the river sediments and to identify which chemicals of concern may warrant further evaluation in Phase 2 of the Pilot Project. Additional chemicals of concern may be identified at M-1 as part of the CERCLA Remedial Investigation/Feasibility Study (RI/FS) process or as other information becomes available.

The Phase 1 investigation was conducted as outlined in the work plan entitled *Source Control Pilot Project for the City of Portland Outfalls* (CH2M HILL, August 2002). The work plan was approved by DEQ and the U.S. Environmental Protection Agency (EPA) on August 15, 2002. Outlined in the work plan are the Pilot Project objectives, a regulatory framework, the work

approach and decision process, the basin assessment process, a description of sediment sampling and analysis, and reporting procedures.

1.2 Phase 2

The purpose of Phase 2 of the Pilot Project is to develop a process for identifying current upland sources of elevated constituents identified in Phase 1 and to identify source control actions. The general objectives of Phase 2 are as follows:

- Identify upland sites or over-water sites that may be contributing contamination to Outfall M-1, to the public stormwater conveyance system, or to the area near Outfall M-1 (e.g., adjacent outfalls).
- Identify data gaps (i.e., potential sampling needs) to determine what contamination is present and to locate possible sources of contamination.
- Develop a process for coordinating DEQ and City source control efforts.
- Implement community outreach and technical assistance to facilities within the basin, focusing on source control issues.

Section 5 of this report presents recommendations for conducting Phase 2 source control activities at Outfall M-1.

1.3 Organization of This Report

This report is organized as follows:

Section 1—Introduction, provides an overview of the Pilot Project.

Section 2—Sediment Sampling at City Outfall M-1, summarizes the field investigation and activities performed at Outfall M-1.

Section 3—Basin Assessment for Outfall M-1, summarizes the basin assessment activities performed at Outfall M-1.

Section 4—Evaluation of Results, evaluates the Pilot Project sampling results at Outfall M-1.

Section 5—Recommendations for Phase 2 Work Planning, provides recommended follow-on source control actions at Outfall M-1.

Section 6—References, lists the references consulted and cited in this report.

Appendixes for this report provide supporting documentation.

SECTION 2

Sediment Sampling at City Outfall M-1

This section summarizes the field observations and activities conducted at City Outfall M-1 on August 21 and August 22, 2002. Sediment samples were collected in accordance with the approved work plan. The data quality objectives (DQOs) for the sediment investigation are presented in Table 4-1 of the work plan.

2.1 Field Activities at Outfall M-1

Nine surface sediment samples, one field duplicate, and one equipment blank were collected in the vicinity of Outfall M-1. Samples were collected from the upper 15 centimeters (cm) of the river bottom. Figure 2-1 shows the sample locations for each sediment sample. As outlined in Section A.3 of the work plan, the sampling grid at Outfall M-1 was developed to collect samples within the assumed discharge area and identify possible chemical gradients. Sample locations were adjusted during the field sampling event due to the presence of riprap.

Sediment grab samples were collected using standard protocols and guidelines for chemical analysis as presented in the EPA document entitled *Methods for Collection, Storage, and Manipulation of Sediments for Chemical and Toxicological Analysis: Technical Manual* (EPA, 2001). All sediment samples were collected in a consistent, repeatable manner using a stainless-steel, 0.025 m^2, van Veen grab sampler.

Before the sediment was removed for chemical analyses, the following physical characteristics were recorded: sediment texture and color; presence, type, and strength of odors; grab penetration depth; degree of leakage or sediment surface disturbance; and any obvious abnormalities, such as wood and shell fragments, debris, or large organisms. Field data sheets for each sample are presented in Appendix A.

The sediment sample was then placed into a stainless steel mixing bowl for homogenization. Biological structures and pieces of debris were removed and noted on the sample field data sheet. In some cases, multiple grabs were collected and composited in order to meet the sample volume required for analysis.

Locations were recorded at each sampling point from the sampling vessel using a Garmin 48-Marine Differential Global Positioning System (DGPS). The DGPS positioning accuracy was on the order of ±3 to 10 feet, with accuracy varying as a function of system signal fluctuations. Post-processing of the DGPS data was completed using Trimble Pathfinder Office® software. Differential correction of the sample positions was completed using data from the Portland State University Department of Geology base station. Locations were then plotted over an aerial photograph of the outfall location and further refined based on physical measurements collected in the field.

2.2 Field Observations at Outfall M-1

2.2.1 Site Observations

During the August sampling, the river was approximately 8 feet lower during the sampling event than during the site reconnaissance visit conducted on June 12, 2002. The 8-foot difference in river elevation and the slope of the northeast riverbank resulted in approximately 10 feet of exposed riverbank between the outfall and the river. The exposed riverbank was covered with cobbles, which extended into the river up to 40 feet from the shoreline in some locations. This lack of shoreline sediment resulted in the collection of the planned nearshore samples up to 40 feet from the shoreline in some locations (see Figure 2-1). During the sampling event, tidal fluctuations of approximately 3 feet occurred. This 3-foot change in the water level resulted in a 10-foot lateral difference between the high and low tide watermark.

Two large docks are located in the vicinity of Outfall M-1. Foss Environmental and Fred Devine Diving & Salvage operate off a dock located to the north of Outfall M-1. The Port of Portland docks dredging equipment at a dock located to the south of Outfall M-1. Two large, yellow, anchored buoys visible in front of Outfall M-1 in Photographs 2 and 3 of Appendix B are associated with the Port of Portland dock to the south of Outfall M-1.

Flow from Outfall M-1 appeared constant and was visually estimated to be 25 gallons per minute (gpm). This flow may be the result of groundwater intrusion into the stormwater system. The discharge was a faint, reddish-brown color resulting from iron bacteria in the pipe. The discharge from the outfall was visually evident in the water column and nearshore sediment near the outfall. The plume originating from the outfall extended about 50 feet outward into the river and about 100 feet to the southeast (see Appendix B, Photograph 1). A layer of approximately 0.1 to 0.2 cm of reddish-brown sediment was observed along the shore in samples PP01M105 and PP01M107. Representative photographs of the riverbank are presented in Appendix B.

2.2.2 Sample Observations

Table 2-1 summarizes collection methods and field observations for each sample collected at Outfall M-1. Field observations for each sample were recorded on the field data sheets and a summary is presented in the paragraphs below.

Samples collected in the vicinity of Outfall M-1, with the exception of PP01M105, were a medium to fine sand, with varying amounts of silt, and little to no gravel. PP01M105, collected nearest the outfall, was a course sand sample with approximately 10 percent gravel. A large amount of debris was removed from this sample, including twigs, pieces of plastic, paint chips, and a metal key. PP01M105 was successfully collected after four attempts. Gravel and other debris prevented the grab sampler from fully closing during sampling attempts.

The sample locations of nearshore samples PP01M107, PP01M108, PP01MW09, and PP01M110 were moved between 5 and 40 feet from the shoreline to avoid nearshore riprap along the banks. Several attempts were made at each sample location to collect the sample as close to the shore as possible before moving farther out. Samples contained varying degrees of anthropogenic debris, including metal shavings, paint chips, various pieces of

plastic, and glass. Representative photographs of the sediment samples are presented in Appendix B.

TABLE 2-1
Summary of Field Sample Observations at Outfall M-1
Source Control Pilot Project

Sample ID	Sample Method	Soil Type	Organic Matter	Anthropogenic Debris/Comments
PP01M101	Van Veen	Sandy Silt	None	Small metal shavings and flakes of blue and white paint
PP01M102D	Van Veen	Sandy Silt	None	Field duplicate collected at PP01M101
PP01M103	Van Veen	Sandy Silt	>1%	Small piece of plastic, metal shavings, and flakes of blue, white, and red paint. Faint sheen and petroleum odor.
PP01M104	Van Veen	Silty Sand	2%	Lots of debris (2-inch paint shavings, rubber band, 2-inch piece of cloth, paint flakes)
PP01M105	Van Veen	Sand	10%	Lots of debris (plastic washer, metal key, plastic zip tie, paint flakes). Faint petroleum odor.
PP01M106	Van Veen	Silty Sand	5%	Lots of debris (paint flakes, small metal pieces, plastic label, glass)
PP01M107	Van Veen	Sand	None	Broken glass, concrete, and gravel
PP01M108	Van Veen	Silty Sand	None	Paint flakes
PP01M109	Van Veen	Sandy Silt	None	Plastic coffee creamer container
PP01M110	Van Veen	Sand	2%	Plastic tape, plastic bag, paint flakes

Notes:
All large organic matter and debris removed from sample.
Organic matter includes woody debris, leaves, pine needles, and twigs.

2.3 Deviations From the Field Sampling Plan

Sampling was done in accordance with the Field Sampling Plan (FSP). However, spacing between the nearshore and offshore samples is less than the 50 feet called for in the FSP for two reasons:

- The four offshore samples (PP01M101, PP01M03, PP01M104, and PP01M106) were collected prior to collection of the nearshore samples (PP01M109 and PP01M110).
- Riprap along the shoreline forced the collection of the nearshore samples up to 40 feet from the shoreline. Several attempts were made at each location before moving farther from the shoreline.

Samples PP01M109 and PP01M103, and PP01M110 and PP01M104, were collected approximately 15 feet from each other, respectively.

2.4 Sediment Laboratory Analytical Results

2.4.1 Summary of Laboratory Analytical Results

Ten sediment samples and one water sample were collected for laboratory analysis at Outfall M-1, including one field duplicate and one equipment blank. Sediment samples were analyzed for metals, semivolatile organic compounds (SVOCs), organochlorine pesticides, chlorinated herbicides, total petroleum hydrocarbons (diesel and heavy oil range), and PCBs as aroclors. Samples were collected, analyzed, and validated in accordance with the analytical methods identified in the Quality Assurance Project Plan (QAPP), except as stated in Section 2.4.2 of this report. The QAPP is located in Appendix B of the work plan.

A summary of analytical results for sediment samples collected at Outfall M-1 is presented in Table 2-2 of this report. Appendix C consists of laboratory reports provided in electronic format on a CD. Appendix D consists of the chain-of-custody (COC) forms maintained for all sediment samples collected. Section 4 provides an evaluation of the analytical results.

2.4.2 Deviations from QAPP

Appendix E consists of the memorandum entitled *Review of Quality Assurance/Quality Control (QA/QC) Data for the Portland Harbor Pilot Project Sediment Sampling*. Materials provided in Appendixes C and E serve as the QA report for sediment sampling at M-1.

2.4.2.1 Deviations in Method Reporting Limits

The method reporting limits (MRLs) achievable for SVOCs and organochlorine pesticides in sediment samples from Portland Harbor were higher than the target MRLs listed in the QAPP. The target MRLs were based on the results obtainable from a clean (sandy–low total organic carbon [TOC]) sediment matrix. Most of the sediment samples associated with the Pilot Project had total petroleum hydrocarbon (TPH-diesel and TPH-heavy oil) concentrations in the hundreds of parts per million (ppm), milligrams per kilogram (mg/kg) range and TOC concentrations in the thousands of ppm range.

Both TPH and TOC are aggregate measurements in that they combine many organic compounds together and report them as one. The compounds that make up TPH and TOC resulted in a high background in the full-scan, ion-trap GC/MS and GC-ECD analysis of the samples. Gel permeation chromatography (which is the only cleanup technique suitable for the full 8270C SVOC compound list) was shown by the laboratory to be ineffective in removing the interferences encountered. This result is not unexpected because TPH compounds are of the same general size as the SVOC/pesticide analytes of interest and GPC cleanup is based on size selectivity. The high background required dilution of the sample (which raised the reporting limit) to obtain usable data within the QA/QC requirements for semivolatile compounds. In addition to elevated reporting limits, dilution of the samples due to matrix interference prevented reporting of SVOC surrogate results in five samples. All SVOC results in each of these samples were qualified as estimates (detect = J, nondetect = UJ).

TABLE 2-2
Sediment Sampling Data for Outfall M-1
Source Control Pilot Project

Analysis Class	Analyte	DEQ Screening Level (high)	DEQ Screening Level (baseline)	Units	*Sample ID:*	PP01M101	PP01M102D[1]	PP01M103	PP01M104	PP01M105	PP01M106	PP01M107	PP01M108	PP01M109	PP01M110
					Date Sampled:	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002
					Sample Type:	Normal	Field Dupe	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Semivolatile Organics:	1,2,4-Trichlorobenzene	9.2	--	mg/kg		0.187 UJ	0.159 UJ	0.172 UJ	0.0142 U	0.148 UJ	0.142 UJ	0.0139 U	0.0157 U	0.0164 U	0.0133 U
	1,2-Dichlorobenzene	1.7	--	mg/kg		0.232 UJ	0.197 UJ	0.213 UJ	0.0176 U	0.184 UJ	0.176 UJ	0.0172 U	0.0195 U	0.0203 U	0.0164 U
	1,3-Dichlorobenzene	0.3	--	mg/kg		0.315 UJ	0.268 UJ	0.29 UJ	0.0239 U	0.25 UJ	0.239 UJ	0.0234 U	0.0264 U	0.0276 U	0.0224 U
	1,4-Dichlorobenzene	0.3	--	mg/kg		0.36 UJ	0.307 UJ	0.331 UJ	0.0273 U	0.285 UJ	0.273 UJ	0.0267 U	0.0302 U	0.0315 U	0.0256 U
	2,3,4,6-Tetrachlorophenol	--	--	mg/kg		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2,4,5-Trichlorophenol	--	--	mg/kg		0.405 UJ	0.345 UJ	0.372 UJ	0.0307 U	0.321 UJ	0.307 UJ	0.03 U	0.034 U	0.0355 U	0.0287 U
	2,4,6-Trichlorophenol	--	--	mg/kg		0.299 UJ	0.255 UJ	0.275 UJ	0.0227 U	0.237 UJ	0.227 UJ	0.0222 U	0.0251 U	0.0262 U	0.0212 U
	2,4-Dichlorophenol	--	--	mg/kg		0.247 UJ	0.211 UJ	0.228 UJ	0.0188 U	0.196 UJ	0.188 UJ	0.0184 U	0.0208 U	0.0217 U	0.0176 U
	2,4-Dimethylphenol	--	--	mg/kg		0.247 UJ	0.211 UJ	0.228 UJ	0.0188 U	0.196 UJ	0.188 UJ	0.0184 U	0.0208 U	0.0217 U	0.0176 U
	2,4-Dinitrophenol	--	--	mg/kg		0.539 UJ	0.46 UJ	0.497 UJ	0.041 U	0.428 UJ	0.409 UJ	0.0401 U	0.0453 U	0.0473 U	0.0383 U
	2,4-Dinitrotoluene	--	--	mg/kg		0.292 UJ	0.249 UJ	0.269 UJ	0.0222 U	0.232 UJ	0.222 UJ	0.0217 U	0.0246 U	0.0256 U	0.0208 U
	2,6-Dinitrotoluene	--	--	mg/kg		0.405 UJ	0.345 UJ	0.372 UJ	0.0307 U	0.321 UJ	0.307 UJ	0.03 U	0.034 U	0.0355 U	0.0287 U
	2-Chloronaphthalene	--	--	mg/kg		0.0674 UJ	0.0575 UJ	0.0621 UJ	0.00512 U	0.0535 UJ	0.0511 UJ	0.00501 U	0.00567 U	0.00591 U	0.00479 U
	2-Chlorophenol	--	--	mg/kg		0.337 UJ	0.287 UJ	0.31 UJ	0.0256 U	0.267 UJ	0.256 UJ	0.025 U	0.0283 U	0.0296 U	0.024 U
	2-Methylnaphthalene	0.2	0.15	mg/kg		0.0351 UJ	0.0299 UJ	0.0323 UJ	0.00266 U	0.0278 UJ	0.0266 UJ	0.0026 U	0.00942 J	0.0154 J	0.00249 U
	2-Methylphenol	--	--	mg/kg		0.27 UJ	0.23 UJ	0.248 UJ	0.0205 U	0.214 UJ	0.205 UJ	0.02 U	0.0227 U	0.0236 U	0.0192 U
	2-Nitroaniline	--	--	mg/kg		0.292 UJ	0.249 UJ	0.269 UJ	0.0222 U	0.232 UJ	0.222 UJ	0.0217 U	0.0246 U	0.0256 U	0.0208 U
	2-Nitrophenol	--	--	mg/kg		0.315 UJ	0.268 UJ	0.29 UJ	0.0239 U	0.25 UJ	0.239 UJ	0.0234 U	0.0264 U	0.0276 U	0.0224 U
	3,3'-Dichlorobenzidine	--	--	mg/kg		0.247 UJ	0.211 UJ	0.228 UJ	0.0188 U	0.196 UJ	0.188 UJ	0.0184 U	0.0208 U	0.0217 U	0.0176 U
	3-Nitroaniline	--	--	mg/kg		0.382 UJ	0.326 UJ	0.475 J	0.029 U	0.303 UJ	0.29 UJ	0.0284 U	0.0321 U	0.0335 U	0.0271 U
	4,6-Dinitro-2-Methylphenol	--	--	mg/kg		0.832 UJ	0.709 UJ	0.766 UJ	0.0632 U	0.659 UJ	0.631 UJ	0.0617 U	0.0699 U	0.0729 U	0.0591 U
	4-Bromophenyl Phenyl Ether	--	--	mg/kg		0.299 UJ	0.255 UJ	0.275 UJ	0.0227 U	0.237 UJ	0.227 UJ	0.0222 U	0.0251 U	0.0262 U	0.0212 U
	4-Chloro-3-Methylphenol	--	--	mg/kg		0.247 UJ	0.211 UJ	0.228 UJ	0.0188 U	0.196 UJ	0.188 UJ	0.0184 U	0.0208 U	0.0298 J	0.0176 U
	4-Chloroaniline	--	--	mg/kg		0.209 UJ	0.178 UJ	0.192 UJ	0.0159 U	0.166 UJ	0.159 UJ	0.0155 U	0.0176 U	0.0183 U	0.0149 U
	4-Chlorophenyl Phenyl Ether	--	--	mg/kg		0.378 UJ	0.322 UJ	0.348 UJ	0.0287 U	0.299 UJ	0.286 UJ	0.028 U	0.0317 U	0.0331 U	0.0268 U
	4-Methylphenol	--	0.68	mg/kg		0.333 UJ	0.284 UJ	0.306 UJ	0.0253 U	0.264 UJ	0.252 UJ	0.0247 U	0.028 U	0.068 J	0.0236 U
	4-Nitroaniline	--	--	mg/kg		0.382 UJ	0.326 UJ	0.352 UJ	0.029 U	0.303 UJ	0.29 UJ	0.0284 U	0.0321 U	0.0335 U	0.0271 U
	4-Nitrophenol	--	--	mg/kg		0.427 UJ	0.364 UJ	0.393 UJ	0.0325 U	0.339 UJ	0.324 UJ	0.0317 U	0.0359 U	0.0374 U	0.0303 U
	Acenaphthene	0.3	0.18	mg/kg		0.111 UJ	0.0948 UJ	0.102 UJ	0.00846 U	0.108 J	0.0844 UJ	0.00826 U	0.0267	0.0202	0.0079 U
	Acenaphthylene	0.2	0.06	mg/kg		0.098 UJ	0.0972 J	0.0902 UJ	0.00745 U	0.0777 UJ	0.0743 UJ	0.00728 U	0.0213	0.0186 J	0.0107 J
	Aniline	--	--	mg/kg		1.12 UJ	0.958 UJ	1.03 UJ	0.0854 U	0.891 UJ	0.852 UJ	0.0834 U	0.0944 J	0.0985 U	0.0798 U
	Anthracene	0.8	0.15	mg/kg		0.0566 UJ	0.101 J	0.0679 J	0.00615 J	0.137 J	0.102 J	0.00497 J	0.0361	0.0173 J	0.0121 J
	Benzo (a) anthracene	1	0.36	mg/kg		0.137 UJ	0.117 UJ	0.126 UJ	0.0104 U	0.109 UJ	0.308 J	0.0102 U	0.15	0.148	0.0573
	Benzo (a) pyrene	1.5	0.5	mg/kg		0.132 UJ	0.112 UJ	0.121 UJ	0.01 U	0.105 UJ	0.1 UJ	0.0098 U	0.136	0.114	0.00937 U
	Benzo [g,h,i] perylene	0.3	0.25	mg/kg		0.0371 UJ	0.0316 UJ	0.0341 UJ	0.00282 U	0.0294 UJ	0.0281 UJ	0.00275 U	0.13	0.105	0.00263 U
	Benzofluoranthenes[2]	--	--	mg/kg		0.0989 UJ	0.0843 UJ	0.581 J	0.0357	0.0784 UJ	0.716 J	0.00734 U	0.262	0.229	0.0923
	Benzoic Acid	--	0.2	mg/kg		3.99 J	3.98 J	3.3 J	0.347 J	2.8 J	4.11 J	0.178 J	0.0642 U	0.498 J	0.48 J
	Benzyl Alcohol	--	0.02	mg/kg		0.472 UJ	0.402 UJ	0.434 UJ	0.0359 U	0.374 UJ	0.358 UJ	0.035 U	0.0397 U	0.0414 U	0.0335 U
	Bis(2-Chloroethoxy) Methane	--	--	mg/kg		0.27 UJ	0.23 UJ	0.248 UJ	0.0205 U	0.214 UJ	0.205 UJ	0.02 U	0.0227 U	0.0236 U	0.0192 U
	Bis(2-Chloroethyl) Ether	--	--	mg/kg		0.429 UJ	0.366 UJ	0.395 UJ	0.0326 U	0.34 UJ	0.326 UJ	0.0319 U	0.0361 U	0.0376 U	0.0305 U
	Bis(2-Chloroisopropyl) Ether	--	--	mg/kg		0.584 UJ	0.498 UJ	0.538 UJ	0.0444 U	0.463 UJ	0.443 UJ	0.0434 U	0.0491 U	0.0512 U	0.0415 U
	Bis(2-Ethylhexyl) Phthalate	0.8	0.39	mg/kg		39.2 J	7.13 J	32.5 J	0.163 J	2.25 J	2.26 J	0.0684 U	0.226	0.994	0.377
	Butyl Benzyl Phthalate	--	0.02	mg/kg		0.427 UJ	0.364 UJ	2.01 J	0.0325 U	0.339 UJ	0.324 UJ	0.0438 J	0.0547 J	0.223	0.0303 U
	Carbazole	1.6	0.1	mg/kg		0.877 UJ	0.747 UJ	0.807 UJ	0.0666 U	0.695 UJ	0.665 UJ	0.0651 U	0.0737 U	0.0768 U	0.0623 U
	Chrysene	1.3	0.425	mg/kg		0.132 UJ	0.112 UJ	0.121 UJ	0.0352	0.469 J	0.45 J	0.0098 U	0.16	0.132	0.0538
	Di-n-Butyl Phthalate	0.1	0.02	mg/kg		1.96 UJ	1.67 UJ	1.8 UJ	0.149 U	1.55 UJ	1.48 UJ	0.145 U	0.164 U	0.171 U	0.139 U

TABLE 2-2
Sediment Sampling Data for Outfall M-1
Source Control Pilot Project

Analysis Class	Analyte	DEQ Screening Level (high)	DEQ Screening Level (baseline)	Units	Sample ID:	PP01M101	PP01M102D[1]	PP01M103	PP01M104	PP01M105	PP01M106	PP01M107	PP01M108	PP01M109	PP01M110
					Date Sampled:	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002
					Sample Type:	Normal	Field Dupe	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
	Di-n-Octyl Phthalate	--	0.02	mg/kg		30.1 J	0.676 J	1.05 J	0.0444 U	0.463 UJ	0.596 J	0.0434 U	0.0491 U	0.134 J	0.0648 J
	Dibenzo (a,h) anthracene	1.3	0.125	mg/kg		0.0524 UJ	0.0446 UJ	0.0482 UJ	0.00398 U	0.0415 UJ	0.0397 UJ	0.00389 U	0.0044 U	0.00459 U	0.00372 U
	Dibenzofuran	5.1	0.1	mg/kg		0.261 UJ	0.222 UJ	0.24 UJ	0.0198 U	0.207 UJ	0.198 UJ	0.0194 U	0.0219 U	0.0229 U	0.0185 U
	Diethyl Phthalate	0.6	--	mg/kg		0.382 UJ	0.326 UJ	0.352 UJ	0.029 U	0.303 UJ	0.29 UJ	0.0284 U	0.0321 U	0.0335 U	0.0271 U
	Dimethyl Phthalate	--	0.02	mg/kg		0.247 UJ	0.211 UJ	0.228 UJ	0.0188 U	0.196 UJ	0.188 UJ	0.0184 U	0.0208 U	0.0217 U	0.0176 U
	Fluoranthene	2.2	0.6	mg/kg		0.486 J	0.81 J	0.815 J	0.0386	0.877 J	0.759 J	0.034	0.446	0.22	0.0996
	Fluorene	0.6	0.125	mg/kg		0.129 J	0.0895 UJ	0.103 J	0.00798 U	0.13 J	0.0796 UJ	0.00779 U	0.0255	0.0224	0.0197
	Hexachlorobenzene	0.1	--	mg/kg		0.247 UJ	0.211 UJ	0.228 UJ	0.0188 U	0.196 UJ	0.188 UJ	0.0184 U	0.0208 U	0.0217 U	0.0176 U
	Hexachlorobutadiene	0.6	--	mg/kg		0.202 UJ	0.172 UJ	0.186 UJ	0.0154 U	0.16 UJ	0.153 UJ	0.015 U	0.017 U	0.0177 U	0.0144 U
	Hexachlorocyclopentadiene	0.4	--	mg/kg		0.317 UJ	0.27 UJ	0.292 UJ	0.0241 U	0.251 UJ	0.24 UJ	0.0235 U	0.0266 U	0.0278 U	0.0225 U
	Hexachloroethane	--	--	mg/kg		0.427 UJ	0.364 UJ	0.393 UJ	0.0325 U	0.339 UJ	0.324 UJ	0.0317 U	0.0359 U	0.0374 U	0.0303 U
	Indeno (1,2,3-cd) pyrene	0.1	0.225	mg/kg		0.0524 UJ	0.0446 UJ	0.0482 UJ	0.00398 U	0.0415 UJ	0.0397 UJ	0.00389 U	0.126	0.076	0.00372 U
	Isophorone	--	--	mg/kg		0.315 UJ	0.268 UJ	0.29 UJ	0.0239 U	0.25 UJ	0.239 UJ	0.0234 U	0.0264 U	0.0276 U	0.0224 U
	n-Nitrosodi-n-Propylamine	--	--	mg/kg		0.247 UJ	0.211 UJ	0.228 UJ	0.0188 U	0.196 UJ	0.188 UJ	0.0184 U	0.0208 U	0.0217 U	0.0176 U
	n-Nitrosodimethylamine	--	--	mg/kg		0.247 UJ	0.211 UJ	0.228 UJ	0.0188 U	0.196 UJ	0.188 UJ	0.0184 U	0.0208 U	0.0217 U	0.0176 U
	n-Nitrosodiphenylamine	--	--	mg/kg		0.18 UJ	0.153 UJ	0.166 UJ	0.0137 U	0.143 UJ	0.136 UJ	0.0134 U	0.0151 U	0.0158 U	0.0128 U
	Naphthalene	0.6	0.2	mg/kg		0.105 UJ	0.0897 UJ	0.0968 UJ	0.0128 J	0.0834 UJ	0.0798 UJ	0.00781 U	0.0144 J	0.0192 J	0.0137 J
	Nitrobenzene	--	--	mg/kg		0.308 UJ	0.263 UJ	0.283 UJ	0.0234 U	0.244 UJ	0.234 UJ	0.0229 U	0.0259 U	0.027 U	0.0219 U
	Pentachlorophenol	1	0.097	mg/kg		0.472 UJ	0.402 UJ	0.434 UJ	0.0359 U	0.374 UJ	0.358 UJ	0.035 U	0.0397 U	0.0414 U	0.0335 U
	Phenanthrene	1.2	0.7	mg/kg		0.243 J	0.0945 J	0.425 J	0.0206	0.369 J	0.331 J	0.0146 J	0.313	0.0939	0.0482
	Phenol	0.05	0.02	mg/kg		0.45 UJ	0.383 UJ	0.414 UJ	0.0342 U	0.356 UJ	0.341 UJ	0.0334 U	0.0378 U	0.0394 U	0.0319 U
	Pyrene	1.5	0.7	mg/kg		0.44 J	0.808 J	0.834 J	0.0485	0.769 J	0.599 J	0.0264	0.354	0.208	0.11
	Pyridine	--	--	mg/kg		0.382 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Tetrachlorophenols[3]	--	--	mg/kg		0.425 UJ	0.362 UJ	0.391 UJ	0.0323 U	0.337 UJ	0.322 UJ	0.0315 U	0.0357 U	0.0372 U	0.0302 U
	Total LPAHs	0.4	0.7	mg/kg		0.372	0.293	0.596	0.04	0.614	0.433	0.02	0.446	0.207	0.104
	Total HPAHs	1	2.4	mg/kg		0.926	1.62	2.23	0.158	2.12	2.83	0.06	1.76	1.23	0.413
Chlorinated Herbicides:	2,4,5-T	--	--	mg/kg		0.000401 U	0.000329 U	0.000377 U	0.000294 U	0.000326 U	0.00031 U	0.000279 U	0.000325 U	0.000356 U	0.000284 U
	2,4,5-TP	--	--	mg/kg		0.000328 U	0.000268 U	0.000308 U	0.00024 U	0.000267 U	0.000253 U	0.000228 U	0.000266 U	0.000291 U	0.000232 U
	2,4-D	--	0.0033	mg/kg		0.000341 U	0.000279 U	0.00032 U	0.000249 U	0.000277 U	0.000263 U	0.000237 U	0.000276 U	0.000302 U	0.000241 U
	2,4-Db	--	0.005	mg/kg		0.000245 U	0.000201 U	0.000231 U	0.00018 U	0.0002 U	0.00019 U	0.000171 U	0.000199 U	0.000218 U	0.000174 U
	4-Nitrophenol	--	--	mg/kg		0.000195 U	0.00016 U	0.000183 U	0.000143 U	0.000159 U	0.000151 U	0.000136 U	0.000158 U	0.000173 U	0.000138 U
	Dalapon	--	--	mg/kg		0.000197 U	0.000161 U	0.000185 U	0.000144 U	0.00016 U	0.000152 U	0.000137 U	0.000159 U	0.000174 U	0.000139 U
	Dicamba	--	--	mg/kg		0.000201 U	0.000165 U	0.000189 U	0.000147 U	0.000164 U	0.000155 U	0.00014 U	0.000163 U	0.000178 U	0.000142 U
	Dichloroprop	--	--	mg/kg		0.000324 U	0.000265 U	0.000304 U	0.000237 U	0.000264 U	0.00025 U	0.000225 U	0.000263 U	0.000287 U	0.000229 U
	Dinoseb	--	--	mg/kg		0.000281 U	0.00023 U	0.000264 U	0.000206 U	0.000229 U	0.000217 U	0.000195 U	0.000228 U	0.000249 U	0.000199 U
	Mcpa	--	--	mg/kg		0.000384 U	0.000315 U	0.000361 U	0.000281 U	0.000313 U	0.000297 U	0.000267 U	0.000312 U	0.000341 U	0.000272 U
	Mcpp	--	--	mg/kg		0.000171 U	0.00014 U	0.000161 U	0.000125 U	0.000139 U	0.000132 U	0.000119 U	0.000139 U	0.000152 U	0.000121 U
	Pentachlorophenol	1	0.097	mg/kg		0.007	0.00752	0.00592	0.000897	0.000204 U	0.000194 U	0.000174 U	0.000204 U	0.00349	0.000178 U
General Chemistry:	Total Organic Carbon	--	20000	mg/kg		38000	18200	18800	4880	20300	7160	780	3150	9570	9990
Total Metals:	Aluminum	--	42800	mg/kg		7890	6690	12000	4820	3560	5310	5430	8120	9030	5130
	Antimony	64	5	mg/kg		1.33 J	3.05 J	1.16 J	0.388 J	1.15 J	1.83 J	0.338 J	0.452 J	0.594 J	0.281 J
	Arsenic	33	5	mg/kg		7.61	4.25	5.81	3.86	4.11	4.1	2.81	8.98	4.84	3.65
	Cadmium	5	0.6	mg/kg		1.64	1.52	1.31	0.348 J	1.89	1.26	0.00927 U	0.00947 U	0.488 J	0.18 J
	Chromium	111	41	mg/kg		45	146	39.9	148	31.5	89.2	11.1	20.9	34.7	20.4
	Copper	149	60	mg/kg		86.5 B2	72.5 B2	79.9 B2	25.6 B2	73.6 B2	49.5 B2	15 B2	34.4 B2	63.8 B2	36 B2

TABLE 2-2
Sediment Sampling Data for Outfall M-1
Source Control Pilot Project

Analysis Class	Analyte	DEQ Screening Level (high)	DEQ Screening Level (baseline)	Units	Sample ID:	PP01M101	PP01M102D[1]	PP01M103	PP01M104	PP01M105	PP01M106	PP01M107	PP01M108	PP01M109	PP01M110
					Date Sampled:	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002
					Sample Type:	Normal	Field Dupe	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
	Lead	130	30	mg/kg		48.2 B2	114 B2	43.4 B2	34 B2	57.6 B2	38.6 B2	5.45 B2	14.6 B2	24.6 B2	10.8 B2
	Mercury	1	0.1	mg/kg		0.125	0.124	0.131	0.0104 U	0.108	0.0102 U	0.0103 U	0.0118 U	0.0124 U	0.0111 U
	Nickel	49	32	mg/kg		20.4 B2	21.3 B2	23.6 B2	14.1 B2	17.3 B2	17.2 B2	11.4 B2	14.6 B2	22.5 B2	17.3 B2
	Selenium	5	15	mg/kg		0.603 U	0.553 U	0.574 U	0.46 U	0.547 U	0.498 U	0.502 U	0.513 U	0.581 U	0.424 U
	Silver	5	1.4	mg/kg		0.249 J	0.161 J	0.248 J	0.0239 J	0.0654 J	0.0855 J	0.017 J	0.112 J	0.115 J	0.0298 J
	Zinc	459	118	mg/kg		403 B2	577 B2	318 B2	359 B2	362 B2	357 B2	57 B2	145 B2	193 B2	123 B2
PCBs:	Aroclor-1016	0.53	--	mg/kg		0.0077 U	0.00887 U	0.00875 U	0.0068 U	0.046	0.00659 U	0.00618 U	0.00743 U	0.00761 U	0.00705 U
	Aroclor-1221	--	--	mg/kg		0.00293 U	0.00338 U	0.00333 U	0.00259 U	0.00264 U	0.00251 U	0.00235 U	0.00283 U	0.0029 U	0.00268 U
	Aroclor-1232	--	--	mg/kg		0.00498 U	0.00573 U	0.00566 U	0.0044 U	0.00448 U	0.00427 U	0.004 U	0.00481 U	0.00492 U	0.00456 U
	Aroclor-1242	--	--	mg/kg		0.00367 U	0.00423 U	0.00417 U	0.00324 U	0.0033 U	0.00314 U	0.00294 U	0.00354 U	0.0287	0.00336 U
	Aroclor-1248	1.5	--	mg/kg		0.0417	0.106	0.00309 U	0.0024 U	0.0785	0.00233 U	0.00218 U	0.00262 U	0.0399	0.00249 U
	Aroclor-1254	0.3	--	mg/kg		0.0625	0.0995	0.0595	0.00207 U	0.0787	0.0197	0.00188 U	0.00226 U	0.0329	0.00214 U
	Aroclor-1260	0.2	--	mg/kg		0.0912	0.141	0.0615	0.00365 U	0.135	0.0148	0.00331 U	0.0135	0.0896	0.00879
	Aroclor-1262	--	--	mg/kg		0.00407 U	0.00468 U	0.00462 U	0.00359 U	0.00366 U	0.00348 U	0.00326 U	0.00392 U	0.00402 U	0.00372 U
	Aroclor-1268	--	--	mg/kg		0.00407 U	0.00468 U	0.00462 U	0.00359 U	0.00366 U	0.00348 U	0.00326 U	0.00392 U	0.00402 U	0.00372 U
	Total PCBs	0.7	0.18	mg/kg		0.195	0.347	0.121	--	0.338	0.034	--	0.014	0.191	0.088
Pesticides:	2,4'-DDD	--	--	mg/kg		0.00658 U	0.00571 U	0.00659 U	0.00515 U	0.00594 U	0.0049 U	0.00512 U	0.00578 U	0.00593 U	0.00497 U
	2,4'-DDE	--	--	mg/kg		0.00658 U	0.00571 U	0.00659 U	0.00515 U	0.00594 U	0.0049 U	0.00512 U	0.00578 U	0.00593 U	0.00497 U
	2,4'-DDT	--	--	mg/kg		0.00658 U	0.00571 U	0.00659 U	0.00515 U	0.00594 U	0.0049 U	0.00512 U	0.00578 U	0.00593 U	0.00497 U
	4,4'-DDD	0.03	--	mg/kg		0.00404 J C2	0.000555 U	0.00249 J C1	0.000501 U	0.000578 U	0.000477 U	0.000498 U	0.000562 U	0.000577 U	0.000483 U
	4,4'-DDE	0.03	--	mg/kg		0.00183 J C2	0.000657 U	0.0019 J C2	0.000593 U	0.00103 J C2	0.000564 U	0.000589 U	0.000666 U	0.00106 J C2	0.000572 U
	4,4'-DDT	0.06	--	mg/kg		0.000852 U	0.00074 U	0.000854 U	0.000667 U	0.00077 U	0.000635 U	0.00133 J C1	0.000749 U	0.000768 U	0.000644 U
	Total DDTs	--	0.22	mg/kg		0.0059	--	0.0044	--	0.001	--	0.001	--	0.001	--
	4,4'-Methoxychlor	--	--	mg/kg		0.00453 U	0.00393 U	0.00454 U	0.00355 U	0.00409 U	0.00338 U	0.00353 U	0.00398 U	0.00408 U	0.00342 U
	Aldrin	0.04	--	mg/kg		0.00142 U	0.00123 U	0.00142 U	0.00111 U	0.00128 U	0.00106 U	0.0011 U	0.00125 U	0.00128 U	0.00107 U
	Alpha-BHC	--	--	mg/kg		0.00102 U	0.000887 U	0.00102 U	0.0008 U	0.000923 U	0.000762 U	0.000796 U	0.000899 U	0.000921 U	0.000772 U
	beta-BHC	--	--	mg/kg		0.00139 U	0.00121 U	0.00139 U	0.00109 U	0.00126 U	0.00104 U	0.00108 U	0.00122 U	0.00125 U	0.00105 U
	Beta-Chlordane	--	--	mg/kg		0.00211 J C2	0.0029 C2	0.00199 J C2	0.00105 U	0.0023 J C2	0.000996 U	0.00104 U	0.00117 U	0.0012 U	0.00101 U
	Chlordane	0.02	--	mg/kg		0.00658 U	0.00571 U	0.00659 U	0.00515 U	0.00594 U	0.0049 U	0.00512 U	0.00578 U	0.00593 U	0.00497 U
	cis-Nonachlor	--	--	mg/kg		0.00658 U	0.00571 U	0.00659 U	0.00515 U	0.00594 U	0.0049 U	0.00512 U	0.00578 U	0.00593 U	0.00497 U
	delta-BHC	--	--	mg/kg		0.00126 U	0.0011 U	0.00126 U	0.000988 U	0.00114 U	0.000941 U	0.000983 U	0.00111 U	0.00114 U	0.000954 U
	Dieldrin	0.06	--	mg/kg		0.00108 U	0.000936 U	0.00108 U	0.000845 U	0.000974 U	0.000804 U	0.00084 U	0.000949 U	0.000973 U	0.000815 U
	Endosulfan I	--	--	mg/kg		0.0014 U	0.00122 U	0.0014 U	0.0011 U	0.00126 U	0.00104 U	0.00109 U	0.00123 U	0.00126 U	0.00106 U
	Endosulfan II	--	--	mg/kg		0.00127 U	0.00219 J C2	0.00127 U	0.000995 U	0.00115 U	0.000948 U	0.00099 U	0.00112 U	0.00115 U	0.00096 U
	Endosulfan Sulfate	--	--	mg/kg		0.0012 U	0.00104 U	0.0012 U	0.000937 U	0.00108 U	0.000892 U	0.000932 U	0.00105 U	0.00108 U	0.000904 U
	Endrin	0.2	--	mg/kg		0.00119 U	0.00103 U	0.00119 U	0.000929 U	0.00107 U	0.000885 U	0.000924 U	0.00104 U	0.00107 U	0.000897 U
	Endrin Aldehyde	--	--	mg/kg		0.00134 U	0.00116 U	0.00134 U	0.00105 U	0.00121 U	0.001 U	0.00104 U	0.00118 U	0.00121 U	0.00101 U
	Endrin Ketone	--	--	mg/kg		0.000924 U	0.000802 U	0.000926 U	0.000724 U	0.000835 U	0.000689 U	0.00072 U	0.000813 U	0.000833 U	0.000698 U
	Heptachlor	0.01	--	mg/kg		0.00113 UJ	0.000983 UJ	0.00113 UJ	0.000887 UJ	0.00102 UJ	0.000844 UJ	0.000882 UJ	0.000996 UJ	0.00102 UJ	0.000855 UJ
	Heptachlor Epoxide	0.02	--	mg/kg		0.0012 U	0.00104 U	0.0012 U	0.000941 U	0.00109 U	0.000896 U	0.000935 U	0.00106 U	0.00108 U	0.000908 U
	Hexachlorobenzene	--	--	mg/kg		0.00329 U	0.00285 U	0.0033 U	0.00257 U	0.00465 C2	0.00245 U	0.00256 U	0.00289 U	0.00296 U	0.00248 U
	Hexachlorobutadiene	--	--	mg/kg		0.00329 U	0.00285 U	0.0033 U	0.00257 U	0.00297 U	0.00245 U	0.00256 U	0.00289 U	0.00296 U	0.00248 U
	Hexachloroethane	--	--	mg/kg		0.00329 U	0.00285 U	0.0033 U	0.00257 U	0.00297 U	0.00245 U	0.00256 U	0.00289 U	0.00296 U	0.00248 U
	Lindane	0.005	--	mg/kg		0.00126 U	0.00109 U	0.00126 U	0.000984 U	0.00114 U	0.000937 U	0.000979 U	0.00111 U	0.00113 U	0.00095 U

TABLE 2-2
Sediment Sampling Data for Outfall M-1
Source Control Pilot Project

Analysis Class	Analyte	DEQ Screening Level (high)	DEQ Screening Level (baseline)	Units	Sample ID:	PP01M101	PP01M102D[1]	PP01M103	PP01M104	PP01M105	PP01M106	PP01M107	PP01M108	PP01M109	PP01M110
					Date Sampled:	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002	8/22/2002
					Sample Type:	Normal	Field Dupe	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
	Toxaphene	--	--	mg/kg		0.0206 U	0.0179 U	0.0206 U	0.0161 U	0.0186 U	0.0154 U	0.016 U	0.0181 U	0.0186 U	0.0156 U
	Trans-Nonachlor	--	--	mg/kg		0.00658 U	0.00571 U	0.00659 U	0.00515 U	0.00594 U	0.0049 U	0.00512 U	0.00578 U	0.00593 U	0.00497 U
	x-Chlordane	--	--	mg/kg		0.00131 U	0.00113 U	0.00131 U	0.00102 U	0.00157 J C1	0.000975 U	0.00102 U	0.00115 U	0.00118 U	0.000988 U
TPH:	Diesel	--	--	mg/kg		541 N	1390 N	777 N	54	345 N	261 N	26.1 JN	44.1 N	204 N	83.7 N
	Lube Oil - NWTPH	--	--	mg/kg		1800	4820	2110	212	1050	871	125	150	494	267

Notes:
DEQ baseline and high values are used here for screening purposes only. Additional evaluation is needed to develop site-specific risk and/or cleanup concentrations.
[1] Duplicate sample of PP01M101.
[2] Benzo(b)fluoranthene and benzo(k)fluoranthene are not well resolved, and the reported results are for the combined benzofluoranthenes.
[3] The three tetrachlorophenols are not well resolved, and they have been reported as the combined tetrachlorophenols.
-- = Not available or applicable.
DEQ High source = *Guidance for Evaluation of Sediment at State Cleanup Sites* (DEQ, 2002).
DEQ Baseline source = *DEQ Notification Letters to Portland Harbor Property Owners* (September 1999).
Qualifiers:
B1 = This analyte was detected in the associated method blank. The concentration was determined not to be notably higher than the associated method blank (less than ten times the concentration reported in the blank).
B2 = This analyte was detected in the associated method blank. The analyte concentration in the sample was determined to be notably higher than the method blank (greater than ten times the concentration reported in the blank).
C1 = Second column confirmation was performed. The relative percent difference value (RPD) between the results on the two columns was evaluated and determined to be < 40%.
C2 = Second column confirmation was performed. The RPD between the results on the two columns was evaluated and determined to be > 40%. The higher result was reported unless anomalies were noted.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
N = Qualifier used to denote result values that fall within diesel carbon range (C12-C24). However, sample peak-pattern does not match diesel standard.
U = The analyte was analyzed for, but the analyte was not detected above the reported sample quantitation limit.
UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
Abbreviations:
mg/kg = milligrams per kilogram
NA = Not analyzed

2.4.2.2 Other Deviations

Other deviations from the QAPP are as follows:

- Analyses for SVOCs (SW8270C, ion-trap GC/MS), metals (SW6020, ICP-MS), organochlorine pesticides (SW8081A), chlorinated herbicides (SW8151A), and grain size were performed by Severn Trent Laboratories (STL) in Seattle, Washington, rather than by Columbia Analytical Services, Inc. (CAS).
- All metals (except mercury [Hg]) were analyzed by ICP-MS (SW6020) to obtain improved reporting limits.
- The organochlorine pesticides g-chlordene and a-chlordene were not analyzed because analytical standards were not commercially available.
- SW8270C analysis was performed using ion-trap mass spectrometry. This allowed for low-level analysis of all SVOC compounds including PAHs in a single analysis. PAH-SIM analysis was not performed because comparable reporting limits (in a clean matrix) were available for PAHs using SW8270C.
- Laboratory in-house control limits for target compound blank spike and matrix spike recovery accuracy were used for data validation rather than the limits listed in Table B-3 of the QAPP.
- The sediment samples were not archived for the 1-year holding time indicated in Table B-5 of the QAPP. The laboratory maintained archive samples until completion of analysis. Neither the laboratories conducting the analysis nor the City's lab had adequate storage space to maintain this volume of samples for a full year. This deviation does not affect the quality of laboratory analytical results.

Figure 2-1

Outfall M-1 Sample Locations
City of Portland
Portland, OR

CH2MHILL

SECTION 3

Basin Assessment for Outfall M-1

This section summarizes the basin assessment activities performed for Outfall M-1. The purpose of the basin assessment was to further characterize the Outfall M-1 drainage basin. Information collected as part of the basin assessment was used with sediment data to identify and prioritize potential sources within the M-1 basin and to direct follow-on Phase 2 actions. The assessment consisted of the following activities:

- Preliminary evaluation update
- City data compilation
- National Pollutant Discharge Elimination System (NPDES) data compilation
- DEQ file reviews
- Interviews
- Facility plan reviews
- Map and photograph reviews

In general, activities were performed in accordance with the work plan. Site reconnaissance was the only basin assessment activity identified in the work plan that was not performed.

Table 3-1 summarizes the assessment activities and associated findings, and identifies the location of supporting data in Appendix F of this report. Note that for purposes of consistency and accessibility, tables that are associated with the preliminary evaluation update task have been left numbered as originally presented in the notebook entitled *Preliminary Evaluation of City Outfall – Portland Harbor Study Area* (CH2M HILL, July 2000). All other Appendix F tables are numbered consecutively.

Figure 3-1 shows the boundaries of the M-1 drainage basin and the major facilities located within the basin.

