Volume I

Preliminary Sediment Assessment for PSDDA Parameters Weyerhaeuser East Site Everett, Washington

Prepared for

Weyerhaeuser Paper Company

Everett, Washington

PTI

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ENVIRONMENTAL SERVICES
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ACRONYMS AND ABBREVIATIONS

BT	bioaccumulation trigger
DGPS	differential global positioning system
DMMU	dredged material management unit
EPA	U.S. Environmental Protection Agency
HPAH	high molecular weight polycyclic aromatic hydrocarbon
LCS	laboratory control sample
LPAH	low molecular weight polycyclic aromatic hydrocarbon
ML	maximum level
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzo-*p*-dioxin
PCDF	polychlorinated dibenzofuran
Port	Port of Everett
PSDDA	Puget Sound Dredged Disposal Analysis
PSEP	Puget Sound Estuary Program
PTI	PTI Environmental Services
RPD	relative percent difference
SAP	sampling and analysis plan
SL	screening level
SVOC	semivolatile organic compound
VOC	volatile organic compound
Weyerhaeuser	Weyerhaeuser Paper Company

1. INTRODUCTION

This data report summarizes the methods, results, and conclusions of a preliminary assessment of sediment conditions in the Snohomish River offshore from the Weyerhaeuser East Site in Everett, Washington (Figure 1). The sediment study and this report were completed by PTI Environmental Services (PTI) on behalf of the Weyerhaeuser Paper Company (Weyerhaeuser). Weyerhaeuser and the Port of Everett (Port) are interested in assessing the likely suitability of sediments that may be dredged from the East Site for possible disposal at a Puget Sound Dredged Disposal Analysis (PSDDA) site in Puget Sound, in the event that the Port acquires the property for industrial redevelopment.

The goal of this investigation was to sample the uppermost 4 ft of sediments from 10 locations and to chemically analyze those sediments for the physical and chemical parameters required for evaluation of the sediments under the PSDDA program. The chemical concentrations in the sediments were compared with PSDDA screening levels, maximum levels, and bioaccumulation trigger values to provide a preliminary assessment of the likely suitability of the sediments for disposal at a PSDDA unconfined, open-water site (see Section 3.1). Although sometimes conducted as part of an actual PSDDA investigation, sediment toxicity tests were not included as part of this investigation. It is understood that because actual plans for any future dredging project have not been defined, the data resulting from this investigation will not be submitted to the PSDDA agencies. The results of this investigation are not likely to be directly applicable to a specific dredging project in the future, although they can be used as a general indication of the likely suitability of the sediments for disposal at a PSDDA site in Puget Sound.

2. METHODS

An overview of the sediment sample collection and chemical analyses is provided in this section. Sample collection and analysis procedures used in this study follow current guidelines of the U.S. Environmental Protection Agency (EPA) Region 10 and the Puget Sound Estuary Program (PSEP). Detailed sample collection and analysis procedures are described in the sampling and analysis plan (SAP) for this investigation (PTI 1996).

2.1 SEDIMENT SAMPLE COLLECTION

Collection of sediment cores was conducted from July 10–11, 1996 aboard the *Adventure*, with Ms. Jane Sexton of PTI serving as chief scientist. A cruise report is provided in Appendix A. Sediment core samples were collected at 10 stations (Figure 2) using a vibrocore deployed from an A-frame. Stations that were intended to assess potential effects from shoreline sources (e.g., storm water outfalls) were generally located within 20 ft of the bulkhead and downstream from the potential source. Although the intent was to locate those stations approximately 50 ft downstream of the potential source, conditions encountered in the field necessitated repositioning two stations. Station WE-03 was repositioned approximately 150 ft downstream from Outfall SW5 as a result of excessive core compaction encountered during sampling attempts closer to the outfall. Station WE-04 was repositioned approximately 100 ft downstream from Outfall SW4 as a result of wood debris and deadheads closer to the outfall. All other station locations approximated those planned in the SAP (PTI 1996). A differential global positioning system (DGPS) was used to establish coordinates for all stations (Table 1).

The uppermost 4 ft of sediments from each core were retained for analysis. If the vibrocore failed to retrieve a sediment core of sufficient length, the sample was rejected and another attempt was made to collect a sediment core at that station. Equipment was decontaminated between stations according to procedures specified in the SAP (PTI 1996). A summary of samples collected at each station is presented in Table 1. All station and sample logs are provided in Appendix B, and sediment core sample descriptions are provided in Appendix C.

A layer of sand near the top of the sediment core was observed at Stations WE-03, WE-09, and WE-10. This layer of sand apparently caused increased compaction of the underlying sediments in the core tube. Several sediment cores collected at these stations were discarded because of this apparent compaction problem and the resulting poor core retention.

Deviations from the SAP (PTI 1996) included the following items:

- The specified minimum of 4 ft (48 in.) of recovered sediment was not obtained at Stations WE-03, WE-05, WE-09. As specified in the SAP, the PTI project manager was notified and a sediment recovery range of 3.5–4 ft (42–48 in.) was approved. All sediment cores submitted for analysis were within this approved range.
- Station positioning photographs were only taken if PTI's chief scientist determined that the photographs would provide useful information. Photographs taken during the sampling event are on file at PTI's Bellevue office.

The sediment cores were kept in the core liners on ice until they were extruded onshore at PTI's field office on July 12, 1996. Subsamples to be submitted for total sulfides, total volatile solids, and volatile organic compound (VOC) analyses were packed into sample jars with no headspace prior to compositing the remaining sediments. The remaining sediments from each core were homogenized using stainless steel bowls and spoons. To avoid loss of substance, any overlying water in sediment was mixed into the sample before compositing. The 10 samples were submitted for laboratory analysis to the Weyerhaeuser Chemical Analytical Laboratory located in Federal Way, Washington, immediately following sample preparation on July 12, 1996. The sediment samples were stored at 4°C until their delivery to the testing laboratory.

2.2 CHEMICAL ANALYSES

Analytical procedures were conducted in accordance with requirements specified in the selected methods, as outlined in the SAP (PTI 1996). All samples were submitted for the following analyses:

- Selected metals
- Selected VOCs
- Selected semivolatile organic compounds (SVOCs) (i.e., selected acid/base/neutral compounds)
- Organochlorine pesticides and polychlorinated biphenyls (PCBs)
- Polychlorinated dibenzo-*p*-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs)
- Ammonia
- Total sulfides

- Total organic carbon (TOC)
- Total volatile solids (TVS)
- Total solids
- Grain-size distribution.

All analyses for organic and inorganic compounds, except for conventional parameters, were performed in accordance with procedures established by EPA SW-846 Methods (U.S. EPA 1986 and updates I and II), as modified by PSEP (1989a,b). Conventional analyses (i.e., ammonia, total sulfides, TOC, TVS, total solids, and grain-size distribution) were performed in accordance with standard methods specified by PSEP (1986) or U.S. EPA (1983). The results of these analyses are presented in the following section.

3. RESULTS

Results of the chemical analyses are presented in Section 3.1 and a summary of the results of the quality assurance review is provided in Section 3.2. Chain-of-custody records are provided in Appendix D. Laboratory data reports are provided in Appendix E.

3.1 ANALYTICAL RESULTS

Table 2 presents comparisons between the chemical results (dry-weight basis) and PSDDA screening levels, bioaccumulation trigger values, and maximum levels. Results are discussed below for each category of chemical analysis.

3.1.1 Selected Metals

With only one exception, all metal concentrations were below the PSDDA screening levels. The exception, Station WE-05, had a zinc concentration only slightly exceeding the PSDDA screening level.

3.1.2 Selected Semivolatile Organic Compounds

SVOC concentrations were generally low at Stations WE-01, WE-03, WE-05, WE-06, WE-07, WE-09, and WE-10. No PSDDA screening levels were exceeded at Stations WE-01, WE-03, WE-07, WE-09, and WE-10, and only a single compound exceeded a PSDDA screening level at Stations WE-05 and WE-06 (acenaphthene and indeno[1,2,3-cd]pyrene, respectively).