TABLE 3-1
Summary of Basin Assessment Tasks and Findings
Source Control Pilot Project

Basin Assessment Task	Findings	Location of Data in Appendix F
Preliminary Evaluation Update: Requery databases and revise tables from the M-1 preliminary evaluation (available sediment data, facilities located within basin, NPDES data, MS4 data, RCRA TSD sites, ECSI sites, CRL sites, LUST sites, and State Fire Marshal hazardous material spills.	***Available historical sediment data*** **1994**: Characterization of Stormwater Outfalls, Port of Portland (SJ10M1 stations; five samples) **1997**: Portland Harbor Investigation, EPA/DEQ (SD136) **1998**: Portland Shipyard Investigation, Port of Portland (PSY08 and PSY11)	**Table 1**[1]—Historical Sediment Results in the Vicinity of Outfall M-1
	Facilities located within basin City assisted in identifying facilities within basin. Types: distribution, manufacturing, transportation, storage, office, ship salvage, and retail. Primarily manufacturing/transportation/distribution.	**Table 3**[1]—Outfall M-1 Facility List
	NPDES stormwater data for industrial facilities NPDES data collected for Freightliner (1993 to present), Roadway Express (1999 to present), United Parcel Service (1997 to present), and Columbia Distributing, Inc. (1998 to present). Not all facilities were tested for the same analytes. However, zinc and oil and grease were sampled at all facilities. Freightliner had the highest concentrations of zinc and Columbia Distributing had the highest concentrations of oil and grease.	**Table 4A**[1]—NPDES Stormwater Results for Industries Discharging to the M-1 Outfall
	MS4 stormwater quality data Data collected from 1991-1996.	**Table 4B**[1]—City of Portland NPDES MS4 Permit

TABLE 3-1
Summary of Basin Assessment Tasks and Findings
Source Control Pilot Project

Basin Assessment Task	Findings	Location of Data in Appendix F
Preliminary Evaluation Update (continued)	***RCRA treatment, storage, and disposal (TSD) sites*** None listed. ***Environmental Cleanup Site Inventory*** Two sites within the M-1 drainage basin. No new sites found in 2002. ***Confirmed Release List*** None listed. ***Leaking underground storage tank (LUST)*** Three LUSTs within the M-1 drainage basin. ***State Fire Marshal hazardous material incidents (spills)*** Nine incidents within the M-1 drainage basin.	Not applicable **Table 7**[1]—Outfall M-1 DEQ Environmental Cleanup Site Information List Not applicable **Table 9**[1]—Outfall M-1 DEQ Leaking Underground Storage Tanks List **Table 12**[1]—Outfall M-1 State Fire Marshal Hazardous Spills List
City Data Compilation: Compile Illicit Discharge Elimination Program (IDEP) and pollution complaint information for Outfall M-1.	IDEP sampling has been performed since 1994. Sampling includes the collection of the following field parameters: fecal coliform, pH, temperature, conductivity, residual chlorine, copper, and iron. Additional laboratory analysis is not performed unless field parameters show the need. During the most recent sampling event (August 2002), metals and TPH were analyzed in the City Laboratory to supplement the existing suite of information.	**Table F-1**—Illicit Discharge Elimination Program

TABLE 3-1
Summary of Basin Assessment Tasks and Findings
Source Control Pilot Project

Basin Assessment Task	Findings	Location of Data in Appendix F
City Data Compilation (continued)	Pollution complaints reported to the Spill Protection and Citizen Response (SPCR) team associated with the M-1 outfall are recorded by the City. A total of 17 pollution complaints have been associated with Outfall M-1. No source has been identified for nine of these complaints. The City received numerous pollution complaints of an oily discharge originating from two industries (Freightliner and Columbia Distributing, Inc.), as well as complaints of diesel and oil spills on the streets of both facilities. A report of leaking batteries draining into a storm sewer from Freightliner property was received. Iron bacteria discharge is also observed from this outfall.	**Table F-2**—Pollution Complaints
NPDES Data Compilation: Update NPDES industrial stormwater discharge data maintained by BES. Compile and summarize NPDES point discharge and stormwater data maintained by DEQ.	Permit types found in the Outfall M-1 drainage basin: Freightliner—100J and 1200Z Roadway Express—1200Z United Parcel Service—1200Z Columbia Distributing, Inc.—1200Z Maletis Beverage Corp.—1200Z BES maintains effluent data for 1200Z permits. DEQ also maintains information on these permits as well as others (for example, 100J permits). Aside from a few additional data points for United Parcel Service (5/14/1998, 10/22/2001, and 3/19/2002), the only new effluent data found during the DEQ water quality file review were for Freightliner's 100J permit. However, details of each permit, including the reason that the permit was issued, requirements of the permit, and permit violations, were found during the DEQ water quality file review. Freightliner's zinc benchmarks were exceeded several times. Oil and grease and suspended solids benchmarks also were exceeded on occasion. Roadway Express has not exceeded any benchmarks throughout their entire permit history.	**Table F-3**—Summary of Information Obtained from the Water Quality File Review of M-1 Facilities with NPDES Permits

TABLE 3-1
Summary of Basin Assessment Tasks and Findings
Source Control Pilot Project

Basin Assessment Task	Findings	Location of Data in Appendix F
NPDES Data Compilation (continued)	United Parcel Service's oil and grease and suspended solids benchmarks were exceeded several times. Columbia Distributing, Inc., has exceeded the oil and grease benchmark on occasion. DEQ has asked this company to address some washing activities. Maletis Beverage Corp. was issued a 1200Z NPDES permit on 10/202002. As of January 2003, no sampling at this facility has been performed yet. The submittal of the first round of sampling is due to the City by July 2003.	
DEQ File Reviews: Review DEQ files for ECSI sites within or adjacent to M-1 outfall drainage basin. Prepare site summaries.	DEQ ECSI files reviewed and summaries prepared for: Freightliner TMP and Fred Devine Diving and Salvage. **Freightliner TMP** Primary operations at this facility: manufacturing of semitruck cabs (machining, welding, painting, cleaning, and assembling). Samples Available: No catch basin sampling available from DEQ file. Currently investigating buried drums and paint disposal pits found behind the facility. Numerous pollution complaints (hydrocarbon sheen coming from Freightliner facility). NPDES samples for metals (As, Cd, Hg, Ni, Pb, Cu, and Zn), COD, oil and grease, TPH, pH, TSS, and temperature. Freightliner frequently exceeds benchmark for zinc. **Fred Devine Diving and Salvage** Primary operation: storage and maintenance of marine salvage equipment (e.g., pumps, diving equipment)	Subsection 4 of Appendix F—DEQ ECSI File Reviews for City Outfall M-1

TABLE 3-1
Summary of Basin Assessment Tasks and Findings
Source Control Pilot Project

Basin Assessment Task	Findings	Location of Data in Appendix F
DEQ File Reviews (continued)	Soil and catch basin sampling performed in April 2002. Samples analyzed for PCBs, BNA SVOCs, and metals (As, Cd, Cu, Pb, Zn). Results identified elevated levels of metals, phthalates, and PAHs (with respect to sediment screening criteria). In addition, there is some indication (based on the laboratory interference that was experienced during analysis) that other SVOCs and TPH may have been present at elevated levels as well. Zinc and lead were present at concentrations above the DEQ high screening levels. Site currently does not have an NPDES permit. However, DEQ has issued a notice to Fred Devine indicating the need for this permit.	
Interviews: Conduct interviews with DEQ project managers for ECSI sites within or adjacent to the Outfall M-1 drainage basin.	Interviewed DEQ project managers for the Freightliner Truck Manufacturing Plant and Fred Devine Diving and Salvage. The DEQ project managers for Freightliner (Alicia Voss) and Fred Devine (Mark Pugh) had new information about their sites. DEQ project managers believe that past practices may have contributed to sediment contamination but that current practices are not likely to be contributing substantially to the sediment contamination.	Information has been incorporated into the DEQ ECSI file reviews for City Outfall M-1.
Facility Plans Review: Review available Stormwater Pollution Control Plans (SWPCPs) and Spill Prevention, Control, and Countermeasure Plans (SPCCs) for facilities within or adjacent to the Outfall M-1 drainage basin.	Available facility documents in DEQ ECSI files or DEQ water quality files were reviewed. Only United Parcel Service had a SWPCP in DEQ files. **United Parcel Service** Activities of industrial significance: package loading and unloading; truck and trailer parking and staging; equipment and vehicle maintenance; vehicle washing; storage of motor oil and antifreeze; spill cleanup debris from damaged or leaking packages, automotive parts, scrap metal, and tires; and vehicle fueling and unloading.	Collected for use at a later time.

TABLE 3-1
Summary of Basin Assessment Tasks and Findings
Source Control Pilot Project

Basin Assessment Task	Findings	Location of Data in Appendix F
Facility Plans Review (continued)	Potential stormwater pollutants: sediments, floatable debris, foam packing material, oil, grease, gasoline, diesel, motor oils, antifreeze, solvents, transmission oil, and metals.	
Map and Photograph Review: Collect facility maps and aerial photographs for the Outfall M-1 drainage basin.	Facility maps and photographs were collected during the DEQ ECSI and water quality file reviews. No other maps were collected. These maps were used in the ECSI site summaries. In addition, aerials were collected from the City's aerial photograph collection. No analysis of the aerials was performed.	Collected for use at a later time.
Site Reconnaissance: Conduct as necessary.	Site reconnaissance was not conducted during this phase.	Not applicable.

[1] Table number has been left unchanged to correspond with the document entitled *Preliminary Evaluation of City Outfalls—Portland Harbor Study Area (*Notebook 1, Eastshore Stormwater and CSO Outfalls) (CH2M HILL, July 2000).

R941170880
Freightliner Truck
Manufacturing Plant

R941171000
Hampton Distribution
Center

R941170070

R941170920
US Coast Guard
Marine Safety Station

R941170940
US Navy and
Marine Center

R941171070
B&G Manufacturing

-RC Display
Vans
-AKZO Nobel
Coatings Inc.

R941171220
-CAMCO Manufacturing
-Pacific Rim Transport

R941170970
-Fowler Acceptance
Corp.
-Freightliner Corp.
-Carpet Supply Inc.

R941170930
Kool-Pak
Distributing

R941171140

R941170910
United Parcel Service

R941170900

R941170870

R941171130
Stack Metallurgical
Services Inc.

R941170860

R941171010
Fred Devine
Diving & Salvage

R941171200

R941170740

R941171030
Port of Portland
Dredging

R941171210

R941171230
EDS Property
Management

R941171120
Port of Portland
Landscape Maintenance

R941170520

R025800040
Pacific Carpet

R025800020

R025800060

R025800080

M1 Basin

R605600040

R605600020

R605604000
Roadway Express

R605604700

R605603500
-Maletis Beverage Inc.
-Columbia Distributing
Inc.
-Gulick Trucking

R605600070

R605602200

R605602210

R941171110

R941170600

R941170610

UNNAMED
AMHERST
PRINCETON
BUTLER
STAFFORD
CAMBRIDGE
UNIVERSITY
WELLESLEY
NEWMAN
DWIGHT
WOOLSEY
WALLACE
FOSS
HURST
CHAUTAUQUA
FOWLER
WASHBURNE
CHASE
SEWARD
WABASH
VINCENT
HOLLAND
MORGAN
OATMAN
BRYANT
SARATOGA
LIBERTY
LOMBARD
HOBEL
ALDEN
YALE
HARVARD
WILLAMETTE BLVD
WILLAMETTE
CLINN
MENLO
FERNE
PORTSMOUTH
ENSIGN
BASIN
LEVERMAN
CUTTER

Legend

- Streets
- M-1 - Basin Area
- Tax Lots
- River Edge 2001
- R941170880 Record Number

0 250 500
Feet

N

Source : David Evans and Associates, Metro DRC, City of Portland BES
Aerial photo flight date Sept. 20, 1997

Figure 3-1

Outfall M-1 Drainage Basin
City of Portland
Portland, OR

CH2MHILL

File Path: P:\PDXBES\164067\gis-data\mxds\PDX-BES_m1-basin2.mxd, Date: December 09, 2002, User: JGATES2

SECTION 4

Evaluation of Results

This section provides an evaluation of the Pilot Project sampling results at Outfall M-1. The objectives of this section are to (1) describe the process for identifying the primary chemicals of interest for the data evaluation based on the complete set of sediment data shown in Table 2-2, (2) provide evaluation results for chemicals of interest with the overall objective of identifying chemicals that warrant investigation as possible source constituents at Outfall M-1, and (3) summarize significant findings of the Phase 1 Pilot Project.

4.1 Data Evaluation Process

The data evaluation process consisted of a three-step approach:

1. The measured concentrations were compared with selected sediment screening benchmarks.
2. The chemicals were prioritized based on the factor of exceedance of screening benchmarks and a subset of primary chemicals of interest was identified.
3. Each of the priority chemicals of interest was further analyzed for spatial trends that could indicate Outfall M-1 as a likely source.

The specifics of each step are described in the following subsections.

4.1.1 Screening Benchmark Comparison

To determine which of the chemical constituents in sediment are of highest priority, the detected concentrations and detection limits for each of the analytes were compared to two sediment benchmark values: the DEQ High Toxicity Screening Level for freshwater receptors presented in the external review draft of the *Guidance for Evaluation of Sediment at State Cleanup Sites* (DEQ, 2002), and the Apparent Portland Harbor Sediment Baseline Maximum Values presented in Table 1 of *DEQ Notification Letters to Portland Harbor Property Owners* (DEQ, September 1999). The DEQ Low Toxicity Screening Levels were not used because many of these values were well below baseline values, which resulted in an excessive number of exceedances that were unlikely to be related to the outfall.

Because some benchmarks are expressed in terms of a total group of constituents rather than individual constituents, the total values were computed from the sum of detected constituents. The relevant compound groups and their respective constituents are listed below:

- **Low molecular weight PAHs (LPAHs)**: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, and 2-methylnaphthalene

- **High molecular weight (HPAHs)**: fluoranthene, pyrene, benz[a]anthracene, chrysene, benzofluoranthenes, benzo[a]pyrene, indeno[1,2,3-cd]pyrene, dibenz[a,h]anthracene, and benzo[ghi]perylene
- **PCBs**: all aroclors

4.1.2 Chemical Prioritization

For each chemical, the maximum detected value within the group of samples at the outfall was compared to each of the two benchmarks to identify the "factor of exceedance" for that chemical. The chemicals were ranked from high to low based on the maximum factor of exceedance. To help determine whether the maximum from the data set might be an outlier, the number of total samples with concentrations exceeding each benchmark was also identified. For samples that were below MRLs, the MRLs were compared to the screening values. In cases where the MRLs exceeded screening values[1], both the maximum factor of exceedance and number of samples exceeding were identified.

Chemicals that had the highest exceedances of the DEQ High Screening Values or the DEQ Portland Harbor baseline levels at Outfall M-1 were selected to be carried on to the spatial distribution analysis.

4.1.3 Spatial Distribution

The spatial distribution analysis was guided by a number of important questions:

- Is there any evidence of a concentration gradient away from the outfall?
- How do the nearshore concentrations compare with data from offshore?
- Is the distribution of organic chemicals measurably influenced by sediment TOC or grain size?
- Do any of the chemicals appear to co-occur (is there spatial correlation between different chemicals)?

Each of these questions was addressed through a detailed graphical analysis, as described in Section 4.2.3.

4.2 Data Evaluation Results

Data evaluation results are summarized in the following subsections.

4.2.1 Benchmark Comparison

Analytes at Outfall M-1 that exceeded DEQ High or Baseline Screening Values are summarized in Tables 4-1 and 4-2. The tables also include analytes whose MRLs exceeded the screening values. Detected exceedances are highlighted and nondetected exceedances are bolded. The analytes are ranked from high to low by the maximum exceedance factor.

[1] Although the analytical methods employed were adequate to meet benchmark levels under ordinary field conditions, the difficult matrix interferences (see Section 2.4.2) associated with these urban sediments resulted in some substantial elevations in MRLs.

TABLE 4-1

Exceedances of DEQ High-Sediment Benchmark Screening Criteria for Freshwater Receptors

Source Control Pilot Project

Class	Analyte	DEQ Screening Level (high)	Units	PP01M101 08/22/2002 Normal		PP01M102D 08/22/2002 Dupe of 01		PP01M103 08/22/2002 Normal		PP01M104 08/22/2002 Normal		PP01M105 08/22/2002 Normal		PP01M106 08/22/2002 Normal		PP01M107 08/22/2002 Normal		PP01M108 08/22/2002 Normal		PP01M109 08/22/2002 Normal		PP01M110 08/22/2002 Normal		DETECTS Max factor of exceedance	DETECTS Number of exceedances	NONDETECTS Max factor of exceedance	NONDETECTS Number of exceedances
BNA	Bis(2-Ethylhexyl) Phthalate	800	µg/kg	39200	J	7130	J	32500	J	163	J	2250	J	2260	J	68.4	U	226		994		377		49.0	6		
BNA	Total HPAH	1000	µg/kg	926		1618		2230		158		2115		2832		60.4		1764		1232		413		2.8	6		
BNA	Total LPAH	400	µg/kg	372		292.7		595.9		39.55		744		433		19.57		446.42		207		104.4		1.9	4		
M-TOTAL	Chromium	111	mg/kg	45		146		39.9		148		31.5		89.2		11.1		20.9		34.7		20.4		1.3	2		
BNA	Indeno (1,2,3-cd) pyrene	100	µg/kg	52.4	UJ	44.6	UJ	48.2	UJ	3.98	U	41.5	UJ	39.7	UJ	3.89	U	126		76		3.72	U	1.3	1		
M-TOTAL	Zinc	459	mg/kg	403	B2	577	B2	318	B2	359	B2	362	B2	357	B2	57	B2	145	B2	193	B2	123	B2	1.3	1		
BNA	Di-n-Butyl Phthalate	100	µg/kg	**1960**	**UJ**	**1670**	**UJ**	**1800**	**UJ**	**149**	**U**	**1550**	**UJ**	**1480**	**UJ**	**145**	**U**	**164**	**U**	**171**	**U**	**139**	**U**			19.6	10
BNA	Phenol	50	µg/kg	**450**	**UJ**	**383**	**UJ**	**414**	**UJ**	**34.2**	**U**	**356**	**UJ**	**341**	**UJ**	**33.4**	**U**	**37.8**	**U**	**39.4**	**U**	**31.9**	**U**			9.0	5
BNA	Hexachlorobenzene	100	µg/kg	**247**	**UJ**	**211**	**UJ**	**228**	**UJ**	18.8	U	**196**	**UJ**	**188**	**UJ**	18.4	U	20.8	U	21.7	U	17.6	U			2.5	5
BNA	1,4-Dichlorobenzene	300	µg/kg	**360**	**UJ**	**307**	**UJ**	**331**	**UJ**	27.3	U	285	UJ	273	UJ	26.7	U	30.2	U	31.5	U	25.6	U			1.2	3
BNA	1,3-Dichlorobenzene	300	µg/kg	**315**	**UJ**	268	UJ	290	UJ	23.9	U	250	UJ	239	UJ	23.4	U	26.4	U	27.6	U	22.4	U			1.1	1

Notes:

DEQ high values are used here for general screening purposes only. Additional evaluation is needed to develop site-specific risk and/or cleanup concentrations.

Detected exceedances are highlighted and nondetected exceedances are bolded.

Qualifiers:

B2 = This analyte was detected in the associated method blank. The analyte concentration in the sample was determined

J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but the analyte was not detected above the reported sample quantitation limit.

UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Abbreviations:

µg/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

TABLE 4-2

Exceedances of Portland Harbor Baseline Sediment Benchmark Screening Criteria

Source Control Pilot Project

Class	Analyte	DEQ Baseline Values	Units	PP01M101 08/22/2002 Normal		PP01M102D 08/22/2002 Dupe of 01		PP01M103 08/22/2002 Normal		PP01M104 08/22/2002 Normal		PP01M105 08/22/2002 Normal		PP01M106 08/22/2002 Normal		PP01M107 08/22/2002 Normal		PP01M108 08/22/2002 Normal		PP01M109 08/22/2002 Normal		PP01M110 08/22/2002 Normal		DETECTS Max factor of exceedance	DETECTS Number of exceedances	NONDETECTS Max factor of exceedance	NONDETECTS Number of exceedances
BNA	Di-n-Octyl Phthalate	20	µg/kg	30100	J	676	J	1050	J	**44.4**	**U**	**463**	**UJ**	596	J	**43.4**	**U**	**49.1**	**U**	134	J	64.8	J	1505.0	6	23.2	4
BNA	Bis(2-Ethylhexyl) Phthalate	390	µg/kg	39200	J	7130	J	32500	J	163	J	2250	J	2260	J	68.4	U	226		994		377		100.5	6		
BNA	Butyl Benzyl Phthalate	20	µg/kg	**427**	**UJ**	**364**	**UJ**	2010	J	**32.5**	**U**	**339**	**UJ**	**324**	**UJ**	43.8	J	54.7	J	223		**30.3**	**U**	100.5	4	21.4	6
BNA	Benzoic Acid	200	µg/kg	3990	J	3980	J	3300	J	347	J	2800	J	4110	J	178	J	64.2	U	498	J	480	J	20.6	8		
M-TOTAL	Zinc	118	mg/kg	403	B2	577	B2	318	B2	359	B2	362	B2	357	B2	57	B2	145	B2	193	B2	123	B2	4.9	9		
M-TOTAL	Lead	30	mg/kg	48.2	B2	114	B2	43.4	B2	34	B2	57.6	B2	38.6	B2	5.45	B2	14.6	B2	24.6	B2	10.8	B2	3.8	6		
M-TOTAL	Chromium	41	mg/kg	45		146		39.9		148		31.5		89.2		11.1		20.9		34.7		20.4		3.6	4		
M-TOTAL	Cadmium	0.6	mg/kg	1.64		1.52		1.31		0.348	J	1.89		1.26		0.00927	U	0.00947	U	0.488	J	0.18	J	3.2	5		
PCB-SW8082	Total PCBs	180	µg/kg	195.4		346.5		121		0		338.2		34.5		0		13.5		191.1		8.79		1.9	4		
CONV	Total Organic Carbon	20000	mg/kg	38000		18200		18800		4880		20300		7160		780		3150		9570		9990		1.9	2		
M-TOTAL	Arsenic	5	mg/kg	7.61		4.25		5.81		3.86		4.11		4.1		2.81		8.98		4.84		3.65		1.8	3		
BNA	Acenaphthylene	60	µg/kg	**98**	**UJ**	97.2	J	**90.2**	**UJ**	7.45	U	**77.7**	**UJ**	**74.3**	**UJ**	7.28	U	21.3		18.6	J	10.7	J	1.6	1	1.6	4
BNA	Fluoranthene	600	µg/kg	486	J	810	J	815	J	38.6		877	J	759	J	34		446		220		99.6		1.5	4		
M-TOTAL	Copper	60	mg/kg	86.5	B2	72.5	B2	79.9	B2	25.6	B2	73.6	B2	49.5	B2	15	B2	34.4	B2	63.8	B2	36	B2	1.4	5		
M-TOTAL	Mercury	0.1	mg/kg	0.125		0.124		0.131		0.0104	U	0.108		0.0102	U	0.0103	U	0.0118	U	0.0124	U	0.0111	U	1.3	4		
BNA	Pyrene	700	µg/kg	440	J	808	J	834	J	48.5		769	J	599	J	26.4		354		208		110		1.2	3		
BNA	Total HPAH	2400	µg/kg	926		1618		2230		158		2115		2832		60.4		1764		1232		413		1.2	1		
BNA	Chrysene	425	µg/kg	132	UJ	112	UJ	121	UJ	35.2		469	J	450	J	9.8	U	160		132		53.8		1.1	2		
BNA	Total LPAH	700	µg/kg	372		292.7		595.9		39.55		744		433		19.57		446.42		207		104.4		1.1	1		
BNA	Fluorene	125	µg/kg	129	J	89.5	UJ	103	J	7.98	U	130	J	79.6	UJ	7.79	U	25.5		22.4		19.7		1.0	2		
BNA	Di-n-Butyl Phthalate	20	µg/kg	**1960**	**UJ**	**1670**	**UJ**	**1800**	**UJ**	**149**	**U**	**1550**	**UJ**	**1480**	**UJ**	**145**	**U**	**164**	**U**	**171**	**U**	**139**	**U**			98.0	10
BNA	Benzyl Alcohol	20	µg/kg	**472**	**UJ**	**402**	**UJ**	**434**	**UJ**	**35.9**	**U**	**374**	**UJ**	**358**	**UJ**	**35**	**U**	**39.7**	**U**	**41.4**	**U**	**33.5**	**U**			23.6	10
BNA	Phenol	20	µg/kg	**450**	**UJ**	**383**	**UJ**	**414**	**UJ**	**34.2**	**U**	**356**	**UJ**	**341**	**UJ**	**33.4**	**U**	**37.8**	**U**	**39.4**	**U**	**31.9**	**U**			22.5	10
BNA	Dimethyl Phthalate	20	µg/kg	**247**	**UJ**	**211**	**UJ**	**228**	**UJ**	18.8	U	**196**	**UJ**	**188**	**UJ**	18.4	U	**20.8**	**U**	**21.7**	**U**	17.6	U			12.4	7
BNA	Carbazole	100	µg/kg	**877**	**UJ**	**747**	**UJ**	**807**	**UJ**	66.6	U	**695**	**UJ**	**665**	**UJ**	65.1	U	73.7	U	76.8	U	62.3	U			8.8	5
BNA	Dibenzofuran	100	µg/kg	**261**	**UJ**	**222**	**UJ**	**240**	**UJ**	19.8	U	**207**	**UJ**	**198**	**UJ**	19.4	U	21.9	U	22.9	U	18.5	U			2.6	5

Notes:

DEQ baseline values are used here for general screening purposes only. Additional evaluation is needed to develop site-specific risk and/or cleanup concentrations.

Detected exceedances are highlighted and nondetected exceedances are bolded.

Qualifiers:

B2 = This analyte was detected in the associated method blank. The analyte concentration in the sample was determined.

J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but the analyte was not detected above the reported sample quantitation limit.

UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Abbreviations:

µg/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

4.2.2 Chemicals Selected for Detailed Analyses

Based on the results of the benchmark comparisons provided in Tables 4-1 and 4-2, it was evident that certain classes of chemicals were more prevalent at levels exceeding benchmarks in sediment. These included:

- Phthalates
- PAHs
- PCBs
- Various metals

Representative constituents were selected from these groups of chemicals for the more detailed graphical analyses. For phthalates, the compound bis(2-ethylhexyl)phthalate was selected as a representative for all phthalates. Table 4-3 lists the constituents selected for the more detailed graphical analyses and identifies whether the DEQ High Screening Values and Baseline Screening Values were exceeded at Outfall M-1 and Outfall 18[2].

Benzoic acid and total organic carbon both exceeded baseline screening values but were not carried forward for further analysis. Although sample values exceeded baseline concentrations in eight of ten M-1 samples, benzoic acid occurs naturally in many plants and animals as a natural degradation product produced by metabolic processes. Benzoic acid is a natural constituent in many foods, including milk products, and is relatively nontoxic (it is used as a food preservative). Based on its common natural occurrence, relatively nontoxic characteristics, and presence in conjunction with high total organic carbon levels typically observed in sediment samples, benzoic acid was considered neither a significant risk to human health and the environment, nor a likely contaminant from human activity in the M-1 basin. Therefore, benzoic acid was not carried forward for further investigation.

4.2.3 Graphical Analysis of Results

4.2.3.1 Spatial Distribution

Bar charts of the sample concentrations for bis(2-ethylhexyl)phthalate, total PCBs, total LPAHs, total HPAHs, zinc, chromium, lead, and mercury are presented as Figures 4-1 through 4-8. The charts were tailored to display a variety of information, such as:

- Visual representation of the different concentrations
- Rough comparison of nearshore and midchannel concentrations and concentrations along the shoreline at increasing distances from the outfall
- Comparison with the relevant historical sample results
- Relationship to DEQ High and Baseline Screening Values; DEQ Low Screening Values are shown on the figures for information purposes only
- Side-by-side comparison to the corresponding results for Outfall 18. (Note: Direct comparisons with Outfall 18 are outside the scope of this report.)

[2] Although this report focuses on the results from Outfall M-1, corresponding results for Outfall 18 are provided for comparative purposes. A separate report will address Outfall 18.

TABLE 4-3
Constituent Groups Selected for Detailed Graphical Analyses
Source Control Pilot Project

Compound or Chemical	Exceeds DEQ High near Outfall M-1	Exceeds Baseline near Outfall M-1	Exceeds DEQ High near Outfall 18	Exceeds Baseline near Outfall 18
Phthalates				
Bis(2-Ethylhexyl)Phthalate	X	X	X	X
Polynuclear Aromatic Hydrocarbons				
Total LPAHs	X	X	X	X
Total HPAHs	X	X	X	X
Polychlorinated Biphenyls				
Total Aroclors		X		X
Metals				
Lead		X	X	X
Zinc	X	X		X
Chromium	X	X		X
Mercury		X		X

Notes:
N/A indicates that the screening value is not available.
Blank indicates that no exceedance exists.

Figures 4-1 through 4-8 present the Outfall M-1 data in three groups based on proximity to the outfall: toward the northwest, centerline of outfall (northeast to southwest), and toward southeast. The samples in each group were roughly arranged in order of increasing distance from the outfall (refer to Figure 2-1 for sample locations). The data set was augmented with historical samples from the vicinity of the outfall.

A definitive correlation between proximity to outfall and concentration was not observed, as shown in Figures 4-1 through 4-8. For some constituents, it appeared that the samples located outside of the centerline group had generally lower concentrations. However, this did not hold true for all chemicals. General observations are as follows:

- Phthalates: Higher concentrations are present in the general area of the outfall, but with no apparent concentration gradient.
- PCBs: Higher concentrations are present in the general area of the outfall, with higher concentrations near the outfall and the center of the lagoon and lower concentrations between these two areas.
- LPAHs: Higher concentrations are present in the general area of the outfall, with generally decreasing concentrations toward the center of the lagoon.
- HPAHs: Somewhat higher concentrations are present in the general area of the outfall, with relatively less variability of data

- Metals: Zinc and lead concentrations are generally consistent or increasing toward the center of the lagoon. Higher chromium concentrations appear to be in the vicinity of the Port dredging dock and the center of the lagoon.

4.2.3.2 Concentration Gradient Analysis

To provide some insight as to whether the selected constituents originated from Outfall M-1, the sediment concentrations within 140 feet of the outfall were plotted against radial distance from the outfalls (computed using the field-measured GPS coordinates). The hypothesis behind these analyses is that chemicals originating from the outfall should show generally decreasing concentrations with distance away from the outfall. The concentrations versus radial distance from outfall correlations for bis(2-ethylhexyl)phthalate, total PCBs, total LPAHs, and total HPAHs are shown in Figure 4-9. Figure 4-10 shows the correlations for zinc, chromium, lead, and mercury.

Overall, the observed linear correlations are poor, with a maximum R^2 at Outfall M-1 of 0.21 for total LPAHs. Owing to the general scatter in the data, a meaningful improvement in higher-order, nonlinear correlations was not attempted[3]. Most samples have regressions with positive slopes, indicating that concentrations tend to increase with distance away from the outfall. This is counter to what may be expected if the outfall is acting as a source. However, given the poor correlation coefficients, the slope of the regression line may not be meaningful.

This analysis provides only a rough estimate of source contribution, because it did not take into account stream hydrodynamics, directionality, or instream chemical sorption characteristics. However, Outfall M-1 is located in a dead-end channel of the river. Consequently, upstream and downstream designations are less meaningful, and inwater flow direction would be expected to have little long-term influence. Despite the simplified approach, the lack of any distinguishable concentration gradients is somewhat surprising. However, it is possible that other influences such as propwash could confound the spatial distribution of constituents.

4.2.3.3 Influence of TOC and Grain Size

Additional parameters that could influence the distribution of organic constituents include the TOC content and sediment particle size. These two properties were evaluated to see if their potential influence could explain the lack of correlation of concentration with distance away from Outfall M-1. The hypothesis behind these analyses is that chemicals originating from the outfall should show generally decreasing concentrations with decreasing TOC or increasing particle size, if indeed these properties measurably influence spatial distribution.

Concentrations of TOC were compared to levels of four organic constituents, as shown in Figure 4-11. No significant correlation was observed for PCBs or TPH, and weak correlations were seen for PAHs and bis(2-ethylhexyl)phthalate. The maximum R^2 at Outfall M-1 was 0.69 for bis(2-ethylhexyl)phthalate. However, the concentration of bis(2-ethylhexyl)phthalate was so high in some of these samples, it is likely that the TOC measurement was significantly biased by the bis(2-ethylhexyl)phthalate.

[3] Due to the occurrences of inwater obstacles (e.g., riprap), linear sampling transects were generally unobtainable.

The median particle diameter (D_{50}) was plotted on a bar chart, as shown in Figure 4-12. One sample at Outfall M-1 was significantly outside of the typical "fine sand" classification. Sample M1-05 fell into the "coarse sand" classification. One might expect M1-05 to show typically lower concentrations because its larger particle size suggests that it would have less specific surface area available for adsorption. However, grain size does not appear to correlate with constituent concentration.

4.2.3.4 Co-occurrence of Different Constituents

The concentrations of selected pairs of constituents were plotted together to evaluate if certain chemicals were co-occurring at the outfall. The hypothesis behind these analyses is that chemicals originating from the outfall should show general co-occurrence in the vicinity of the outfall.[4]

The plots are presented in Figure 4-13 for organics and Figure 4-14 for metals. A strong correlation was observed between lead and zinc ($R^2 = 0.86$) and a moderate correlation between zinc and chromium ($R^2 = 0.54$) and LPAHs and HPAHs ($R^2 = 0.57$) at Outfall M-1.

Although not included in the DEQ High or the Baseline Screening Value tables owing to lack of benchmark values, petroleum hydrocarbons were also analyzed for co-occurrence (Figure 4-15). A very strong correlation ($R^2 = 0.98$) was observed between diesel and lube oil at Outfall M-1.

4.2.3.5 Variability of Constituents

A duplicate sample was collected at location 01. Comparison of analyte values showed relatively comparable values for most analyte chemicals and groups. Variability of greater than 2X was observed for bis(2-ethylhexyl)phthalate, total HPAH, total LPAH, and chromium. The heterogeneous nature of sediment samples may account for the variability observed for these analytes.

4.3 Conclusions

The significant findings of the Phase 1 Pilot Project at Outfall M-1 are summarized below:

- Chemicals of interest occur in sediment collected near Outfall M-1 at levels that exceed screening benchmarks. However, there are no spatial patterns that conclusively indicate Outfall M-1 as a significant source**.**
- Elevated chemicals of interest identified during the sampling and subsequent screening consist of phthalates, PAHs, PCBs, and some metals.
- The spatial distribution of organic and inorganic chemicals is not strongly influenced by TOC and grain size.
- Certain chemicals appear to co-occur at Outfall M-1, suggesting a common source of release.

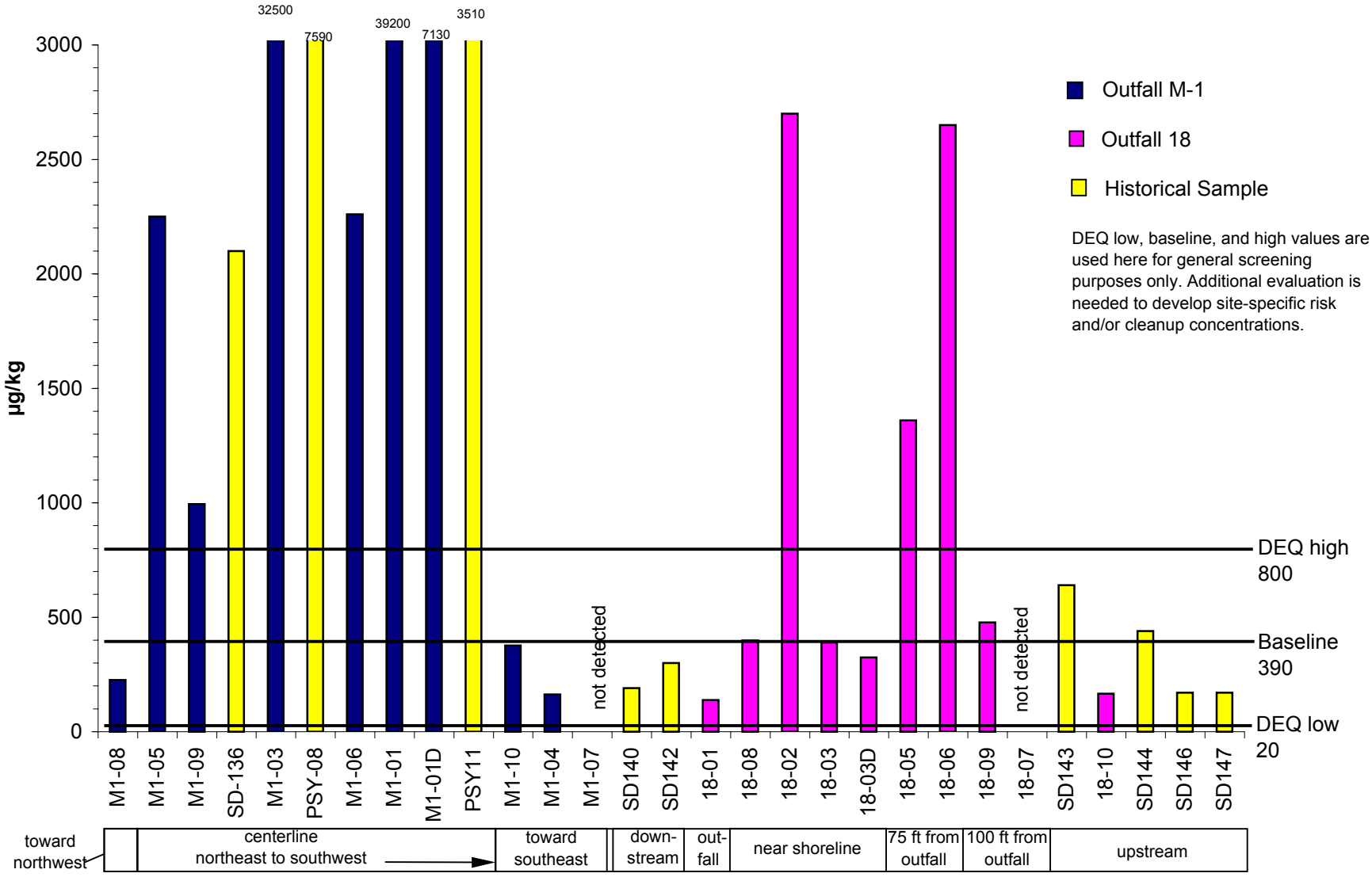
[4] Co-occurrence does not conclusively indicate common release from the outfall, but may result from common release from another instream source.

The purpose of Phase 2 of the Source Control Pilot Project will be to develop a process for identifying current upland sources of elevated constituents identified in Phase 1 and to identify source control actions. Objectives include identifying sites that may be contributing contamination to Outfall M-1, identifying data gaps, developing a process for coordinating efforts between DEQ and the City, and implementing outreach. Based on the results of the Phase 1 evaluation, it is recommended that Phase 2 of the Pilot Project include further evaluation of potential outfall sources. These chemicals include:

- Phthalates
- PAHs
- PCBs
- Chromium
- Zinc

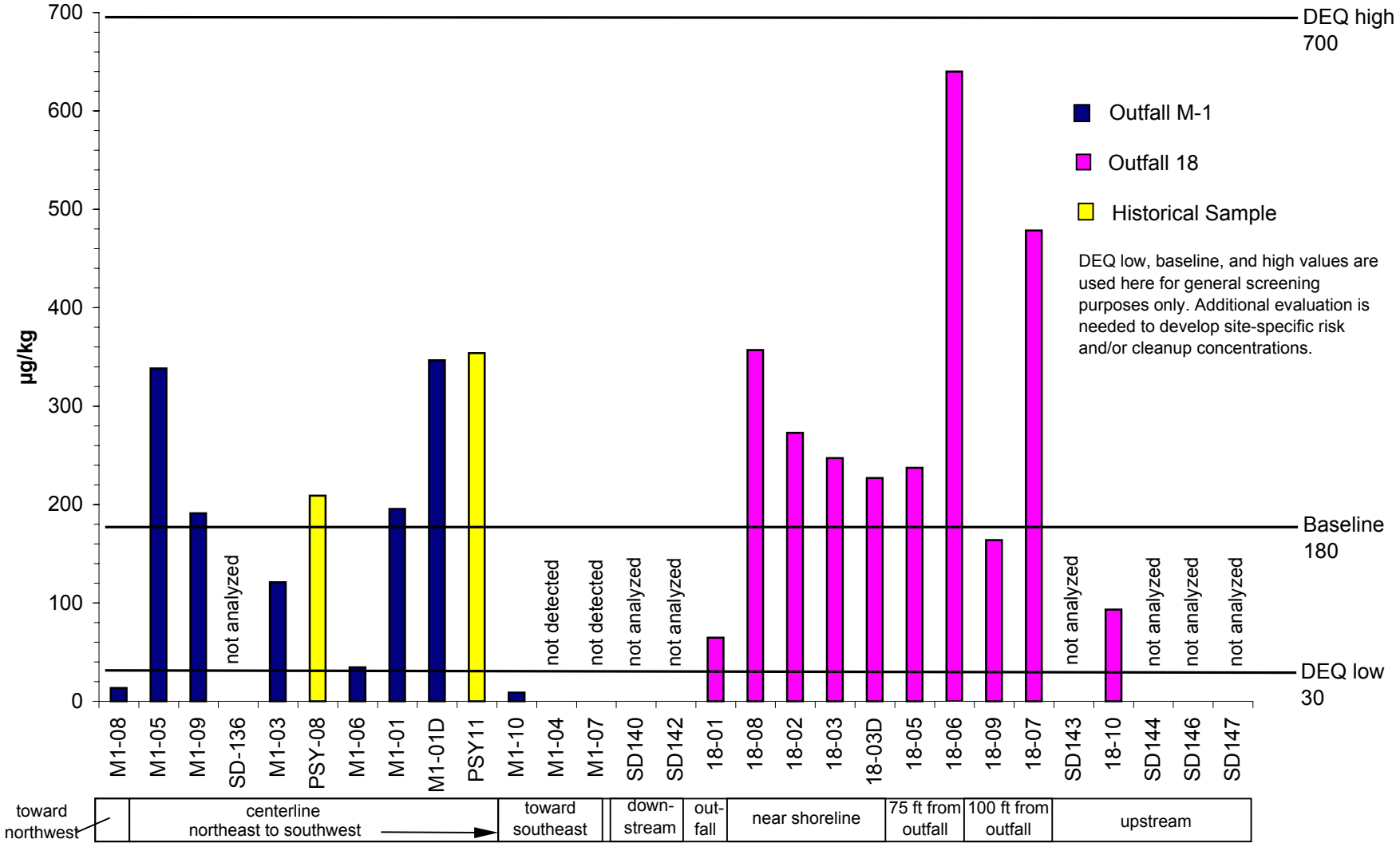
During the RI/FS, additional chemicals may be identified in relation to Outfall M-1, and further source investigation/control may need to be reevaluated in the future.

Figure 4-1. Bis(2-Ethylhexyl)Phthalate Concentrations in Sediment



USR/030280018.XLS

Figure 4-2. Total PCB Concentrations in Sediment



USR/030280018.XLS

Figure 4-3. Total LPAH Concentrations in Sediment

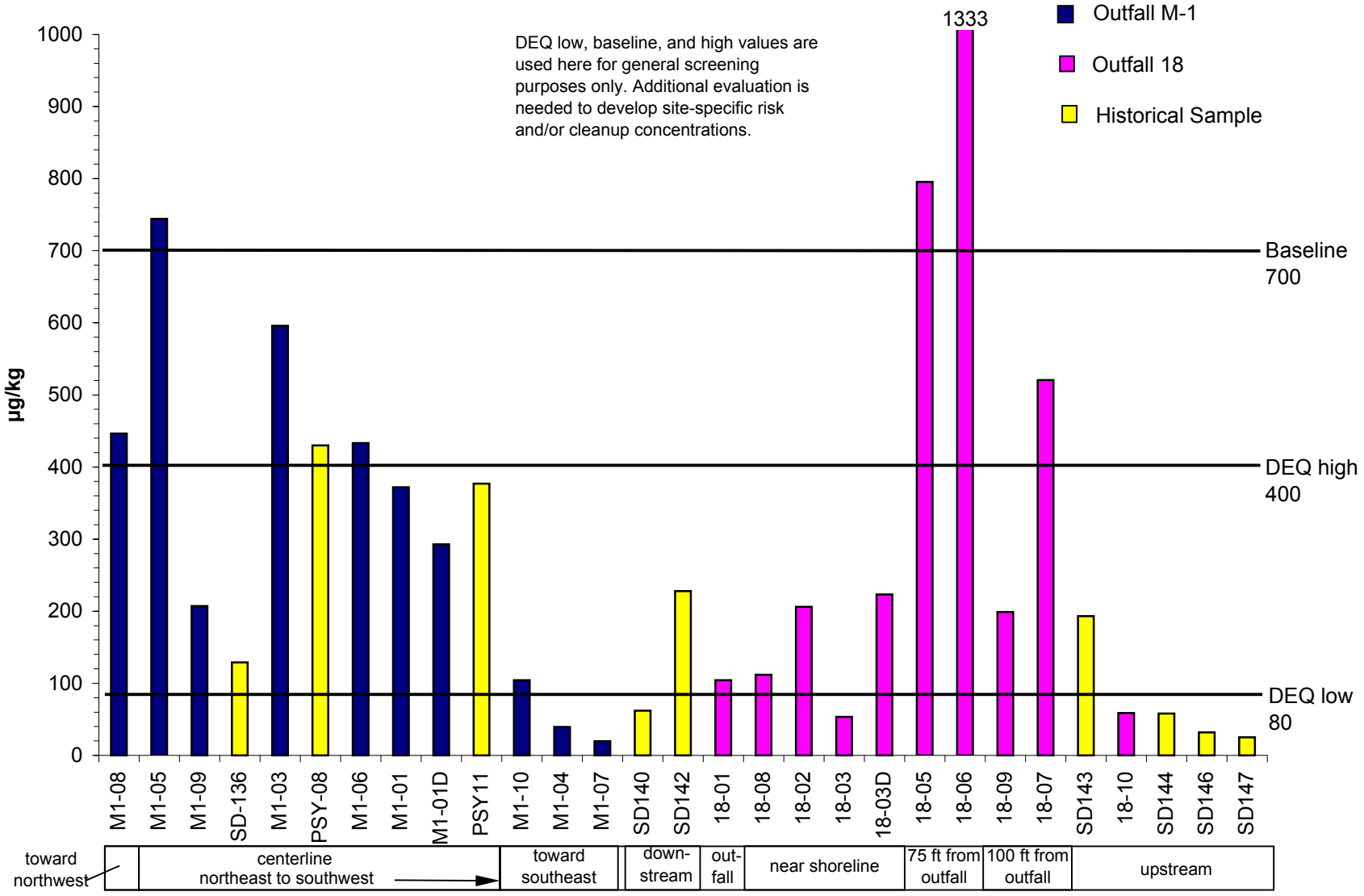


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Figure 4-4. Total HPAH Concentrations in Sediment

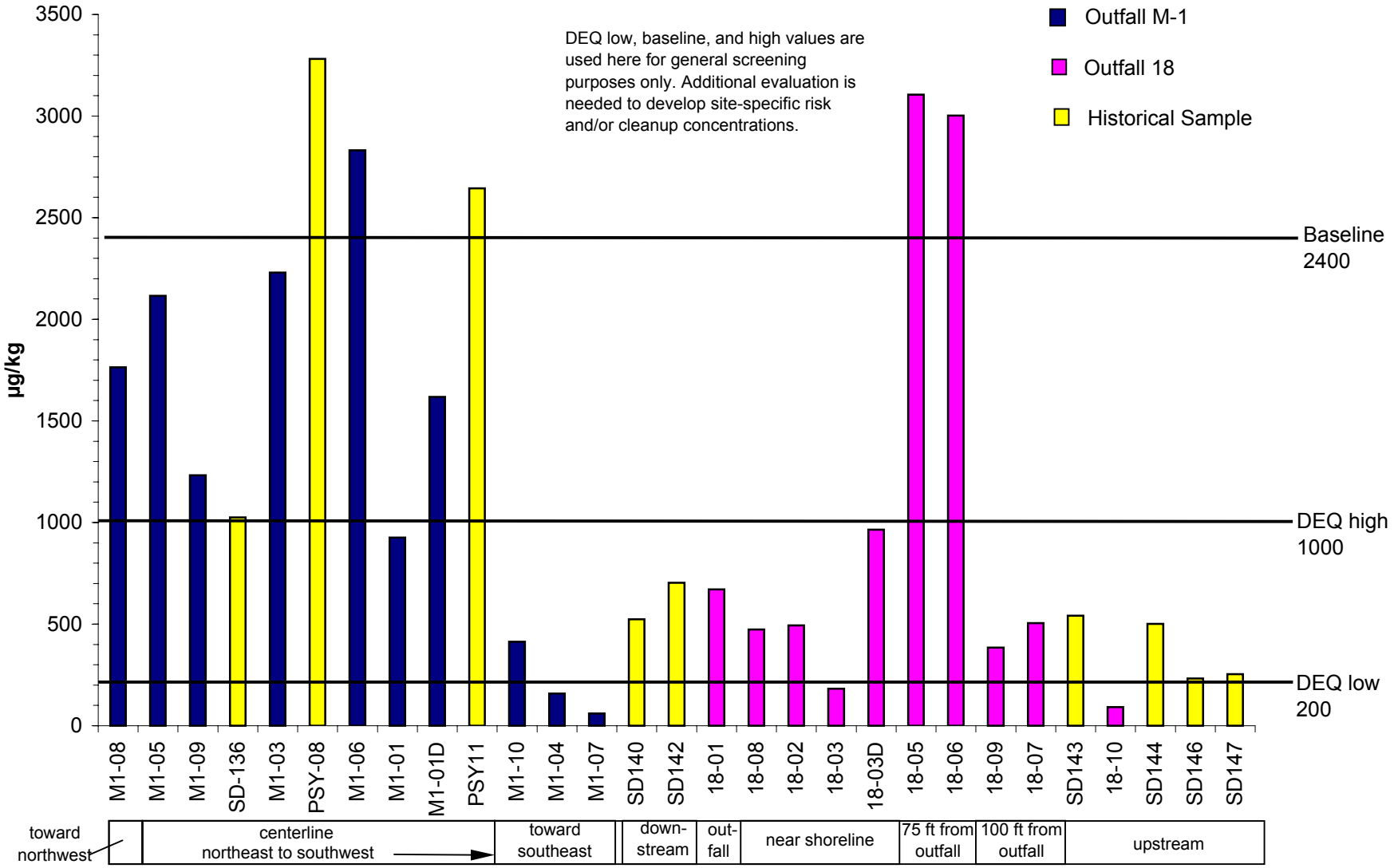

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Figure 4-5. Zinc Concentrations in Sediment

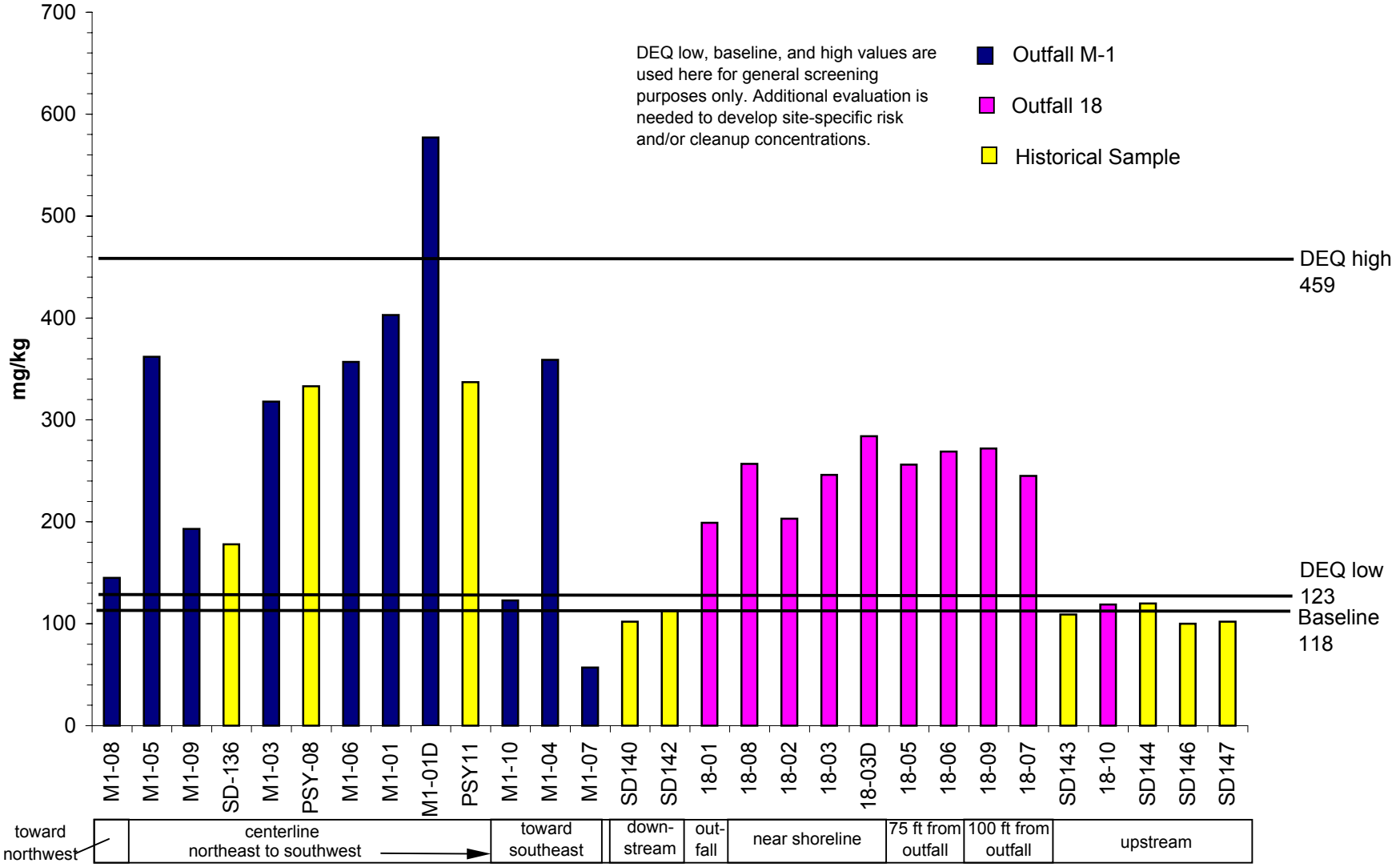

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Figure 4-6. Chromium Concentrations in Sediment

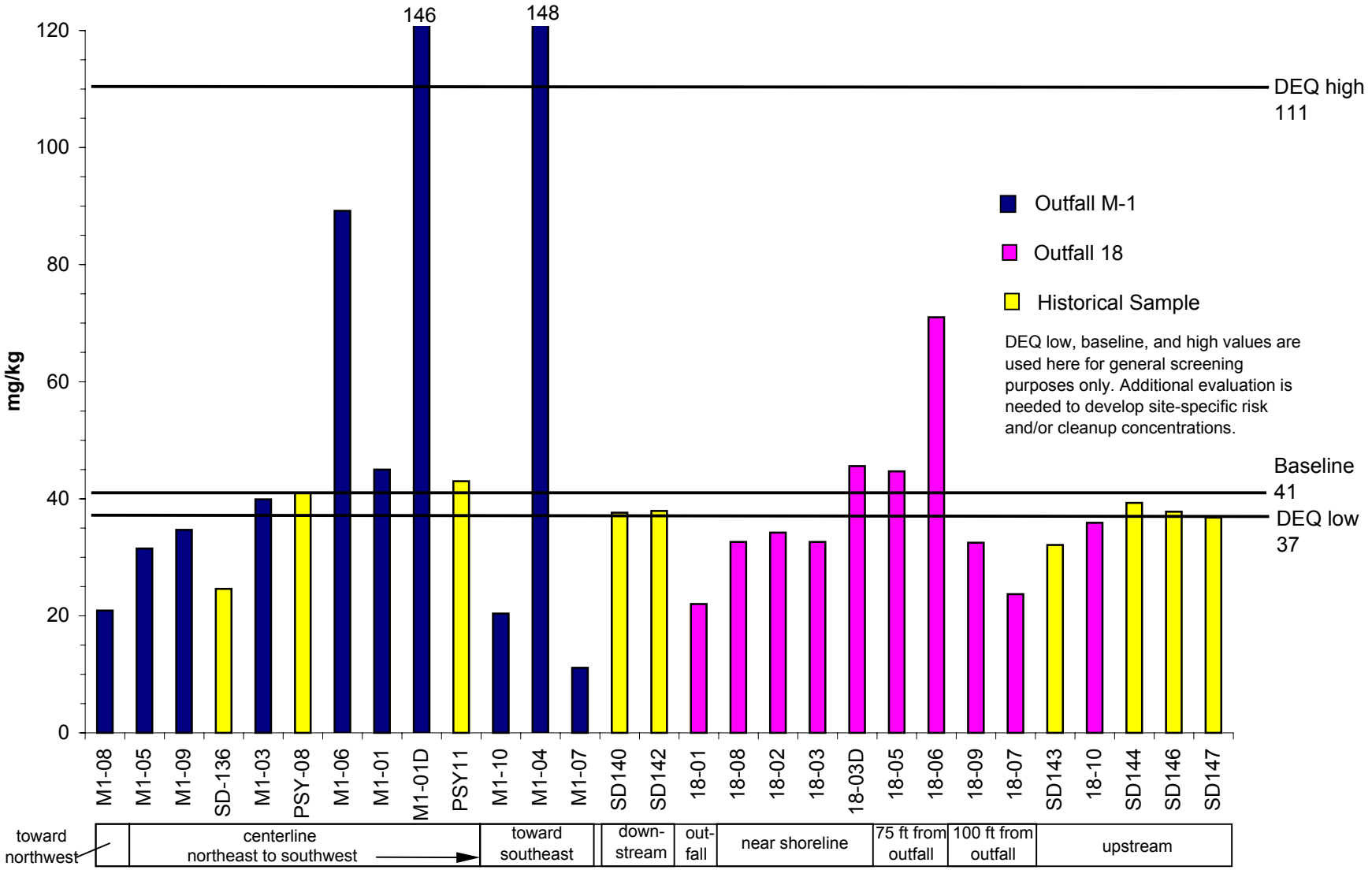

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Figure 4-7. Lead Concentrations in Sediment

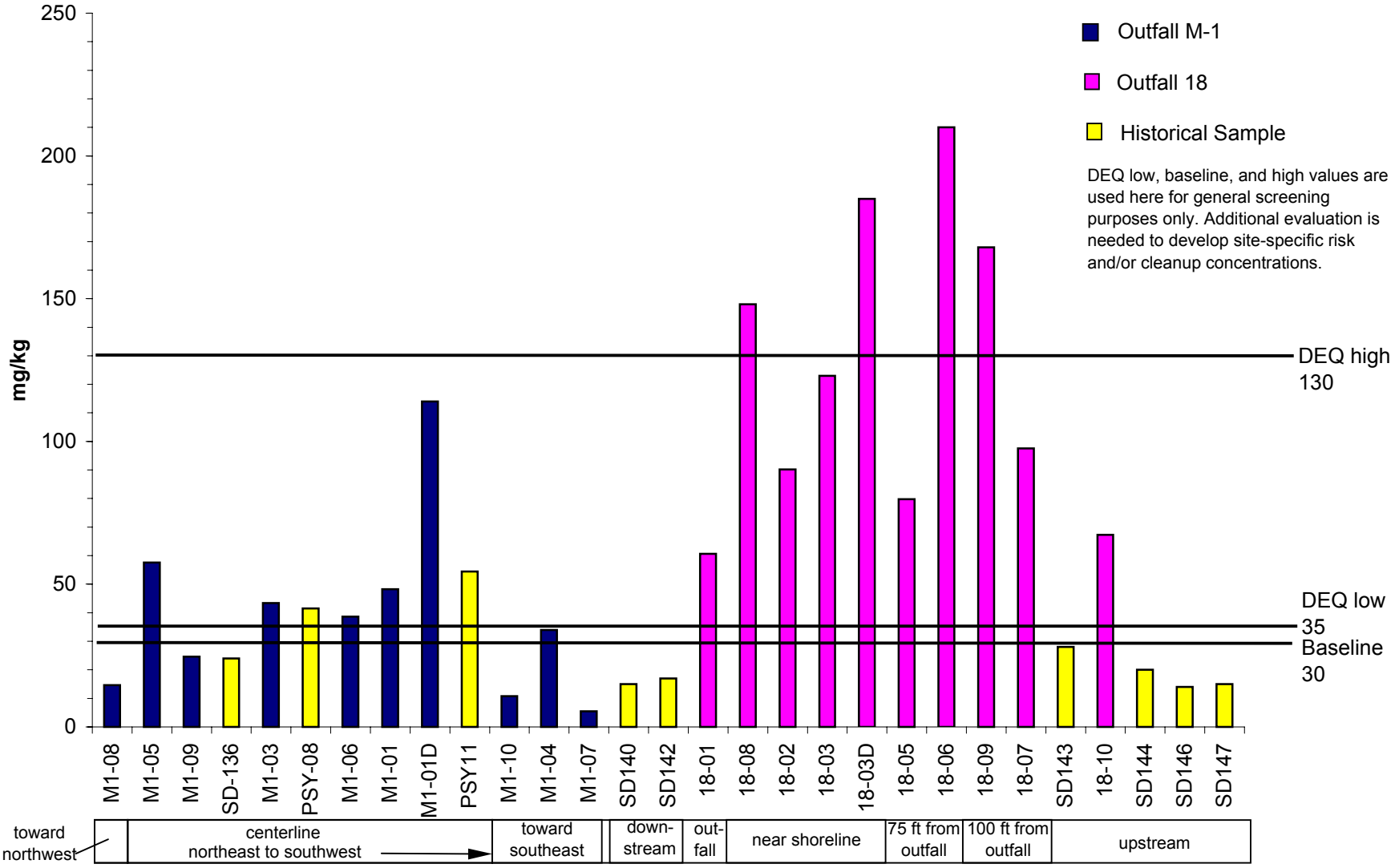

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Figure 4-8. Mercury Concentrations in Sediment

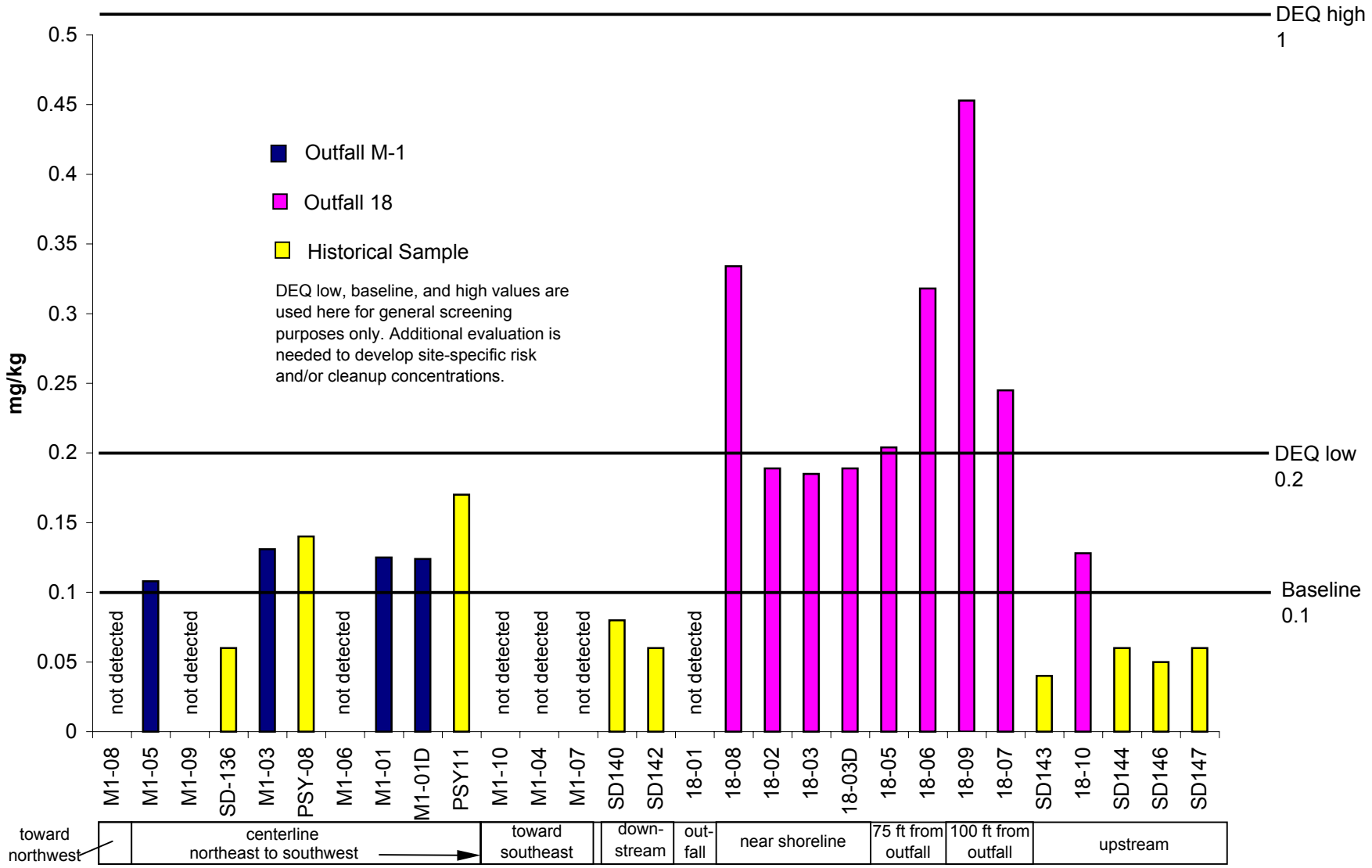

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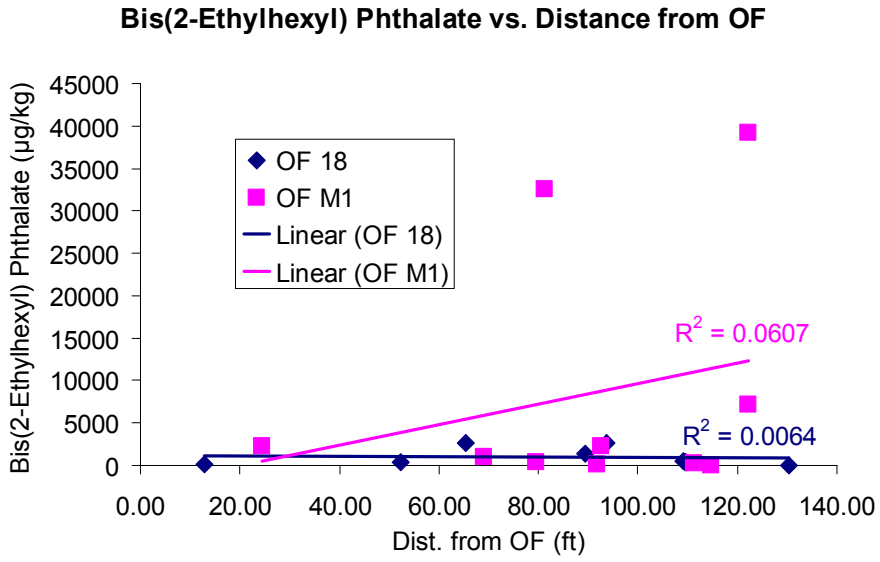
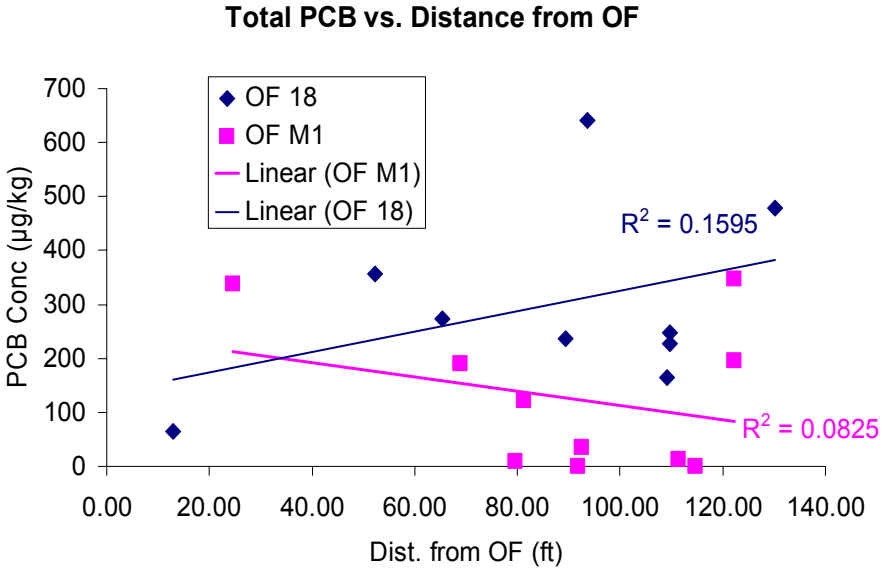
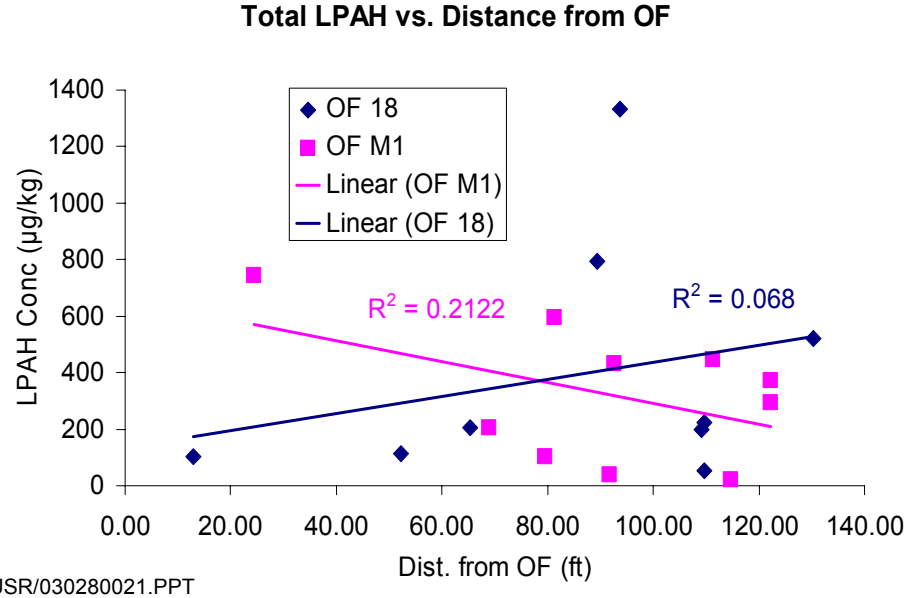
Figure 4-9. Radial Distance Correlations for Organics in Sediment







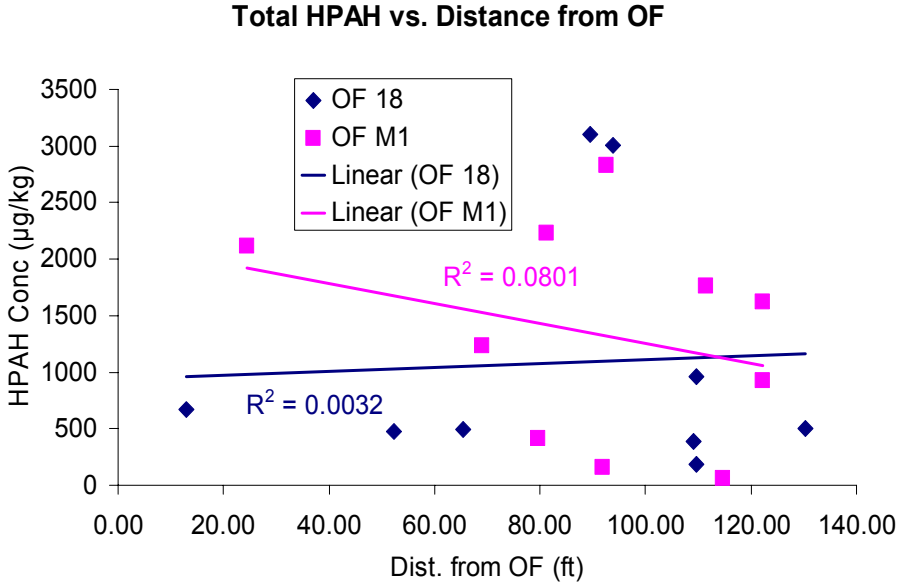
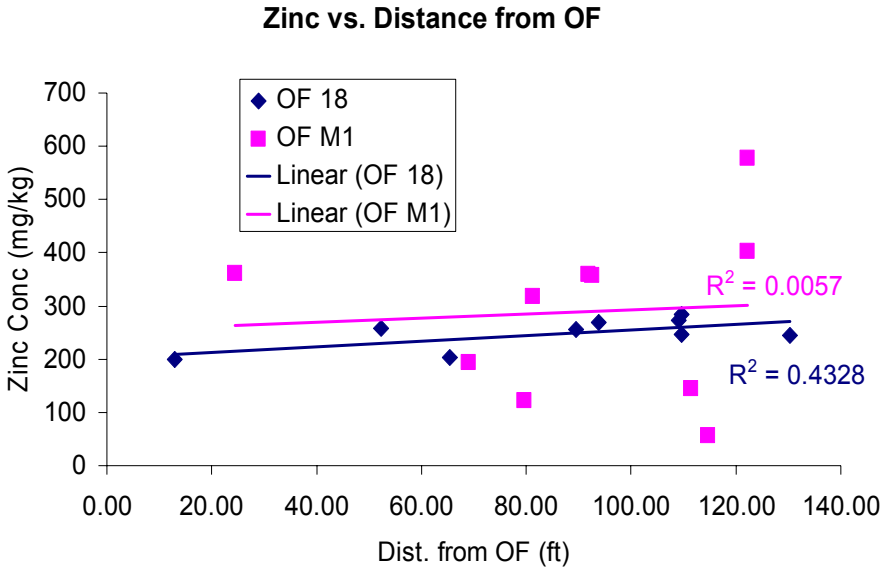
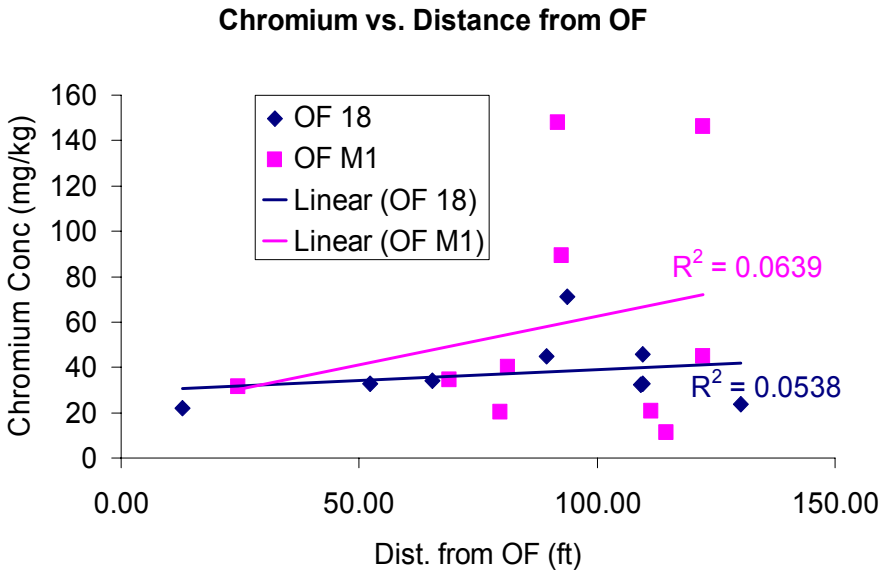
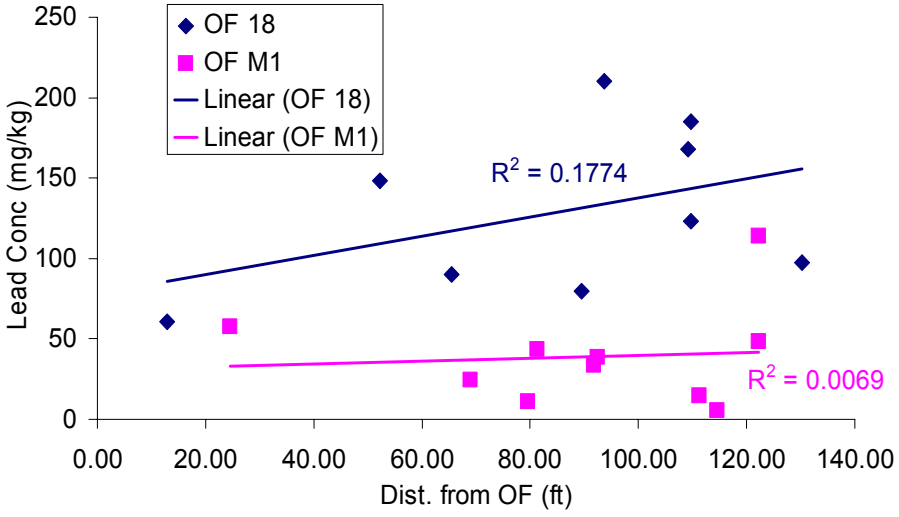
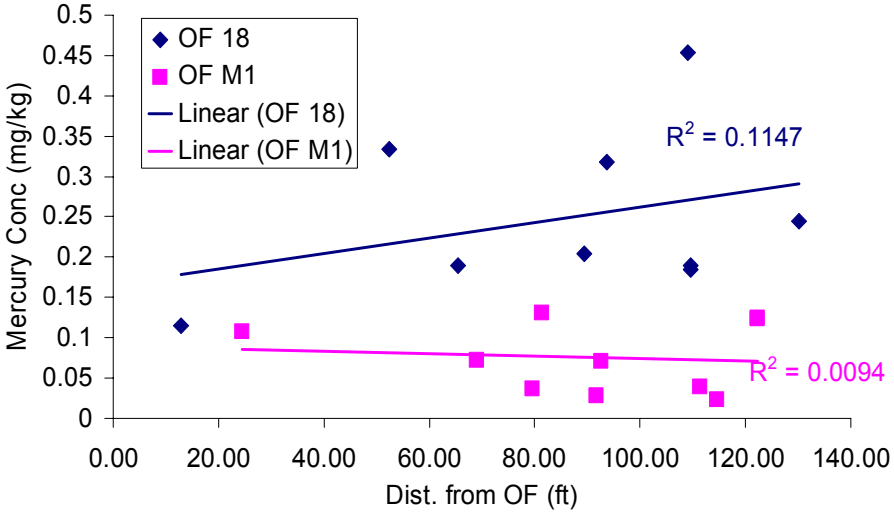


Figure 4-10. Radial Distance Correlations for Metals in Sediment



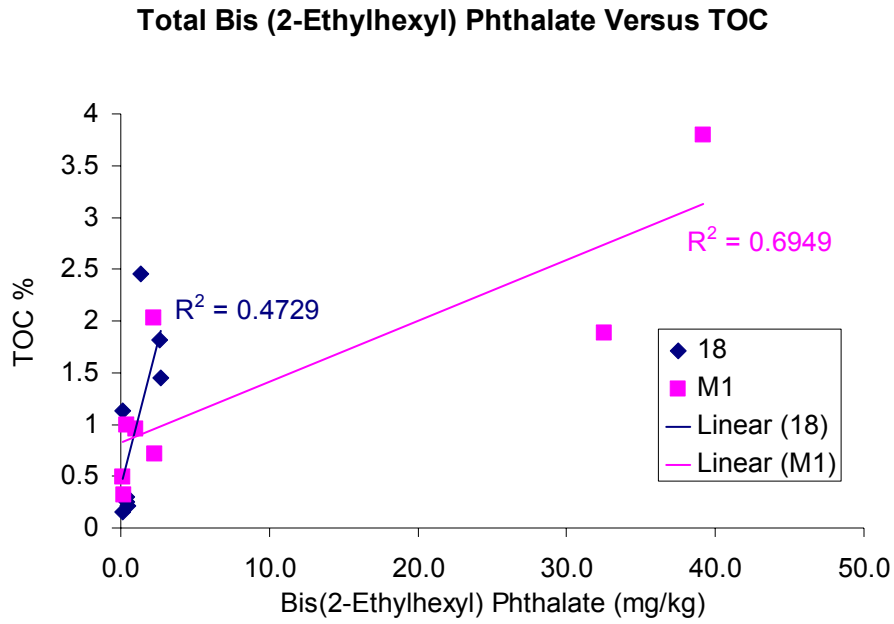


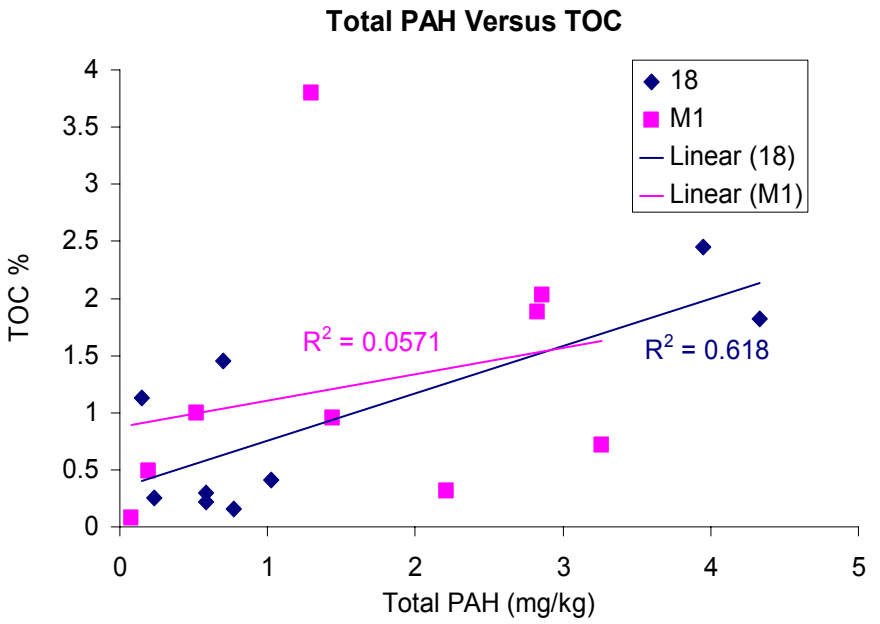


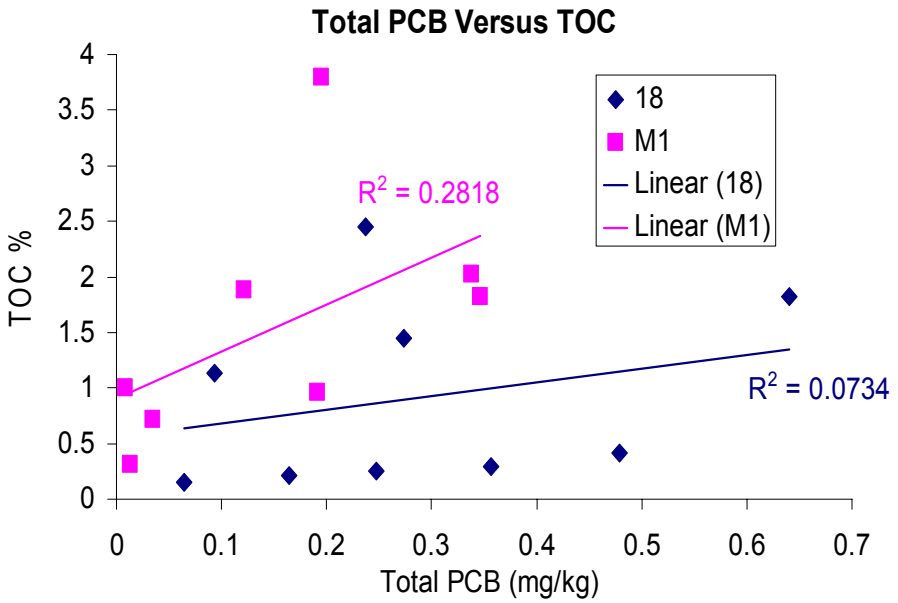


USR/030280021.PPT

Figure 4-11. Concentrations of TOC Compared with Bis(2-Ethylhexyl)Phthalate, PAH, PCB, and TPH







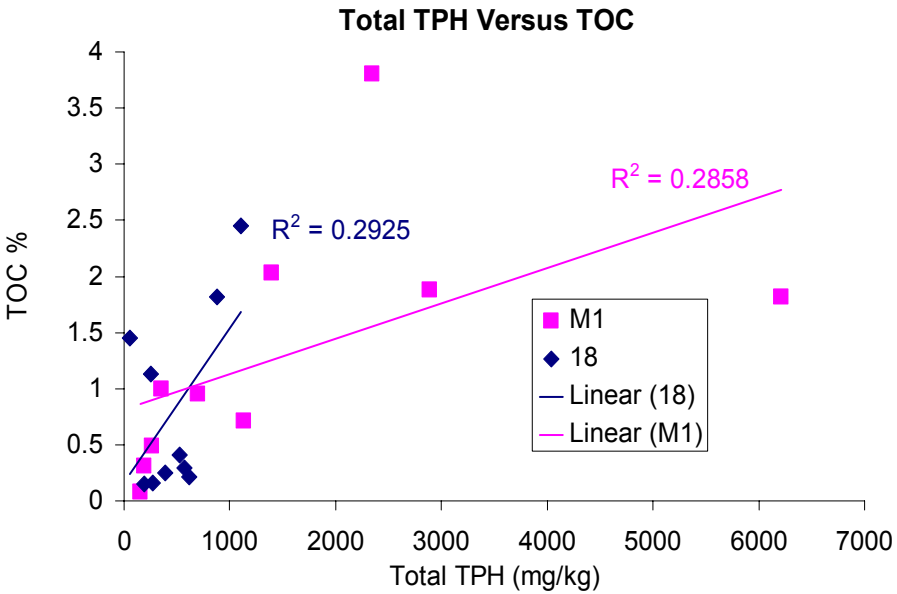


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Figure 4-12. Sediment Particle Size (D_{50}) Distributions

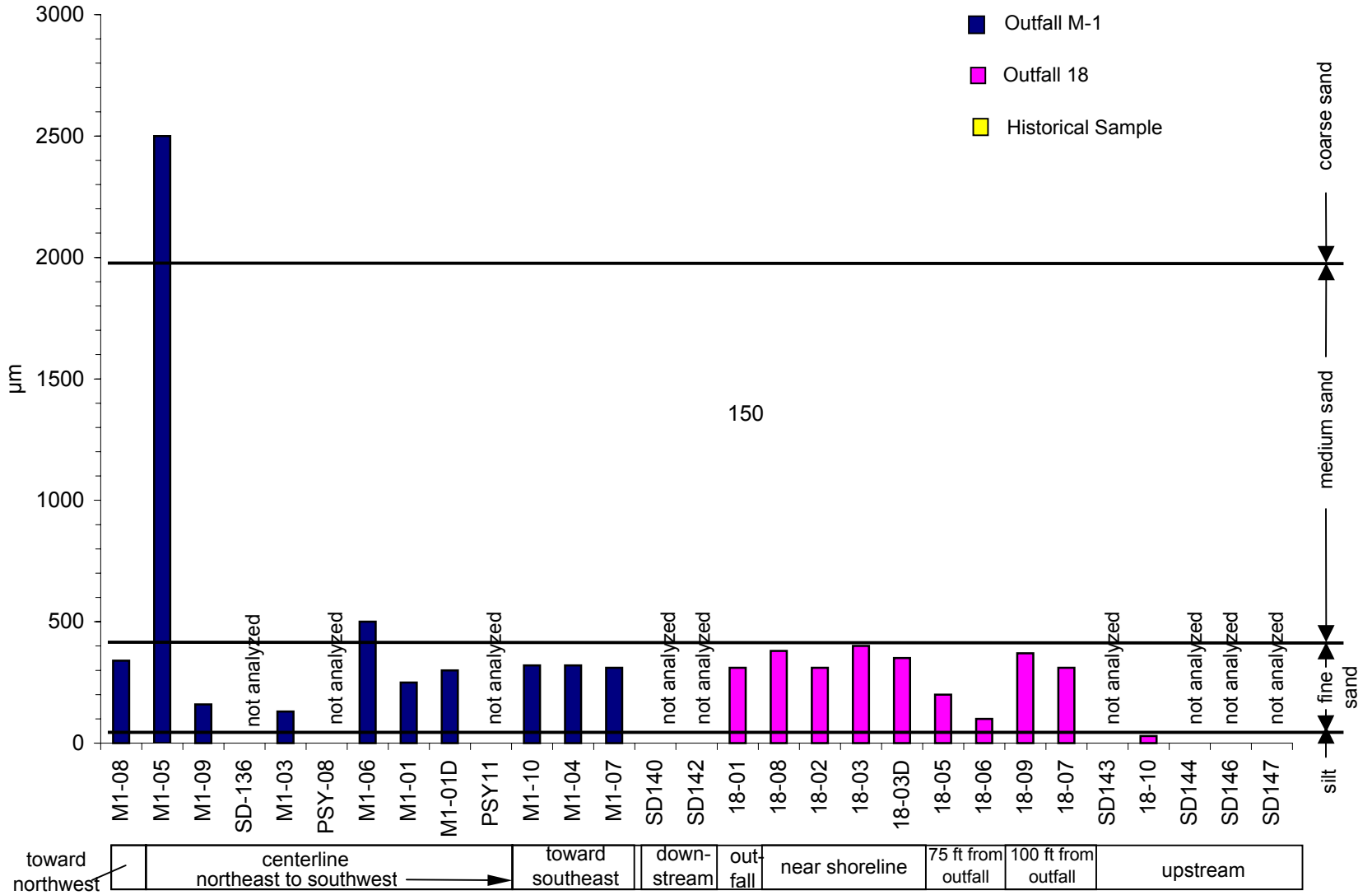
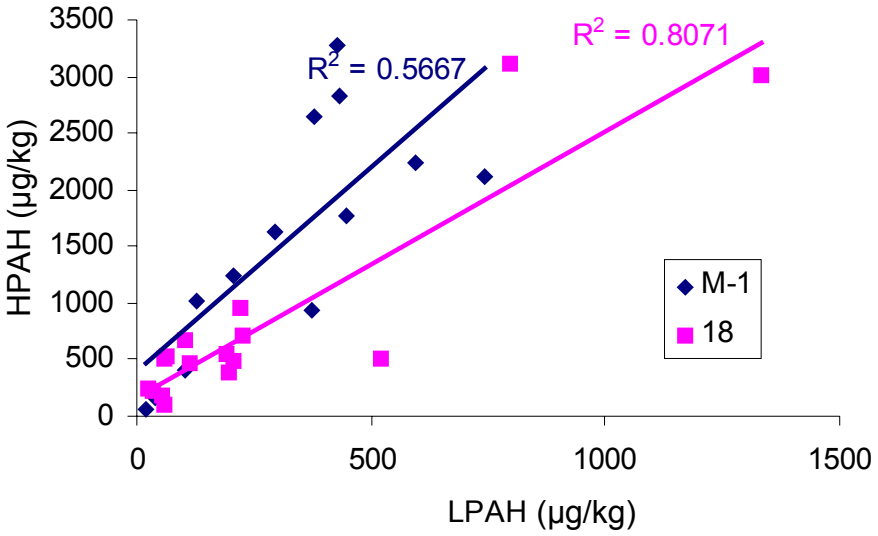
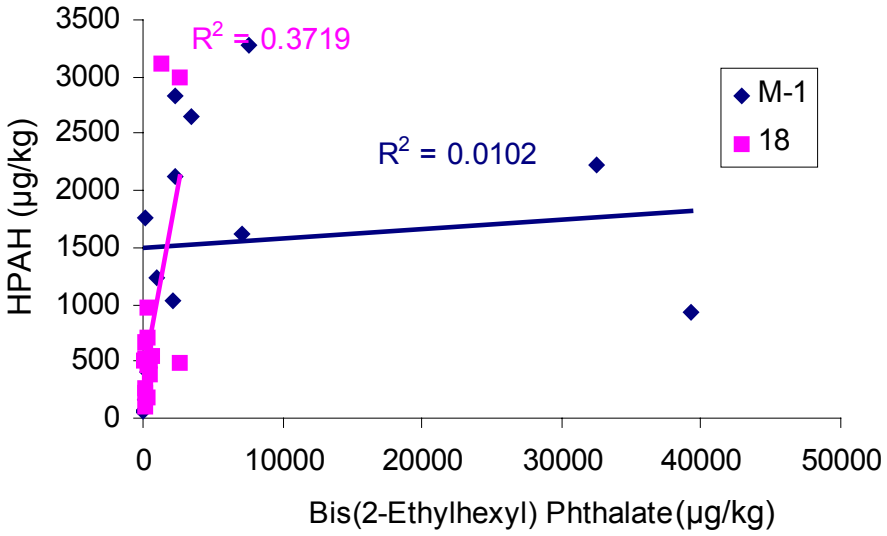


Figure 4-13. Co-Occurrence Plots for Organics in Sediment





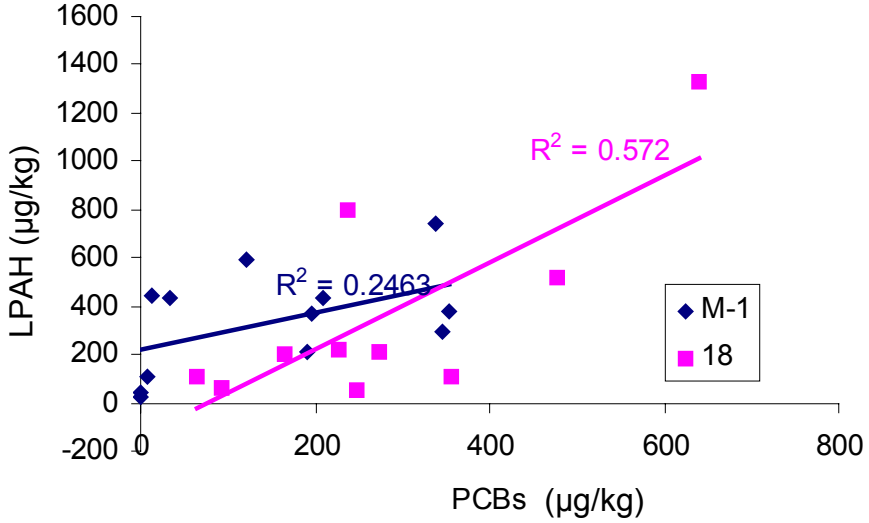
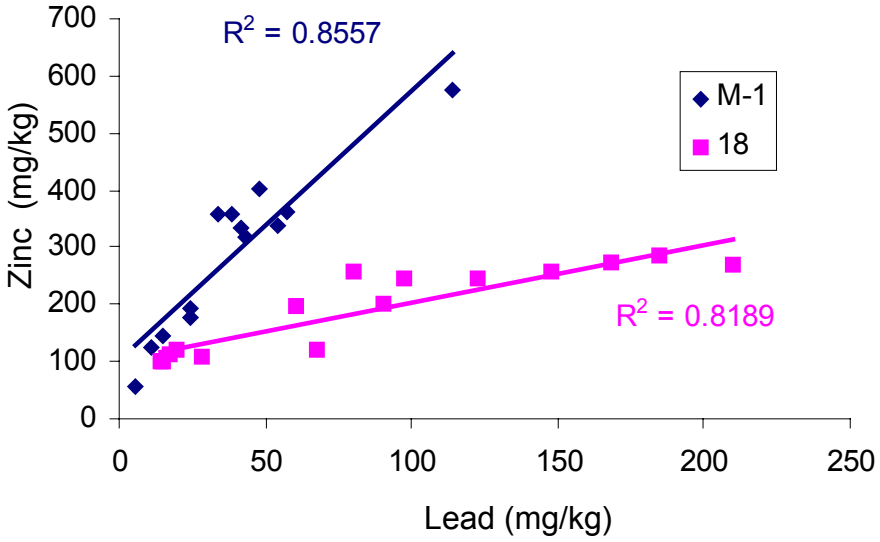
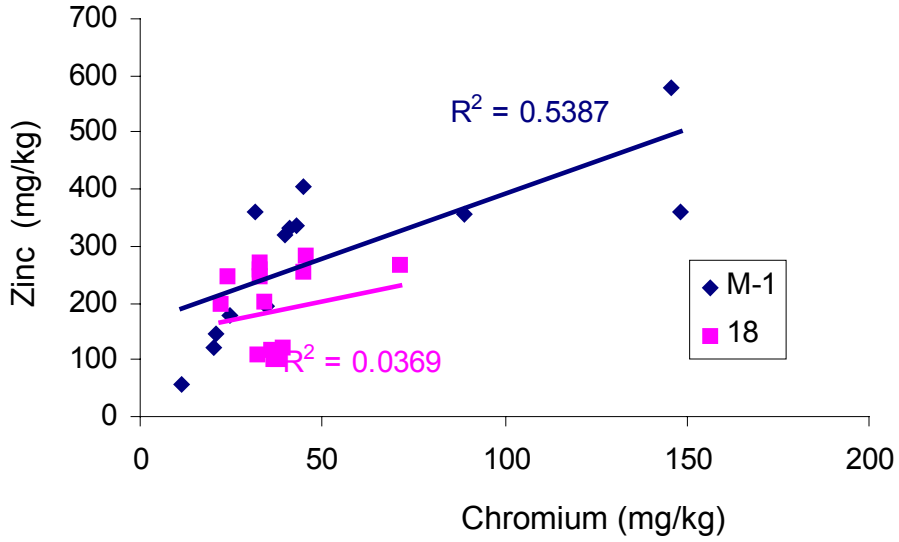
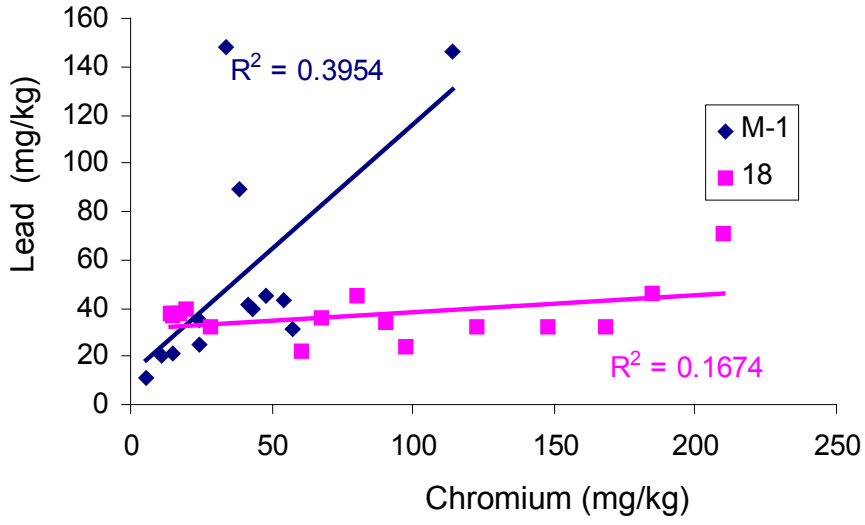


Figure 4-14. Co-Occurrence Plots for Metals in Sediment







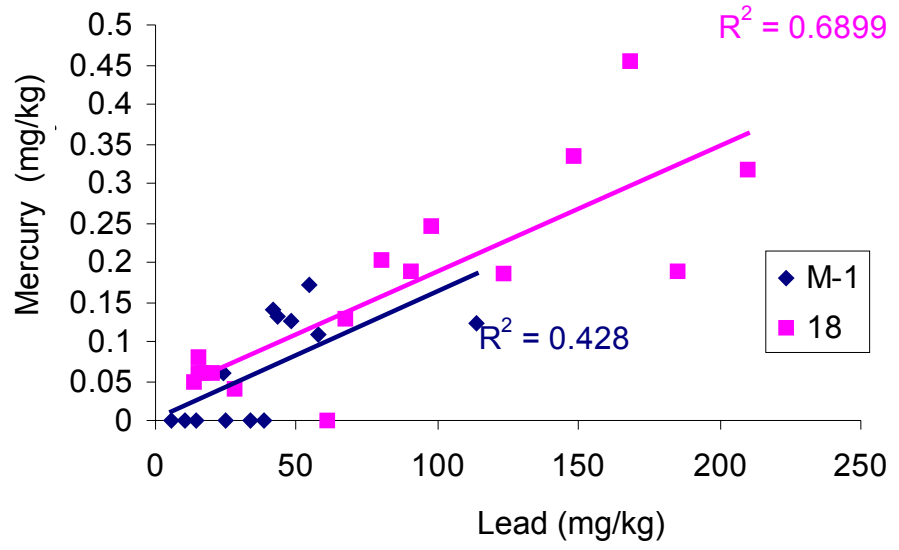
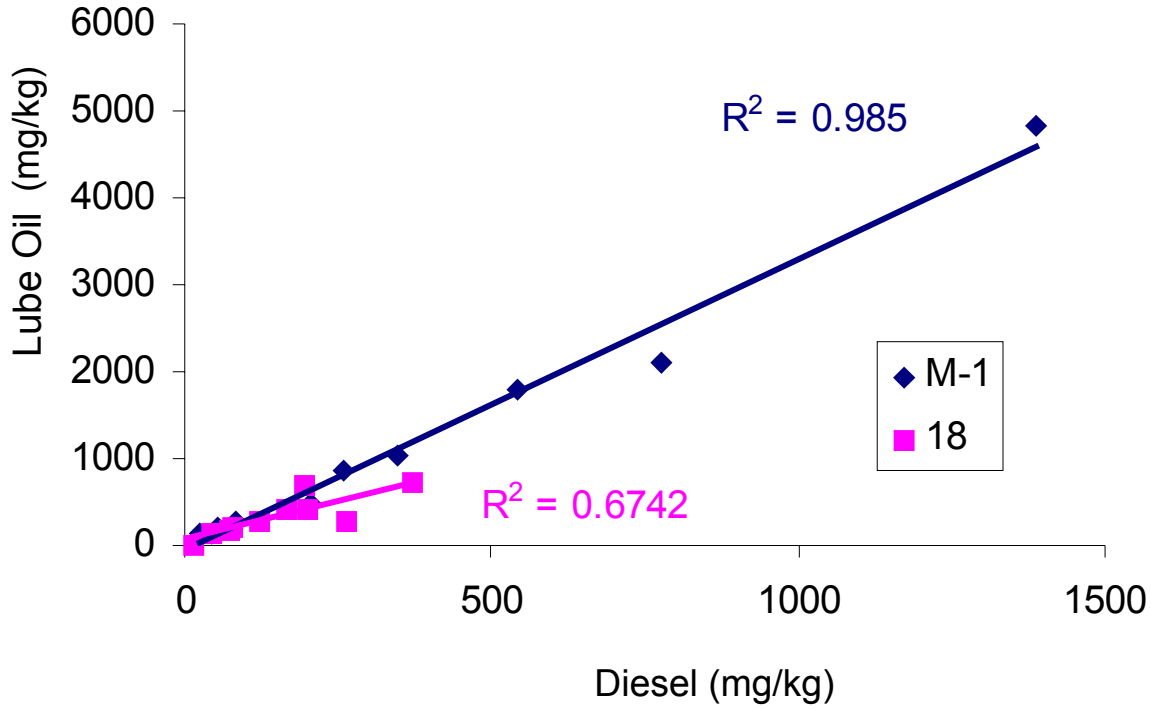


Figure 4-15. Co-Occurrence Plots for Petroleum Hydrocarbons in Sediment



SECTION 5

Recommendations for Phase 2 Work Planning

This section presents recommendations for Phase 2 actions based on findings from Phase I efforts to identify chemicals of interest and conduct basin assessment activities.