Station WE-02 had a total concentration of low molecular weight polycyclic aromatic hydrocarbon (LPAH) compounds that exceeded the PSDDA maximum level for that class of compounds. The majority of the LPAH compounds was comprised of naphthalene and 2-methylnaphthalene, which both exceeded the PSDDA maximum levels for those compounds. In addition, acenaphthene and indeno[1,2,3-cd]pyrene were detected at Station WE-02 at concentrations exceeding the PSDDA screening levels for those compounds.

Station WE-04 had a total concentration of LPAH compounds exceeding the PSDDA screening level for that class of compounds, with the individual LPAH compounds acenaphthene, fluorene, and phenanthrene exceeding the corresponding PSDDA screening levels for each individual compound. Pyrene was also detected at Station WE-04 at a concentration slightly exceeding the PSDDA screening level for that compound.

Finally, acenaphthene was detected at Station WE-08 at a concentration slightly exceeding the PSDDA screening level. Station WE-08 also had a total concentration of high molecular weight PAH (HPAH) compounds exceeding the PSDDA screening level for that class of compounds, and the concentrations of both pyrene and indeno[1,2,3-cd]pyrene exceeded the corresponding PSDDA screening levels for each individual compound.

No other semivolatile organic compounds were detected at concentrations exceeding the PSDDA screening levels.

3.1.3 Selected Volatile Organic Compounds

Station WE-02 had a concentration of ethylbenzene that exceeded both the PSDDA screening level and bioaccumulation trigger level, and a concentration of total xylenes that slightly exceeded the PSDDA screening level. No other VOCs were detected at concentrations exceeding the PSDDA screening levels.

3.1.4 Organochlorine Pesticides and Polychlorinated Biphenyls

No organochlorine pesticides or PCBs were detected at concentrations exceeding the method detection limits, which were well below the PSDDA screening levels.

3.1.5 Polychlorinated Dibenzo-*p*-dioxins and Polychlorinated Dibenzofurans

At the very low concentrations (ng/kg dry weight, parts per trillion) that can be detected in environmental samples, PCDDs and PCDFs are generally found to be ubiquitous in the environment. Not surprisingly, certain PCDD and PCDF congeners were detected in every sediment sample (Table 3). The concentrations of individual congeners were highly variable, however. Because there are no PSDDA criteria for PCDDs and PCDFs, there is no straightforward method available for judging the ecological significance of the reported PCDD and PCDF concentrations.

3.1.6 Ammonia

Sediment concentrations of ammonia were highly variable among stations, ranging from 4 N-mg/kg to 106 N-mg/kg.

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Sediment concentrations of ammonia were highly variable among stations, ranging from 4 N-mg/kg to 106 N-mg/kg.

3.1.7 Total Sulfides

Sediment concentrations of total sulfides ranged from 26 mg/kg to 72 mg/kg. The higher concentrations of total sulfides were generally found in sediments with higher TOC contents.

3.1.8 Total Organic Carbon

TOC contents of the sediments ranged from 1.04 percent to 5.56 percent. The highest TOC contents were found at Stations WE-02 and WE-06 (5.54 percent and 5.56 percent, respectively), and were likely associated with the wood debris noted in the sediment sample collected at each of these stations.

3.1.9 Total Volatile Solids and Total Solids

Percentages of TVS ranged from 2.7 to 16.0. Percentages of total solids ranged from 50.1 to 72.4.

3.1.10 Grain-Size Distribution

Sediment samples from Stations WE-07 and WE-08 were comprised primarily of fines (i.e., silt and clay), with 75.5 percent and 74.5 percent, respectively. Sediment samples from all other stations were predominantly made up of sand, with sand fractions ranging from 60.2 percent to 90.5 percent.

3.2 QUALITY ASSURANCE RESULTS

A quality assurance review was performed on the analytical data in accordance with the project data quality objectives specified in the SAP (PTI 1996). To assess the quality of

- Reviewing the results reported for all blank analyses to ensure that potential common laboratory contaminants did not result in the reporting of false positives in the natural samples.