5.1 Summary of Phase 1 Actions

The purpose of the M-1 Source Control Pilot Project is to obtain information regarding sediment quality around Outfall M-1 and simultaneously obtain information about land use and ownership within the M-1 basin. This approach is intended to efficiently identify any chemicals of interest in nearshore sediments that may be associated with Outfall M-1 while also examining available records, permits, and existing documentation regarding potential releases of chemicals of interest into the basin drainage system.

Basin assessment activities were conducted to further characterize the Outfall M-1 drainage area. The assessment consisted of the following activities:

- Preliminary evaluation update
- City data compilation
- National Pollutant Discharge Elimination System (NPDES) data compilation
- DEQ file reviews
- Interviews
- Facility plan reviews
- Map and photograph reviews

These activities are described in Section 3.

Chemical data from sediment sampling were compared with DEQ Low and High and Willamette River Baseline Screening Values, as described in Section 4. The purpose of this comparison was to identify chemicals that may be present at concentrations suggesting historical or ongoing releases to the river. Using this approach, the following chemicals and compound groups were identified near Outfall M-1:

- Phthalates
- PAHs
- PCBs
- Chromium
- Zinc

Sediment sampling results are described in detail in Section 4.

Basin assessment information was reviewed along with sediment data to determine potential upland sources for the chemicals and compound groups. This review included researching current and past land usage drainage information, storm drainage exposure potential, pollution complaint data, and available water and sediment data. A summary of

upland properties within the M-1 basin and the results of the various screening approaches used to evaluate them is shown in Table 5-1.

5.2 Recommended Follow-On Actions for Outfall M-1

Based on the combined evaluation of basin properties and sediment data, certain properties were identified as requiring additional evaluation in Phase 2. This section identifies the recommended actions, properties, evaluation methodologies, and relevant information with which to develop recommendations for a Phase 2 action plan.

Potential follow-on actions are categorized as follows:

- Conduct additional historical data review, including historical land use/owner searches and interviews with DEQ staff.
- Perform DEQ information requests under authority of the Site Discovery/Site Assessment Program.
- Conduct inspections to determine compliance with existing discharge requirements and best management practices. Inspections to be conducted by City Industrial Stormwater Program staff.
- Sample sediment and stormwater in selected catch basins.
- Investigate potential historical releases from electrical equipment.

Table 5-1 summarizes the recommended follow-on actions for basin properties and identifies a suggested lead agency for each activity. The City is reviewing the storm sewer system to identify possible manhole and catch basin locations for follow-on sediment and stormwater sampling. Sediment and stormwater sampling will be performed at specific locations to further delineate potential upland sources. Based on information derived from the existing storm sewer system review, a site-specific work plan will be developed outlining future sampling activities.

5.3 Phase 2 Priorities and Schedule

As the M-1 Source Control Pilot Project progresses it will become increasingly important for the City and DEQ to coordinate activities, share timely data, and collaborate on planning and implementation of actions within the basin. These actions should be coordinated with EPA to ensure that all agencies have a complete and working knowledge of current information, strategies, and activities.

Phase 2 activities should include early implementation of all programmatic source control measures, including site inspections, technical assistance visits, and information collection. These and other activities should be planned to allow higher priority sites to be addressed first. Priority sites should include ECSI sites (Freightliner and Fred Devine Diving and Salvage), those associated with priority compounds of interest, and those flagged by one or more of the screening tools described in Section 3 and summarized in Table 5-1.

It will be important for the City and BES to coordinate areas of responsibilities, schedules, and regulatory authorities in planning and executing Phase 2 work. It will also be important to establish mechanisms for ensuring that data and information are shared to the extent practical on a timely basis.

Based on further evaluations of basin properties and comparison with chemicals of interest, sampling of catch basins within the basin should be considered to provide better definition of any possible connections between sediment quality and basin activities. A recommended schedule would include:

- January 2003—Scoping of Phase 2 activities, issues, and tasks
- January–February 2003—Agreements reached by task on lead agencies, level of effort, and completion dates
- January–April 2003—Implementation of tasks
- June 2003—Evaluation of available data

Results of the Phase 2 effort will be used to develop and augment the scopes of work related to the Pilot Project outfalls and other City outfalls.

Table 5-1
Potential Upland Sources and Proposed Phase 2 Actions
Source Control Pilot Project

RNO	Business Name	Address	Land Use	SIC Number	SIC TYPE	Business Type	Drainage	Permit Number	Pollution Complaint Information	Storm Drainage Exposure[1]	Notes	Chemicals/ Compound Groups	DEQ TA Sites	Proposed Phase 2 Actions
R941171030	Port of Ptld Dredging	6208 N Ensign	COM	1629/3731	Heavy Construction, Ship Building and Repair		MS4			n/a	On facility profiler site this address was listed as Port of Portland Navigation.	PAHs, Metals	Yes	**DEQ**—Site Discovery Information Request **City**—Stormwater Site Inspection
R941171010	Devine Diving and Salvage Inc.	6211 N Ensign	IND	1629*/4499*/ 7389*	Heavy Construction, Water Transportation, Business Services	Ship salvage yard	MS4			Yes	Environmental cleanup site. Pacific Coast Environmental previously operated on a portion of the site. Three permitted tanks have been decommissioned.	PAHs, Metals, and Phthalates	Yes	**DEQ**—Put site under NPDES permit **City**—Work with DEQ on permit requirements and BMPs
R941171010	Foss Environmental	6211 N Ensign	IND	unknown		Offices	MS4			No				Property covered under Devine Diving XPA
R941171010	FPS Marine	6211 N Ensign	IND	unknown		Offices	MS4			No				Property covered under Devine Diving XPA
R941171010	Marine Salvage Consortium	6211 N Ensign	IND	4489	Water Passenger Transportation, NEC	Offices	MS4			No				Property covered under Devine Diving XPA
R941171010	Riedel Environmental	6211 N Ensign	IND	8741	Management Services	Offices	MS4				No longer at site			Property covered under Devine Diving XPA
R941171010	Smith Environmental Servs.	6211 N Ensign	IND	7363	Help Supply Services	Offices	MS4				No longer at site			Property covered under Devine Diving XPA
R941171010	Sternwheeler Rose	6211 N Ensign	IND	4489*	Water Passenger Transportation, NEC	Office	MS4			No				Property covered under Devine Diving XPA
R941170740	Xtra Lease	6310 N Basin	COM	7359/ 7519*	Equipment Rental and Leasing; Utility Trailer Rental	Transportation	MS4			Yes		Metals, PAHs	No	**City**—Stormwater Site Inspection
R941171130	Reynolds Aluminum Supply	6330 N Basin	IND	5051	Metals Service Center/Ofc—Wholesale	Distribution	MS4			Yes		Metals, PAHs	Yes	**City**—Stormwater Site Inspection
R941171200	W W Grainger INC	6335 N Basin	IND	5063	Electric Apparatus/ Equip—Wholesale	Retail	MS4			No			Yes	None
R941171130	Stack Metallurgical Services Inc	6340 N Basin	IND	3398*	Metal Heat Treating—Mfg	Manufacturing	MS4			No		Metals	Yes	**City**—Stormwater Site Inspection
R941170860	Parker Hannifin Corp	6458 N Basin	IND	3492*/ 5072/ 5085*	Fluid Power Valves and Hose Fittings, Hardware - Wholesale, Industrial Supplies	Distribution	MS4			No	State Fire Marshal lists one spill (diesel fuel, 2000).	PAHs	Yes	**DEQ**—Site Discovery Information Request **City**—Stormwater Site Inspection
R941170900	Portland Screw Co.	6520 N Basin	IND	5072	Hardware—Wholesale Distrib	Distribution	MS4			No		Metals	Yes	**City**—Stormwater Site Inspection
R941170930	Kool-Pak Dist.	6645 N Ensign	IND	4214*/4222 /5142	Local Trucking With Storage, Refrigerated Warehousing, Packaged Frozen Foods	Transportation	MS4			No	Three permitted tanks decommissioned for Ness & Co. at 6645 N Ensign.	Metals, PAHs	Yes	**DEQ**—Site Discovery Information Request **City**—Stormwater Site Inspection
R941170930	Cargill Foods	6645 N Ensign	IND	5147	Meats and Meat Products		MS4				Could not find			Same taxlot as Kool-Pak
R941170930	Distributive Resource Inc	6645 N Ensign	IND	5143	Dairy Products, Except Dry or Canned		MS4				Could not find			Same taxlot as Kool-Pak
R941170970	AKZO Nobel Coatings Inc	6650 N Basin	IND	5198*	Paints, Varnishes, and Supplies		MS4				Could not find	Phthalates, Metals	Yes	**City**—Stormwater Site Inspection at entire taxlot
R941170970	Carpet Supply Inc	6650 N Basin	IND	5072	Hardware—Wholesale Distrib		MS4				Vacant			Same taxlot as AKZO Nobel
R941170970	Cleaning & Laundry Equipment	6650 N Basin	IND	5087	Service Establishment Equipment	Office	MS4			No				Same taxlot as AKZO Nobel
R941170970	Fowler Acceptance Corp	6650 N Basin	IND	6141	Personal Credit Institutions		MS4				Could not find			Same taxlot as AKZO Nobel
R941170970	R C Display Vans Inc	6650 N Basin	IND	7532	Top and Body Repair and Paint Shops	Manufacturing	MS4			No		Phthalates, Metals		Same taxlot as AKZO Nobel
R941170970	Freightliner Corp	6720 N Basin	IND	unknown		Manufacturing	MS4			No				Same taxlot as AKZO Nobel
R941170870	Kilsby-Roberts	6650 N Ensign	IND	5051	Metals Service Center/Ofc—Wholesale	Distribution	drywell, MS4			Yes		Metals	Yes (listed under EM Jorgenson Co.)	**DEQ** - Site Discovery Information Request **City**- Review site inspection reports, possible additional NPDES sampling
R941170910	United Parcel Service	6707 N Basin	IND	4212/ 4215*	Local Trucking Without Storage, Courier Services, Except by Air	Transportation	MS4	1200Z		Yes	LUST #26-92-0109 (unleaded gasoline) cleanup completed 6/17/1997. UPS has two active permitted tanks and six tanks which have been decommissioned. State Fire Marshall list three spills (Methyl methacrylate, ADJA Silver Marker #225, and Nitric Acid).	PAHs, Metals, and Phthalates	No	**DEQ**—Site Discovery Information Request **City**—Review Site Inspection Reports
R941170910	United Parcel Service	6707 N Basin	IND	4212/4215*	Local Trucking Without Storage, Courier Services, Except by Air	Transportation	pretreatment			Yes			No	**City**—Review Pretreatment Records
R941170940	US Navy and Marine Center	6735 N Basin	COM	unknown	NA	Military Facility	MS4			Yes	LUST #26-93-0085 (oil and misc gasoline) cleanup started 1993, no end date listed. LUST #26-94-0198 (diesel) cleanup ended 11/10/1994. Five tanks decommissioned.	Metals, PAHs	No	**DEQ**—Refer to EPA for Site Discovery **City**—Stormwater Site Inspection
R605603500	Columbia Distributing	6840 N Cutter Cr	IND	4213*/ 4214*/ 5181/ 5182	Trucking, Except Local/ Local Trucking With Storage/Beer, Wine and Distilled Beverages	Transportation	MS4	1200Z	Pollution complaint 6/10/02 regarding truck washing and discharges to the storm sewer.	Yes	State Fire Marshall lists one spill (propane, 1989). Exceeded NPDES benchmarks for oil and grease (highest concentration out of facilities in basin with permits).	Metals, PAHs	Yes	**DEQ**—Site Discovery Information Request **City**—Review Site Inspection Reports
R605603500	Gulick Trucking Inc	6840 N Cutter Cr	IND	4213	Trucking, Except Local		MS4				Could not find		No	Same taxlot as Columbia Distr

Table 5-1
Potential Upland Sources and Proposed Phase 2 Actions
Source Control Pilot Project

RNO	Business Name	Address	Land Use	SIC Number	SIC TYPE	Business Type	Drainage	Permit Number	Pollution Complaint Information	Storm Drainage Exposure[1]	Notes	Chemicals/ Compound Groups	DEQ TA Sites	Proposed Phase 2 Actions
R605603500	Maletis Beverage Corp.	7000 N Cutter Cr	IND	4214*	Local Trucking With Storage, Beer, and Ale— Wholesale	Trans/Dist	MS4	1200Z		Yes	Covered with new parking. Same taxlot as Columbia Distributing.	Metals, PAHs	Yes	**DEQ**—Site Discovery Information Request **City**—Stormwater Site Inspection
R941171220	CAMCO Manufacturing	6840 N Fathom	IND	2899	Chemical Preparations	Manu/Dist	MS4			No		N/A	Yes	**DEQ**—Site Discovery Information Request **City**—Stormwater Site Inspection
R941171220	Columbia Ladder Co.	6840 N Fathom	IND	5084*	Industrial Machinery and Equipment		MS4				Could not find			Same taxlot as CAMCO
R941171220	CSI Crown Inc	6840 N Fathom	IND	4213*/5023*	Trucking, Except Local/Home Furnishings		MS4				Could not find			Same taxlot as CAMCO
R941171220	Pacific Rim Transport	6840 N Fathom	IND	4213*	Trucking, Except Local	Distribution	MS4			No				Same taxlot as CAMCO
R605604000	Roadway Express	6845 N Cutter Cr	IND	4213*	Trucking	Transportation	MS4	1200Z	One pollution complaint of oily discharge to storm sewer 11/24/99.	Yes	State Fire Marshall lists three spills (nitric acid, corrosive liquids, and methyl iodide, 1990, 1992, and 1998, respectively).	Metals, PAHs	Yes	**DEQ**—Site Discovery Information Request **City**—Review Site Inspection Reports
R941171000	Hampton Distribution Center	6851 N Fathom	UNK	4789	Transportation Services	Trans/Dist	MS4			Yes	Freightliner shares site.	Metals, PAHs	No	**City**—Stormwater Site Inspection
R941171070	B&G Manufacturing Co.	6870 N Fathom	IND	3452*/ 5072*	Bolts, Nuts, Rivets, Washers—Mfg of/ Hardware - Wholesale Distrib	Manufacturing	MS4			No	On facility profiler site this address was listed as Freightliner.	Metals	No	**DEQ**—Site Discovery Information Request **City**—Stormwater Site Inspection
R941171070	American Feed & Farm Supply	6874 N Fathom	IND	5075	Warm Air Heating and Air Conditioning	Distribution	MS4			Yes	Formerly Lennox Industries	N/A		Same taxlot as B&G
R941170880	Freightliner Corp	6936 N Fathom	IND	3711*	Motor Vehicles and Car Bodies	Manufacturing	MS4	100J/1200Z	Numerous pollution complaints (six of 17 total complaints for outfall), hydrocarbon sheen entering storm sewer. Three hundred batteries possibly leaking into storm sewer.	Yes	LQG. Cleanup site. Exceeded NPDES benchmarks for zinc.	PAHs, Metals, and Phthalates	No	**DEQ**—Continue site investigation under VCP **City**—Review site inspection reports. Recommend additional data needs to be collected under VCP
R941170880	Freightliner Corp	6936 N Fathom	UNK	3711*	Motor Vehicles and Car Bodies	Manufacturing	Pretreatment	433.014		Yes		PAHs, Metals		**City**—Review Pretreatment Records
R025800020	Vacant, formally Flex Alloy Co.	6949 N Cutter Cr	IND	5013*	Motor Vehicle Supplies and New Parts—Wholesale		MS4				According to DEQ TA files, site occupant is Pacific Fluid.		Yes	**City**—Review City files to determine if further work warranted
R025800040	Pacific Carpet	7010 N Cutter Cr	IND	unknown	N/A	Distribution	MS4			No		PAHs, Metals	Yes	**City**—Stormwater Site Inspection

Notes:

[1] Storm drainage exposure is a qualitative assessment made by City of Portland staff on the potential for releases to enter the storm drainage system.

* = SIC number has been verified via site inspection.

Highlighted text = Site has been identified for further investigation based on highlighted screening criteria.

CEG = Conditionally Exempt Generator
SQG = Small Quantity Generator
COM = Commercial land use
EPA = U.S. Environmental Protection Agency
IND = Industrial land use
LQG = Large Quantity Generator
N/A = Not available
NPDES = National Pollutant Discharge Elimination System
PAH = Polynuclear aromatic hydrocarbon
RNO = Record number
SIC = Standard Industrial Classification
UNK = Land use not designated by Multnomah County Tax Assessor's MetroScan
VCP = DEQ Voluntary Cleanup Program

SECTION 6

References

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APPENDIX A

Field Notes

City of Portland Outfalls (Project No. 164067.A0.05)
Source Control Pilot Project

CH2MHILL

Sediment Sample Characteristics

Date (mm/dd/yy)	Location	Station Name/No.
08/22/02	Outfall M1 (Foss/Fred Divine) 100'- Straight out from center of outfall	PP01M101

Coordinates		Water Depth		Elevation				
North	~~East~~	Depth	Unit	+	Elev.	Unit	Time	Weather
45°34.054'-N	122°42.972'-W	22	Ft				0905	Overcast

Waypoint 888

Rep.	Equipment	Sample Type	Penetration Depth	Penetration Unit	Recovery Length	Recovery Unit	Photograph Roll #	Photograph Unit	Initials
1	Van Veen	SED	15	cm	1	Ft	1	15, 16	DJL

Surficial Sediment Characteristics: (circle most descriptive)

Texture: Smooth Medium Fine Coarse / Clay ~~Silt~~ Sand Gravel Cobble 50% Silt

Color: Light Dark / Gray Brown Black Other _____

Odor: Normal Sewage Petroleum Chemical H_2S None Other Very Faint

Redox Layer	
Depth	Unit
None	Observed

Presence of:

	Yes/No	Percent	Description
Biological structures	Yes		Vegetation on top. Thin fibrous roots on top.
Debris	YES	>1%	Small flakes of metal and paint-Blue & white
Oil sheen	Yes		Slight sheen observed in spots while mixing

Vertical profile characteristics:

	Description
Changes in sediment characteristics	Top 2cm finer silt w/ little sand, lighter brown
Presence and depth of redox potential discontinuity layer (rpd)	

Sample quality comments:

	Description
Leakage	Little - one to inch of head space
Winnowing	Light on both sides.
Disturbance	None

Sample QC: Field Duplicate Matrix Spike Matrix Spike Duplicate Equipment Blank

PP01M102

Comments:
- Sediment Plume visible in water from outfall. Light brown to orange suspended soils. Extended 50-ft into River and could be see 100-ft upriver. See photo roll 1, unit 14
- Two attemps prior to sample collection, due to large rock in jaws and poor recovery.
- No Archival sample collected for Duplicate. Only ⅓ Full for sample archival.
- Picture #1 17, 18, 19, 20

Signature

8.22.02
Date

City of Portland Outfalls (Project No. 164067.A0.05)
Source Control Pilot Project

CH2MHILL

Sediment Sample Characteristics

Date (mm/dd/yy)	Location	Station Name/No.
08/22/02	Outfall MI (Foss/Fred Divine)	PP01MI03

Coordinates		Water Depth		Elevation			Time	Weather
North	East	Depth	Unit	+	Elev.	Unit		
45° 34.064'N	122° 42.970'W	20	FT				1005	Overcast

Way Point 889

Rep.	Equipment	Sample Type	Penetration Depth	Penetration Unit	Recovery Length	Recovery Unit	Photograph Roll #	Photograph Unit	Initials
1	Van Veen	SED	15	CM	1	FT	2	1,2	DJC

Surficial Sediment Characteristics: (circle most descriptive)

Texture: Smooth Fine ~~Medium~~ Coarse / Clay ~~Silt~~ ~~Sand~~ 50% Silt Gravel Cobble

Color: Light ~~Dark~~ / ~~Gray~~ Brown Black Other _____

Odor: Normal Sewage ~~Petroleum~~ Chemical H_2S None Other Very Light

Redox Layer	
Depth	Unit

Presence of:

	Yes/No	Percent	Description
Biological structures	No		
Debris	Yes	>1%	Woody and Leaves debris, Metal flakes, Paint flakes Red, White
Oil sheen	Yes		Light Sheen

→ Thin plastic

Vertical profile characteristics:

	Description
Changes in sediment characteristics	Top 2cm lighter gray/brown Silt layer w/ 40% Fine Sand
Presence and depth of redox potential discontinuity layer (rpd)	

Sample quality comments:

	Description
Leakage	Little - ½ inch of headspace on one side
Winnowing	Very little on both sides in the corner
Disturbance	None

Sample QC: Field Duplicate Matrix Spike Matrix Spike Duplicate Equipment Blank

Comments:
- Four Attempts made prior to collection of sample due to Sampler not closing
- One large red metal chip removed and thin platic piece ½ inch long removed.
- Very faint petroleum odor.

Signature

8-22-02
Date

City of Portland Outfalls (Project No. 164067.A0.05)
Source Control Pilot Project

CH2MHILL

Sediment Sample Characteristics

Date (mm/dd/yy)	Location	Station Name/No.
08/22/02	Outfall M1 (Foss/Fred Divine)	PPOIM104

50-ft ~~Straight out~~ from Outfall upstream & 50-ft from Shore.

Coordinates		Water Depth		Elevation			Time	Weather
North	~~East~~ WEST	Depth	Unit	+	Elev.	Unit		
45° 34.054' N. (WAYPOINT #890)	122° 42.955' W	11.8	ft				~~1100~~ 1130	Overcast

Rep.	Equipment	Sample Type	Penetration Depth	Penetration Unit	Recovery Length	Recovery Unit	Photograph Roll #	Photograph Unit	Initials
1	Van Veen	SED.	15	cm	1	ft	2	3	DJL

Surficial Sediment Characteristics: (circle most descriptive)

Texture: Smooth ~~Fine~~ Medium Coarse / Clay Silt (Sand) Gravel Cobble 10% Silt

Color: Light (Dark) / (Gray) Brown Black Other _____

Odor: Normal Sewage Petroleum Chemical H_2S (None) Other _____

Redox Layer	
Depth	Unit
Ø	

Presence of:	Yes/No	Percent	Description
Biological structures	No	nc	
Debris	Yes	~~11~~ 2%	Blue & White Paint Shavings. Two inch long, Woody debris
Oil sheen	No		

Vertical profile characteristics:	Description
Changes in sediment characteristics	Uniform
Presence and depth of redox potential discontinuity layer (rpd)	None observed

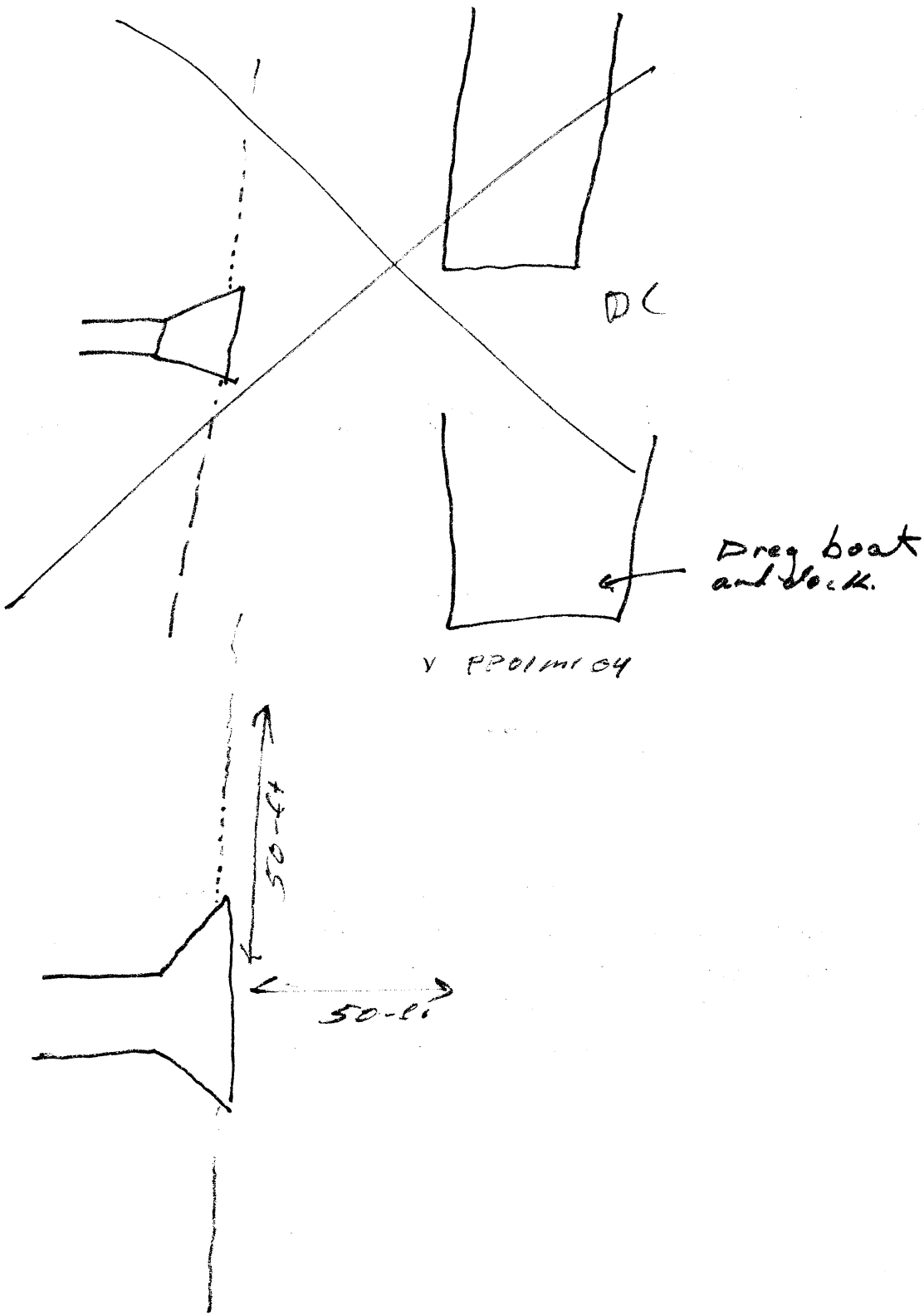
Sample quality comments:	Description
Leakage	Yes- Three inches of head space
Winnowing	Yes- Throughout
Disturbance	None

Sample QC: Field Duplicate Matrix Spike Matrix Spike Duplicate Equipment Blank

Comments:
- Lots of debris - Paint shavings upto two inches long, rubber band, metal shavings, woody debris, and cloth piece 2 inches long
- Two attempts prior to sample collection due to large rocks in sampler jaws.
- Location - See map on back

D Jilling 8-22-02

Signature Date


DC
Dreg boat and dock.
V PPolmroy
50-ft
50-ft

City of Portland Outfalls (Project No. 164067.A0.05)
Source Control Pilot Project

CH2MHILL

Sediment Sample Characteristics

Date (mm/dd/yy)	Location	Station Name/No.
08/22/02	Outfall #41 (Foss/Fred Divino) 1 ft From center of Outfall	PPOI/M105

Coordinates		Water Depth		Elevation			Time	Weather
North	East	Depth	Unit	+	Elev.	Unit		
45° 34.067 DL 45° 34.067 N	122° 42.957 W Way Point 891	2	ft				1215	Sunny

Rep.	Equipment	Sample Type	Penetration Depth	Penetration Unit	Recovery Length	Recovery Unit	Photograph Roll #	Photograph Unit	Initials
2	VanVeen	SED	12	cm	1	ft	2	4	DSL

Surficial Sediment Characteristics: (circle most descriptive)

Texture: Smooth Fine (Coarse) / Clay Silt (Sand) Gravel Cobble ~10% Gravel

Color: Light (Dark) / (Gray) Brown Black Other

Odor: Normal Sewage (Petroleum) Chemical H_2S None Other Faint

Redox Layer	
Depth	Unit

Presence of:

	Yes/No	Percent	Description
Biological structures	No		
Debris	Yes	15%	Gravel one inch, Leaves, Twigs, Plastic washer, Paint flakes
Oil sheen	No		

Vertical profile characteristics:

	Description
Changes in sediment characteristics	One cent~~i~~mm/cm light brown/orange silt layer on top
Presence and depth of redox potential discontinuity layer (rpd)	None observed

Sample quality comments:

	Description
Leakage	Yes. Large amount, Sample only half full
Winnowing	Yes Throughout
Disturbance	None

Sample QC: Field Duplicate Matrix Spike Matrix Spike Duplicate Equipment Blank

Comments:
- Lots of debris - One inch gravel, Leaves, Twigs, Plastic washer, Key, plastic zip tie, paint flakes. All removed from sample
- Four attempts made prior to sample collection due to rocks and other debris in sampler.
- Pictures of debris Roll 2 Unit 5

Signature

8-22-02
Date

City of Portland Outfalls (Project No. 164067.A0.05)
Source Control Pilot Project

CH2MHILL

Sediment Sample Characteristics

Date (mm/dd/yy)	Location	Station Name/No.
08/22/02	Outfall M1 (Foss/Fred Devine	PP01M106

Coordinates		Water Depth		Elevation				
North .058	East .967-W	Depth	Unit	+	Elev.	Unit	Time	Weather
45° 34 ~~.053'~~ N	122° 42 ~~.928'~~ W	15.5	ft				1405	Sunny

Waypoint # ~~892~~ 863

Rep.	Equipment	Sample Type	Penetration Depth	Penetration Unit	Recovery Length	Recovery Unit	Photograph Roll #	Photograph Unit	Initials
2	Van Veen	SED	12	cm	1	ft	2	6	DJL

Surficial Sediment Characteristics: (circle most descriptive)

Texture: Smooth Fine Coarse / Clay Silt Sand Gravel Cobble — Medium, 20% Silt

Color: Light Dark / Gray Brown Black Other

Odor: Normal Sewage Petroleum Chemical H_2S ~~None~~ Other

Redox Layer	
Depth	Unit

Presence of:	Yes/No	Percent	Description
Biological structures	No		
Debris	Yes	5%	Red, White, Blue Paint Chips, Twigs, Leaves, Plastic Cable.
Oil sheen	Yes		Light Sheen

Vertical profile characteristics:

	Description
Changes in sediment characteristics	Uniform
Presence and depth of redox potential discontinuity layer (rpd)	None Observed.

Sample quality comments:

	Description
Leakage	Yes - Leaves and twigs in jaws.
Winnowing	Yes - On both sides
Disturbance	Yes

Sample QC: Field Duplicate Matrix Spike Matrix Spike Duplicate Equipment Blank

Comments:
- Made Ten Attements at 50-ft from outfall due to rocks in sampler. Little to NO sediment was recovered during these attempts. Moved to 65-ft out.
- Four attemts made prior to sample collection due to debris in jaws.
- Lots of debris - Paint flakes, Small Metal pieces, Plastic table, woody debris, glass pieces.
- Fresh water clam ½ inch

D Young — Signature

8-22-02 — Date

City of Portland Outfalls (Project No. 164067.A0.05)
Source Control Pilot Project

CH2MHILL

Sediment Sample Characteristics

Date (mm/dd/yy)	Location	Station Name/No.
08/22/02	Outfall M1 Foss/Fred Devine	PP01 M1 07

Coordinates		Water Depth		Elevation			Time	Weather
North	East	Depth	Unit	+	Elev.	Unit		
45° 34.053' N	122° 42.958' W	3	ft				15:00	Sunny & Warm

Waypoint 892

Rep.	Equipment	Sample Type	Penetration Depth	Penetration Unit	Recovery Length	Recovery Unit	Photograph Roll #	Photograph Unit	Initials
1	VanVeen	Sed	15	cm	1	ft.	2	7	JTI

Surficial Sediment Characteristics: (circle most descriptive)

Texture: Smooth (Fine) Coarse / Clay Silt (Sand 99%) Gravel Cobble

Color: Light (Dark) / (Gray) Brown Black Other _____

Odor: Normal Sewage Petroleum Chemical H_2S (None) Other _____

Redox Layer	
Depth	Unit
NA	

Presence of:

	Yes/No	Percent	Description
Biological structures	No		
Debris	Yes	<1%	see comments
Oil sheen	No		

Vertical profile characteristics:

	Description
Changes in sediment characteristics	No, very uniform
Presence and depth of redox potential discontinuity layer (rpd)	None observed

Sample quality comments:

	Description
Leakage	Moderate
Winnowing	Yes - on both sides
Disturbance	Yes

Sample QC: Field Duplicate Matrix Spike Matrix Spike Duplicate Equipment Blank

Comments:
- VanVeen sampler dropped by hand ~5 feet from low water line
- thin veneer of reddish oxidized material on surface ~2-3 mm same orange/red color as found at mouth of storm outfall
- less debris than at previous sample locations near outfall including woody debris, concrete, & gravel sized rocks, broken glass

Josh Ivens — 8/22/02
Signature Date

City of Portland Outfalls (Project No. 164067.A0.05)
Source Control Pilot Project

CH2MHILL

Sediment Sample Characteristics

Date (mm/dd/yy)	Location	Station Name/No.
08/22/02	Outfall M1 (Foss/Fred drive)	PPOI M108

120-ft Down stream of M1 15-ft from shore

Coordinates		Water Depth		Elevation				
North	East	Depth	Unit	+	Elev.	Unit	Time	Weather
45° 34.078-N	122° 42.974-W						1540	Sunny

Waypoint 894

Rep.	Equipment	Sample Type	Penetration Depth	Penetration Unit	Recovery Length	Recovery Unit	Photograph Roll #	Photograph Unit	Initials
1	VanVeen	SED	15	cm	1	~~ft~~	2	8	DJL

Surficial Sediment Characteristics: (circle most descriptive) Median 20% S.lt

Texture: Smooth Fine Coarse / Clay Silt (Sand) Gravel Cobble

Color: Light (Dark) / (Gray) Brown Black Other _____

Odor: Normal Sewage Petroleum Chemical H_2S None Other _____

Redox Layer	
Depth	Unit
—	—

Presence of:

	Yes/No	Percent	Description
Biological structures	No		
Debris	~~No~~ Yes	>1%	Woody Debris, Paint chip.
Oil sheen	No		

Vertical profile characteristics:

	Description
Changes in sediment characteristics	
Presence and depth of redox potential discontinuity layer (rpd)	

Sample quality comments:

	Description
Leakage	Some -
Winnowing	Minor on one side
Disturbance	No

Sample QC: Field Duplicate Matrix Spike Matrix Spike Duplicate Equipment Blank

Comments: - Sample taken 15-ft from shore due to rocks or large rocks closer in.

- Very uniform and little debris, no odor or sheen.
- Small, thin, fibrous, Plant like structures on surface less long.
- Small drop of oil floated to the surface while filling jars.

DJL 8-22-02

Signature Date

City of Portland Outfalls (Project No. 164067.A0.05)
Source Control Pilot Project

CH2MHILL

Sediment Sample Characteristics

Date (mm/dd/yy)	Location	Station Name/No.
08/22/02	Outfall M1 (Foss/Fred Devine) 50-ft Down Stream of M1 50-ft from Shore	PP01M109

Coordinates		Water Depth		Elevation			Time	Weather
North	~~East~~	Depth	Unit	+	Elev.	Unit		
45° 34.066'-N	122° 42.968'-W Waypoint 895	24	ft				1630	Sunny

Rep.	Equipment	Sample Type	Penetration Depth	Penetration Unit	Recovery Length	Recovery Unit	Photograph Roll #	Photograph Unit	Initials
1	Van Veen	SED	15	cm	1	ft	2	9	

Surficial Sediment Characteristics: (circle most descriptive)

Texture: Smooth ~~Medium~~ Fine Coarse / Clay (Silt) ~~Sand~~ Gravel Cobble — 60% SILT

Color: Light ~~Dark~~ / (Gray) Brown Black Other

Odor: Normal Sewage (Petroleum) Chemical H_2S None Other — Faint

Redox Layer	
Depth	Unit
—	-

Presence of:

	Yes/No	Percent	Description
Biological structures	No		
Debris	Yes		Plastic Creamer container
Oil sheen	No		

Vertical profile characteristics:

	Description
Changes in sediment characteristics	Top 0.5cm Brown Silt.
Presence and depth of redox potential discontinuity layer (rpd)	

Sample quality comments:

	Description
Leakage	Little.
Winnowing	Small amount on one side.
Disturbance	

Sample QC: Field Duplicate Matrix Spike Matrix Spike Duplicate Equipment Blank

Comments:
- Several small worms in top 1cm of sample.
- top 0.5cm ~~light~~ brown silt, rest of sample dark gray sand with 60% silt.
- Ten attempts made at 20-ft off of shore line prior to collection of sample due to woody debris. Moved to ~~@~~ 50-feet out and ~~collected off Sam~~ attempted one before collection of sample.

David Carey 8-22-02
Signature Date

City of Portland Outfalls (Project No. 164067.A0.05)
Source Control Pilot Project

CH2MHILL

Sediment Sample Characteristics

Date (mm/dd/yy)	Location	Station Name/No.
08/22/02	50 ft UPSTREAM OF OUTFALL ~ 20-25 ft FROM WATERLINE (35' FROM STAKE)	PP01M110

Coordinates		Water Depth		Elevation			Time	Weather
North	~~East~~ W.	Depth	Unit	+	Elev.	Unit		
45° 34.056' W (WAYPT. #896)	122° 42.954'	14.8 @ 13.8	ft				1700 HRS.	SUNNY + CLEAR Hi 70's / Low 80's

Rep.	Equipment	Sample Type	Penetration Depth	Penetration Unit	Recovery Length	Recovery Unit	Photograph Roll #	Photograph Unit	Initials
1	VANVEEN	SED.	15	cm	1	ft	2	10	BKB

Surficial Sediment Characteristics: (circle most descriptive)

Texture: Smooth Fine (MED.) Coarse / Clay Silt (Sand) Gravel Cobble

Color: Light (Dark) / (Gray) Brown Black Other _____

Odor: Normal Sewage Petroleum Chemical H_2S (None) Other _____

Redox Layer	
Depth	Unit
Ø	

Presence of:

	Yes/No	Percent	Description
Biological structures	No	-	—
Debris	YES	<5%	BLACK PLASTIC TAPE, SMALL PORTION OF PLASTIC BAG, A FEW PAINT CHIPS, WOODY DEBRIS (SMALL)
Oil sheen	No	-	

Vertical profile characteristics:

	Description
Changes in sediment characteristics	NO - VERY UNIFORM W/ DEPTH.
Presence and depth of redox potential discontinuity layer (rpd)	Ø

Sample quality comments:

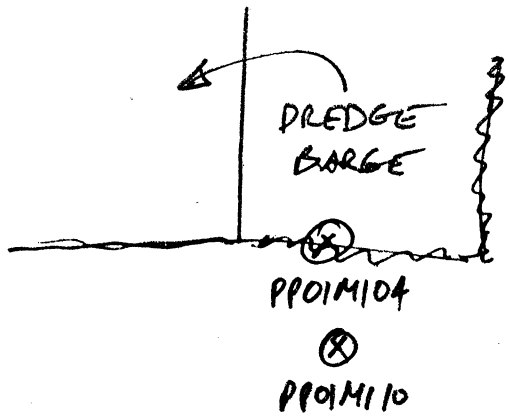
	Description
Leakage	YES, UPPER 1" OVER SAMPLE
Winnowing	MOD. AMOUNT ON ONE SIDE; OTHER SIDE SLIGHT
Disturbance	NONE

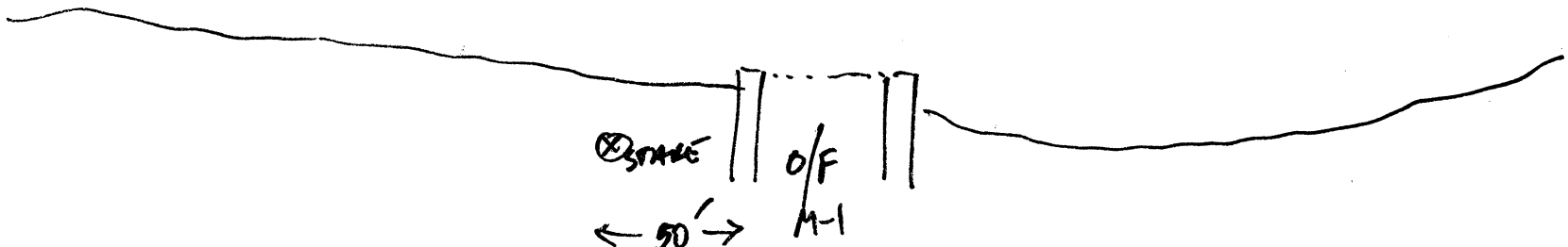
Sample QC: Field Duplicate Matrix Spike Matrix Spike Duplicate Equipment Blank

Comments: UNIFORM, MEDIUM SAND ~10% FINES. A VERY DIFFERENT SAMPLE TO COLLECT - COBBLES EXTEND BELOW WATER LINE ANOTHER 20-25 ft TO WATER DEPTH OF 12-14 ft. SAMPLE COLLECTED W/ VAN VEEN OFF OF BOAT (i.e. NOT FROM SHORE). THIS SAMPLE WAS COLLECTED W/; APPROX. 15-20 ft OF SAMPLE PP01M104, ADJACENT TO BOW OF DREDGE BARGE.

Signature

8/22/02
Date





NTS

APPENDIX B

Representative Photographs of Sediment Samples

Photograph 1: Discharge plume observed at outfall M-1.

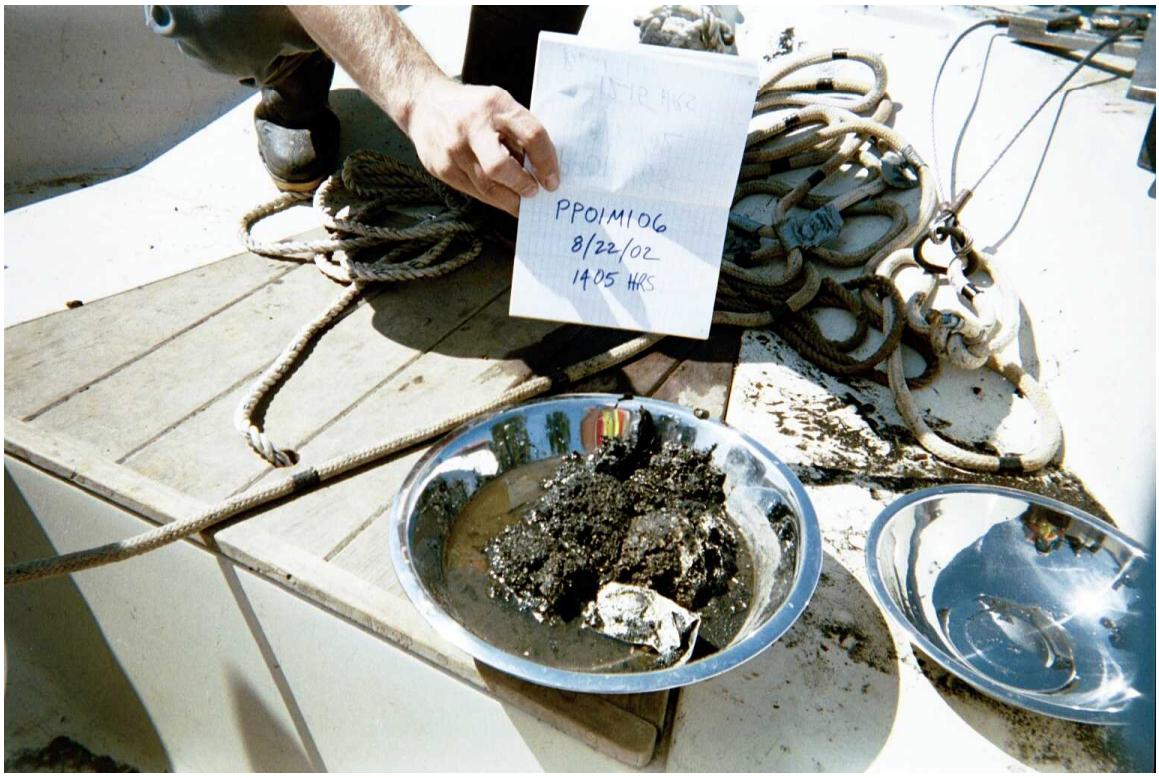
Photograph 2: Outfall M-1 downstream riverbank. Sample PP01M101 location marked with white float. Sample PP01M106 location marked with yellow float.

Photograph 3: Outfall M-1 upstream riverbank. Sample PP01M109 location marked with white float.

Photograph 4: Sample PP01M101.

Photograph 5: Sample PP01M104.

Photograph 6: Sample PP01M105.



Photograph 7: Sample PP01M106.

Photograph 8: Debris removed from sample PP01M106.

APPENDIX C

Laboratory Results

Laboratory results are provided electronically in CD format.

APPENDIX D

Chain-of-Custody Forms

COC #4
PP-004

CH2M HILL
APPLIED SCIENCES LABORATORY

CHAIN OF CUSTODY RECORD AND AGREEMENT TO PERFORM SERVICES

CH2M Hill Project #	164067.AL.02
Purchase Order #	
Project Name	CITY OF PORTLAND OUTFALLS PILOT PROJECT
Company Name/CH2M HILL Office	CITY OF PORTLAND
Project Manager & Phone #	Mr. [ ] Ms. [X] DAWN SANDERS Dr. [ ] (503) 235-5000
Report Copy to:	DAWN SANDERS (PDX)
Requested Completion Date:	STANDARD
Sampling Requirements	AS PER CONTRACT
Sample Disposal:	Dispose [X] Return [ ]

SDWA [ ] NPDES [ ] RCRA [ ] OTHER ____

LAB TEST CODES

SHADED AREA– FOR LAB USE ONLY: Lab 1 # | Lab 2 # | Quote # | Kit Request # | Project # | No. of Samples | Page of | Login | LIMS Ver | REMARKS | LAB 1 ID | LAB 2 ID

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	Matrix AIR	CLIENT SAMPLE ID (9 CHARACTERS)	# OF CONTAINERS	Grain Size (ASTM D-422)	Metals (SW6020)	Pesticides (SW8081A)	Herbicides (SW8151A)	TPH - Dx (NWTPH-D,O)	Mercury (SW7470A)	SVOCs/Low Level (SW-PAHs (8270C)	PCBs (SW8082)	TOC (ASTM E777-81)
8/22	0905		X		X		PP01M101	4	X	X	X	X	X	X	X	X	X
8/22	2400		X		X		PP01M102D	4	X	X	X	X	X	X	X	X	X
8/22	1005		X		X		PP01M103	4	X	X	X	X	X	X	X	X	X
8/22	1130		X		X		PP01M104	4	X	X	X	X	X	X	X	X	X

Fld Dup of 01

PRESERVATION - All @ 4°C.

Sampled By & Title (Please sign and print name)	BRAD PAULSON / FIELD TEAM LEADER	Date/Time	8/23/02 1000
Received By (Please sign and print name)	Brad Paulson	Date/Time	
Received By (Please sign and print name)	Julia Iverson	Date/Time	8/23/02 10:03
Received By (Please sign and print name)		Date/Time	
Work Authorized By (Please sign and print name)			

Relinquished By (Please sign and print name)	BRAD PAULSON Brad Paulson	Date/Time	8/23/02 1000
Relinquished By (Please sign and print name)	Brad Paulson	Date/Time	
Relinquished By (Please sign and print name)		Date/Time	
Shipped Via	UPS BUS Fed-Ex (Hand) Other ____	Shipping #	
Remarks			

QC Level: 1 2 3 Other: ____

COC Rec	ICE
Ana Req	TEMP
Cust Seal	Ph

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client

REV 3/94 FORM 340

CH2M HILL

APPLIED SCIENCES LABORATORY

CHAIN OF CUSTODY RECORD AND AGREEMENT TO PERFORM SERVICES

CH2M Hill Project #: 164967.AL.02 | Purchase Order #:

Project Name: CITY OF PORTLAND OUTFALLS (PILOT PROJECT)

Company Name/CH2M HILL Office: CITY OF PORTLAND

Project Manager & Phone #: Mr. [ ] Ms. [X] DAWN SANDERS (503) 235-5000 Dr. [ ]

Report Copy to: DAWN SANDERS (PDX)

Requested Completion Date: STANDARD

Sampling Requirements: AS PER CONTRACT — SDWA [ ] NPDES [ ] RCRA [ ] OTHER ____

Sample Disposal: Dispose [X] Return [ ]

LAB TEST CODES

SHADED AREA – FOR LAB USE ONLY: Lab 1 # | Lab 2 # | Quote # | Kit Request # | Project # | No. of Samples | Page ____ of ____ | Login | LIMS Ver

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	Matrix AIR	CLIENT SAMPLE ID (9 CHARACTERS)	# OF CONTAINERS	GRAIN SIZE (ASTM D-422)	METALS (SW6020)	PESTICIDES (SW8081A)	HERBICIDES (SW8151A)	TPH-Dx (NWTPH-D,O)	MERCURY (SW7470A)	SVOCs/Low Level PAHs (SW 8270C)	PCBs (SW8082)	TOC (ASTM E777-81)	REMARKS	LAB 1 ID	LAB 2 ID
8/22/2002	1630		X		X		PP01M109	4	X	X	X	X	X	X	X	X	X			
8/22	1700		X		X		PP01M110	4	X	X	X	X	X	X	X	X	X			
8/22	1315	X		X			PP01M1EB02	10		X	X	X	X	X	X	X				

Sampled By & Title (Please sign and print name): BRAD PAULSON / FIELD TEAM LEADER — Date/Time: 8/23/02 800

Received By (Please sign and print name): Brad Paulson — Date/Time:

Received By (Please sign and print name): Jaclyn Ivancie — Date/Time: 8/23/02 10:00

Received By (Please sign and print name): — Date/Time:

Work Authorized By (Please sign and print name):

Relinquished By (Please sign and print name): BRAD PAULSON Brad Paulson — Date/Time: 8/23/02 1000

Relinquished By (Please sign and print name): — Date/Time:

Relinquished By (Please sign and print name): — Date/Time:

Shipped Via: UPS BUS Fed-Ex Hand Other ____ — Shipping #:

Remarks:

QC Level: 1 2 3 Other: ____

COC Rec | ICE

Ana Req | TEMP

Cust Seal | Ph

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client

REV 3/94 FORM 340

CH2M HILL

APPLIED SCIENCES LABORATORY

CHAIN OF CUSTODY RECORD AND AGREEMENT TO PERFORM SERVICES

CH2M Hill Project # 164067.AL.02	**Purchase Order #**
Project Name CITY OF PORTLAND OUTFALLS (PILOT PROJECT)	
Company Name/CH2M HILL Office CITY OF PORTLAND	
Project Manager & Phone # Mr. [ ] Ms. [X] Dr. [ ] DAWN SANDERS. (503) 235-5000	**Report Copy to:** DAWN SANDERS (PDX)
Requested Completion Date: STANDARD	**Sampling Requirements** AS PER CONTRACT — SDWA [ ] NPDES [ ] RCRA [ ] OTHER ____ — **Sample Disposal:** Dispose [X] Return [ ]

LAB TEST CODES

SHADED AREA– FOR LAB USE ONLY

Lab 1 #	Lab 2 #
Quote #	Kit Request #
Project #	
No. of Samples	Page of
Login	LIMS Ver

Sampling Date	Sampling Time	Type COMP	Type GRAB	Matrix WATER	Matrix SOIL	Matrix AIR	CLIENT SAMPLE ID (9 CHARACTERS)	# OF CONTAINERS	GRAIN SIZE (ASTM D-422)	METALS (SW6020)	PESTICIDES (SW8081A)	HERBICIDES (SW8151A)	TPH-Dx (NWTPH-D,O)	MERCURY (SW7470A)	SVOCs/LOW LEVEL PAHs (SW8270C)	PCBs (SW8082)	TOC (ASTM E777-8)	REMARKS	LAB 1 ID	LAB 2 ID
2002 8/22	1215	X			X		PP01M105	4	X	X	X	X	X	X	X	X	X			
8/22	1405	X			X		PP01M106	4	X	X	X	X	X	X	X	X	X			
8/22	1500		X		X		PP01M107	4	X	X	X	X	X	X	X	X	X			
8/22	1540		X		X		PP01M108	4	X	X	X	X	X	X	X	X	X			

PRESERVATION – ALL @ 4°C

Sampled By & Title (Please sign and print name) BRAD PAULSON / FIELD TEAM LEADER	Date/Time 8/23/02 1000	**Relinquished By** (Please sign and print name) BRAD PAULSON	Date/Time 8/23/02 1000	QC Level: 1 2 3 Other: ____	
Received By (Please sign and print name)	Date/Time	**Relinquished By** (Please sign and print name)	Date/Time	COC Rec	ICE
Received By (Please sign and print name) Justin Iverson	Date/Time 8/23/02 10:00	**Relinquished By** (Please sign and print name)	Date/Time	Ana Req	TEMP
Received By (Please sign and print name)	Date/Time	**Shipped Via** UPS BUS Fed-Ex (Hand) Other ____	**Shipping #**	Cust Seal	Ph
Work Authorized By (Please sign and print name)	**Remarks**				

Instructions and Agreement Provisions on Reverse Side

DISTRIBUTION: Original - LAB, Yellow - LAB, Pink - Client

REV 3/94 FORM 340

APPENDIX E

Quality Assurance/Quality Control Report

Review of Quality Assurance/Quality Control (QA/QC) Data for the Portland Harbor Pilot Project Sediment Sampling, August 2002

TO: Dave Livesay/CH2M HILL/CVO
Erin Toelke/CH2M HILL/PDX
Scott Echols/CH2M HILL/CVO

COPIES: Project File

FROM: Wendi Gale/CH2M HILL/CVO

DATE: October 15, 2002

Summary

The majority of the data have met the QA/QC acceptance criteria outlined for the Portland Harbor Pilot Project Sampling study. Nonconformances with QA/QC criteria are discussed, identified, and qualified in this report. The following is a brief summary of the overall quality of the sample results.

All herbicide, polychlorinated biphenyls (PCBs), and total organic carbon (TOC) results for all samples met all QA/QC criteria for the selected QC parameters. A completeness objective of 95 percent was achieved for all samples analyzed for all parameters based on precision and accuracy.

The majority of semivolatile organic compound (SVOC) results for all samples met all QA/QC criteria for the selected QC parameters. A completeness objective of 95 percent was achieved for all samples analyzed for all parameters based on precision and accuracy. Nonconformances with the QA/QC criteria were observed as follows:

- Benzoic acid, 4-chloroaniline, benzyl alcohol, 4-nitroaniline, and 3,3-dichlorobenzidine results for two water samples were qualified as estimates and flagged with a "J" for positive results or with a "UJ" for nondetected results as a result of exceeding continuing calibration criteria.
- Aniline, bis(2-chloroethyl)ether, nitrobenzene, and 4-chloroaniline results for ten sediment samples were qualified as estimates and flagged with a "J" for positive results or with a "UJ" for nondetected results as a result of exceeding continuing calibration criteria.
- SVOC results for five sediment samples were qualified as estimates and flagged with a "J" for positive results or with a "UJ" for nondetected results as a result of surrogate recoveries not reported due to sample dilution.
- Phenol results for two water samples were rejected and flagged with a "UR" as a result of laboratory control sample recoveries reported below the lower QC acceptance criteria.

The majority of NWTPH-Dx results for all samples met all QA/QC criteria for the selected QC parameters. A completeness objective of 95 percent was achieved for all samples analyzed for all parameters based on precision and accuracy. Nonconformances with the QA/QC criteria were observed as follows:

- The NWTPH-Lube Oil result for one sediment sample was qualified as a nondetect and flagged with a "U" as a result of method blank contamination.

- NWTPH-Diesel and NWTPH-Lube Oil results for two sediment samples were qualified as estimates and flagged with a "J" for positive results as a result of surrogate recoveries not reported due to sample dilution.
- NWTPH-Diesel and NWTPH-Lube Oil results for one sediment sample were qualified as estimates and flagged with a "J" for positive results as a result of surrogate recoveries reported below the lower QC acceptance criteria.

The majority of mercury results for all samples met all QA/QC criteria for the selected QC parameters. A completeness objective of 95 percent was achieved for all samples analyzed for all parameters based on precision and accuracy. Nonconformances with the QA/QC criteria were observed as follows:

- Mercury results for three sediment samples were qualified as estimates and flagged with a "J" for positive results as a result of matrix spike recoveries reported below the lower QC acceptance criteria.
- Mercury results for seven sediment samples were qualified as nondetects and flagged with a "U" as a result of equipment blank contamination.

The majority of metals results for all samples met all QA/QC criteria for the selected QC parameters. A completeness objective of 95 percent was achieved for all samples analyzed for all parameters based on precision and accuracy. Nonconformances with the QA/QC criteria were observed as follows:

- Aluminum and zinc results for one water sample were qualified as estimates and flagged with a "J" for positive results as a result of exceeding laboratory duplicate relative percent difference (RPD) QC acceptance criteria.

The majority of pesticide results for all samples met all QA/QC criteria for the selected QC parameters. A completeness objective of 95 percent was achieved for all samples analyzed for all parameters based on precision and accuracy. Nonconformances with the QA/QC criteria were observed as follows:

- Heptachlor results for thirteen sediment samples were qualified as estimates and flagged with a "J" for positive results or with a "UJ" for nondetected results as a result of exceeding continuing calibration criteria.

Introduction

Eighteen sediment samples, two field duplicate, and two equipment blank samples were collected between August 20 and 22, 2002. Samples submitted for NWTPH-Dx, PCBs, mercury, and TOC analyses were performed by CH2M HILL Applied Sciences Group laboratory, located in Corvallis, Oregon. Samples submitted for SVOC, herbicides, pesticides, and metals analyses were performed by Severn Trent Services laboratory (STL), located in Tacoma, Washington.

Data Review Criteria

EPA Contract Laboratory Program (CLP) *National Functional Guidelines (NFG) for Organic Data Review* (February 1994) and *National Functional Guidelines (NFG) for Inorganic Data Review* (February 1994) provided guidelines for data qualification, where applicable.

This QA review focuses on criteria for the following QA/QC parameters and their overall effect on the data:

- Sample custody, handling, and preservation
- Holding time compliance
- Summary initial and continuing calibration data
- Method blanks
- Surrogate spike recovery
- Precision and Accuracy (laboratory control samples, spike/spike duplicates, and laboratory duplicates)
- Field QA/QC (equipment blanks and field duplicates)

Only summary QA/QC information were reviewed for each analytical parameter. Analytical results and QA/QC summary information were provided for all sample analyses.

Analytical Methods

All samples were analyzed by and QA/QC criteria were taken from one of the following sources:

- U.S. EPA. Test Methods for Evaluating Solid Waste (SW 846), December 1996.
- U.S. EPA. Methods for Chemical Analysis of Water and Wastes. 600/4-79-200, March, 1983.
- U.S. EPA. Methods for the Determination of Organic Compounds in Drinking Water. 600/4-88-039, December, 1988. Revised July, 1991.
- Standard Methods for the Examination of Water and Wastewater. 18th Edition. 1992.
- Oregon D.E.Q. Method NWTPH-Dx is based on Oregon's Department of Environmental Quality TPH-D and Washington's Department of Ecology WTPH-D methods.

Table 1 lists the analytical method used for each parameter and the number and type of samples analyzed.

Table 1
Summary of Analyses

Parameter	Method	No. of Field Samples	No. of Field Duplicates	No. of Equipment Blanks
SVOC	EPA 8270C	18 sediment	2 sediment	2 water
Herbicides	EPA 8151A GC/MS Mod	18 sediment	2 sediment	2 water
Pesticides	SW 8081A	18 sediment	2 sediment	2 water
PCBs	SW 8082	18 sediment	2 sediment	2 water
NWTPH-Diesel, NWTPH-Lube Oil	NWTPH-Dx	18 sediment	2 sediment	2 water
Metals	EPA 6010/6020	18 sediment	2 sediment	2 water
Mercury	SW 7471A	18 sediment	2 sediment	2 water
TOC	ASTM E-777	18 sediment	2 sediment	none

Qualifiers

The following definitions provide brief explanations of the data qualifiers that were assigned to results in the data review process.

U - The analyte was analyzed for, but the analyte was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

UR - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

The laboratory may have assigned additional data qualifiers. Laboratory data qualifiers are defined in each laboratory report.

Sample Custody, Handling, and Preservation

Chain-of-custody (COC) forms and the laboratory sample receiving checklists were reviewed to determine if any sample handling procedures might affect the integrity or the quality of the sample results.

All coolers were received by the laboratory at a temperature of 4 °C ± 2 °C, as recommended by EPA. All sample containers were received intact and no bubbles were noted in liquid samples submitted for analysis. All sediment and equipment blank samples were extracted and/or analyzed within their respective holding time requirements.

No preserved TOC vials were provided for the equipment blank sample PP0118EB01, therefore TOC was not analyzed for this sample.

Matrix spike duplicate analysis was requested on the chain of custody form for sample PP011808. Matrix spike analysis was added for all analyses as per Scott Echols/CVO.

STL was unable to locate standards for two requested pesticide compounds (alpha-chlordene and gamma chlordene), therefore the laboratory was unable to collect data for these compounds.

The sample time listed on the sample bottle did not match the chain of custody form for sample PP011805. The sample time on the chain of custody form was used for this sample.

GC/MS Tune Criteria

Instrument tuning must be performed at the beginning of each twelve-hour instrument sequence, prior to standard and sample analyses. Analysis frequency criteria and ion abundance criteria for each instrument sequence were met.

Initial Calibration

Initial calibration criteria monitor analytical performance and proper compound identification at the start of analysis.

Initial calibration data were provided for each instrument used for SVOC, herbicide, pesticide, PCBs, NWTPH-Dx, metals, and TOC analysis. Except for the instances noted below, all initial calibrations met QC acceptance criteria.

- The SVOC initial calibration performed on August 19, 2002 (SDGs 108166 and 108177) reported the percent relative standard deviation for nitrobenzene (32.8%) greater than 30. Nitrobenzene results for all associated samples were reported as nondetects, therefore qualification was not required.
- The SVOC initial calibration performed on August 29, 2002 (SDGs 108160, 108164, and 108166) reported the percent relative standard deviation for benzoic acid (37.3%), 2,4-dinitrophenol (32.6%), and aniline (31.1%) greater than 30. Benzoic acid, 2,4-dinitrophenol, and aniline results for all associated samples were reported as nondetects, therefore qualification was not required.

Continuing Calibration

Continuing calibration criteria monitor analytical performance and proper compound identification on a daily or more frequent basis.

Continuing calibration data were provided for each instrument used for SVOC, herbicide, pesticide, PCBs, NWTPH-Dx, metals, and TOC analysis. A continuing calibration verification was performed every 12 hour tuning period using a mid-calibration range standard. %D results should be within the QC control limits of ±25% to meet continuing calibration QC acceptance criteria. Except for the instances noted below, all target compounds met continuing calibration QC acceptance criteria.

- The SVOC CCV performed on August 28, 2002 at 3:28pm (SDGs 108166 and 108177) reported the %D results for benzoic acid (63.5%), 4-chloroaniline (48.6%), benzyl alcohol (30.5%), 4-nitroaniline (52.9%), and 3,3-dichlorobenzidine (37%) above the QC acceptance criteria. Benzoic acid, 4-chloroaniline, benzyl alcohol, 4-nitroaniline, and 3,3-dichlorobenzidine results for equipment blank samples PP0118EB01 and PP01M1EB02 were qualified as estimates and flagged with a "J" for positive results or with a "UJ" for nondetected results.

- The SVOC CCV performed on September 5, 2002 at 4:47pm (SDGs 108160, 108164, 108166, and 108177) reported the %D results for aniline (33.1%), bis(2-chloroethyl)ether (38.2%), nitrobenzene (118.2%), and 4-chloroaniline (41.1%) above the QC acceptance criteria. Aniline, bis(2-chloroethyl)ether, nitrobenzene, and 4-chloroaniline results for sediment samples PP011801, PP011802, PP011803, PP011804D, PP011805, PP011806, PP011807, PP011808, PP011809, and PP011810 were qualified as estimates and flagged with a "J" for positive results or with a "UJ" for nondetected results.

- The pesticide CCV performed on September 12, 2002 at 8:34am (SDGs 108166 and 108177) reported the %D result for heptachlor (61.9%) above the QC acceptance criteria. Heptachlor results for sediment samples PP011801, PP011809, PP011810, PP01M101, PP01M102D, PP01M103, PP01M104, PP01M105, PP01M106, PP01M107, PP01M108, PP01M109, and PP01M110 were qualified as estimates and flagged with a "J" for positive results or with a "UJ" for nondetected results.

Method Blanks

Method blanks monitor contamination that may be introduced during analysis.

A method blank was analyzed with each analytical batch, therefore meeting frequency QC acceptance criteria. Except for the instances noted below, all method blanks were contamination-free, therefore meeting QC acceptance criteria.

- The NPWPH-Dx method blank analyzed on August 23, 2002 (SDGs 8005, 8006, and 8008) was reported with detectable concentrations of NWTPH-Lube Oil (9.96 J mg/kg). The NWTPH-Lube Oil result for sediment sample PP011802 (35.8 U) was qualified as a nondetect and flagged with a "U" as a result of method blank contamination.

- The NWTPH-Dx method blank analyzed on August 27, 2002 (SDGs 8006 and 8016) was reported with detectable concentrations of NWTPH-Diesel (0.04 J mg/L) and NWTPH-Lube Oil (0.19 J mg/L). Equipment blank results are not qualified based on method blank contamination, therefore no sample results required qualification as a result of the method blank contamination.

- The NWTPH-Dx method blank analyzed on August 28, 2002 (SDG 8016) was reported with detectable concentrations of NWTPH-Lube Oil (15.6 J mg/kg). NWTPH-Lube Oil results for the associated sediment samples were reported with concentrations greater than five times the concentration detected in the method blank, therefore, no sample results required qualification as a result of the method blank contamination.

- The SVOC method blank analyzed on August 28, 2002 (SDGs 108166 and 108177) was reported with detectable concentrations of 2-methylnaphthalene (0.0228 J µg/L). Equipment blank results are not qualified based on method blank contamination, therefore no sample results required qualification as a result of the method blank contamination.

- The metals method blank analyzed on August 29, 2002 (SDG 108166) was reported with detectable concentrations of aluminum (0.00698 J mg/L), antimony (0.00003 J mg/L), chromium (0.00085 J mg/L), copper (0.000039 J mg/L), lead (0.000018 J mg/L), and zinc (0.0015 J mg/L).

Equipment blank results are not qualified based on method blank contamination, therefore no sample results required qualification as a result of the method blank contamination.

- The metals method blank analyzed on August 30, 2002 (SDGs 108160, 108164, 108166, and 108177) was reported with detectable concentrations of copper (0.011 J mg/kg), lead (0.0064 J mg/kg), nickel (0.0072 J mg/kg), and zinc (0.365 J mg/kg). Copper, lead, nickel, and zinc results for the associated sediment samples were reported with concentrations greater than five times the concentration detected in the method blank, therefore, no sample results required qualification as a result of the method blank contamination.
- The metals method blank analyzed on August 30, 2002 (SDG 108177) was reported with detectable concentrations of aluminum (0.0087 J mg/L), chromium (0.000059 J mg/L), copper (0.000055 J mg/L), lead (0.000033 J mg/L), nickel (0.000046 J mg/L), and zinc (0.00226 J mg/L). Equipment blank results are not qualified based on method blank contamination, therefore no sample results required qualification as a result of the method blank contamination.
- The mercury method blank analyzed on September 4, 2002 (SDG 8005) was reported with detectable concentrations of mercury (0.0074 J mg/kg). Mercury results for the associated sediment samples were reported with concentrations greater than five times the concentration detected in the method blank, therefore, no sample results required qualification as a result of the method blank contamination.
- The mercury method blank analyzed on September 10, 2002 (SDGs 8006 and 8016) was reported with detectable concentrations of mercury (0.016 J µg/L). Equipment blank results are not qualified based on method blank contamination, therefore no sample results required qualification as a result of the method blank contamination.

Surrogate Spike Recovery

Surrogate compounds are organic compounds which are similar to the analytes of interest in chemical composition, extraction, and chromatography, but are not likely to be found in environmental samples. Every sample and blank analyzed for organic parameters is spiked prior to extraction or analysis with surrogate compounds that are representative of the analysis.

All surrogate spike recoveries should be within the laboratory-established control limits to meet QC acceptance criteria.

EPA Method 8270C (SVOCs)

Surrogate recoveries should be within the QC control limits of 42 to 154 percent for nitrobenzene-d5, 51 to 142 percent for 2-fluorobiphenyl, 44 to 144 percent for terphenyl-d14, 43 to 157 percent for phenol-d5, 37 to 160 percent for 2-fluorophenol, and 36 to 159 percent for 2,4,6-tribromophenol for sediment samples. SVOC sample results are not qualified unless two or more SVOC surrogates within the same fraction (base/neutral or acid fraction) are outside QC criteria. Except for the instances noted below, all surrogate recoveries were within the specified QC control limits.

- The surrogate recovery for terphenyl-d14 was reported above the upper QC control limit for sample PP011806 (182%). No sample results required qualification.
- The surrogate recovery for 2-fluorobiphenyl was reported below the lower QC control limit for samples PP011801 (31.3%), PP011807 (50.7%), PP01M108 (37.3%), PP01M109 (50.4%), and PP01M110 (40.3%). No sample results required qualification.

- The surrogate recoveries for nitrobenzene-d5 and 2-fluorobiphenyl were reported below the lower QC control limit for samples PP01M104 (36.8% and 38.2%, respectively) and PP0118EB01 (39.3% and 47.1%, respectively). No sample results required qualification.
- The surrogate recoveries for nitrobenzene-d5, 2-fluorobiphenyl, terphenyl-d14, phenol-d5, 2-fluorophenol, and 2,4,6-tribromophenol were not reported as a result of dilution in sediment samples PP01M101, PP01M102D, PP01M103, PP01M105, and PP01M106. SVOC results for these samples were qualified as estimates and flagged with a "J" for positive results or with a "UJ" for nondetected results.

EPA Method 8151A GC/MS Modified (Herbicides)

Surrogate recoveries should be within the QC control limits of 48 to 128 percent for 2,4-dichlorophenylacetic acid in sediment samples. All surrogate recoveries were within the specified QC control limits.

SW Method 8082 (PCBs)

Surrogate recoveries should be within the QC control limits of 25 to 143 percent for decachlorobiphenyl in sediment samples. All surrogate recoveries were within the specified QC control limits.

NWTPH-Dx Method (NWTPH-Diesel and NWTPH-Lube Oil)

Surrogate recoveries should be within the QC control limits of 50 to 150 percent for o-terphenyl and octacosane in sediment samples. Except for the instances noted below, all surrogate recoveries were within the specified QC control limits.

- The surrogate recoveries for o-terphenyl and octacosane were not reported as a result of dilution in sediment samples PP011806DL and PP011807DL. NWTPH-Diesel and NWTPH-Lube Oil results for samples PP011806DL and PP011807DL were qualified as estimates and flagged with a "J" for positive results.
- The surrogate recoveries for o-terphenyl and octacosane were reported below the lower QC control limit for sample PP011805DL (33.9% and 25%, respectively). NWTPH-Diesel and NWTPH-Lube Oil results for sample PP011805DL were qualified as estimates and flagged with a "J" for positive results.

Laboratory Control Samples, Matrix Spike/Matrix Spike Duplicates, and Laboratory Duplicates

Precision and accuracy of laboratory performance are evaluated by the analysis of laboratory control samples (LCS), matrix spike (MS), matrix spike duplicates (MSDs), and laboratory duplicates. LCSs, MS/MSDs, and laboratory duplicates should be performed at a frequency of five percent or once per analytical batch, whichever is more frequent. LCS, MS/MSD, and laboratory duplicate recoveries and relative percent difference (%RPD) results should be within laboratory established control limits to meet precision and accuracy QC acceptance criteria.

Frequency criteria were met for all analytical methods. Except for the instances noted below, all LCS, MS/MSD, and laboratory duplicate recoveries and %RPD results were within the laboratory established QC control limits for all samples analyzed. Therefore, the majority of the samples met precision and accuracy QC acceptance criteria.

- The aluminum MS recovery for sample PP011808 (70%) was reported below the QC control limits of 75 to 125 percent. Spike recovery limits do not apply when sample concentration exceeds the spike concentration by a factor of four or greater, therefore sample results were not qualified based on aluminum MS recoveries.
- The mercury MS recovery for sample PP011802 (178%) was reported above the QC control limits of 75 to 125 percent. Spike recovery limits do not apply when sample concentration exceeds the spike concentration by a factor of four or greater, therefore sample results were not qualified based on aluminum MS recoveries.
- The mercury MSD recovery for sample PP011808 (52.5%) was reported below the QC control limits of 75 to 125 percent. The positive mercury results for samples PP011806, PP011807, and PP011808 were qualified as estimates and flagged with a "J" as a result of MSD recovery.
- The SVOC LCS analyzed on August 28, 2002 reported recoveries below the QC control limits for phenol (23%). The phenol results for samples PP0118EB01 and PP01M1EB02 were rejected and flagged with a "UR" as a result of LCS recovery.
- The metals laboratory duplicate reported the RPD results for arsenic (200%) and aluminum (26%) above the QC acceptance criteria. The arsenic result for sample PP01M1EB02 was reported as a nondetect, and no further qualification was required. The positive aluminum result for sample PP01M1EB02 was qualified as an estimate and flagged with a "J" as a result of laboratory duplicate RPD.
- The metals laboratory duplicate reported the RPD results for antimony (59%) and zinc (25%) above the QC acceptance criteria. The positive antimony result for sample PP0118EB01 was flagged by the laboratory with a "J" qualifier, and no further qualification was required. The positive zinc result for sample PP0118EB01 was qualified as an estimate and flagged with a "J" as a result of laboratory duplicate RPD.
- Several MS/MSD recoveries and RPD results were reported outside the laboratory-established QC control limits for SVOC, herbicide, pesticide, and NWTPH-Dx analysis. Organic sample results cannot be qualified using MS/MSD data alone, but can be used in conjunction with other QC criteria to determine the precision and accuracy of individual samples. Sample results did not require qualification based on precision or accuracy criteria, therefore SVOC, herbicide, pesticide, and NWTPH-Dx results were not qualified based on MS/MSD results.

Field QA/QC

Equipment Blanks

Equipment blanks are used primarily to indicate if contamination has occurred as a result of sample collection or handling procedures.

Two equipment blank samples (PP0118EB01 and PP01M1EB02) were analyzed for SVOC, herbicides, pesticides, PCBs, NWTPH-Dx, metals, and mercury.

Equipment blank sample PP018EB01 was reported with detectable concentrations of NWTPH-Diesel (0.16 J mg/L), NWTPH-Lube Oil (0.17 J mg/L), mercury (0.025 J µg/L), aluminum (0.0181 mg/L), antimony (0.00095 J mg/L), chromium (0.00879 mg/L), copper (0.00239 mg/L), lead (0.000368 J mg/L), nickel (0.00753 mg/L), zinc (0.00677 mg/L), di-n-octylphthalate (0.222 µg/L), benzoic acid (0.166 J µg/L), naphthalene (0.0709 µg/L), 4-chloro-3-methylphenol (0.204 µg/L), and bis(2-ethylhexyl)phthalate (0.634 µg/L). NWTPH-Diesel, NWTPH-Lube Oil, aluminum, antimony, chromium, copper, lead, nickel, zinc, di-n-octylphthalate, benzoic acid, naphthalene, 4-chloro-3-

methylphenol, and bis(2-ethylhexyl)phthalate were not detected in any associated samples or were greater than 5 times the detected concentration, therefore sample results were considered unaffected and were not qualified based on equipment blank contamination. The mercury result for sample PP011801 (0.115 U) was qualified as a nondetect and flagged with a "U" as a result of equipment blank contamination.

Equipment blank sample PP01M1EB02 was reported with detectable concentrations of NWTPH-Diesel (0.17 J mg/L), NWTPH-Lube Oil (0.19 J mg/L), mercury (0.02 J µg/L), aluminum (0.013 mg/L), chromium (0.0032 mg/L), copper (0.0026 mg/L), lead (0.000315 J mg/L), nickel (0.00164 mg/L), zinc (0.00817 mg/L), naphthalene (0.0958 µg/L), 4-chloro-3-methylphenol (0.256 µg/L), and di-n-octylphthalate (0.144 J µg/L). NWTPH-Diesel, NWTPH-Lube Oil, aluminum, chromium, copper, lead, nickel, zinc, naphthalene, 4-chloro-3-methylphenol, and di-n-octylphthalate were not detected in any associated samples or were greater than 5 times the detected concentration, therefore sample results were considered unaffected and were not qualified based on equipment blank contamination. The mercury result for samples PP01M104 (0.0725 U), PP01M106 (0.0725 U), PP01M107 (0.0714 U), PP01M108 (0.082 U), PP01M109 (0.0877 U), and PP01M110 (0.0758 U) were qualified as nondetects and flagged with a "U" as a result of equipment blank contamination.

Field Duplicates

Field duplicates are another measure of reproducibility by duplicate analysis.

Field duplicate results are used to determine the precision of field sampling and laboratory techniques. There are no criteria or control limits for the %RPD of field duplicates; therefore laboratory duplicate criteria are applied. This allows control limits of ±35 RPD for sediment samples with the provisional control limit of plus or minus the MRL when sample concentrations are less than five times the MRL. These control limits may be too stringent, however, since precision in this case involves both sampling and laboratory precision. There are no specific review criteria used to compare field sample result comparability. Qualifiers are not assigned when field duplicate results do not meet QC acceptance criteria.

Samples PP011803 and PP01M101 were collected in duplicate and analyzed for SVOC, herbicides, pesticides, PCBs, NWTPH-Dx, metals, mercury, and TOC.

APPENDIX F

Basin Assessment

APPENDIX F

Basin Assessment

This appendix consists of the following data subappendixes:

- **Preliminary Evaluation Update**

  Tables 1, 3, 4A, 4B, 7, 9, and 12 from the document entitled *Preliminary Evaluation of City Outfalls – Portland Harbor Study Area:* Notebook 1, Eastshore Stormwater and CSO Outfalls (CH2M HILL, July 2000). Table 7 includes Environmental Cleanup Site Inventory (ESCI) Site Summary Data Reports for Fred Devine Diving and Salvage, Inc., and Freightliner, Inc.

- **City Data Compilation**

  – Table F-1: Illicit Discharge Elimination Program Data
  – Table F-2: Pollution Complaints Data

- **National Pollutant Discharge Elimination System (NPDES) Data Compilation**

  Table F-3: Summary of Information Obtained from the Water Quality File Review of M-1 Facilities with NPDES Permits

- **Department of Environmental Quality ECSI File Reviews.** The ECSI file reviews are followed by additional investigation data provided for Fred Devine Diving and Salvage, Inc.

Preliminary Evaluation Update

Table 1
Historical Sediment Results in the Vicinity of Outfall M-1

updated: Sep-02

StationID		SJ10M1-A	SJ10M1-A	SJ10M1-B	SJ10M1-C	SJ10M1-D	SJ10M1-E	SJ10M1-E	SD136	SD136	PSY08	PSY08	PSY08	PSY08	PSY11	PSY11C	PSY11C	PSY11C	PSY11C
Sample ID #		WRSTRM94J10M1A	WRSTRM94J10M1A	WRSTRM94J10M1B	WRSTRM94J10M1C	WRSTRM94J10M1D	WRSTRM94J10M1E	WRSTRM94J10M1E	WR-WSI98SD136	WR-WSI98SD136	PSYSEA98PSY08	PSYSEA98PSY08	PSYSEA98PSY08	PSYSEA98PSY08	PSYSEA98PSY11	PSYSEA98PSY11C	PSYSEA98PSY11C	PSYSEA98PSY11C	PSYSEA98PSY11C
Field Replicate #									#	#			1	2					
SubSample #		T	B				T	B	#	#		1							
Sample Depth		0-2 CM	2-8 CM	0-10 CM	0-10 CM	0-10 CM	0-2 CM	2-8 CM	0-10 CM	0-90 CM	0-10 CM	0-10 CM	0-10 CM	0-10 CM	0-10 CM	0-4 FT	4-8 FT	8-12 FT	12-13.9 FT
Sample Date		7/18/94	7/18/94	7/18/94	7/18/94	7/18/94	7/18/94	7/18/94	9/22/97	10/14/97	4/7/98	4/7/98	4/7/98	4/7/98	4/5/98	4/15/98	4/15/98	4/15/98	4/15/98
Analyte	**Units**																		
Aluminum	mg/Kg								15400 AA	29200 AA									
Antimony	mg/Kg	10 U AA	10 U AA	10 U AA	10 U AA	10 U AA	10 U AA	10 U AA	7 UJ AA	4 UJ AA	0.1 G AB	0.1 G AB	0.2 G AB	0.2 G AB	0.1 G AB	0.1 UG AB	0.1 UG AB	0.1 UG AB	0.1 UG AB
Arsenic	mg/Kg	2 AA	2 AA	2 AA	2 AA	2 AA	2 AA	2 AA	7 U AA	4 U AA	6 AB	7 AB	6 AB	5 AB	8 AB	4 AB	4 AB	3 AB	3 AB
Barium	mg/Kg								138 AA	168 AA									
Beryllium	mg/Kg	1 U AA	1 U AA	1 U AA	1 U AA	1 U AA	1 U AA	1 U AA	0.3 AA	0.46 AA									
Cadmium	mg/Kg	1 U AA	1 U AA	1 U AA	1 U AA	1 U AA	1 U AA	1 U AA	1 AA	0.8 AA	2.3 AB	2.2 AB	2.8 AB	1.5 AB	1.2 AB	0.4 AB	0.1 AB	0.1 U AB	0.1 U AB
Chromium	mg/Kg	23 AA	23 AA	35 AA	26 AA	27 AA	24 AA	23 AA	24.6 AA	40.2 AA	41 E AB	43 E AB	43 E AB	52 E AB	43 E AB	29 AB	25 AB	28 AB	25 AB
Cobalt	mg/Kg								12.5 AA	16.4 AA									
Copper	mg/Kg	27 AA	25 AA	29 AA	29 AA	32 AA	28 AA	25 AA	81.5 AA	43.4 AA	82.3 AB	81.7 AB	42.6 AB	66.6 AB	119 AB	38.5 G AB	33.2 G AB	30.1 G AB	28.1 G AB
Iron	mg/Kg								37900 AA	35400 AA									
Lead	mg/Kg	20 U AA	20 U AA	20 U AA	20 U AA	20 U AA	20 U AA	20 U AA	24 AA	27 AA	41.5 EG AB	55.3 EG AB	55.8 EG AB	36.6 EG AB	54.4 EG AB	116 E AB	5.9 E AB	6.4 E AB	5.4 E AB
Manganese	mg/Kg								323 AA	431 AA									
Mercury	mg/Kg	0.2 U AA	0.2 U AA	0.2 U AA	0.2 U AA	0.2 U AA	0.2 U AA	0.2 U AA	0.06 AA	0.04 AA	0.14 AB	0.08 AB	0.12 AB	0.08 AB	0.17 AB	0.4 AB	0.07 AB	0.07 AB	0.05 U AB
Nickel	mg/Kg	23 AA	22 AA	26 AA	24 AA	25 AA	24 AA	22 AA	20 AA	25 AA	25 AB	22 AB	22 AB	17 AB	28 AB	24 AB	24 AB	24 AB	23 AB
Selenium	mg/Kg	1 U AA	1 U AA	1 U AA	1 U AA	1 U AA	1 U AA	1 U AA	10 AA	9 AA									
Silver	mg/Kg	2 U AA	2 U AA	2 U AA	2 U AA	2 U AA	2 U AA	2 U AA	0.9 AA	0.9 AA	0.2 AB	0.3 AB	0.4 AB	0.2 AB	0.6 AB	0.4 AB	0.1 U AB	0.1 U AB	0.1 U AB
Thallium	mg/Kg	1 U AA	1 U AA	1 U AA	1 U AA	1 U AA	1 U AA	1 U AA	7 U AA	4 AA									
Vanadium	mg/Kg								68.6 AA	89.9 AA									
Zinc	mg/Kg	84 AA	59 AA	63 AA	63 AA	70 AA	68 AA	59 AA	178 AA	116 AA	333 E AB	330 E AB	424 E AB	322 E AB	337 E AB	113 AB	61 AB	60 AB	59 AB
Total organic carbon	%								1.5 AA	1.3 AA	2.03 AA	2.06 AA	4.51 AA	2.49 AA	2.66 AA	1.09 AA	0.94 AA	0.85 AA	0.69 AA
4-Methylphenol	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	380 AA	19 U AA	100 U AB	100 U AB	100 U AB	100 U AB	100 U AB	100 U AB	100 U AB	100 U AB	100 U AB
Benzoic acid	ug/Kg	2000 U AA	2000 UH AA	3000 U AA	3000 U AA	3000 U AA	2000 UH AA	3000 U AA	190 U AA	190 U AA									
Benzyl alcohol	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 U AA	19 UJ AA									
Bis(2-ethylhexyl) phthalate	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	900 AA	300 UH AA	500 U AA	2100 AA	370 AA	7590 J AB	6760 J AB	11400 J AB	11600 J AB	3510 AB	97 B AB	18 B AB	18 B AB	17 B AB
Butylbenzyl phthalate	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	62 AA	19 U AA	407 AB	512 AB	456 AB	1020 AB	145 AB	21 AB	10 U AB	10 U AB	10 U AB
Dibutyl phthalate	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 U AA	44 AA	71 AB	61 AB	128 AB	87 AB	61 AB	10 U AB	10 U AB	10 U AB	10 U AB
Di-n-octyl phthalate	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 U AA	19 U AA	256 AB	226 AB	433 AB	366 AB	115 AB	10 U AB	10 U AB	10 U AB	10 U AB
Dibenzofuran	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 U AA	19 U AA	15 AB	23 AB	27 AB	21 AB	14 AB	10 U AB	10 U AB	10 U AB	10 U AB
Dimethyl phthalate	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 J AA	19 U AA	42 AB	37 AB	127 AB	53 AB	58 AB	10 U AB	10 U AB	10 U AB	10 U AB
Pentachlorophenol	ug/Kg	2000 U AA	2000 UH AA	3000 U AA	3000 U AA	3000 U AA	2000 UH AA	3000 U AA	96 U AA	97 UJ AA	100 U AB	100 U AB	100 U AB	100 U AB	100 U AB	100 U AB	100 U AB	100 U AB	100 U AB
Phenol	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 U AA	19 U AA	163 AB	124 AB	50 U AB	50 U AB	50 U AB	50 U AB	50 U AB	50 U AB	50 U AB
2-Methylnaphthalene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 U AA	19 U AA	13 AB	55 AB	22 AB	21 AB	13 AB	10 AB	10 U AB	10 U AB	10 U AB
Acenaphthene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 U AA	19 U AA	23 AB	31 U AB	36 AB	27 AB	20 AB	10 U AB	10 U AB	10 U AB	10 U AB
Acenaphthylene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 U AA	19 U AA	13 AB	438 AB	13 AB	10 U AB	10 U AB	11 AB	10 U AB	10 U AB	10 U AB
Anthracene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 AA	19 U AA	52 AB	308 AB	86 AB	36 AB	53 AB	16 AB	10 U AB	10 U AB	10 U AB
Benz(a)anthracene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	69 AA	40 AA	288 AB	870 AB	388 AB	211 AB	240 AB	46 AB	10 U AB	10 U AB	10 U AB
Benzo(a)pyrene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	85 AA	48 AA	223 AB	1200 AB	364 AB	206 AB	213 AB	65 AB	10 U AB	10 U AB	10 U AB
Benzo(b)fluoranthene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	110 AA	46 AA	350 AB	949 AB	694 AB	313 AB	340 AB	61 AB	10 U AB	10 U AB	10 U AB
Benzo(g,h,i)perylene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	49 AA	48 AA	164 AB	899 AB	336 AB	195 AB	134 AB	49 AB	10 U AB	10 U AB	10 U AB
Benzo(k)fluoranthene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	74 AA	42 AA	267 AB	798 AB	416 AB	234 AB	239 AB	51 AB	10 U AB	10 U AB	10 U AB
Chrysene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	130 AA	60 AA	430 AB	922 AB	696 AB	348 AB	412 AB	70 AB	10 U AB	10 U AB	10 U AB
Dibenz(a,h)anthracene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 U AA	19 U AA	31 AB	78 AB	61 AB	39 AB	24 AB	10 U AB	10 U AB	10 U AB	10 U AB

Table 1
Historical Sediment Results in the Vicinity of Outfall M-1

updated: Sep-02

StationID		SJ10M1-A	SJ10M1-A	SJ10M1-B	SJ10M1-C	SJ10M1-D	SJ10M1-E	SJ10M1-E	SD136	SD136	PSY08	PSY08	PSY08	PSY08	PSY11	PSY11C	PSY11C	PSY11C	PSY11C
Sample ID #		WRSTRM94J10M1A	WRSTRM94J10M1A	WRSTRM94J10M1B	WRSTRM94J10M1C	WRSTRM94J10M1D	WRSTRM94J10M1E	WRSTRM94J10M1E	WR-WSI98SD136	WR-WSI98SD136	PSYSEA98PSY08	PSYSEA98PSY08	PSYSEA98PSY08	PSYSEA98PSY08	PSYSEA98PSY11	PSYSEA98PSY11C	PSYSEA98PSY11C	PSYSEA98PSY11C	PSYSEA98PSY11C
Field Replicate #									#	#			1	2					
SubSample #		T	B				T	B	#	#		1							
Sample Depth		0-2 CM	2-8 CM	0-10 CM	0-10 CM	0-10 CM	0-2 CM	2-8 CM	0-10 CM	0-90 CM	0-10 CM	0-10 CM	0-10 CM	0-10 CM	0-10 CM	0-4 FT	4-8 FT	8-12 FT	12-13.9 FT
Sample Date		7/18/94	7/18/94	7/18/94	7/18/94	7/18/94	7/18/94	7/18/94	9/22/97	10/14/97	4/7/98	4/7/98	4/7/98	4/7/98	4/5/98	4/15/98	4/15/98	4/15/98	4/15/98
Analyte	**Units**																		
Fluoranthene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	240 AA	130 AA	674 AB	3810 AB	1660 AB	597 AB	453 AB	151 AB	10 U AB	10 U AB	10 U AB
Fluorene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 U AA	19 U AA	33 AB	246 AB	51 AB	37 AB	30 AB	10 AB	10 U AB	10 U AB	10 U AB
Indeno(1,2,3-cd)pyrene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	48 AA	33 AA	155 AB	678 AB	314 AB	173 AB	134 AB	41 AB	10 U AB	10 U AB	10 U AB
Naphthalene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	19 U AA	19 U AA	27 AB	84 AB	53 AB	38 AB	27 AB	21 AB	10 U AB	10 U AB	10 U AB
Phenanthrene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	500 U AA	110 AA	61 AA	282 AB	3120 AB	531 AB	287 AB	234 AB	77 AB	10 U AB	10 U AB	10 U AB
Pyrene	ug/Kg	300 U AA	300 UH AA	500 U AA	500 U AA	500 U AA	300 UH AA	600 AA	220 AA	130 AA	700 AB	5160 AB	1540 AB	620 AB	455 AB	241 AB	10 U AB	10 U AB	10 U AB
Carbazole	ug/Kg								19 U AA	19 UJ AA									
Polychlorinated biphenyls	ug/Kg	100 UA AA	100 UA AA	100 UA AA	100 UA AA	100 UA AA	100 UA AA	100 UA AA			209 A AB	79 A AB	231 A AB	101 A AB	354 A AB	80 A AB	10 UA AB	10 UA AB	10 UA AB

Notes:

QA Level:

AA = QA1Cat1

AB = QA2Cat1

Qualifier List:

Qualifier	Definition
A	Detected quantities of analytes added together as defined in WAC 173-204-320 for LPAH and HPAH, as in DMMO 2000 for DDT, and for all Aroclors or congeners for PCB.
B	Possible method blank contamination.
E	Estimate, usually applied because the value exceeded the instrument calibration range.
G	Estimate is greater than value shown.
J	Estimate, usually applied because the value is less than the method reporting limit but greater than the method detection limit, or for QA/QC concerns.
U	Undetected at the detection limit shown.
UG	Undetected at the detection limit shown; Estimate is greater than value shown.
UH	Undetected at the detection limit shown; Holding time exceeded.
UJ	Undetected at the detection limit shown. Estimate, usually applied because the value is less than the method reporting limit but greater than the method detection limit, or for QA/QC concerns.
UA	Undetected at the detection limit shown. Detected quantities of analytes added together as defined in WAC 173-204-320 for LPAH and HPAH, as in DMMO 2000 for DDT, and for all Aroclors or congeners for PCB. All analytes in addition were undetected so highest detection limit is reported for total.

Abbreviations:

µg/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

Table 3
Outfall M-1 Facility List

Aquarius Search: May-1999
Basin Reconn: Jul-2002
Updated: Dec-2002

RNO	Business Name	Address	Drainage	SIC Number	Permit Type	Permit Number	Business Type	Exposure	Comments
R941170970	AKZO Nobel Coatings Inc.	6650 N Basin	MS4	5198*					Could not find
R941171070	American Feed & Farm Supply	6874 N Fathom	MS4	5075			Distribution	Yes	Formerly Lennox Industries
R941171070	B&G Manufacturing Co.	6870 N Fathom	MS4	3452*/5072*			Manufacturing	No	
R941171220	CAMCO Manufacturing	6840 N Fathom	MS4	2899			Manu/Dist	No	
R941170930	Cargill Foods	6645 N Ensign	MS4	5147					Could not find
R941170970	Carpet Supply Inc.	6650 N Basin	MS4	5072					Vacant
R941170970	Cleaning & Laundry Equipment	6650 N Basin	MS4	5087			Office	No	
R605603500	Columbia Distributing	6840 N Cutter Cr	MS4	4213*/4214*/ 5181/5182	NPDES	1200Z	Transportation	Yes	
R941171220	Columbia Ladder Co.	6840 N Fathom	MS4	5084*					Could not find
R941171220	CSI Crown Inc	6840 N Fathom	MS4	4213*/5023*					Could not find
R941170930	Distributive Resource Inc.	6645 N Ensign	MS4	5143					Could not find
R941171010	Devine Diving and Salvage Inc.	6211 N Ensign	MS4	1629*/4499*/ 7389*			Ship salvage yard	Yes	
R025800020	Vacant, formally Flex Alloy Co.	6949 N Cutter Cr	MS4	5013*					
R941171010	Foss Environmental	6211 N Ensign	MS4	unknown			offices	No	
R941170970	Fowler Acceptance Corp.	6650 N Basin	MS4	6141					Could not find
R941171010	FPS Marine	6211 N Ensign	MS4	unknown			offices	No	
R941170880	Freightliner Corp.	6936 N Fathom	MS4	3711*	NPDES	100J/1200Z	Manufacturing	Yes	
R941170880	Freightliner Corp.	6936 N Fathom	MS4	3711*	pretreatment	433.014	Manufacturing	Yes	
R941170970	Freightliner Corp.	6720 N Basin	MS4	unknown			Manufacturing	No	
R605603500	Gulick Trucking Inc.	6840 N Cutter Cr	MS4	4213					Could not find
R941171000	Hampton Distribution Center	6851 N Fathom	MS4	4789			Trans/Dist	Yes	Frght Lnr also shares site
R941170870	Kilsby-Roberts	6650 N Ensign	drywell, MS4	5051			Distribution	Yes	
R941171220	KMS	6850 N Basin	MS4	unknown					Could not find
R941170930	Kool-Pak Dist.	6645 N Ensign	MS4	4214*/4222/5 142			Transportation	No	
R605603500	Maletis Beverage Corp.	7000 N Cutter Cr	MS4	4214*/5181*	NPDES	1200Z	Trans/Dist	Yes	
R941171010	Marine Salvage Consortium	6211 N Ensign	MS4	4489			Offices	No	
R025800040	Pacific Carpet	7010 N Cutter Cr	MS4	unknown			Distribution	No	
R941171220	Pacific Rim Transport	6840 N Fathom	MS4	4213*			Distribution	No	
R941170860	Parker Hannifin Corp.	6458 N Basin	MS4	3492*/5072/5 085*			Distribution	No	
R941171030	Port of Ptld Dredging	6208 N Ensign	MS4	1629/3731			n/a	n/a	
R941170900	Portland Screw Co.	6520 N Basin	MS4	5072			Distribution	No	
R941170970	R C Display Vans Inc.	6650 N Basin	MS4	7532			Manufacturing	No	
R941171130	Reynolds Aluminum Supply	6330 N Basin	MS4	5051			Distribution	Yes	
R941171010	Riedel Environmental	6211 N Ensign	MS4	8741			Offices	No	No longer @ site
R605604000	Roadway Express	6845 N Cutter Cr	MS4	4213*	NPDES	1200Z	Transportation	Yes	
R941171010	Smith Environmental Servs.	6211 N Ensign	MS4	7363			Offices	No	No longer @ site
R941171130	Stack Metallurgical Services Inc.	6340 N Basin	MS4	3398*			Manufacturing	No	

Table 3
Outfall M-1 Facility List

Aquarius Search: May-1999
Basin Reconn: Jul-2002
Updated: Dec-2002

RNO	Business Name	Address	Drainage	SIC Number	Permit Type	Permit Number	Business Type	Exposure	Comments
R941171010	Sternwheeler Rose	6211 N Ensign	MS4	4489*			Office	No	
R941170910	United Parcel Service	6707 N Basin	MS4	4212/4215*	NPDES	1200Z	Transportation	Yes	
R941170910	United Parcel Service	6707 N Basin	MS4	4212/4215*	pretreatment		Transportation	Yes	
R941171220	Unknown	6840 N Fathom	MS4	unknown			Distribution	No	
R941170940	US Navy and Marine Center	6735 N Basin	MS4	unknown			Military Facility	Yes	
R941171070	Vacant	6872 N Fathom	MS4						
R941171200	W W Grainger INC	6335 N Basin	MS4	5063			Retail	No	
R941170740	Xtra Lease	6310 N Basin	MS4	7359/7519*			Transportation	Yes	

* Indicates SIC number has been verified via site inspection.

CEG = Conditionally Exempt Generator
SQG = Small Quantity Generator

Table 4A
NPDES Stormwater Results for Industries Discharging to the M-1 Outfall
Database Search: September 2002

updated: Jan-03

Date	Location Code	Tester	Arsenic	Cadmium	COD	TOC	Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	O/G - polar	O/G - total	TPH	pH	TP	Selenium	Silver	TSS	Temp	Zinc
FREIGHTLINER CORP-TRUCK MFG																						
6/22/1993	01	self	<0.005mg/L	<0.002mg/L	<1mg/L	=12mg/L	<0.001mg/L	=0.079mg/L	=0.011mg/L	<0.0005mg/L		<0.01mg/L		=16mg/L		=7std units				=26mg/L		=0.32mg/L
9/8/1994	01	self	<0.005mg/L	=0.002mg/L	=55mg/L	=16mg/L	=0.008mg/L	=0.03mg/L	=0.015mg/L	<0.0005mg/L		<0.01mg/L	=5mg/L	=9mg/L	=4mg/L	=7.52std units				=16mg/L		=0.45mg/L
3/13/1995	01	self		=0.003mg/L	=57mg/L	=11mg/L	=0.008mg/L	=0.03mg/L	=0.009mg/L					=8mg/L		=6.53std units				=34mg/L		=0.18mg/L
4/12/1995	01	city	=0.02mg/L	<0.001mg/L	=88mg/L	=26mg/L	<0.003mg/L	=0.012mg/L	<0.02mg/L	<0.0005mg/L		<0.004mg/L		=24mg/L		=7.1std units				=18.8mg/L	=14.1deg C	=0.547mg/L
6/8/1995	01	self														=7.17std units						
9/7/1995	01	self	<0.005mg/L	=0.003mg/L	=44mg/L	=8mg/L	=0.006mg/L	=0.03mg/L	=0.007mg/L	<0.001mg/L		<0.01mg/L		=5mg/L		=7.09std units				=20mg/L		=0.17mg/L
11/27/1995	01	city		<0.001mg/L	=17mg/L	=51mg/L	<0.003mg/L	=0.007mg/L	<0.02mg/L	=0.0006mg/L	<0.003mg/L	<0.004mg/L		=11mg/L		=7.2std units		=0.048mg/L	<0mg/L	=41.6mg/L	=9.5deg C	=0.18mg/L
3/4/1996	01	self	<0.005mg/L	=0.002mg/L	=56mg/L	=5mg/L	=0.006mg/L	<0.02mg/L	=0.013mg/L	<0.0002mg/L		<0.01mg/L		=4mg/L		=6.93std units				=37mg/L		=0.36mg/L
10/15/1996	01	self	<0.001mg/L	=0.0028mg/L	=84mg/L	=10mg/L	=0.004mg/L	=0.04mg/L	=0.015mg/L	<0.0005mg/L		<0.01mg/L	<3mg/L	<3mg/L	<3mg/L	=7.23std units				=25mg/L		=0.27mg/L
10/18/1996	01	city	<0.001mg/L	=0.0023mg/L	=63mg/L	=20mg/L	=0.0046mg/L	=0.02mg/L	=0.0058mg/L	<0.0005mg/L		=0.0033mg/L		=11mg/L		=6.3std units				=20mg/L		=0.2mg/L
3/10/1997	01	self	=0.0005mg/L	=0.003mg/L	=77mg/L	=8.5mg/L	=0.008mg/L	<0.02mg/L	=0.012mg/L	<0.0005mg/L		<0.01mg/L	<4mg/L	=4mg/L	<4mg/L	=6.6std units				=44mg/L		=0.41mg/L
10/2/1997	01	city		<0.04mg/L	=9mg/L		<0.02mg/L	=0.027mg/L	<0.2mg/L		<0.2mg/L	<0.05mg/L		=5.5mg/L		=7.3std units		<0.3mg/L		=1mg/L		<0.02mg/L
10/30/1997	01	self	<0.0005mg/L	=0.001mg/L	=13mg/L	=3.3mg/L	=0.002mg/L	<0.02mg/L	<0.05mg/L	<0.0002mg/L		<0.01mg/L	<3mg/L	<3mg/L	=3mg/L	=7.1std units	=0.05mg/L			=10mg/L		=0.22mg/L
1/21/1998	01	city			=130mg/L			=0.037mg/L	<0.1mg/L					=8.3mg/L		=7std units				=82mg/L		=1.45mg/L
3/3/1998	01	self						<0.02mg/L	<0.05mg/L					=4mg/L		=6.85std units				=29mg/L		=0.33mg/L
11/4/1998	01	self						=0.03mg/L	=0.05mg/L				<3mg/L	=7mg/L	=7mg/L	=6.66std units				=110mg/L		=0.78mg/L
11/30/1998	01	city			=35mg/L			<0.03mg/L	<0.1mg/L					=9.1mg/L		=6.4std units				=37.3mg/L		=0.262mg/L
5/11/1999	01	self						<0.02mg/L	<0.05mg/L					=3mg/L		=6.62std units				=29mg/L		=0.87mg/L
10/28/1999	01	city			=80mg/L			<0.03mg/L	<0.1mg/L					=16.1mg/L		=6.9std units				=24mg/L		=0.57mg/L
12/16/1999	01	self						=0.017mg/L	<0.025mg/L					<5mg/L		=7.2std units				=150mg/L	=21.9deg C	=0.279mg/L
5/8/2000	01	self						=0.016mg/L	<0.025mg/L					=9mg/L		=7.2std units				=30mg/L	=15.7deg C	=1.14mg/L
12/19/2000	01	self						=0.0334mg/L	=0.0224mg/L					=7.26mg/L		=6.7std units				=33mg/L	=10.2deg C	=0.435mg/L
5/14/2001	01	city			=82mg/L			<0.05mg/L	<0.2mg/L					=5.1mg/L		=6.1std units				=57mg/L	=12.7deg C	=0.698mg/L
5/14/2001	01	self						=0.0453mg/L	=0.00935mg/L					<6.25mg/L		=6.43std units				=171mg/L	=18deg C	=0.918mg/L
11/21/2001	01	city			=30mg/L			<0.05mg/L	<0.2mg/L					<5mg/L		=6.3std units				=13mg/L	=10deg C	=0.643mg/L
11/30/2001	01	self						<0.02mg/L	<0.01mg/L					=6.76mg/L		=6.9std units				=43mg/L	=10.3deg C	=0.362mg/L
12/20/2001	01	self						<0.02mg/L	<0.01mg/L					<5mg/L		=5std units				<10mg/L	=70deg F	=0.636mg/L
6/17/2002	01	self						=0.0323mg/L	<0.01mg/L					<5mg/L		=6.9std units				=46mg/L	=23.7deg C	=0.268mg/L
6/22/1993	02	self	<0.005mg/L	<0.001mg/L	=9.4mg/L	=4mg/L	<0.001mg/L	=0.15mg/L	=0.0062mg/L	<0.0005mg/L		<0.01mg/L		=3.7mg/L		=7std units				<1mg/L		=0.098mg/L
9/8/1994	02	self	<0.005mg/L	=0.005mg/L	=100mg/L	=21mg/L	=0.054mg/L	=0.07mg/L	=0.024mg/L	<0.0005mg/L		<0.01mg/L	=3mg/L	=13mg/L	=10mg/L	=7.5std units				=66mg/L		=0.47mg/L
4/12/1995	02	city	=0.007mg/L	<0.001mg/L	=39mg/L	=5.5mg/L	=0.039mg/L	=0.041mg/L	<0.02mg/L	<0.0005mg/L		=0.004mg/L		=16mg/L		=7.1std units				=85mg/L	=17.4deg C	=0.329mg/L
10/2/1995	02	self	<0.005mg/L	=0.001mg/L	=77mg/L	=20mg/L	=0.01mg/L	=0.09mg/L	=0.017mg/L	<0.0005mg/L		<0.01mg/L		<3mg/L		=7.17std units				=6mg/L		=0.08mg/L
11/27/1995	02	city		=0.003mg/L	=33mg/L	=17mg/L	=0.011mg/L	=0.018mg/L	<0.02mg/L	=0.001mg/L	=0.006mg/L	=0.011mg/L		=7.9mg/L		=7.5std units		=0.031mg/L	<0mg/L	=59.2mg/L	=10.2deg C	=0.196mg/L
3/4/1996	02	self	<0.005mg/L	<0.001mg/L	=27mg/L	=3mg/L	=0.024mg/L	=0.03mg/L	=0.011mg/L	<0.0002mg/L		<0.01mg/L		<3mg/L		=6.87std units				=24mg/L		=0.21mg/L
10/15/1996	02	self	<0.001mg/L	=0.0007mg/L	=20mg/L	=3.9mg/L	=0.002mg/L	=0.08mg/L	=0.003mg/L	<0.0005mg/L		<0.01mg/L	<3mg/L	<3mg/L	<3mg/L	=7.02std units				=3mg/L		=0.08mg/L
10/18/1996	02	city	<0.001mg/L	=0.00091mg/L	=36mg/L	=3.4mg/L	=0.0089mg/L	=0.032mg/L	=0.0056mg/L	=0.0006mg/L		=0.0038mg/L		=7.3mg/L		=6.78std units				=51.6mg/L		=0.16mg/L
3/10/1997	02	self	=0.0006mg/L	=0.0013mg/L	=56mg/L	=3.1mg/L	=0.01mg/L	=0.05mg/L	=0.01mg/L	<0.0005mg/L		<0.01mg/L	<3mg/L	<3mg/L	<3mg/L	=6.99std units				=39mg/L		=0.2mg/L
10/30/1997	02	self	=0.0006mg/L	=0.0009mg/L	=17mg/L	=2.6mg/L	=0.005mg/L	<0.02mg/L	<0.05mg/L	<0.0002mg/L		<0.01mg/L	<3mg/L	<3mg/L	<3mg/L	=7.19std units	=0.21mg/L			=100mg/L		=0.21mg/L
1/21/1998	02	city			=35mg/L			=0.027mg/L	<0.1mg/L					<5mg/L		=7.3std units				=22mg/L		=0.684mg/L
3/3/1998	02	self						<0.02mg/L	<0.05mg/L					<3mg/L		=7.05std units				=11mg/L		=0.11mg/L
11/4/1998	02	self						<0.02mg/L	<0.05mg/L					<3mg/L		=6.78std units				=7mg/L		=0.2mg/L
11/30/1998	02	city			=19mg/L			=0.031mg/L	<0.1mg/L					=7.4mg/L		=6.7std units				=39mg/L		=0.221mg/L
5/11/1999	02	self						=0.02mg/L	<0.05mg/L					<3mg/L		=6.52std units				=26mg/L		=0.75mg/L
10/28/1999	02	city			=11mg/L			<0.03mg/L	<0.1mg/L					=21.9mg/L		=7.2std units				=10mg/L		=0.12mg/L
12/16/1999	02	self						=0.014mg/L	<0.025mg/L					<5mg/L		=7.2std units				=5mg/L	=23.5deg C	=0.201mg/L
5/8/2000	02	self						=0.0334mg/L	<0.025mg/L					=13mg/L		=7.1std units				=110mg/L	=16.1deg C	=0.871mg/L
12/19/2000	02	self						=0.0342mg/L	=0.00289mg/L					<5mg/L		=6.7std units				=13mg/L	=29.1deg C	=0.148mg/L
5/14/2001	02	city			=50mg/L			<0.05mg/L	<0.2mg/L					<5mg/L		=6.3std units				=38mg/L	=15.6deg C	=0.625mg/L
5/14/2001	02	self						=0.0313mg/L	=0.00144mg/L					<7.69mg/L		=6.67std units				=11mg/L	=24deg C	=0.24mg/L
11/21/2001	02	city			=65mg/L			<0.05mg/L	<0.2mg/L					<5mg/L		=6std units				=17mg/L	=10.7deg C	=0.75mg/L
11/30/2001	02	self						<0.02mg/L	<0.01mg/L					<5mg/L		=6.5std units				=38mg/L	=11.3deg C	=0.331mg/L
12/20/2001	02	self						=0.0287mg/L	<0.01mg/L					<5mg/L		=5std units				<10mg/L	=70deg F	=0.493mg/L
6/17/2002	02	self						<0.02mg/L	<0.01mg/L					<5mg/L		=6.8std units				=25mg/L	=18.7deg C	=0.992mg/L

Table 4A
NPDES Stormwater Results for Industries Discharging to the M-1 Outfall
Database Search: September 2002

updated: Jan-03

Date	Location Code	Tester	Arsenic	Cadmium	COD	TOC	Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	O/G - polar	O/G - total	TPH	pH	TP	Selenium	Silver	TSS	Temp	Zinc
ROADWAY EXPRESS																						
1/20/1999	01	self						<0.1mg/L	=0.011mg/L					<5mg/L		=6.24std units				=30mg/L		<0.1mg/L
5/7/1999	01	city			=46mg/L									=8.3mg/L		=6.1std units				=45mg/L		=0.17mg/L
5/7/1999	01	self						<0.1mg/L	<0.2mg/L					<5mg/L		=6.4std units				=52mg/L		=0.1mg/L
11/11/1999	01	self						=0.053mg/L	<0.2mg/L					<5mg/L		=6.8std units				=30mg/L		=0.13mg/L
11/24/1999	01	city			=60mg/L									=8.6mg/L		=6.2std units				=115mg/L	=9.8deg C	=0.21mg/L
5/11/2000	01	self						<0.1mg/L	<0.2mg/L					<5mg/L		=6.8std units				=31mg/L		<0.1mg/L
10/9/2000	01	city			=41mg/L									=5.4mg/L		=7.5std units				=18mg/L	=15.9deg C	=0.08mg/L
11/21/2001	01	city			=32mg/L									=8.4mg/L		=6std units				=23mg/L	=10.8deg C	=0.17mg/L
UNITED PARCEL SERVICE																						
11/19/1997	01	city			=13mg/L									=5mg/L		=6.4std units				=21mg/L	=12.3deg C	=0.069mg/L
12/9/1997	01	self	<0.005mg/L	<0.004mg/L	=15mg/L			=0.016mg/L	=0.011mg/L	<0.0005mg/L		<0.02mg/L		=6mg/L			=0.09mg/L			=28mg/L		=0.211mg/L
12/15/1997	01	city			=52mg/L									=9.5mg/L		=7.2std units				=48mg/L	=10.2deg C	=0.18mg/L
5/14/1998	01	self						=0.114mg/L	=0.019mg/L					<5mg/L		=6.71std units				N/A		=0.398mg/L
6/10/1998	01	self	<0.005mg/L	<0.004mg/L				=0.033mg/L	=0.004mg/L	<0.0005mg/L				<5mg/L		=6.87std units						=0.134mg/L
11/19/1998	01	self	<0.005mg/L	<0.004mg/L				=0.013mg/L	=0.008mg/L	<0.0002mg/L				<5mg/L		=8.03std units						=0.132mg/L
11/30/1998	01	city			=5mg/L									=6.3mg/L		=6.8std units				=9mg/L		=0.05mg/L
4/8/1999	01	self	<0.005mg/L	<0.004mg/L				=0.059mg/L	=0.028mg/L	<0.0002mg/L		<0.02mg/L		=30mg/L		=5.35std units						=0.497mg/L
11/24/1999	01	city			=39mg/L									=6mg/L		=6.7std units				=36mg/L	=9.5deg C	=0.17mg/L
12/16/1999	01	self						<0.01mg/L	=0.007mg/L					=5mg/L		=6.88std units				=240mg/L		=0.11mg/L
3/22/2000	01	self		<0.004mg/L			=0.005mg/L	=0.021mg/L	=0.005mg/L	<0.0002mg/L		<0.02mg/L		=5mg/L		=6.7std units			<0.01mg/L			=0.169mg/L
10/22/2001	01	self												<5mg/L		=6.9std units				=366mg/L		
3/19/2002	01	self												=14mg/L		=6.8std units				=96mg/L		
12/9/1997	02	self	<0.005mg/L	<0.004mg/L	=16mg/L			=0.016mg/L	=0.012mg/L	<0.0005mg/L		<0.02mg/L		=6mg/L			=0.09mg/L			=39mg/L		=0.247mg/L
12/15/1997	02	city			=60mg/L									=7mg/L		=7.3std units				=65.5mg/L	=12.1deg C	=0.166mg/L
5/14/1998	02	self						=0.033mg/L	=0.004mg/L					<5mg/L		=6.87std units				N/A		=0.134mg/L
6/10/1998	02	self	<0.005mg/L	<0.004mg/L				=0.114mg/L	=0.019mg/L	<0.0005mg/L				<5mg/L		=6.71std units						=0.398mg/L
11/19/1998	02	self	<0.005mg/L	<0.004mg/L				=0.022mg/L	=0.14mg/L	<0.0002mg/L				=11mg/L		=8.2std units						=0.196mg/L
4/8/1999	02	self	<0.005mg/L	<0.004mg/L				=0.055mg/L	=0.037mg/L	<0.0002mg/L		<0.02mg/L		=11mg/L		=7.47std units						=0.447mg/L
11/24/1999	02	city			=70mg/L									<5mg/L		=6.7std units				=75.3mg/L	=9.8deg C	=0.22mg/L
12/16/1999	02	self						=0.016mg/L	=0.02mg/L					=8mg/L		=7.19std units				=58mg/L		=0.175mg/L
10/22/2001	02	self												=6.8mg/L		=6.9std units				=200mg/L		
3/19/2002	02	self												<5mg/L		=6.9std units				=76mg/L		
COLUMBIA DISTRIBUTING CO																						
11/19/1998	01	self												<9.3mg/L		=4.9std units				=16mg/L		=0.12mg/L
11/30/1998	01	city			=11mg/L									=12mg/L		=6.5std units				=2.5mg/L		<0.05mg/L
3/12/1999	01	city			=33mg/L									=6.5mg/L		=6.3std units				=19mg/L		=0.11mg/L
11/24/1999	01	city			=45mg/L									<5mg/L		=6.6std units				=52mg/L	=9.4deg C	=0.1mg/L
12/8/1999	01	self						=0.011mg/L	=0.00752mg/L					<5mg/L		=3.5std units				<5mg/L		=0.139mg/L
5/30/2000	01	self						=0.0114mg/L	<0.005mg/L				=240mg/L	=430mg/L		=6.2std units				=39mg/L		=0.348mg/L
10/9/2000	01	city			=36mg/L									<5mg/L		=6.2std units				=11mg/L	=15.1deg C	=0.09mg/L
10/30/2001	01	self						<0.005mg/L	<0.005mg/L					<5mg/L		=5.8std units				=8mg/L		=0.0288mg/L
3/11/2002	01	self												<5mg/L		=4.9std units				=14mg/L		=0.044mg/L
11/19/1998	02	self												<21mg/L		=6.6std units				<5mg/L		=0.083mg/L
11/30/1998	02	city			=8mg/L									=6.2mg/L		=6.6std units				=1mg/L		<0.05mg/L
3/12/1999	02	city			=15mg/L									<5mg/L		=6.2std units				=7.3mg/L		=0.052mg/L
11/24/1999	02	city			=10mg/L									<5mg/L		=6.1std units				=12mg/L	=9.7deg C	<0.05mg/L
12/8/1999	02	self						<0.005mg/L	<0.005mg/L					<5mg/L		=5.6std units				=10mg/L		=0.0728mg/L
5/30/2000	02	self						=0.0112mg/L	<0.005mg/L					<5mg/L		=5.3std units				<5mg/L		=0.0747mg/L
10/9/2000	02	city			=19mg/L									<5mg/L		=6.2std units				=6.2mg/L	=14.6deg C	<0.05mg/L
10/30/2001	02	self						=0.0067mg/L	<0.005mg/L					<5mg/L		=5.6std units				=28mg/L		=0.0763mg/L
3/11/2002	02	self												=5mg/L		=4.8std units				=14mg/L		=0.0863mg/L

Notes:
mg/L = milligrams per liter
N/A = not available

Table 4B
City of Portland NPDES MS4 Permit
Outfall M-1 Stormwater Quality Monitoring Data: Conventional Parameters
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Total Dissolved Solids				Method EPA 160.1	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		1
# 2	**8/9/1991**	0.31	18	125	1
# 2a	**10/15/1991**	0.08	12		1
# 3	**10/22/1991**	0.51	11		1
# 4	**12/5/1991**	1.60	33		1
# 5	**12/18/1991**	0.63	23	60	1
# 6	**1/10/1992**	0.48	40	134	1
# 7	**9/23/1992**	0.69	15	89	1
# 8	**10/29/1992**	1.29	36	53	1
# 9	**11/18/1992**	0.54	9	68	1
# 10	**1/19/1993**	0.94	19		1
#11	**4/7/1995**	0.59	16	42	2
#12	**10/25/1995**	0.69	17	130	2
#13	**3/3/1996**	0.80	20		2
Base Flow	**6/17/1993**			142	

Total Suspended Solids				Method EPA 160.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		1
# 2	**8/9/1991**	0.31	18	131	1
# 2a	**10/15/1991**	0.08	12		1
# 3	**10/22/1991**	0.51	11		1
# 4	**12/5/1991**	1.60	33		1
# 5	**12/18/1991**	0.63	23	37	1
# 6	**1/10/1992**	0.48	40	92	1
# 7	**9/23/1992**	0.69	15	135	1
# 8	**10/29/1992**	1.29	36	317	1
# 9	**11/18/1992**	0.54	9	100	1
# 10	**1/19/1993**	0.94	19		1
#11	**4/7/1995**	0.59	16	140	1
#12	**10/25/1995**	0.69	17	64	1
#13	**3/3/1996**	0.80	20		2
Base Flow	**6/17/1993**			89	

BOD5				Method EPA 405.1	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		1
# 2	**8/9/1991**	0.31	18	32	1
# 2a	**10/15/1991**	0.08	12		1
# 3	**10/22/1991**	0.51	11		1
# 4	**12/5/1991**	1.60	33		1
# 5	**12/18/1991**	0.63	23	12	1
# 6	**1/10/1992**	0.48	40	*48*	1
# 7	**9/23/1992**	0.69	15	69	3
# 8	**10/29/1992**	1.29	36	19	3
# 9	**11/18/1992**	0.54	9	71	5
# 10	**1/19/1993**	0.94	19		3
#11	**4/7/1995**	0.59	16	15	1
#12	**10/25/1995**	0.69	17	6	3
#13	**3/3/1996**	0.80	20		3
Base Flow	**6/17/1993**			26	1

COD				Method EPA 410.4	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		1
# 2	**8/9/1991**	0.31	18	131	1
# 2a	**10/15/1991**	0.08	12		1
# 3	**10/22/1991**	0.51	11		1
# 4	**12/5/1991**	1.60	33		1
# 5	**12/18/1991**	0.63	23	81	1
# 6	**1/10/1992**	0.48	40	57	1
# 7	**9/23/1992**	0.69	15	110	1
# 8	**10/29/1992**	1.29	36	140	1
# 9	**11/18/1992**	0.54	9	37	1
# 10	**1/19/1993**	0.94	19		1
#11	**4/7/1995**	0.59	16	22	1
#12	**10/25/1995**	0.69	17	49	1
#13	**3/3/1996**	0.80	20		1
Base Flow	**6/17/1993**			77	

Table 4B
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TKN				Method SM 420	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.07
# 2	**8/9/1991**	0.31	18	4.8	0.2
# 2a	**10/15/1991**	0.08	12		0.1
# 3	**10/22/1991**	0.51	11		0.2
# 4	**12/5/1991**	1.60	33		0.2
# 5	**12/18/1991**	0.63	23	0.8	0.2
# 6	**1/10/1992**	0.48	40	1.4	0.1
# 7	**9/23/1992**	0.69	15	2.6	0.1
# 8	**10/29/1992**	1.29	36	1.8	0.2
# 9	**11/18/1992**	0.54	9	1.7	0.2
# 10	**1/19/1993**	0.94	19		0.2
#11	**4/7/1995**	0.59	16	1.3	0.2
#12	**10/25/1995**	0.69	17	1.0	0.2
#13	**3/3/1996**	0.80	20		0.2
Base Flow	**6/17/1993**			2.5	

Ammonia Nitrogen (NH3-N)				Method SM 417 A, D	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.14
# 2	**8/9/1991**	0.31	18	1.7	0.2
# 2a	**10/15/1991**	0.08	12		0.1
# 3	**10/22/1991**	0.51	11		0.2
# 4	**12/5/1991**	1.60	33		0.2
# 5	**12/18/1991**	0.63	23	nd	0.2
# 6	**1/10/1992**	0.48	40	nd	0.1
# 7	**9/23/1992**	0.69	15	0.5	0.1
# 8	**10/29/1992**	1.29	36	0.2	0.1
# 9	**11/18/1992**	0.54	9	0.3	0.2
# 10	**1/19/1993**	0.94	19		0.2
#11	**4/7/1995**	0.59	16	nd	0.2
#12	**10/25/1995**	0.69	17		
#13	**3/3/1996**	0.80	20		0.2
Base Flow					

Total Phosphorus				Method SM 424 C,E	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.05
# 2	**8/9/1991**	0.31	18	1.30	0.05
# 2a	**10/15/1991**	0.08	12		0.05
# 3	**10/22/1991**	0.51	11		0.05
# 4	**12/5/1991**	1.60	33		0.05
# 5	**12/18/1991**	0.63	23	0.35	0.05
# 6	**1/10/1992**	0.48	40	0.90	0.05
# 7	**9/23/1992**	0.69	15	0.71	0.05
# 8	**10/29/1992**	1.29	36	0.63	0.01
# 9	**11/18/1992**	0.54	9	0.50	0.05
# 10	**1/19/1993**	0.94	19		0.05
#11	**4/7/1995**	0.59	16	0.55	0.05
#12	**10/25/1995**	0.69	17	0.23	0.05
#13	**3/3/1996**	0.80	20		0.05
Base Flow	**6/17/1993**			1.40	

Orthophosphate				Method SM 242 E	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.05
# 2	**8/9/1991**	0.31	18	0.88	0.05
# 2a	**10/15/1991**	0.08	12		0.05
# 3	**10/22/1991**	0.51	11		0.05
# 4	**12/5/1991**	1.60	33		0.05
# 5	**12/18/1991**	0.63	23	*0.21*	0.05
# 6	**1/10/1992**	0.48	40	0.52	0.05
# 7	**9/23/1992**	0.69	15	0.25	0.05
# 8	**10/29/1992**	1.29	36	0.04	0.01
# 9	**11/18/1992**	0.54	9	0.04	0.01
# 10	**1/19/1993**	0.94	19		0.01
#11	**4/7/1995**	0.59	16	0.03	0.01
#12	**10/25/1995**	0.69	17	0.03	0.01
#13	**3/3/1996**	0.80	20		0.01
Base Flow				--	

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Outfall M-1 Stormwater Quality Monitoring Data: Conventional Parameters
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Nitrate (NO3-N)				Method EPA 300	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.05
# 2	**8/9/1991**	0.31	18	*0.70*	0.10
# 2a	**10/15/1991**	0.08	12		0.10
# 3	**10/22/1991**	0.51	11		0.1
# 4	**12/5/1991**	1.60	33		0.3
# 5	**12/18/1991**	0.63	23	0.2	0.1
# 6	**1/10/1992**	0.48	40	*nd*	0.1
# 7	**9/23/1992**	0.69	15	nd	0.1
# 8	**10/29/1992**	1.29	36	nd	0.1
# 9	**11/18/1992**	0.54	9	nd	0.1
# 10	**1/19/1993**	0.94	19		0.1
#11	**4/7/1995**	0.59	16	0.11	0.01
#12	**10/25/1995**	0.69	17	0.10	0.01
#13	**3/3/1996**	0.80	20		0.01
Base Flow	**6/17/1993**			0.40	

Total Calcium				Method EPA 200.7	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		
# 2	**8/9/1991**	0.31	18	9.60	0.05
# 2a	**10/15/1991**	0.08	12		0.1
# 3	**10/22/1991**	0.51	11		0.1
# 4	**12/5/1991**	1.60	33		0.1
# 5	**12/18/1991**	0.63	23	9.6	0.1
# 6	**1/10/1992**	0.48	40	12.0	0.1
# 7	**9/23/1992**	0.69	15	5.9	0.2
# 8	**10/29/1992**	1.29	36	7	1
# 9	**11/18/1992**	0.54	9	5.6	0.2
# 10	**1/19/1993**	0.94	19		0.1
#11	**4/7/1995**	0.59	16	5.4	1
#12	**10/25/1995**	0.69	17		0.0125
#13	**3/3/1996**	0.80	20		
Base Flow				--	

Notes:
Italicized values are considered estimates based on QA/QC review.
Results expressed as mg/L (ppm) unless otherwise noted.
"nd" means none detected at or above the detection limit listed. If no value is shown, the lab analysis was not performed.
City MS4 sample location I-2, at Ensign Ct., is at outfall M-1.

Table 4B
City of Portland NPDES MS4 Permit
Outfall M-1 Stormwater Quality Monitoring Data: Bacterial
Source Control Pilot Project

Revision Date: Jan. 2003

Fecal Streptococcus		**Method SM 923OC**	***Detection Limit***
Storm	**Date**	***I-2***	colonies/100ml
# 1	**5/7/1991**		1
# 2	**8/9/1991**	500	1
# 3	**10/22/1991**	36000	1
# 4	**12/5/1991**	6200	1
# 5	**12/18/1991**	7800	1
# 6	**1/10/1992**	50	1
# 7	**9/23/1992**	1710	1
# 8	**10/29/1992**	980	1
# 9	**11/18/1992**	1710	1
# 10	**1/19/1993**	810	1

Enterococcus Bacteria		**Method SM 923OC**	***Detection Limit***
Storm	**Date**	***I-2***	colonies/100ml
# 1	**5/7/1991**		1
# 2	**8/9/1991**	3600	1
# 3	**10/22/1991**	58000	1
# 4	**12/5/1991**	7000	1
# 5	**12/18/1991**	800	1
# 6	**1/10/1992**	30	1
# 7	**9/23/1992**	6000	1
# 8	**10/29/1992**	7000	1
# 9	**11/18/1992**	6000	1
# 10	**1/19/1993**	320	1

Fecal Coliform Bacteria		**Method SM 92222D**	***Detection Limit***
Storm	**Date**	***I-2***	colonies/100ml
# 1	**5/7/1991**		1
# 2	**8/9/1991**	nd	1
# 2a	**10/15/1991**		
# 3	**10/22/1991**	1000	1
# 4	**12/5/1991**	970	1
# 5	**12/18/1991**	10	1
# 6	**1/10/1992**	230	1
# 7	**9/23/1992**	280	1
# 8	**10/29/1992**	990	1
# 9	**11/18/1992**	280	1
# 10	**1/19/1993**	120	1
# 11	**4/7/1995**	4900	1
# 12	**10/25/1995**	40900	1
# 13	**3/3/1996**		10

E. Coli		**Method SM 9213D**	***Detection Limit***
Storm	**Date**	***I-2***	colonies/100ml
# 11	**4/7/1995**	4200	1
# 12	**10/25/1995**	3700	1
# 13	**3/3/1996**		10

Notes:
"nd" means none detected at or above the detection limit listed. If no value is shown, the lab analysis was not performed.
City MS4 sample location I-2, at Ensign Ct., is at outfall M-1.

Table 4B
City of Portland NPDES MS4 Permit
Outfall M-1 Stormwater Quality Monitoring Data: Oil & Grease
Source Control Pilot Project

Revision Date: Jan. 2003

Total Oil & Grease				Method SM 5520c	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.6
# 2	**8/9/1991**	0.31	18	1.7	0.5
# 3	**10/22/1991**	0.51	11	4.9	0.6
# 4	**12/5/1991**	1.60	33	4.3	0.5
# 5	**12/18/1991**	0.63	23	2.8	0.5
# 6	**1/10/1992**	0.48	40	4.0	0.6
# 7	**9/23/1992**	0.69	15	3.1	0.6
# 8	**10/29/1992**	1.29	36	3.2	0.6
# 9	**11/18/1992**	0.54	9	3.1	0.6
# 10	**1/19/1993**	0.94	19	3.1	0.6
#11	**4/7/1995**	0.59	16	4.0	1.0
#12	**10/25/1995**	0.69	17	1.6	2.0
#13	**3/3/1996**	0.80	20		0.5
Base Flow	**6/17/1993**			7.3	0.7

Total Petroleum Hydrocarbons				Method SM 5520f	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.6
# 2	**8/9/1991**	0.31	18	1.4	0.5
# 3	**10/22/1991**	0.51	11	3.7	0.6
# 4	**12/5/1991**	1.60	33	3.4	0.5
# 5	**12/18/1991**	0.63	23	2.5	0.5
# 6	**1/10/1992**	0.48	40	3.1	0.6
# 7	**9/23/1992**	0.69	15	2.6	0.6
# 8	**10/29/1992**	1.29	36	2.4	0.6
# 9	**11/18/1992**	0.54	9	2.6	0.6
# 10	**1/19/1993**	0.94	19	2.3	0.6
#11	**4/7/1995**	0.59	16	2.0	1.0
#12	**10/25/1995**	0.69	17	1.3	1.0
#13	**3/3/1996**	0.80	20		0.5
Base Flow				--	

Polar Oil & Grease				Method SM 5520 c,f	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.6
# 2	**8/9/1991**	0.31	18	0.3	0.5
# 3	**10/22/1991**	0.51	11	1.2	0.6
# 4	**12/5/1991**	1.60	33	0.9	0.5
# 5	**12/18/1991**	0.63	23	nd	0.5
# 6	**1/10/1992**	0.48	40	0.9	0.6
# 7	**9/23/1992**	0.69	15	nd	0.6
# 8	**10/29/1992**	1.29	36	0.8	0.6
# 9	**11/18/1992**	0.54	9	nd	0.6
# 10	**1/19/1993**	0.94	19	0.8	0.6
#11	**4/7/1995**	0.59	16	2.0	1.0
#12	**10/25/1995**	0.69	17	nd	1.0
#13	**3/3/1996**	0.80	20		0.5
Base Flow				--	

Notes:
Italicized values are considered estimates based on QA/QC review.
Results expressed as mg/L (ppm) unless otherwise noted.
City MS4 sample location I-2, at Ensign Ct., is at outfall M-1.

Table 4B
City of Portland NPDES MS4 Permit
Outfall M-1 Stormwater Quality Monitoring Data: Total Metals
Source Control Pilot Project

Revision Date: Jan. 2003

Total Antimony				Method EPA 204.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.003
# 2	8/9/1991	0.31	18	nd	0.003
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.001
# 5	12/18/1991	0.63	23	nd	0.001
# 6	1/10/1992	0.48	40	nd	0.001
# 7	9/23/1992	0.69	15	nd	0.005
# 8	10/29/1992	1.29	36	nd	0.005
# 9	11/18/1992	0.54	9		
# 10	1/19/1993	0.94	19		0.001

Total Cadmium				Method EPA 213.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.0002
# 2	8/9/1991	0.31	18	0.0045	0.0002
# 2a	10/15/1991	0.08	12		0.0002
# 3	10/22/1991	0.51	11		0.0002
# 4	12/5/1991	1.60	33		0.0002
# 5	12/18/1991	0.63	23	0.0010	0.0002
# 6	1/10/1992	0.48	40	0.0020	0.0002
# 7	9/23/1992	0.69	15	0.003	0.001
# 8	10/29/1992	1.29	36	0.0040	0.0005
# 9	11/18/1992	0.54	9	0.0010	0.0002
# 10	1/19/1993	0.94	19		0.0002
#11	4/7/1995	0.59	16	0.0019	0.0002
#12	10/25/1995	0.69	17	0.0008	0.0003
#13	3/3/1996	0.80	20		0.0005
Base Flow	6/17/1993			0.0006	0.0002

Total Arsenic				Method EPA 206.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.001
# 2	8/9/1991	0.31	18	0.004	0.001
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.005
# 5	12/18/1991	0.63	23	nd	0.005
# 6	1/10/1992	0.48	40	0.005	0.005
# 7	9/23/1992	0.69	15	nd	0.005
# 8	10/29/1992	1.29	36	nd	0.005
# 9	11/18/1992	0.54	9		
# 10	1/19/1993	0.94	19		0.005

Total Chromium				Method EPA 218.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.001
# 2	8/9/1991	0.31	18	0.023	0.001
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.001
# 5	12/18/1991	0.63	23	0.012	0.001
# 6	1/10/1992	0.48	40	0.083	0.001
# 7	9/23/1992	0.69	15	0.120	0.001
# 8	10/29/1992	1.29	36	0.072	0.001
# 9	11/18/1992	0.54	9		
# 10	1/19/1993	0.94	19		0.001

Total Beryllium				Method EPA 200.7	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.0002
# 2	8/9/1991	0.31	18	nd	0.0002
# 2a	10/15/1991	0.08	12		0.0002
# 3	10/22/1991	0.51	11		0.0002
# 4	12/5/1991	1.60	33		0.0002
# 5	12/18/1991	0.63	23	nd	0.0002
# 6	1/10/1992	0.48	40	nd	0.0002
# 7	9/23/1992	0.69	15	nd	0.0002
# 8	10/29/1992	1.29	36	nd	0.0002
# 9	11/18/1992	0.54	9		
# 10	1/19/1993	0.94	19		0.0002

Total Copper				Method EPA 200.7	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.001
# 2	8/9/1991	0.31	18	0.080	0.002
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.001
# 5	12/18/1991	0.63	23	0.016	0.001
# 6	1/10/1992	0.48	40	0.029	0.001
# 7	9/23/1992	0.69	15	0.085	0.001
# 8	10/29/1992	1.29	36	0.100	0.004
# 9	11/18/1992	0.54	9	0.013	0.001
# 10	1/19/1993	0.94	19		0.003
#11	4/7/1995	0.59	16	0.024	0.001
#12	10/25/1995	0.69	17	0.016	0.001
#13	3/3/1996	0.80	20		0.001
Base Flow	6/17/1993			0.039	0.001

Table 4B
City of Portland NPDES MS4 Permit
Outfall M-1 Stormwater Quality Monitoring Data: Total Metals
Source Control Pilot Project

Revision Date: Jan. 2003

Table 4B
City of Portland NPDES MS4 Permit
Outfall M-1 Stormwater Quality Monitoring Data: Total Metals
Source Control Pilot Project

Revision Date: Jan. 2003

Total Lead				Method EPA 239.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.001
# 2	8/9/1991	0.31	18	0.030	0.001
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.001
# 5	12/18/1991	0.63	23	*0.011*	0.001
# 6	1/10/1992	0.48	40	0.021	0.001
# 7	9/23/1992	0.69	15	0.049	0.001
# 8	10/29/1992	1.29	36	0.093	0.001
# 9	11/18/1992	0.54	9	0.008	0.001
# 10	1/19/1993	0.94	19		0.001
#11	4/7/1995	0.59	16	0.019	0.001
#12	10/25/1995	0.69	17	*0.013*	0.005
#13	3/3/1996	0.80	20		0.001
Base Flow	7/17/1993			0.004	0.001

Total Silver				Method EPA 272.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.0002
# 2	8/9/1991	0.31	18	nd	0.0002
# 2a	10/15/1991	0.08	12		0.0002
# 3	10/22/1991	0.51	11		0.0002
# 4	12/5/1991	1.60	33		0.0002
# 5	12/18/1991	0.63	23	nd	0.0002
# 6	1/10/1992	0.48	40	nd	0.0002
# 7	9/23/1992	0.69	15	nd	0.001
# 8	10/29/1992	1.29	36	0.0008	0.0002
# 9	11/18/1992	0.54	9	nd	0.0002
# 10	1/19/1993	0.94	19		0.0002
#11	4/7/1995	0.59	16	nd	0.0002
#12	10/25/1995	0.69	17	0.0002	0.0003
#13	3/3/1996	0.80	20		0.0005
Base Flow	6/17/1993			nd	0.0002

Total Mercury				Method EPA 245.1	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.005
# 2	8/9/1991	0.31	18	nd	0.005
# 2a	10/15/1991	0.08	12		0.0005
# 3	10/22/1991	0.51	11		0.0005
# 4	12/5/1991	1.60	33		0.0005
# 5	12/18/1991	0.63	23	nd	0.0005
# 6	1/10/1992	0.48	40	nd	0.0005
# 7	9/23/1992	0.69	15	nd	0.0005
# 8	10/29/1992	1.29	36	nd	0.0005
# 9	11/18/1992	0.54	9		
# 10	1/19/1993	0.94	19		0.0005

Total Selenium				Method EPA 270.3	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.0005
# 2	8/9/1991	0.31	18	nd	0.001
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.001
# 5	12/18/1991	0.63	23	nd	0.001
# 6	1/10/1992	0.48	40	nd	0.001
# 7	9/23/1992	0.69	15	nd	0.005
# 8	10/29/1992	1.29	36	nd	0.005
# 9	11/18/1992	0.54	9		
# 10	1/19/1993	0.94	19		0.0005

Total Nickel				Method EPA 200.7	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.001
# 2	8/9/1991	0.31	18	0.004	0.002
# 2a	10/15/1991	0.08	12		0.002
# 3	10/22/1991	0.51	11		0.002
# 4	12/5/1991	1.60	33		0.002
# 5	12/18/1991	0.63	23	nd	0.002
# 6	1/10/1992	0.48	40	*0.004*	0.002
# 7	9/23/1992	0.69	15	0.010	0.002
# 8	10/29/1992	1.29	36	0.014	0.002
# 9	11/18/1992	0.54	9		
# 10	1/19/1993	0.94	19		0.002

Total Thallium				Method EPA 279.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.001
# 2	8/9/1991	0.31	18	nd	0.001
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.001
# 5	12/18/1991	0.63	23	nd	0.001
# 6	1/10/1992	0.48	40	nd	0.001
# 7	9/23/1992	0.69	15	nd	0.005
# 8	10/29/1992	1.29	36	nd	0.005
# 9	11/18/1992	0.54	9		
# 10	1/19/1993	0.94	19		0.001

Table 4B

City of Portland NPDES MS4 Permit

Revision Date: Jan. 2003

Outfall M-1 Stormwater Quality Monitoring Data: Total Metals

Source Control Pilot Project

Total Zinc				**Method EPA**	***Detection***
		Volume	**Duration**	**200.7**	***Limit***
Storm Event	***Date***	**(in)**	**(hrs)**	***I-2***	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.001
# 2	**8/9/1991**	0.31	18	0.550	0.005
# 2a	**10/15/1991**	0.08	12		0.001
# 3	**10/22/1991**	0.51	11		0.001
# 4	**12/5/1991**	1.60	33		0.001
# 5	**12/18/1991**	0.63	23	0.190	0.001
# 6	**1/10/1992**	0.48	40	0.268	0.001
# 7	**9/23/1992**	0.69	15	0.63	0.01
# 8	**10/29/1992**	1.29	36	0.590	0.003
# 9	**11/18/1992**	0.54	9	0.27	0.01
# 10	**1/19/1993**	0.94	19		0.01
#11	**4/7/1995**	0.59	16	0.25	0.001
#12	**10/25/1995**	0.69	17	0.13	0.001
#13	**3/3/1996**	0.80	20		0.001
Base Flow	**6/17/1993**			0.047	0.001

Notes:

Italicized values are considered estimates based on QA/QC review.

Results expressed as mg/L (ppm) unless otherwise noted.

"nd" means none detected at or above the detection limit listed. If no value is shown, the lab analysis was not performed.

City MS4 sample location I-2, at Ensign Ct., is at outfall M-1.

Table 4B

City of Portland NPDES MS4 Permit

Revision Date: Jan. 2003

Outfall M-1 Stormwater Quality Monitoring Data: Dissolved Metals

Source Control Pilot Project

Dissolved Antimony				Method EPA 204.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.003
# 2	8/9/1991	0.31	18	nd	0.003
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.001
# 5	12/18/1991	0.63	23	nd	0.001
# 6	1/10/1992	0.48	40	nd	0.001
# 7	9/23/1992	0.69	15	nd	0.005
# 8	10/29/1992	1.29	36	nd	0.002
# 9	11/18/1992	0.54	9		
# 10	1/19/1993	0.94	19		0.001

Dissolved Arsenic				Method EPA 206.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.001
# 2	8/9/1991	0.31	18	nd	0.001
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.005
# 5	12/18/1991	0.63	23	nd	0.005
# 6	1/10/1992	0.48	40	nd	0.005
# 7	9/23/1992	0.69	15	nd	0.005
# 8	10/29/1992	1.29	36	nd	0.005
# 9	11/18/1992	0.54	9		
# 10	1/19/1993	0.94	19		0.005

Dissolved Beryllium				Method EPA 200.7	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		
# 2	8/9/1991	0.31	18		0.0002
# 2a	10/15/1991	0.08	12	nd	0.0002
# 3	10/22/1991	0.51	11		0.0002
# 4	12/5/1991	1.60	33		0.0002
# 5	12/18/1991	0.63	23		0.0002
# 6	1/10/1992	0.48	40	nd	0.0002
# 7	9/23/1992	0.69	15	nd	0.0002
# 8	10/29/1992	1.29	36	nd	0.0002
# 9	11/18/1992	0.54	9	nd	0.0002
# 10	1/19/1993	0.94	19		0.0002

Dissolved Chromium				Method EPA 218.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.001
# 2	8/9/1991	0.31	18	0.003	0.001
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.001
# 5	12/18/1991	0.63	23	0.003	0.001
# 6	1/10/1992	0.48	40	0.002	0.001
# 7	9/23/1992	0.69	15	0.002	0.001
# 8	10/29/1992	1.29	36	nd	0.001
# 9	11/18/1992	0.54	9		
# 10	1/19/1993	0.94	19		0.001

Dissolved Cadmium				Method EPA 213.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.0002
# 2	8/9/1991	0.31	18	nd	0.004
# 2a	10/15/1991	0.08	12		0.0002
# 3	10/22/1991	0.51	11		0.0002
# 4	12/5/1991	1.60	33		0.0002
# 5	12/18/1991	0.63	23	0.0008	0.0002
# 6	1/10/1992	0.48	40	0.0007	0.0002
# 7	9/23/1992	0.69	15	nd	0.001
# 8	10/29/1992	1.29	36	0.0005	0.0005
# 9	11/18/1992	0.54	9	0.0008	0.0002
# 10	1/19/1993	0.94	19		0.0002
#11	4/7/1995	0.59	16	0.0002	0.0002
#12	10/25/1995	0.69	17	nd	0.0003
#13	3/3/1996	0.80	20		0.0005

Dissolved Copper				Method EPA 200.7	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.001
# 2	8/9/1991	0.31	18	0.020	0.002
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.001
# 5	12/18/1991	0.63	23	0.008	0.001
# 6	1/10/1992	0.48	40	0.006	0.001
# 7	9/23/1992	0.69	15	0.008	0.005
# 8	10/29/1992	1.29	36	0.007	0.001
# 9	11/18/1992	0.54	9	0.004	0.001
# 10	1/19/1993	0.94	19		0.003
#11	4/7/1995	0.59	16	0.004	0.001
#12	10/25/1995	0.69	17	0.004	0.001
#13	3/3/1996	0.80	20		0.001

Table 4B
City of Portland NPDES MS4 Permit
Outfall M-1 Stormwater Quality Monitoring Data: Dissolved Metals

Revision Date: Jan. 2003

Dissolved Iron				Method EPA 200.7	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		
# 2	**8/9/1991**	0.31	18	1.40	0.02
# 2a	**10/15/1991**	0.08	12		0.05
# 3	**10/22/1991**	0.51	11		0.05
# 4	**12/5/1991**	1.60	33		0.05
# 5	**12/18/1991**	0.63	23	0.89	0.05
# 6	**1/10/1992**	0.48	40	2.90	0.05
# 7	**9/23/1992**	0.69	15	2.00	0.05
# 8	**10/29/1992**	1.29	36	0.5	0.1
# 9	**11/18/1992**	0.54	9	0.11	0.05
# 10	**1/19/1993**	0.94	19		0.05

Dissolved Mercury				Method EPA 245.1	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.005
# 2	**8/9/1991**	0.31	18	nd	0.005
# 2a	**10/15/1991**	0.08	12		0.005
# 3	**10/22/1991**	0.51	11		0.005
# 4	**12/5/1991**	1.60	33		0.005
# 5	**12/18/1991**	0.63	23	nd	0.005
# 6	**1/10/1992**	0.48	40	nd	0.005
# 7	**9/23/1992**	0.69	15	nd	0.005
# 8	**10/29/1992**	1.29	36	nd	0.005
# 9	**11/18/1992**	0.54	9		
# 10	**1/19/1993**	0.94	19		0.005

Dissolved Lead				Method EPA 239.2	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.0010
# 2	**8/9/1991**	0.31	18	0.001	0.0010
# 2a	**10/15/1991**	0.08	12		0.0010
# 3	**10/22/1991**	0.51	11		0.0010
# 4	**12/5/1991**	1.60	33		0.0010
# 5	**12/18/1991**	0.63	23	*0.007*	0.0010
# 6	**1/10/1992**	0.48	40	*0.003*	0.0010
# 7	**9/23/1992**	0.69	15	nd	0.0010
# 8	**10/29/1992**	1.29	36	0.001	0.0010
# 9	**11/18/1992**	0.54	9	nd	0.0010
# 10	**1/19/1993**	0.94	19		0.0010
#11	**4/7/1995**	0.59	16	nd	0.0010
#12	**10/25/1995**	0.69	17	0.001	0.0003
#13	**3/3/1996**	0.80	20		0.0010

Dissolved Nickel				Method EPA 200.7	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.001
# 2	**8/9/1991**	0.31	18	0.005	0.002
# 2a	**10/15/1991**	0.08	12		0.002
# 3	**10/22/1991**	0.51	11		0.002
# 4	**12/5/1991**	1.60	33		0.002
# 5	**12/18/1991**	0.63	23	nd	0.002
# 6	**1/10/1992**	0.48	40	0.002	0.002
# 7	**9/23/1992**	0.69	15	0.002	0.002
# 8	**10/29/1992**	1.29	36	0.005	0.002
# 9	**11/18/1992**	0.54	9		
# 10	**1/19/1993**	0.94	19		0.002

Dissolved Magnesium				Method EPA 200.7	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		
# 2	**8/9/1991**	0.31	18	2.200	0.005
# 2a	**10/15/1991**	0.08	12		0.05
# 3	**10/22/1991**	0.51	11		0.05
# 4	**12/5/1991**	1.60	33		0.05
# 5	**12/18/1991**	0.63	23	3.00	0.05
# 6	**1/10/1992**	0.48	40	3.80	0.05
# 7	**9/23/1992**	0.69	15	1.30	0.05
# 8	**10/29/1992**	1.29	36	1.4	0.1
# 9	**11/18/1992**	0.54	9	0.96	0.05
# 10	**1/19/1993**	0.94	19		0.05

Dissolved Selenium				Method EPA 270.3	*Detection Limit*
Storm Event	*Date*	Volume (in)	Duration (hrs)	*I-2*	mg/L (ppm)
# 1	**5/7/1991**	0.83	19		0.0005
# 2	**8/9/1991**	0.31	18	nd	0.001
# 2a	**10/15/1991**	0.08	12		0.001
# 3	**10/22/1991**	0.51	11		0.001
# 4	**12/5/1991**	1.60	33		0.001
# 5	**12/18/1991**	0.63	23	nd	0.001
# 6	**1/10/1992**	0.48	40	nd	0.001
# 7	**9/23/1992**	0.69	15	nd	0.005
# 8	**10/29/1992**	1.29	36	nd	0.001
# 9	**11/18/1992**	0.54	9		
# 10	**1/19/1993**	0.94	19		0.005

Table 4B
City of Portland NPDES MS4 Permit
Outfall M-1 Stormwater Quality Monitoring Data: Dissolved Metals

Revision Date: Jan. 2003

Dissolved Silver				Method EPA	*Detection*
		Volume	Duration	272.2	*Limit*
Storm Event	*Date*	(in)	(hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.0002
# 2	8/9/1991	0.31	18	0.0005	0.0002
# 2a	10/15/1991	0.08	12		0.0002
# 3	10/22/1991	0.51	11		0.0002
# 4	12/5/1991	1.60	33		0.0002
# 5	12/18/1991	0.63	23	nd	0.0002
# 6	1/10/1992	0.48	40	nd	0.0002
# 7	9/23/1992	0.69	15	nd	0.001
# 8	10/29/1992	1.29	36	0.0002	0.0002
# 9	11/18/1992	0.54	9	nd	0.0002
# 10	1/19/1993	0.94	19		0.0002
#11	4/7/1995	0.59	16	nd	0.0002
#12	10/25/1995	0.69	17	nd	0.0003
#13	3/3/1996	0.80	20		0.0005

Dissolved Zinc				Method EPA	*Detection*
		Volume	Duration	200.7	*Limit*
Storm Event	*Date*	(in)	(hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.001
# 2	8/9/1991	0.31	18	0.280	0.005
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.001
# 5	12/18/1991	0.63	23	0.110	0.001
# 6	1/10/1992	0.48	40	0.113	0.001
# 7	9/23/1992	0.69	15	0.220	0.01
# 8	10/29/1992	1.29	36	0.180	0.002
# 9	11/18/1992	0.54	9	0.200	0.01
# 10	1/19/1993	0.94	19		0.01
#11	4/7/1995	0.59	16	0.092	0.001
#12	10/25/1995	0.69	17	0.058	0.001
#13	3/3/1996	0.80	20		0.001

Dissolved Thallium				Method EPA	*Detection*
		Volume	Duration	279.2	*Limit*
Storm Event	*Date*	(in)	(hrs)	*I-2*	mg/L (ppm)
# 1	5/7/1991	0.83	19		0.001
# 2	8/9/1991	0.31	18	nd	0.001
# 2a	10/15/1991	0.08	12		0.001
# 3	10/22/1991	0.51	11		0.001
# 4	12/5/1991	1.60	33		0.001
# 5	12/18/1991	0.63	23	nd	0.001
# 6	1/10/1992	0.48	40	nd	0.001
# 7	9/23/1992	0.69	15	nd	0.005
# 8	10/29/1992	1.29	36	nd	0.002
# 9	11/18/1992	0.54	9		
# 10	1/19/1993	0.94	19		0.001

Dissolved Hardness				Method SM 314a
		Volume	Duration	
Storm Event	*Date*	(in)	(hrs)	*I-2*
# 1	5/7/1991	0.83	19	
# 2	8/9/1991	0.31	18	33
# 2a	10/15/1991	0.08	12	
# 3	10/22/1991	0.51	11	
# 4	12/5/1991	1.60	33	
# 5	12/18/1991	0.63	23	36
# 6	1/10/1992	0.48	40	46
# 7	9/23/1992	0.69	15	20
# 8	10/29/1992	1.29	36	23
# 9	11/18/1992	0.54	9	18
# 10	1/19/1993	0.94	19	
#11	4/7/1995	0.59	16	15
#12	10/25/1995	0.69	17	10
#13	3/3/1996	0.80	20	

Notes:
Italicized values are considered estimates based on QA/QC review.
Results expressed as mg/L (ppm) unless otherwise noted.
"nd" means none detected at or above the detection limit listed. If no value is shown, the lab analysis was not performed.
City MS4 sample location I-2, at Ensign Ct., is at outfall M-1.

Table 7
Outfall M-1 DEQ Environmental Cleanup Site Information List

updated: Sep-02

RNO	Address	Company	ECSI ID	CERCLIS	Action	Status	Notes
R941170880	6936 N Fathom St	Freightliner--Truck Mfr.	2366	*	Site Screening recommended	SUS	Metals, PAH, dibutylphtalates, phenols
R941171010	6211 N Ensign	Fred Devine Diving & Salvage Co.	2365	*	Site Screening recommended	SUS	Metals, PAH, dibutylphtalates, phenols

Notes:
* This site does not have a Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) ID assigned.
ECSI = Environmental Cleanup Site Inventory
PAH = polynuclear aromatic hydrocarbon
SUS = suspected

DEQ ECSI reports for Fred Devine Diving and Salvage, Inc., and Freightliner, Inc.

Oregon DEQ

Environmental Cleanup Site Information Database
Site Summary Report - Details for Site ID 2365

This report shows data entered as of January 23, 2003 at 2:52:18 PM

See the bottom of this page for a key to certain acronyms and terms used in the report below

For more information on what is occuring at this site see DEQ's Facility Profiler.

Site Information

Site ID: 2365	Site Name: Fred Devine Diving and Salvage Co		CERCLIS No:
	Address: 6211 N Ensign Portland 97217		
	County: Multnomah		Region: Northwest
	Investigation Status: Suspect site requiring further investigation	NPL Site: No	Orphan Site: No / Study Area: No
Property:	Twnshp/Range/Sect: 1N , 1E , 17		Tax Lots: 600
	Latitude: 45 deg. 34 ' 14"	Longitude: -122 deg. 42 ' 46"	Site Size: 5.74 acres
Other Site Names:			
	Pacific Coast Environmental		
	The Marine Salvage Consortium Inc		
Operations:			
	Name: Fred Devine Diving and Salvage Co		
	Comments:		
	Years of Operation: 1975 - Current		
	SIC Code: 4400		Operating Status: Active

Contamination Information

Hazardous Substances/Waste Types:	
Manner and Time of Release:	
Contamination Information:	Weston sampling results from the Portland Harbor Sediment Study revealed dibutylphthalates, dimethylphthalates, bis(2-ethylhexyl)phthalates, cadmium, copper, zinc, arsenic, antimony, and PAHs in river sediments adjacent to the site.
Pathways:	
Environmental/Health Threats:	
Status of Investigative or Remedial Action:	(6/8/99 JMW/SAP) Based on initial sampling results from a river sediment quality study, the Fred Devine Diving and Salvage Co. property has been identified as a potential source of contamination to the Portland Harbor. A Site Assessment Review Notice was sent on March 3, 1999. A site screening is scheduled (level II priority). (8/31/99 TG/SAP) Strategy

Recommendation for a high-priority Remedial Investigation. A sediment sample adjacent to site dock shows elevated arsenic, copper, zinc and PAHs; PAHs appear to be a hot spot with the Portland Shipyard. (4/30/01 ELB/VCP) Voluntary Cleanup Letter Agreement for Expanded Preliminary Assessment under evaluation.

Data Sources: Portland Harbor Sediment Investigation Report, prepared by Roy F. Weston, Inc. for US EPA, 5/98.

Substance Contamination Information

Substance	Media Contaminated	Concentration Level	Date Recorded	Lab Data	Agency Observation	Owner Operator Admission
ARSENIC	Sediment			No	No	No
ARSENIC	Sediment	17 ppm	6/1/1998	Yes	No	No
COPPER	Sediment	119 ppm	6/1/1998	Yes	No	No
POLYAROMATIC HYDROCARBONS (PAH)	Sediment	HPAHs - 17,268 ppm	6/1/1998	Yes	No	No
ZINC	Sediment	264 ppm	6/1/1998	Yes	No	No

Investigative, Remedial and Administrative Actions

Action	Start Date	Compl. Date	Resp. Staff	Agency Code	Region	Lead Pgm
Site added to database	6/8/1999	6/8/1999	Janelle Waggy	DEQ	NWR	VCS
Site Screening recommended (EV)	6/8/1999	6/8/1999	Stephen Fortuna	DEQ	NWR	SAS
SITE SCORING	8/31/1999	8/31/1999	Thomas Gainer	DEQ	NWR	SAS
SITE EVALUATION	9/21/1999	9/21/1999	Thomas Gainer	DEQ	NWR	SAS
Insufficient information to list	9/21/1999	9/21/1999	Thomas Gainer	DEQ	NWR	SAS
Remedial Investigation recommended (RI)	9/21/1999	9/21/1999	Thomas Gainer	DEQ	NWR	SAS
EXPANDED PRELIMINARY ASSESSMENT	2/9/2001		Mark Pugh	DEQ	NWR	VCS

Key to certain acronyms and terms in this report:

CERCLIS No.: The U.S. EPA's Hazardous Waste Site identification number, shown only if EPA has been involved at the site.

Region: DEQ divides the state into three regions (E, NW, and W); the regional office shown is responsible for site investigation/cleanup.

NPL Site: Is the site on EPA's Superfund List? (Y/N).

Orphan Site: Has DEQ's Orphan Program been active at this site? (Y/N). The Orphan Program cleans up high-priority sites where owners and operators responsible for the contamination are absent, or are unwilling or unable to use their own resources for cleanup.

Study Area: Is this site a Study Area? (Y/N). ECSI assigns unique Site ID numbers to both individual sites and to Study Areas, which are groupings of individual ECSI sites that may be contributing to a larger, area-wide problem.

SIC Code: The Standard Industrial Classification code assigned to the operation described in this part of the report.

Pathways: A description of human or environmental resources that site contamination could affect.

Lead Pgm: This column refers to the Cleanup Program affiliation of the DEQ employee responsible for the action shown. SAS = Site Assessment; VCS = Voluntary Cleanup; SRS

= Site Response (enforcement cleanup).

For more information about this page please contact Gil Wistar at (503) 229-5512 or via email at wistar.gil@deq.state.or.us.

DEQ Online is the official web site for the Oregon Department of Environmental Quality.

Oregon DEQ

Environmental Cleanup Site Information Database
Site Summary Report - Details for Site ID 2366

This report shows data entered as of January 23, 2003 at 2:53:07 PM

See the bottom of this page for a key to certain acronyms and terms used in the report below

For more information on what is occuring at this site see DEQ's Facility Profiler.

Site Information

Site ID: 2366	Site Name: Freightliner - Truck Manufacturing Plant		CERCLIS No:
	Address: 6936 N Fathom St Portland 97217		
	County: Multnomah		Region: Northwest
	Investigation Status: Suspect site requiring further investigation	NPL Site: No	Orphan Site: No / Study Area: No
Property:	Twnshp/Range/Sect: 1N , 1E , 17		Tax Lots: 200 and 10900
	Latitude: 45 deg. 34 ' 20"	Longitude: - 122 deg. 43 ' 1"	Site Size: 25.22 acres
Other Site Names:			
	Portland Harbor Sediment Study		
Operations:			
	Name: Freighliner Corp Truck Mfg Plant		
	Comments:		
	Years of Operation: January 1981 - Current		
	SIC Code: 3711		Operating Status: Active

Contamination Information

Hazardous Substances/Waste Types:	
Manner and Time of Release:	
Contamination Information:	1998 sampling data from the Portland Harbor Sediment Study revealed dibutylphthalates, 4-methylphenol, bis(2-ethylhexyl) phthalate, copper, mercury and zinc in river sediments adjacent to the site. (11/1/01 ACV/VCP) Freightliner PA indicated the possible improper disposal of manufacturing wastes behind the truck manufacturing plant.
Pathways:	
Environmental/Health Threats:	
Status of Investigative or Remedial Action:	(6/9/99 JMW/SAP) Based on initial sampling results from a river sediment quality study, the Freightliner Truck Manufacturing Plant has been identified as a potential source of contamination to the Portland Harbor. A Site Assessment

Review Notice was sent on March 3, 1999, to which Freightliner responded April 22, 1999. (8/20/99 TG/SAP) Strategy Recommendation for medium-priority Preliminary Assessment; questionable link between site and adjacent sediment contamination. (11/1/01 ACV/VCP) Freightliner asked to submit Preliminary Assessment (PA) under Agreement. Results of PA indicated possible improper disposal of manufacturing wastes behind plant. (12/6/02 ACV/VCP) Since August 2002, DEQ and Freightliner have been investigating the suspected disposal of process wastes at the site. Former Freightliner employees suggested that during the early 1970s, manufacturing wastes, suspected to be paint solids and waste liquids, were disposed of in pits behind the plant building. Other information indicated that waste liquids may have been disposed of directly to the ground surface. Freightliner contracted a geophysical survey of the area behind the site to search for buried drums or debris, which showed 10 areas of interest. Based on past employee interviews, Freightliner believes that seven of these 10 areas contain drums. In October 2002 Freightliner conducted initial soil and groundwater testing near the suspected disposal areas. The purpose of the testing was to find out if the drums had leaked and if wastes had entered soil and groundwater. Results indicated localized soil and groundwater impacts, but suggested the need for further testing. Freightliner intends to remove the buried drums and debris during its regular holiday shut down in December 2002 and January 2003.

Data Sources: Portland Harbor Sediment Investigation Report, prepared by Roy F. Weston, Inc. for US EPA, 5/98.

Substance Contamination Information

Substance	Media Contaminated	Concentration Level	Date Recorded	Lab Data	Agency Observation	Owner Operator Admission
BIS(2-ETHYLHEXYL) PHTHALATE	Sediment	2,100 ppb	6/1/1998	Yes	No	No
COPPER	Sediment	131 ppm	6/1/1998	Yes	No	No
CRESOL,4-	Sediment	1,100 ppb	6/1/1998	Yes	No	No

Investigative, Remedial and Administrative Actions

Action	Start Date	Compl. Date	Resp. Staff	Agency Code	Region	Lead Pgm
Site added to database	6/9/1999	6/9/1999	Janelle Waggy	DEQ	NWR	VCS
Site Screening recommended (EV)	6/9/1999	6/9/1999	Stephen Fortuna	DEQ	NWR	SAS
SITE SCORING	8/20/1999	8/20/1999	Thomas Gainer	DEQ	NWR	SAS
Insufficient information to list	9/7/1999	9/7/1999	Thomas Gainer	DEQ	NWR	SAS
SITE EVALUATION	9/7/1999	9/7/1999	Thomas Gainer	DEQ	NWR	SAS
State Basic Preliminary Assessment recommended (PA)	9/7/1999	9/7/1999	Thomas Gainer	DEQ	NWR	SAS
Independent Cleanup Program	10/28/1999		James Anderson	DEQ	NWR	VCS
Letter Agreement	11/1/2001	11/1/2001	Alicia Voss	DEQ	NWR	ICP
BASIC PRELIMINARY						

ASSESSEMENT	11/1/2001		Alicia Voss	DEQ	NWR	ICP
REMEDIAL INVESTIGATION	6/1/2002		Alicia Voss	DEQ	NWR	ICP
Letter Agreement	11/1/2002	11/1/2002	Alicia Voss	DEQ	NWR	ICP

Key to certain acronyms and terms in this report:
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Table 9
Outfall M-1 DEQ Leaking Underground Storage Tanks List

updated: Sep-02

RNO	Address	Log Number	Company	Release Stopped	Cleanup Start	Cleanup End
R941170940	6735 N BASIN AVE	26-94-0198	NAVAL RESERVE READINESS CENTER	6/10/1994	6/10/1994	11/10/1994
R941170910	6707 N BASIN AVE	26-92-0109	UNITED PARCEL SERVICE	7/28/1992	7/28/1992	6/17/1997
R941170940	6735 N BASIN AVE	26-93-0085	US NAVY		4/30/1993	

Table 12
Outfall M-1 State Fire Marshal Hazardous Spills List

updated: Aug-02

RNO	Address	Chemical	Date	Incident ID
R941170910	6707 N Basin 97217	Methyl Methacrylate	03/16/92	02-291-920077
R941170910	6707 N Basin 97217	ADJA Silver Marker #225	01/23/92	02-291-920013
R941170910	6707 N Basin 97217	Nitric Acid	04/02/91	02-291-910119
R605603500	6840 N Cutter Circle 97217	Propane	08/14/89	02-291-890300
R605604000	6845 N Cutter Circle	Nitric Acid	12/19/90	02-291-900477
R605604000	6845 N Cutter Circle 97217	Corrosive Liquids	04/18/92	02-291-920122
R605604000	6845 N Cutter Cr 97217	Methyl Iodide	07/30/98	HM-06-980212
	6458 N Basin 97217	Diesel Fuel	5/2/2000	42
	Foot of Ensign (Swan Island) 97217	Unknown Chemical	11/10/98	980254

City Data Compilation

Table F-1
Illicit Discharge Elimination Program Data
Source Control Pilot Project

updated: Jan-03

NPDES #	Date	Time	Type of Site	Dominant Land Use	Flow Observed	Odor	Color	Clarity	Floatables	Biological	Deposits/ Stains	Vegetation Condition	Structural Condition	pH	Temp. (F)	Conduct. (umhos/cm)	Copper (mg/L)	Iron (mg/L)	Zinc (mg/L)	Arsenic (ug/L)	Cadmium (ug/L)	Chromium (mg/L)	Mercury (ug/L)	Nickel (mg/L)	Lead (ug/L)	Silver (mg/L)	Residual Chlorine (mg/L)	Chlorine (total) mg/L	Potassium (mg/L)	Nitrite (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)	Phosphate (mg/L)	Phenolics (mg/L)	Detergents (mg/L)	Fecal Coliform (f/100cfu)	Sample #	Actions Taken/Comments	Since Last Rain
SJ10M1	08/01/94	8:00		industrial	yes	sewage	brown	suspended solids	garb/sew	bact/alg	sediment	normal	concrete crackings				0.22		0.01		6.0	ND			46.0	ND		0.04				0.1	0.01						
SJ10M1	10/12/94	12:25	outfall	industrial	yes	none	orange	cloudy	none	none	iron bacteria	none	normal	6.9			0.03		ND		3.0	ND		0.04	19.0	0.01		0.02				ND	0.04	ND	0.045	<100			>1 WEEK
SJ10M1	07/17/95	12:55	outfall	industrial	yes	musty	orange	suspended solids	oily sheen	none	iron bacteria	none	normal	6.4	77	222											0.04									<100	SRP 950084		> 1 WK
SJ10M1	08/02/95	10:55	manhole	industrial	yes	musty								6.45	80	278											0.06									25		outfall submerged, sampled 1ST MH UPS, SRP 950099	> 1 WK
SJ10M1	7/2/96	13:35	manhole	industrial	yes									6.6	82	413											0.03									9		outfall submerged, sampled 1ST UPS. MH also sampled for phenol and copper	3-6 Days
SJ10M1	05/20/97	13:00			no																																outfall submerged, 1st two ups mh's standing water. No follow-up needed	
SJ10M1	07/31/97	11:50	outfall	industrial	no																																outfall submerged, 1st ups MH standing water. No follow-up needed	
SJ10M1	09/22/97	12:05	outfall	industrial	yes	none	orange	cloudy	None	iron bacteria	iron bacteria	none	normal	6.8	78	300											0.01									7	SRP 970232	no follow-up needed	
SJ10M1	07/13/98	12:05	outfall	industrial																																	outfall submerged, 1st ups MH standing water	
SJ10M1	08/20/98	13:35	outfall	industrial	yes	none	clear	clear	iron bacteria	iron bacteria	iron bacteria	none	normal	6.7	88	326											0.00									10	SRP 980145		
SJ10M1	09/17/98	11:25	outfall	industrial	yes	musty	clear	clear	iron bacteria	iron bacteria	iron bacteria	none	normal	6.7	69	303											0.05									200	SRP 980194		
SJ10M1	07/13/99	13:10	manhole	industrial																																	outfall submerged, 1st ups MH standing water	
SJ10M1	08/25/99	12:55	outfall	industrial	yes	none	orange	clear	iron bacteria	iron bacteria	iron bacteria	None	normal	6.7	80	216	0.1	5.0									0.01			0.1	0.1					9	SRP 990181		
SJ10M1	09/22/99	10:55	outfall	industrial	yes	musty	orange	cloudy	iron bacteria	iron bacteria	iron bacteria	None	normal	6.7	82	194	0.1	5.0									0.05			0.1	0.1					10	SRP 990227		
SJ10M1	06/26/00	11:20	manhole	industrial																																	outfall submerged, 1st ups MH standing water	
SJ10M1	07/25/00	9:40	outfall	industrial	yes	none	orange	clear	iron bacteria	iron bacteria	iron bacteria	None	normal	6.4	73	183	5.0	0.1																		10	SRP 000099	too much Fe bacteria interference to run cl	
SJ10M1	08/16/00	12:00	manhole	industrial																																	outfall submerged, 1st ups MH standing water	
SJ10M1	06/26/01	9:50	manhole	industrial																																	outfall submerged, 1st ups MH standing water	
SJ10M1	07/24/01	10:15	manhole	industrial																																	outfall submerged, 1st ups MH standing water	
SJ10M1	08/30/01	11:05	outfall	industrial	yes	musty	orange	clear	iron bacteria	iron bacteria	iron bacteria	None	normal	7.1	78	197	0.2	5																		27	SRP 010090	too much Fe bacteria interference to run cl	
SJ10M1	09/20/01	13:20	outfall	industrial	yes	musty	orange	clear	iron bacteria	iron bacteria	iron bacteria	None	normal	7.1	81	181	0.1	5																		10	SRP 010116	too much Fe bacteria interference to run cl	
SJ10M1	07/16/02	10:05	outfall	industrial																																	O.S.	
SJ10M1	07/25/02	12:55	outfall	industrial																																	O.S.	
SJ10M1	08/12/02	12:05	outfall	industrial																																	O.S.	
SJ10M1	09/05/02	13:35	outfall	industrial	yes	none	orange	cloudy	Iron bacteria	Iron bacteria	Iron bacteria	None	normal	6.9	84	196	0.1	5																		10	LAB 021077	Too much Fe bac interference to run cl Also sampled for M+ & TPH HCID	
SJ10M1	09/09/02	14:55	outfall	industrial	yes									6.9	82	229	0.0132	5	0.054	1.38	0.17	ND	ND	5E-04	0.78		0.03									<10	LAB 021086	Also sampled for M+ & TPH HCID (ND)	
SJ10M1	10/31/02	9:40	outfall	industrial	yes									6.2	68	168		5																		10	LAB 021309	too much Fe bac interference to run cl	

Notes:
Only E coli is sent to the lab. All other tests are field tests unless otherwise noted (copper and iron are strips). If an extreme pH is recorded, additional samples are sent to the lab.
µg/L = microgram per liter
µmhos/cm = micromho per centimeter
mg/L = milligram per liter

Table F-2
Pollution Complaints Data
Source Control Pilot Project

updated: Jun-02

Org ID	Organization Name	Site Number	Site Quad	Site Street	PC ID	PC Date/time Received	PC Pollutant Type	PC Description
1837	Columbia distributing Co	6840	N	CUTTER	2993	10-Jun-02	Water	Anonymous complaint reports truck washing on Saturday discharging to a "fish" stenciled cb. Complaint to EPA referred to BES. ISCD SW PM Alberg contacted IU; contract washer collects w/w and works on Sunday; w/w letter in file.
1653	Freightliner Corp Truck MFG	6936	N	FATHOM	1098	29-Jan-99	Hazard/Toxic	Fire Bureau reports 300 batteries at IU, possibly leaking to storm sewer. Two pallet racks had tipped over. PM Holtrop contacted to respond and met PFB Haz Mat crew at scene. IU had blocked storm drain initially and called in Foss Environmental for cleanup.
1653	Freightliner Corp Truck MFG	6936	N	FATHOM	2094	2-Dec-00	Oil/Fuel	PFB reports oil/hydraulic release on street. Freightliner contacted and looking into situation. Trail in street to IU; Freightliner cleaned street. Referred to ISCD PM. No discharge to outfall.
1653	Freightliner Corp Truck MFG	6936	N	FATHOM	2884	9-Apr-02	Oil/Fuel	Report of diesel spill from Freightliner truck near Fathom & Basin. Foss called out to clean up. Very little if any material to cb. Sheen in street for approximately five blocks.
26014	Outfall M1	6211	N	ENSIGN	427	15-Apr-97	Oil/Fuel	USCG reported oil discharge at outfall. EG, JH, IHB, and AD investigated and found no source.
26014	Outfall M1	6211	N	ENSIGN	545	10-Feb-97		Dye testing being done by John Holtrop.
26014	Outfall M1	6211	N	ENSIGN	998	9-Nov-98	Oil/Fuel	USCG reported oil sheen discharge at OF. McGregor responded; Holtrop and Vincent of ISCD Stormwater investigated w/Mcg. Freightliner contributing sheen at MH. Holtrop contacted IU.
26014	Outfall M1	6211	N	ENSIGN	999	10-Nov-98	Oil/Fuel	USCG reports oily sheen at OF. McGregor responded; sheen requires boom placement. PFB boat #6 placed boom. OERS notified; OERS #98-2693. Dirks & Blinderman inves. ; no source identified.
26014	Outfall M1	6211	N	ENSIGN	1093	19-Jan-99	Oil/Fuel	Complaint of oily sheen at outfall. Dirks investigate at 10:47 and reports small strip of sheen w/moss along Swan Island riverbank at outfall. No need for further action.
26014	Outfall M1	6211	N	ENSIGN	1154	24-Mar-99	Oil/Fuel	Report from USCG of sheen at outfall -AMD/IHB invest- Sheen disptng @ arrival, trckd ups to 6851 N Fathom. Lrg sheen in street from Frghtlnr Truck. Foss called out to clean up. Frghtlnr took over responsibility of cleaning up street OERS 99-0804.
26014	Outfall M1	6211	N	ENSIGN	1121	10-Mar-99	Oil/Fuel	Report from USCG of oily sheen discharge at outfall, OERS . McGregor & Holtrop investg: oily dischrge @1045, boom placed by McG at OF. Up-stream investigation found possible small sheen discharging from Freightliner. Holtrop will contact Freightliner.

Table F-2
Pollution Complaints Data
Source Control Pilot Project

updated: Jun-02

Org ID	Organization Name	Site Number	Site Quad	Site Street	PC ID	PC Date/time Received	PC Pollutant Type	PC Description
26014	Outfall M1	6211	N	ENSIGN	1210	29-Mar-99	Oil/Fuel	Report from USCG of sheen at OF. McG inves: OF completely submerged, light sheen near location of submerged OF. No other inves at this time.
26014	Outfall M1	6211	N	ENSIGN	1251	28-Apr-99	Oil/Fuel	CG reports sheen coming from outfall -AMD invest- Sheen @ outfall appears to be from Iron bacteria decay not oil. No signs of sheen upstream of outfall.
26014	Outfall M1	6211	N	ENSIGN	1548	24-Nov-99	Oil/Fuel	Report from Vincent with ISCD. Stormwater of oily discharge; identified RP as Roadway. IU PM Holtrop contacted; Roadway to place boom at OF(McG note).
26014	Outfall M1	6211	N	ENSIGN	1776	2-May-00	Oil/Fuel	BOM reported diesel spill at 6540 N. Basin; truck saddle tank ruptured due to auto collision, approx 50 gal to cb. PFB respndd w/sorbent to street and cb; DO onsite. FOSS called in for cleanup. PFB placed boom at OF; no sheen noticed. OERS notified.
26014	Outfall M1	6211	N	ENSIGN	1961	20-Sep-00	Color	Marvin Smith 283-5285 rpt. milky white liquid discharging from M-1 outfall. SPCR respond; milky white substance dispersed in water; outfall running clear. Check MH upstream outside Freightliner. No evidence of substance.
26014	Outfall M1	6211	N	ENSIGN	2170	2-Feb-01	Other	Discharge sheen reported at OF M-1. PFB Fireboat #6 contacted and placed absorbent boom at OF. Subsequent discharge on 02/09/2001 identified as iron bacteria material and resultant oily sheen.

NPDES Data Compilation

Table F-3
Summary of Information Obtained from the Water Quality File Review of M-1 Facilities with NPDES Permits, 2002
Source Control Pilot Project

File review performed: Jan-03

Facility	Permit	Activities that May Contribute to the Contamination of Stormwater	Stormwater Fate	Stormwater Management	Leaks or Spills or Other Instances of Stormwater Contamination	Permit Violations	SWPCP or SPCC Plan?	Industrial Significant Activities	Potential Pollutants	References
United Parcel Service	1200Z	USTs, fueling activities, vehicle maintenance	There are five discharge points from which stormwater leaves the property, all stormwater discharges to the municipal storm sewer system. There are no direct discharge to surface water or seeps in to the ground.	There are oil and water separators outside the facility that treat stormwater runoff associated with the fuel islands. Catch basins are equipped with debris traps. See SWPCP for other types of management.	1993 - hydraulic fluid spilled from a trash compactor	Exceeded suspended solids benchmark on 12/16/1999, 7/20/2000, and 10/22/2001. Suspended solids not collected on 11/19/1998 and 9/9/1999 because of lab error. Exceeded oil and grease benchmark 11/19/1998, 4/8/1999, and 3/19/2002. Required sampling for July 1, 2000 to June 30, 2001, did not occur.	SWPCP 1998	Package loading and unloading, truck and trailer parking and staging, equipment and vehicle maintenance, vehicle washing, storage of motor oil, antifreeze, spill cleanup debris from damaged or leaking packages, automotive parts, scrap metal, and tires, vehicle fueling and unloading.	Potential Stormwater Pollutants: sediments, floatable debris, foam packing material, oil, grease, gasoline, diesel, motor oils, antifreeze, solvents, transmission oil, and metals.	1996 Permit Renewal Application and 1998 SWPCP
Roadway Express	1200Z	Vehicle fueling, vehicle maintenance, and vehicle washing	N/A	Not in file	N/A	No violations during entire reporting history	N/A	N/A	N/A	1997 Permit Application
Columbia Distributing Co. (Maletis Beverage)	1200Z	Truck washing	N/A	Oil and water separator by truck washing area. Sediment traps on catch basins.	N/A	Exceeded oil and grease benchmark 11/30/1998 and 5/30/2000. Exceeded pH benchmark 11/19/1998, 12/8/1999, 5/30/2000, and 3/11/2002. In July 2002, a letter from DEQ stated that the company needed to address some wash activities.	N/A	N/A	N/A	DEQ File
Freightliner Truck Manufacturing Plant	100J (compressor cooling water)	N/A	N/A	N/A	N/A	Temperature excursion on 7/11/2001. Exceedances of pH limit and chlorine limit on 2/10/1997. Chlorine routinely exceeded.	N/A	N/A	N/A	DEQ File
Freightliner Truck Manufacturing Plant	500J (boiler blow down)	Note the incinerator and associated boiler were removed in 1994. No monitoring was performed after Sept. 1994.	N/A	N/A	N/A	Not in file	N/A	N/A	N/A	DEQ File
Freightliner Truck Manufacturing Plant	1700J (vehicle wash water)	Permit closed in 1993	N/A	N/A	N/A	N/A	N/A	N/A	N/A	DEQ File

Table F-3
Summary of Information Obtained from the Water Quality File Review of M-1 Facilities with NPDES Permits, 2002
Source Control Pilot Project

File review performed: Jan-03

Facility	Permit	Activities that May Contribute to the Contamination of Stormwater	Stormwater Fate	Stormwater Management	Leaks or Spills or Other Instances of Stormwater Contamination	Permit Violations	SWPCP or SPCC Plan?	Industrial Significant Activities	Potential Pollutants	References
Freightliner Truck Manufacturing Plant	1200Z	Outdoor storage of raw materials, metals, scrap metals, and chemical drums	Not in file	Oil and water separator processes stormwater collected in tank farm containment	Not in file	Exceeded zinc benchmarks 1/21/1998, 11/4/1998, 5/11/1999, 5/8/2000, 5/14/2001, 11/21/2001, 12/20/2001, and 6/17/2002. Zinc a continuous battle for this facility due to aging roofing and asphalt. Exceeded suspended solids benchmark 12/16/1999 and 5/14/2001. Exceeded oil and grease benchmark 6/22/1993, 9/8/1994, 4/12/1995, 11/27/1995, 10/18/1996, 10/28/1999, 12/16/1999, and 5/8/2000. Exceeded pH benchmark 12/20/2001.	Not in file	Not in file	Not in file	DEQ File

N/A = Not available.

DEQ ECSI File Reviews

APPENDIX F

DEQ ECSI File Reviews for City Outfall M-1

Two Oregon Department of Environmental Quality (DEQ) Environmental Cleanup Site Inventory (ECSI) sites are located within the M-1 outfall basin. DEQ ECSI files were reviewed for both of these sites. The information obtained during these file reviews is summarized in the following discussion, which has been organized by address.

6211 N. Ensign, Portland OR 97217
ECSI ID #2365
Fred Devine Diving and Salvage

The Fred Devine Diving and Salvage facility is the only ECSI site located at 6211 N. Ensign Street in Portland, Oregon. This 5.74-acre site is located along the east bank of the Willamette River in the Swan Island Industrial Park and within the M-1 drainage basin, directly adjacent to the M-1 outfall (see Figure 3-1 in Section 3 of the M-1 report).

Information gathered from the DEQ ECSI files for this site is summarized below.

Site Location and Description

The Fred Devine property has been used by four main parties: Fred Devine Diving and Salvage Inc. (since 1975), Pacific Coast Environmental (tenant from 1988 to 1995), Smith Environmental Services (tenant from 1995 to 1996), and Portland Steam Navigation Co. (tenant since 1987).

Based on information provided in the DEQ ECSI file, there is not much record of Fred Devine Diving and Salvage (FDD&S) historical site operations. FDD&S currently uses the site for storage and maintenance of marine salvage equipment (e.g., pumps, diving equipment). No other operations are performed by FDD&S at this site (Wood Tatum Sanders & Murphy, 2000). Pacific Coast Environmental (PCE), a co-occupant, leased the property and operated an industrial cleaning and hazardous waste transportation business from the property for several years. Smith Environmental Services performed environmental services such as industrial washing, hazardous waste profiling, transport, and disposal. The only other occupant of the site is the Portland Steam Navigation Co., which uses office and dock space at the site.

Hazardous substances currently used at the site consist of small quantities of lube oils and other petroleum hydrocarbons, and paints.

According to a site visit conducted by DEQ in July 2000, "Other than the paint shop, the steam cleaning of some equipment and a small trailer where sand blasting takes place, there was little evidence of potential hazardous substance release" (DEQ, 2000).

There are six catch basins located throughout the asphalt-covered portions of the site (see Figure 2). The catch basins collect surface runoff from the asphalt-covered areas of the site and then discharge into the City Storm Sewer, which discharges to the Willamette River through outfall M-1. In addition to the six catch basins, there is a 400-

gallon, three-chambered oil water separator (OWS) onsite that receives discharges from the shop and paint room area of the main shop from a 10-foot-long, 8-inch floor drain. According to FDD&S, the OWS is connected to the sanitary sewer. However, it has been intentionally plugged and is pumped out once a year (EEM, 2001). In the DEQ strategy recommendation, note was made of a floor drain located in the PCE portion of the warehouse that was connected to the "Storm Sewer." Based on available information, it is not known whether the floor drain that was referred to was actually the drain connected to the OWS.

As of July 2002, BES had determined that this site did not require a NPDES permit (EEM, 2001). However, recent findings suggest that a permit may in fact be appropriate.

Background and Site History

The regulatory history in DEQ's files associated with this site is short and relatively limited. The following is a list of regulatory events and other environmental events that have occurred at the site:

- June 24, 1980: A 500-foot by 35-foot petroleum sheen was observed "coming out of the Devine Building at 6211 N. Ensign Ave." A spill source was not determined (DEQ spill report, 1980).
- July 1992: A Phase 1 Environmental Assessment was performed to evaluate the general environmental condition at the site based on past and current practices. The Phase 1 concluded that the site still did not pose a threat to human health or the environment. It recommended the removal of three USTs that were not being used (Marine & Environmental Testing, 1992).
- 1993: PCE spilled 50 gallons of diesel or ballast water into the river (EEM, 2001).
- April 1993: Three USTs were removed from the property. No leaks were documented (DEQ, 1999).
- 1995: Oil-stained absorbent pads were dropped into the river; they were quickly recovered (EEM, 2001).
- March 17, 1995: A complaint to DEQ was received by an employee regarding the disposal practices (dumping of hazardous materials) of Pacific Coast Environmental. DEQ visited the site and no violations were observed, but DEQ noted "suspicious disposal procedures" (DEQ, 1999).
- December 1995: A Phase 1 Environmental Assessment Update was performed in order to update the Phase 1 EA performed in 1982. The Phase 1 update concluded that the site still did not pose a threat to human health or the environment. It also recommended the removal of two aboveground storage tanks (Marine & Environmental Testing, 1995).
- 1996: Five gallons of paint spilled into the river; fluid was recovered (EEM, 2001).
- March 10, 1999: A 1,000-foot by 400-foot petroleum sheen was observed coming from the same outfall as the spill observed in 1980. The cause and source were not determined (DEQ, 1999).

- 2000: Three gallons of hydraulic oil spilled into the river from a broken hose. (EEM, 2001).
- 2001: A PA was prepared for FDD&S by Evergreen Environmental Management, Inc. (EEM) in response to DEQ's request to prepare a Scope of Work for soil, sediment, and groundwater sampling. The following recommendations were contained in the PA: "EEM firmly does not believe the subject property has been or is a source of petroleum hydrocarbons or other types of contamination in the sediment in the lagoon or river. " (EEM, 2001)
- February 2001-March 2001: Water samples were collected from a manhole located on FDD&S property to assess the applicability of an NPDES permit. Results indicated that pH was slightly low. However, no petroleum contaminants were detected. BES determined no NPDES permit was needed (EEM, 2001).
- August 2002: The *Subsurface Soil and Catch Basin Debris Sampling Report* was prepared and submitted to DEQ. The primary objective of this work was to identify the types of contaminants present and the possible pathways by which those contaminants could reach the river. Soil and catch basin sediment samples were collected and analyzed for PCBs, BNA SVOCs, and metals. Metals, PAHs, and phthalates were found in elevated concentrations with respect to sediment screening criteria (see attached data). In addition, based on reported laboratory interference, additional SVOCs and TPH may also have been present at elevated concentrations. In a letter from DEQ dated September 17, 2002, DEQ made the following statement: "The PAHs fluoranthene and phenanthrene were detected at elevated levels in samples collected from the catch basins, near the FDD&S dock, and outfall M-1. These data suggest a potential link between site contaminants and river sediment." (DEQ, 2002)

In addition to the above site-specific events, two sediment investigations were performed for the Portland Harbor Study Area: one in 1997 by EPA/Weston, Inc., and the other in 1998 by the Port of Portland and Cascade General. One sediment sample, relative to this site was collected in the Swan Island Lagoon. Several different constituents were detected above Portland Harbor Baseline levels in the collected sediment sample. These constituents may be representative of constituents that may have entered the Willamette River via stormwater or over-water activities conducted at this site. Table 1 provides a summary of those constituents.

TABLE 1
Contaminants Detected in Sediment Samples Above Portland Harbor Baseline Levels
Site Summaries for the M-1 Outfall

Sediment Sample ID	Investigation	Location	Results	Comments
PSY12 (shallow)	**1998** Portland Shipyard Investigation (conducted by the Port of Portland and Cascade General)	North side of Fred Devine Dock	**Metals**: Arsenic, copper, and zinc **Phthalates**: bis(2-ethylhexyl)phthalate **PAHs**: High molecular weight PAHs (HPAHs) and low molecular weight PAHs (LPAHs)	This sample was one of the highest hot spots for PAHs in the Portland Shipyard. The Devine dock appears to be the source of PAH contamination.

Source: DEQ Site Assessment Program – Strategy Recommendation. September 21, 1999.

Based on the results documented in Table 1, EPA and DEQ determined that further site assessment was needed. In 1999, DEQ ranked the site as a high priority for a remedial investigation (RI). There is no record of an RI being performed for this site.

Summary

Limited activities have been performed to determine the extent to which the Fred Devine site has contributed or is currently contributing to the sediment contamination found adjacent to the site.

A Phase I Environmental Site Assessment (ESA) was prepared for the site in 1993 and revised in December 1995. The purpose of the Phase I ESA was to evaluate potential environmental risks associated with historical activities at the site and surrounding properties. The Phase I ESA concluded that (1) the general environmental condition of the site did not appear to pose a threat to human health or the environment, and (2) there was no direct evidence indicating a significant impact to the site from contamination (Marine & Environmental Testing, 1995).

In 1998, results from a sediment sample collected on the North Side of the Fred Devine dock initiated DEQ's interest in the site.

Surface soil and catch basin sampling was performed in April 2002. Results indicate high levels of metals, phthalates, and PAHs, and DEQ suggested a link between the site contaminants and river sediment contamination.

Based on the historical operations and activities associated with this site, it is possible that Fred Devine has contributed to the metals, phthalates, and PAH contamination found in the sediment adjacent to the facility.

References

Department of Environmental Quality. 1999. *DEQ Site Assessment Program – Strategy Recommendation*. September 1999.

Evergreen Environmental Management, Inc. (EEM). 2001. *Preliminary Assessment for the Fred Devine Diving & Salvage, Inc*. June 28, 2001.

Marine & Environmental Testing, Inc. 1992. *Phase I Environmental Assessment*. July 1992.

Marine & Environmental Testing, Inc. 1995. *Phase I Environmental Assessment Update*. December 1995.

Wood Tatum Sanders & Murphy. Letter Re: Fred Devine & Salvage. October 6, 2000.

Other letters and correspondence.

6936 N. Fathom St., Portland, OR 97217
ECSI ID #2366
Freightliner Truck Manufacturing Plant

The Freightliner Truck Manufacturing Plant (TMP) is the only ECSI site located at 6939 N. Fathom Street, in Portland, Oregon. This site is located within the M-1 drainage basin, approximately 1,400 feet from the east bank of the Willamette River in the Swan Island Industrial Park. This is a lowland area which is largely composed of dredge spoils deposited between 1931 and the 1960s. In relation to the City of Portland's M-1 outfall, the southeast portion of the TMP is approximately 1,400 feet north-northeast of the outfall (see Figure 3-1 in Section 3 of the M-1 report).

Information gathered from the DEQ ECSI files for this site is summarized below.

Site Description

The TMP is located on a 25-acre parcel of land owned by the Port of Portland. Freightliner has operated the TMP since 1969. The primary operation conducted at the TMP is the manufacturing of semitruck cabs. Industrial processes required for this operation consist of machining, welding, painting, cleaning, and assembling. The majority of these activities occur within enclosed buildings, which occupy nearly half of the site. In addition to the enclosed buildings, there is a tank farm, drum storage area (called the Environmental Center, or EC), used oil and antifreeze storage area, and a wastewater treatment plant (WWTP). The remainder of the site is primarily paved. Figure 1 shows the facility layout (Exponent, 2001).

Materials and hazardous substances used at the TMP include aluminum, steel, transmission oils, gear oil, hydraulic oil, diesel, ketone-ester based solvent thinner, batteries, sodium hydroxide, sulfuric acid, and ethylene glycol. Waste products generated include waste paint, used solvent/thinner, waste paint solids, chrome sludge, used oil, waste rags and absorbent, used antifreeze, paint filters, cardboard, wood, oil filters, scrap metal, and general refuse. This facility is a large quantity generator under RCRA permit no. ORD000602110.

According to the Preliminary Assessment (PA) (Exponent, 2001), all site chemicals and hazardous substances are currently managed either within secondary containment structures or within the manufacturing building with equivalent controls. Over the years the TMP has undergone a variety of changes, including disconnection of drains within the active portions of the main building from the storm sewer system and improvements

in waste storage and handling facilities. Although these improvements have not always been in place, the PA states that best management practices have always been used (Exponent, 2001).

The TMP operates under a Spill Prevention, Control, and Countermeasures Plan (SPCC Plan), and a Stormwater Pollution Control Plan (SWPCP). Although the facility does not have any direct discharges to the Willamette River, currently regulated stormwater (permit 1200-Z) from the site is collected in a network of catch basins located across the site (see Figure 1). Stormwater collected in these catch basins is discharged to the City of Portland storm sewer system, which discharges to the Willamette River via the City of Portland Outfall M-1 (Exponent, 2001). In addition, runoff from the southwest corner of the TMP flows into either a blind catch basin that allows for direct infiltration to soil, or a short distance over land to low areas along the north side of the railroad tracks.

An onsite wastewater treatment plant (WWTP) is used to treat wastewater that is generated when preparing the cabs for painting. The cabs are washed with a water-based chromate solution which etches the aluminum cabs. After treatment, the water is discharged to the publicly owned treatment works (POTW) (Exponent, 2001).

Background and Site History

The DEQ ECSI files for this site indicate a short and relatively limited regulatory history including occasional DEQ inspections. However, a number of recorded spills have occurred in recent history:

- June 1983: RCRA inspection; no violations (Exponent, 2001).
- April 1985: RCRA inspection; waste management violations (Exponent, 2001).
- May 1986: Eleven USTs were removed in accordance with the standard procedures of the time. Petroleum was formerly stored in these USTs. Tanks were in good condition, with no evidence of leakage, according to the contractor who performed the work. No samples were collected (Exponent, 2001).
- August 1993: Water from the fire suppression system leaked into a nearby ditch believed to be associated with construction activities in the immediate area. The presence of a oil and antifreeze sheen or liquid in the accumulated water prompted the liquid removal (Exponent, 2001).
- December 1994: Three lead-acid batteries leaked onto pavement and prompted a RCRA inspection by DEQ. A Notice of Non-Compliance was issued for 12 violations of hazardous waste regulations (Exponent, 2001).
- 1995: Wastewater treatment system incident (water overflow) was reported as a spill; the water was contained within the treatment system (Exponent, 2001).
- November 1998: An oily sheen was reported at outfall M-1. The City investigated and found that Freightliner was contributing to the sheen at a manhole (BES, 2002).
- January 1999: Ten gallons of sulfuric acid spilled onto pavement as a result of approximately 300 damaged non-lead-type batteries. A portion of the acid reached a nearby catch basin (Exponent, 2001).

- March 1999: An onsite truck developed a leak in its fuel tank and approximately 5 gallons of diesel fuel were released to a storm drain. Later in the month, the U.S. Coast Guard (USCG) reported a large sheen in the street from another Freightliner truck. Freightliner cleaned the street (BES, 2002).
- December 1999: A forklift punctured two 55-gallon barrels containing ketone-ester based solvent/thinner. Approximately 50 gallons spilled onto the pavement, a portion of which reached a nearby storm drain. A RCRA inspection was also performed in December. A Notice of Non-Compliance was issued (Exponent, 2001).
- April 2002: Report of a diesel spill from a Freightliner truck near Fathom and Basin. Foss was called to clean the street, although there was very little to cleanup. There was a sheen for approximately 5 blocks (Exponent, 2001).

The TMP became of further interest to DEQ and EPA after the two sediment investigations were performed in 1997 by EPA/Weston, Inc., and in 1998 by the Port of Portland and Cascade General.

Sediment samples for this site were collected in the Swan Island Lagoon. Several different constituents were detected above Portland Harbor Baseline levels in the collected sediment samples. Based on these results, DEQ identified the following constituents as a possible concern for the TMP: barium, cadmium, copper, iron, lead, mercury, zinc, 4-methylphenol, bis (2-ethylhexyl) phthalate, butylbenzylphthalate, di-n-butylphthalate, and high molecular-weight-polycyclic hydrocarbons (HPAHs). In 1999, DEQ requested that a PA be performed for the site.

A PA was submitted to DEQ in November 2001. As documented in a letter from DEQ dated February 6, 2002 (DEQ, 2002a), the PA submitted to DEQ was insufficient because the PA did not include an evaluation of all possible constituents. DEQ requested that a revised PA be submitted to DEQ by March 8, 2002. The DEQ ECSI files did not have record of a revised PA being submitted.

In August 2002, DEQ and Freightliner began investigating new information regarding past disposal practices conducted at Freightliner. Former Freightliner employees claim that during the 1970s, process waste (some suspected to contain paint solids) were disposed of in drums and pits behind the facility located at 6936 N. Fathom Street. A geophysical investigation was performed in August and September 2002 to determine the extent of buried drums. Limited soil and groundwater sampling was performed in October 2002. Results indicated localized soil and groundwater impacts. Freightliner is planning to excavate the buried drums and debris in December 2002 and January 2003 (DEQ, 2002b).

Summary

Limited activities have been performed to determine the extent to which the Freightliner TMP site has contributed or is currently contributing to the sediment contamination found adjacent to the M-1 outfall. Based on site history, a variety of chemicals or hazardous substances related to the site may potentially have contaminated stormwater. Drains within active portions of the manufacturing building were previously connected to the stormwater sewer. Additionally, past practices such as paint removal, steam

cleaning, operations at the former acid dip tank, spills, and other activities may have contributed to stormwater contamination. Although plant personnel claim that best management practices have always been used, no confirmative sampling of potential source areas has been performed and recent discoveries (buried drums and discharge pits) may suggest otherwise. According to the PA, there are secondary containment systems currently in place, including oil/water separators, run-on/runoff collection and inspection, and spill management.

References

City of Portland Bureau of Environmental Services (BES). 2002. *Pollution Complaints* Table 2002.

Department of Environmental Quality (DEQ). 2002a. *Letter regarding Focused Preliminary Assessment*. February 2002.

Department of Environmental Quality. 2002b. Fact Sheet: "Freightliner Plans Removal Action at Truck Manufacturing Plant." December 2002.

Exponent. 2001. *Focused Preliminary Assessment*. November 2001.

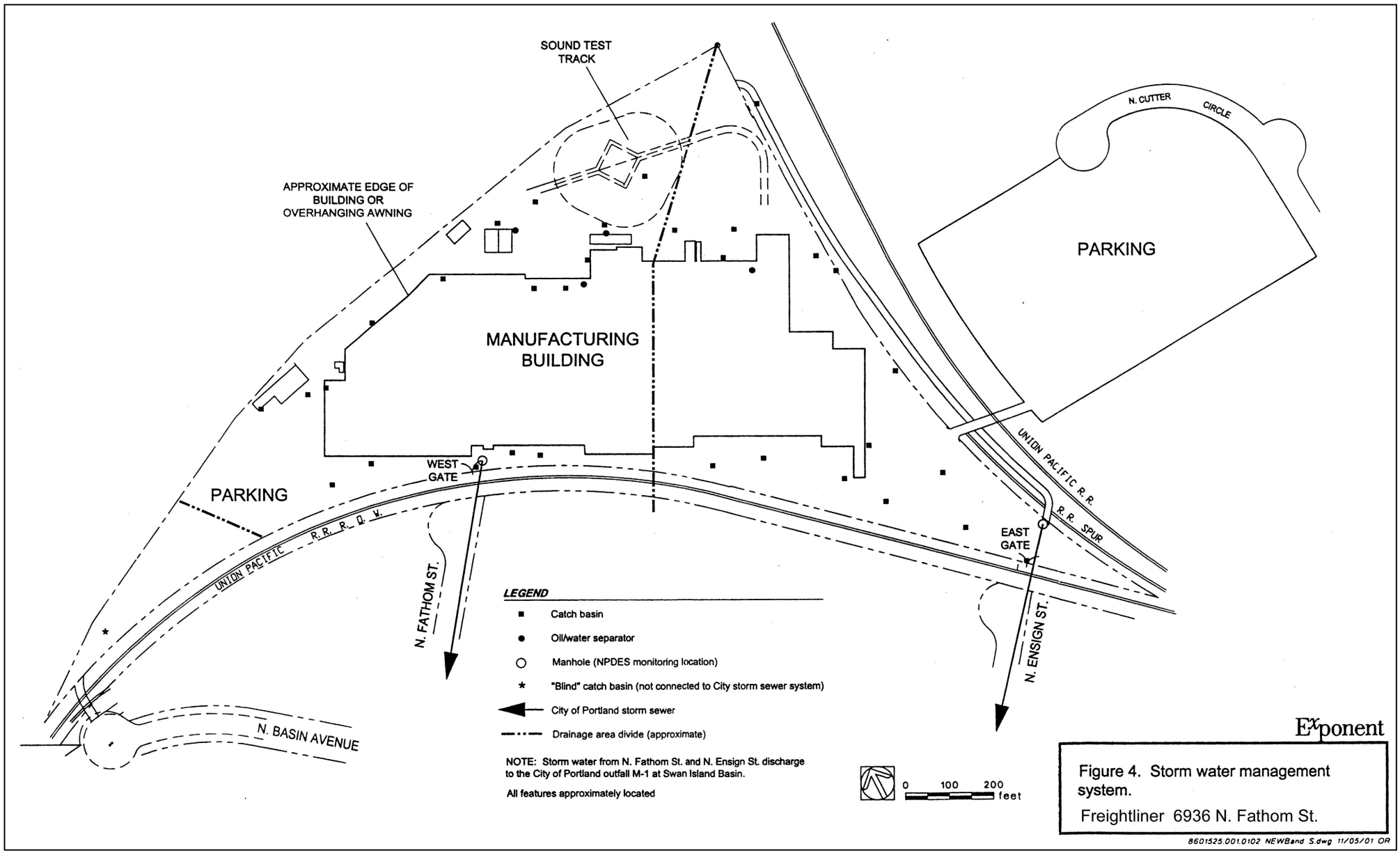
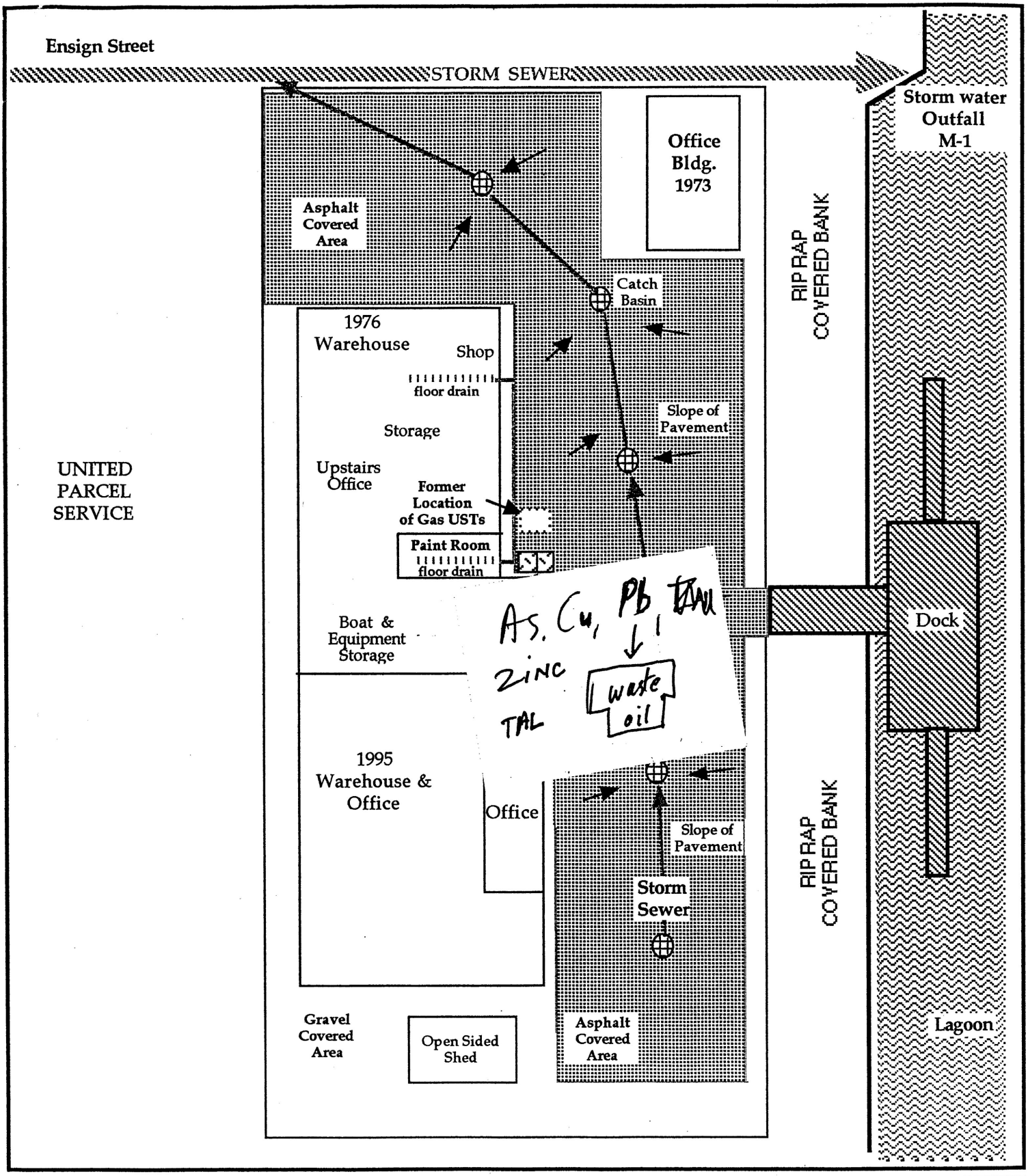

SOUND TEST TRACK
APPROXIMATE EDGE OF BUILDING OR OVERHANGING AWNING
MANUFACTURING BUILDING
PARKING
N. CUTTER CIRCLE
PARKING
WEST GATE
EAST GATE
UNION PACIFIC R.R.
R.R. SPUR
UNION PACIFIC R.R.R.O.W.
N. FATHOM ST.
N. ENSIGN ST.
N. BASIN AVENUE
LEGEND
Catch basin
Oil/water separator
Manhole (NPDES monitoring location)
"Blind" catch basin (not connected to City storm sewer system)
City of Portland storm sewer
Drainage area divide (approximate)
NOTE: Storm water from N. Fathom St. and N. Ensign St. discharge to the City of Portland outfall M-1 at Swan Island Basin.
All features approximately located
0 100 200 feet
Exponent
Figure 4. Storm water management system.
Freightliner 6936 N. Fathom St.
8601525.001.0102 NEWBand S.dwg 11/05/01 OR

Figure 1



EVERGREEN ENVIRONMENTAL MANAGEMENT, INC.
P.O. Box 1604
Beaverton, OR 97075-1604

FIGURE NO. 5 Project #01-06
Project Site Map
Fred Devine Diving & Salvage Facility
6211 N Ensign Drive
Portland, Oregon

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Northwest Region Portland Office
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September 17, 2002

Mr. J. (Mick) Leitz
Fred Devine Diving and Salvage, Inc.
6211 N. Ensign Street
Portland, OR 97217

Re: DEQ Comments
Subsurface Soil & Catch Basin Debris Sampling
Fred Devine Diving and Salvage Site
ECSI #794

Dear Mr. Leitz:

This letter contains the Department of Environmental Quality's (DEQ) comments to the above-referenced report prepared by Evergreen Environmental Management and dated August 26, 2002.

General Comments

1) Because the investigation objectives were not documented in the work plan it would be helpful to state them in the revised report, and how successful the investigation was in meeting these objectives. The main objective of the soil sampling and catch basin sediment sampling was to determine the types of contaminants present, and to evaluate pathways through which those contaminants could reach the river. A secondary objective was to compare the types of contaminants detected on site to those detected at elevated levels in river sediment in order determine if the site historically may have contributed to river sediment contamination. A third objective was to identify potential contaminant sources to focus best management practices in order to eliminate or reduce contaminant concentrations potentially migrating from the site.

2) The concentrations of metals, phthalates and polycyclic aromatic hydrocarbons (PAHs) in catch basin sediment are elevated with respect to sediment screening criteria. Detection limits for a number of SVOC compounds were elevated, so other contaminants could be present at significant levels. The PAHs flouranthene and phenanthrene were detected at elevated levels in samples collected from the catch basin, near the FDDS dock, and outfall M-1. These data suggest a potential link between site contaminants and river sediment and emphasize the need for preventative measures to ensure future potential sediment impacts are negated or minimized.

3) There are a number of errors in the analytical data tables. Marked up copies have been attached for reference. Of particular note are reported values for bis(2-

chloroisopropyl)ether in the catch basin #4 sample. A review of the laboratory data sheets shows that this compound was not detected. However, butylbenzylphthalate was detected, and it appears that the reported concentrations of bis(2-ethylhexyl)phthalate and butylbenzylphthalate have been transposed in the data tables presented in the report.

4) A brief summary of quality assurance/quality control (QA/QC) should be provided in the report. Of particular concern are the elevated detection limits for some semi-volatile organic compounds (SVOCs) and polychlorinated bi-phenyls (PCBs), which appear to occur as a result of sample dilution prompted by matrix interference. The nature of the matrix interference (e.g., total petroleum hydrocarbons) also should be discussed. The summary should include a discussion of the detection limits that exceeded applicable screening levels.

5) In comments to the Preliminary Assessment report, DEQ requested documentation for disposal of the material that accumulates in the oil water separator. These records should be included in the revised report.

Specific Comments

1) Page 1, *Catch Basin Sampling*

Catch basin designations should be included on Figure 2. The method for catch basin cleaning should be described in greater detail. Catch basin sediment and water disposal records should be included in the revised report. The configuration of the storm system inlets and outlets should be discussed (i.e., where are they with respect to bottom of the catch basin?).

2) Page 2, *Sub-Surface Soil Sampling*

The coordinates of soil samples #1 and #2 do not seem to correlate with sample locations shown on Figure 2. The sample locations' distance and direction from the reference point should be checked.

During my site visit on April 18, 2002, I recall specifying a sample location at the southwest corner of the property adjacent to the steep break in slope down to the river. This sample location was selected to assess possible contaminant transport to the river via overland flow. None of the sample locations shown on Figure 2 are in this area.

3) Page 4, *Laboratory Analytical Results*

Although there were no laboratory detections of PCBs, and limited detections of polycyclic aromatic hydrocarbons (PAHs), elevated detection limits due to matrix interference should be discussed and compared to screening levels cited in the report (e.g., some detection limits are above DEQ Screening Level Values for freshwater sediment).

The discussion of SVOCs should be modified to reflect the detection of butylbenzylphthalate, and references to bis(2-chloroisopropyl)ether should be deleted.

4) Page 5, *Total Metals*

Because the soil samples were collected beneath a gravel layer the text states that "it appears unlikely that the soil has been subject to impact by industrial or commercial activities". The aerial photo from 1986 shows what appears to be an area of black staining on soil adjacent to the west of an open-sided shed. The northeast end of the site, including the stained area, appears to be covered with gravel in the 1994 aerial photo. Therefore it is possible that soil was impacted prior to emplacement of the gravel cover in the late 1980s or early 1990s. The gravel cover likely would inhibit mobilization of soil contaminants.

The text makes an argument that because Mocks Bottom was constructed of dredge spoils that "total metals detected in subsurface soil samples may be typical for the Mocks Bottom area". Sediment analytical data collected from the Portland Harbor area by EPA does not support this conclusion. Most of the metal concentrations detected in site soil are significantly higher that the Portland Harbor baseline concentrations. Until a study has been conducted that determines "average" Mock's Bottom soil concentrations, DEQ will evaluate metal concentrations in soil through comparison with Clark County metals data.

The detected metals concentrations in SS#1 are elevated with respect to DEQ SLVs and Portland Harbor Baseline concentrations, and are similar to concentrations reported for sediment sample PSY-12 collected adjacent to the FDDS dock. These data suggest that migration of site soil to the river via erosion and runoff may have contributed to contamination in river sediment in the past. However, it appears that the compact gravel layer at the site largely eliminates this type of contaminant transport, although historical impacts prior to emplacement of the gravel cover cannot be ruled out.

5) Page 6, *Clark County Background Levels*

Washington Department of Ecology (WDOE) background soil metal concentrations for Clark County are commonly used to assess "background" concentrations because they were determined from a statistically significant population of 5 samples collected from undisturbed or undeveloped areas. Until such data is compiled for Oregon soil, DEQ considers the Clark County data suitable for screening level assessments. Although the Columbia River and Willamette River have different drainage basins, historical catastrophic flooding of the Columbia River has distributed sediment over the region that has since commingled with Willamette River basin sediments. Many terrace deposits in the Portland metropolitan area are comprised of catastrophic flood deposits originating in the Columbia basin.

DEQ also has considered metals concentrations in a sample of silt collected by the United States Geological Survey (USGS, 1981) in Corbett, Oregon as a reference sample for background metals concentrations in Multnomah County. A comparison of selected metal concentrations in this sample to the Clark County data is presented below. Because the USGS data are from a single sample, DEQ generally prefers to use Clark County concentrations for site screening.

Comparison of Reference Metal Concentrations (mg/kg)

	Clark County (5 samples)	USGS* (1 sample)
Arsenic	6	4.4
Cadmium	1	NA
Chromium	27	100
Copper	34	20
Lead	17	20
Nickel	21	30
Zinc	96	88

NA – Not Analyzed

* USGS (United States Geological Survey), 1981, *Chemical Analyses of Soils and Other Surficial Materials of the Conterminous United States, Josephine G. Boerngen and Hansford T. Shackette, U.S.G.S. Open file Report 81-197.*

6) Page 8, *EPA Preliminary Remediation Goals for Industrial Soil*

The reference to bis(2-chloroisopropyl) should be deleted. It should be noted that laboratory detection limits for a number of carcinogenic PAHs are above their respective EPA Region IX Preliminary Remediation Goals (PRGs).

7) Page 11, Third Paragraph.

On Table 5 the Portland Harbor reference concentration and sediment data for PAHs are shown in parts per billion, which should be divided by 1,000 for comparison with site PAH data. Both low and high molecular weight PAH concentrations in catch basins #3 and #4 exceeded their respective Portland Harbor reference concentrations by at least an order of magnitude.

8) Page 15, *Site Best Management Practices.*

This section describes a number of Best Management Practices (BMPs) such as catch basin cleaning, sorbent boom placement in catch basins, and deployment of drip pans under leaking vehicles. A more detailed discussion of site activities should be presented, including a description of materials stored at the site, vehicle washing locations and procedures, and painting or sandblasting, to determine if other BMPs may be warranted.

Conclusion/Recommendations

Based on the observed sheen and analytical detections in two catch basin samples, it appears the shop and maintenance area activities are contributing PAHs and possibly metals to the storm drain system. Due to reported laboratory interferences during analysis it is likely that catch basin sediment contains potentially significant levels of other SVOCs or total petroleum hydrocarbons (TPH). Potential sources of petroleum contamination appear to be maintenance activities, small-scale drips and spills during petroleum handling, and/or runoff from the parking areas. Phthalates are associated with plastics. Possible sources of the phthalate compounds could be leaching of plastic pipes or sheeting or plastic particulates. Some types of sampling gloves also can be phthalate sources, and some catch basin systems are coated with plastic. Future source control measures and best management practices should focus on these potential sources.

Elevated metal concentrations in site soil suggest that, prior emplacement of the gravel cover, historical erosion and runoff may have contributed metals to river sediment. However, it does not appear that this is currently a complete contaminant pathway.

DEQ requests that the report be revised to reflect DEQ comments. DEQ concurs with the quarterly cleaning schedule and best management practices recommended in the report, although a more detailed evaluation of specific site activities and possibly additional BMPs should be included. DEQ further requests that these recommendations be incorporated into a source control plan with a schedule and/or documentation for the proposed tasks. Periodic sampling should be maintained to evaluate the effectiveness of the source control plan and best management practices. The source control plan can be incorporated in the revised report or submitted under separate cover.

Please contact me at (503) 229-5587 if you have questions regarding DEQ's comments or expectations for further site work.

Sincerely,

Mark Pugh, R.G.
Project Manager
Cleanup/Portland Harbor

Attachment

cc: Eric Blischke, Coordinator, Portland Harbor Study Area (w/o attach.)
Todd Zilbert, Wood Tatum Sanders & Murphy (w/attach.)
David Samples, Evergreen Environmental Management, Inc. (w/attach.)
ECSI file #794

TABLE 1
SOIL SAMPLING ANALYTICAL RESULTS
Fred Devine Salvage
6211 N. Ensign Street, Portland, Oregon

Sample Identification	Date Collected	PCBs[a] parts per billion	BNA Semi-Volatile Organic Compounbds[b] parts per million	Total Metals[c] parts per million
Catch Basin #1	4/30/02	ND[d]	Bis(2-ethylhexyl)phthalate - 27.6 ✓	Arsenic - 16.7 ✓ Cadmium - 2.25 ✓ Copper - 206 ✓ Lead - ~~228~~ 226 Zinc - 477 ✓
Catch Basin #3	4/30/02	ND	Bis(2-ethylhexyl)phthalate - 172 ✓ Fluoranthene - ~~15.3~~ 16.3 Phenanthrene - 12.1 ✓ Pyrene - 5.90 8.9 18.7	Arsenic - 5.98 ✓ Cadmium - 2.7~~0~~5 Copper - 172 ✓ Lead - 176 ✓ Zinc - 365 ✓
Catch Basin #4	4/30/02	ND	Bis(2-ethylhexyl)phthalate - ~~27.2~~ ~~Bis(2-chloroisopropyl)ether~~ - ~~18.7~~ butylbenzylphthalate - 272 Anthracene - 16.7 ✓ Fluoranthene - 18.7 ✓ Fluorene - 6.73 ✓ Phenanthrene - 20 ✓ Pyrene - 12.5 ✓	Arsenic - 9.05 ✓ Cadmium - 3.47 ✓ Copper - 202 ✓ Lead - ~~253~~ 203 Zinc - 488 ✓
Catch Basin #6	4/30/02	ND	ND	Arsenic - 2.71 ✓ Cadmium - ND ✓ Copper - 85.5 ✓ Lead - 66.6 ✓ Zinc - 236 ✓
SS #1	4/30/02	ND	Bis(2-ethylhexyl)phthalate - 0.0817 ✓	Arsenic - 17.9 ✓ Cadmium - 1.45 ✓ Copper - 98.8 ✓ Lead - 57.6 ✓ Zinc - 288 ✓
SS #2	4/30/02	ND	ND	Arsenic - 2.12 ✓ Cadmium - ND ✓ Copper - 19.7 ✓ Lead - 3.59 ✓ Zinc - 47.7 ✓
SS #3	4/30/02	ND	ND	Arsenic - 5.07 ✓ Cadmium - 1.35 ✓ Copper - 33.2 ✓ Lead - 10.2 ✓ Zinc - 97.5 ✓
SS #4	4/30/02	ND	ND	Arsenic - 2.53 Cadmium - ND Copper - 39.2 Lead - 25.7 Zinc - 164

a Polychlorinated Biphnyls by EPA Method 8082A. Method Detection Level was 500 parts per billion.

b BNA Semi-Volatile Organics by EPA Method 8270C. Method Detection Levels ranged from 6.7 to 13.4 parts per million.

c Total Metals by EPA 6010B. Method Detection Level was 1.0 ppm.

d ND = None Detected above Method Detection Levels.

TABLE 5
SOIL SAMPLING ANALYTICAL RESULTS
Fred Devine Salvage
6211 N. Ensign Street, Portland, Oregon

Sample Identification	Date Collected	BNA Semi-Volatile Organic Compounds[b] parts per million	Low PAHs parts per million	High PAHs parts per million
Catch Basin #1	4/30/02	Bis(2-ethylhexyl)phthalate - 27.6	0	0
Catch Basin #3	4/30/02	Bis(2-ethylhexyl)phthalate - 172 ✓ Fluoranthene - ~~15.3~~ 10.3 Phenanthrene - 12.1 ✓ Pyrene - ~~5.90~~ 8.90	Total of 12.1 ✓	Total of ~~21.2~~ ~~33.2~~ 30.2 25.2
Catch Basin #4	4/30/02	Bis(2-ethylhexyl)phthalate - ~~27.2~~ 18.7 ~~Bis(2-chloroisopropyl)ether - 18.7~~ Anthracene - 16.7 ✓ Fluoranthene - 18.7 ✓ Fluorene - 6.73 ✓ Phenanthrene - 20 ✓ Pyrene - 12.5 ✓	Total of 43.43 ✓	Total of ~~20.2~~ 31.2
Catch Basin #6	4/30/02	~~ND~~	0	0
SS #1	4/30/02	Bis(2-ethylhexyl)phthalate - 0.0817	0	0
SS #2	4/30/02	ND	0	0
SS #3	4/30/02	ND	0	0
SS #4	4/30/02	ND	0	0
SD129	1997		.433	2.474
PSY12	1997		2.433	17.268
SD136	1997		.129	1.025
SD136-c	1997		.061	0.577
Apparent Portland Harbor Sediment Baseline Max Value			0.700	2.400

a Polychlorinated Biphenyls by EPA Method 8082A. Method Detection Level was 500 parts per billion.

b BNA Semi-Volatile Organics by EPA Method 8270C. Method Detection Levels ranged from 6.7 to 13.4 parts per million.

c Total Metals by EPA 6010B. Method Detection Level was 1.0 ppm.

d ND = None Detected above Method Detection Levels.

ppm
22.5 - 100 ppm

TABLE 5
SOIL SAMPLING ANALYTICAL RESULTS
Fred Devine Salvage
6211 N. Ensign Street, Portland, Oregon

Sample	Date	BNA Semi-Volatile Organic	Low PAHs	High PAHs

TABLE 2a
COMPARISON OF CATCH BASIN DEBRIS SAMPLING ANALYTICAL RESULTS FOR TOTAL METALS TO DEQ SUPPLIED DATA
Fred Devine Salvage
6211 N. Ensign Street, Portland, Oregon

Sample Identification	Date Collected	Clark County, Washington Natural Metals Background Levels Parts per Million	Total Metals parts per million	DEQ Level II Screening Level Values for Freshwater Sediments	Total Metals parts per million	EPA Preliminary Remediation Goals Industrial Soil parts per million	Total Metals parts per million	NOAA SQUIRTa Values Freshwater Sediment parts per billion	Total Metals Originally reported in parts per million but converted to parts per billion for comparison purposes
Catch Basin #1	4/30/02	**Arsenic - 6.0** **Cadmium - 1.0** **Copper - 34.0** **Lead - 17.0** **Zinc - 96**	Arsenic - 16.7 Cadmium - 2.25 Copper - 206 Lead - ~~228~~ 226 Zinc - 477	**Arsenic - 6.0** **Cadmium - 0.6** **Copper - 36.0** **Lead - 35.0** **Zinc - 123**	Arsenic - 16.7 Cadmium - 2.25 Copper - 206 Lead - 228 Zinc - 477	**Arsenic - 440** **Cadmium - 810** **Copper - 76,000** **Lead - 750** **Zinc - 10,000**	Arsenic - 16.7 Cadmium - 2.25 Copper - 206 Lead - 228 Zinc - 477	**Arsenic - 17,000** **Cadmium - 3,530** **Copper - 197,000** **Lead - 91,300** **Zinc - 315,000**	Arsenic - 16,700 Cadmium - 2,250 Copper - 206,000 Lead - 228,000 Zinc - 477,000
Catch Basin #3	4/30/02		Arsenic - 5.98 Cadmium - 2.765 Copper - 172 Lead - 176 Zinc - 365		Arsenic - 5.98 Cadmium - 2.76 Copper - 172 Lead - 176 Zinc - 365		Arsenic - 5.98 Cadmium - 2.76 Copper - 172 Lead - 176 Zinc - 365		Arsenic - 5,980 Cadmium - 2,760 Copper - 172,000 Lead - 176,000 Zinc - 365,000
Catch Basin #4	4/30/02		Arsenic - 9.05 Cadmium - 3.47 Copper - 202 Lead - ~~253~~ 283 Zinc - 488		Arsenic - 9.05 Cadmium - 3.47 Copper - 202 Lead - 253 Zinc - 488		Arsenic - 9.05 Cadmium - 3.47 Copper - 202 Lead - 253 Zinc - 488		Arsenic - 9,050 Cadmium - 3,470 Copper - 202,000 Lead - 253,000 Zinc - 488,000
Catch Basin #6	4/30/02		Arsenic - 2.71 Cadmium - ND Copper - 85.5 Lead - 66.6 Zinc - 236		Arsenic - 2.71 Cadmium - ND Copper - 85.5 Lead - 66.6 Zinc - 236		Arsenic - 2.71 Cadmium - ND Copper - 85.5 Lead - 66.6 Zinc - 236		Arsenic - 2,710 Cadmium - ND Copper - 85,500 Lead - 66,600 Zinc - 236,000

GREEN TEXT INDICATES AGENCY TABLE VALUES

RED TEXT INDICATES WHICH SAMPLING ANALYTICAL RESULT IS IN EXCESS OF THAT AGENCY'S TABLE VALUE

a Polychlorinated Biphenyls by EPA Method 8082A. Method Detection Level was 500 parts per billion.

b BNA Semi-Volatile Organics by EPA Method 8270C. Method Detection Levels ranged from 6.7 to 13.4 parts per million.

c Total Metals by EPA 6010B. Method Detection Level was 1.0 ppm.

d ND = None Detected above Method Detection Levels.

ppm
22.5 - pec

TABLE 5
SOIL SAMPLING ANALYTICAL RESULTS
Fred Devine Salvage
6211 N. Ensign Street, Portland, Oregon

TABLE 3a
COMPARISON OF CATCH BASIN DEBRIS SAMPLING ANALYTICAL RESULTS FOR SEMI-VOLATILE ORGANIC COMPOUNDS TO DEQ SUPPLIED DATA
Fred Devine Salvage
6211 N. Ensign Street, Portland, Oregon

Sample Identification	Date Collected	DEQ Level II Screening Level Values for Freshwater Sediments parts per billion	BNA Semi-Volatile Organic Compounds Originally reported in parts per million but converted to parts per billion for comparison purposes	EPA Preliminary Remediation Goals Industrial Soil parts per million	BNA Semi-Volatile Organic Compounds parts per million	NOAA SQUIRTs Values Freshwater Sediment parts per billion	BNA Semi-Volatile Organic Compounds Originally reported in parts per million but converted to parts per billion for comparison purposes
Catch Basin #1	4/30/02	Bis(2-ethylhexyl)phthalate -750 ~~Bis(2-chloroisopropyl)ether - NA~~ Butylbenzylphthalate-NA Anthracene - 57 Fluoranthene - 111 Fluorene - 77 Phenanthrene - 42 Pyrene - 53	Bis(2-ethylhexyl)phthalate - 27,600	Bis(2-ethylhexyl)phthalate - 180 ~~Bis(2-chloroisopropyl)ether - 3.1~~ Butylbenzylphthalate - 100,000 Anthracene - 100,000 Fluoranthene - 30,000 Fluorene - 33,000 Phenanthrene -Not Listed Pyrene - 54,000	Bis(2-ethylhexyl)phthalate - 27.6	Bis(2-ethylhexyl)phthalate -NA Bis(2-chloroisopropyl)ether - NA Anthracene - NA Fluoranthene - 2,355 Fluorene - NA Phenanthrene - 515 Pyrene - 875	Bis(2-ethylhexyl)phthalate - 27,600
Catch Basin #3	4/30/02		Bis(2-ethylhexyl)phthalate - 172,000 Fluoranthene - ~~15,300~~ 16,300 Phenanthrene - 12,100 Pyrene - ~~5,900~~ 8,900		Bis(2-ethylhexyl)phthalate - 172 Fluoranthene - 15.3 Phenanthrene - 12.1 Pyrene - ~~5.90~~		Bis(2-ethylhexyl)phthalate - 172,000 Fluoranthene - 15,300 Phenanthrene - 12,100 ~~Pyrene - 5,900~~
Catch Basin #4	4/30/02		Bis(2-ethylhexyl)phthalate - ~~27,200~~ 18,700 ~~Bis(2-chloroisopropyl)ether - 18,700~~ Butylbenzylphthalate 27,200 Anthracene - 16,700 Fluoranthene - 18,700 Fluorene - 6,730 Phenanthrene - 20,000 Pyrene - 12,500	same	Bis(2-ethylhexyl)phthalate - ~~27.2~~ Bis(2-chloroisopropyl)ether - 18.7 Anthracene - 16.7 Fluoranthene - 18.7 Fluorene - 6.73 Phenanthrene - 20 Pyrene - 12.5	same	Bis(2-ethylhexyl)phthalate - 27,200 Bis(2-chloroisopropyl)ether - 18,700 Anthracene - 16,700 Fluoranthene - 18,700 Fluorene - 6,730 Phenanthrene - 20,000 Pyrene - 12,500
Catch Basin #6	4/30/02		ND		ND		ND

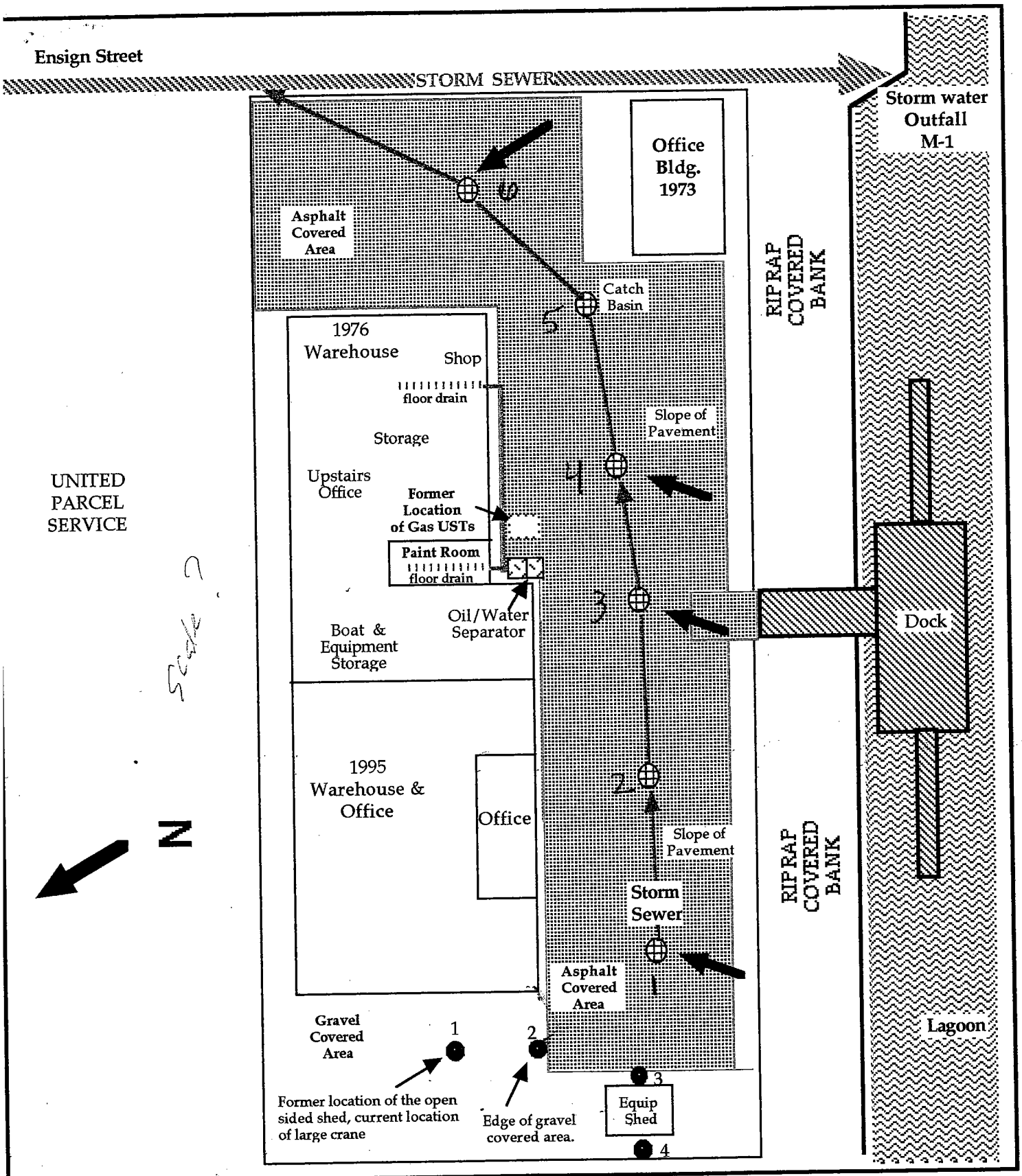
GREEN TEXT INDICATES AGENCY TABLE VALUES

RED TEXT INDICATES WHICH SAMPLING ANALYTICAL RESULT IS IN EXCESS OF THAT AGENCY'S TABLE VALUE

TABLE 5
SOIL SAMPLING ANALYTICAL RESULTS
Fred Devine Salvage
6211 N. Ensign Street, Portland, Oregon

TABLE 4a
COMPARISON OF CATCH BASIN SAMPLING ANALYTICAL RESULTS TO
AGENCY COLLECTED LAGOON SEDIMENT SAMPLING DATA
Fred Devine Salvage
6211 N. Ensign Street, Portland, Oregon

Contaminant	Catch Basin #1	Catch Basin #3	Catch Basin #4	Catch Basin #6	Northwest SD129	PSY12	SD136	SD136C	Apparent Portland Harbor Sediment Baseline Maximum Value
PCBs (parts per billion)	ND	ND	ND	ND	NA	ND	NA	NA	<180
Total Metals (parts per million)									
Arsenic	16.7	5.98	9.05	2.71	<6	17	<7	<4	<5
Cadmium	2.25	2.7	3.47	ND	0.7	0.4	1	0.8	0.6
Copper	206	172	202	85.5	131	119	82	43	60
Lead	228	176	~~253~~ 253	66.6	38	27	24	27	30
Zinc	477	365	488	236	279	264	178	116	118
Semi-Volatile Organic Compounds (parts per billion)			18,700				2,100		
Bis(2-ethylhexyl)phthalate*	27,600	172,000	~~27,200~~	ND	760	440	2.100	370	~~Not Listed~~ 390
~~Bis(2-chloroisopropyl)ether~~*	ND	ND	~~18,700~~	ND	~~ND~~ 74	ND	ND	ND	Not Listed <20
Anthracene*	ND	ND	16,700	ND	ND	ND	ND	ND	Not Listed
Fluoranthene*	ND	13,300	18,700	ND	ND	ND	ND	ND	Not Listed
Fluorene*	ND	ND	6,730	ND	ND	ND	ND	ND	Not Listed
Phenanthrene*	ND	12,100	20,000	ND	ND	ND	ND	ND	Not Listed
Pyrene*	ND	7,900	12,500	ND	ND	ND	ND	ND	Not Listed
2-Methylnaphthalene	ND	ND	ND	ND	26	20	<19	<19	150
4-Methylphenol	ND	ND	ND	ND	1,100	NA	380	<19	680
Benzoic Acid	ND	ND	ND	ND	<190	NA	<190	<190	<200



EVERGREEN ENVIRONMENTAL MANAGEMENT, LLC
P.O. Box 1604
Beaverton, OR 97075-1604

FIGURE NO. 2 Project #01-06
Project Site Map
Fred Devine Diving & Salvage Facility
6211 N Ensign Drive
Portland, Oregon