- Assessing analytical accuracy in terms of the recovery of surrogate compound, matrix spike, and laboratory control sample (LCS) recoveries for the VOC, SVOC, organochlorine pesticides and PCBs, PCDD and PCDF, total solids (LCS only), TOC (LCS only), and ammonia (LCS only) chemical analyses.

- Assessing analytical precision in terms of the relative percent difference (RPD) between duplicate sample analyses for metals, TVS, total sulfides, TOC, ammonia, and total solids; the RPD between duplicate matrix spike analyses for VOC, SVOC, and organochlorine pesticides and PCBs; and, the RPD between duplicate LCS analyses for PCDD and PCDF analyses. Analytical precision for grain-size distribution analyses was quantified as the relative standard deviation between triplicate sample analyses.

- Assessing internal standard performance for VOC, SVOC, and PCDD/PCDF analyses.

- Verifying that target detection limits were met.

Data qualifiers were assigned during the data review, as necessary, to results for which specific quality control acceptance limits were not met. The results of all conventional analyses (i.e., ammonia, total sulfides, TOC, TVS, total solids, grain-size distribution), as well as the results of the analyses of organochlorine pesticides and PCBs, were acceptable without qualification. Exceedances of specific method quality control acceptance limits for the other analyses are summarized below.

3.2.1 Selected Metals

All results reported for antimony, arsenic, and copper were qualified during the data review. All results reported for antimony were rejected because the recovery of this analyte in the matrix spike analysis was extremely low (0 percent). All results reported for arsenic were qualified as estimated because the recoveries for the initial (122 percent) and final (128 percent) contract required detection limit standard exceeded the upper quality control acceptance limit of 120 percent. All results reported for copper were qualified as estimated because the recovery of this analyte in the matrix spike analysis (56 percent) was below the lower quality control acceptance limit of 75 percent. The potential effects of these departures from quality control acceptance limits are that arsenic results may be slightly biased high and copper results may be biased low, although the magnitude of such potential effects would not likely change conclusions based on comparisons with the PSDDA values.

3.2.2 Selected Semivolatile Organic Compounds

The results reported for all SVOC target analytes in Sample SD0004 were qualified as estimated because the sample was extracted 11 days after the 14-day holding time criterion. This sample required re-extraction because the original sample extract, which was extracted within the holding time criterion, was inadvertently spiked with the matrix spiking compounds. Such an exceedance of the 14-day holding time is unlikely to result in substantially different analytical results for the targeted analytes.

Detected concentrations of bis(2-ethylhexyl)phthalate that were reported for all samples except Samples SD0002, SD0006, and SD0007 were restated as undetected (a *U* qualifier was assigned to the concentration reported by the laboratory) during the data review because the concentrations of bis(2-ethylhexyl)phthalate in the affected samples were less than 10 times the concentration found in the method blank. Results reported for bis(2-ethylhexyl)phthalate in Samples SD0002, SD0006, and SD0007 were detected at concentrations greater than 10 times the concentration found in the method blank and were qualified as estimated.

Results reported for all base/neutral SVOC target analytes for Sample SD0004 were qualified as estimated because the recoveries for three base/neutral surrogate compounds were below the lower quality control acceptance limits.

3.2.3 Selected Volatile Organic Compounds

The lower quality control acceptance limit of one internal standard compound (chlorobenzene-d_5) was not met during analysis of Sample SD0007. The undetected results reported for Sample SD0007 for the three target analytes (1,1,2,2-tetrachloroethene, ethylbenzene, and toluene) quantified using the affected internal standard were qualified as estimated during the data review.

3.2.4 Polychlorinated Dibenzo-*p*-dioxins and Polychlorinated Dibenzofurans

Six target analytes were detected in the method blank, which resulted in the qualification of 32 results. The analytes detected included 2,3,7,8-TCDF, 2,3,4,6,7,8-HxCDF, total TCDF, total HxCDF, OCDF, and OCDD.

Three 2,3,7,8-TCDF, three 2,3,4,6,7,8-HxCDF, three Total TCDF, and one Total HxCDF results were restated as undetected (a *U* qualifier was assigned to the concentration reported by the laboratory) during the data review because the concentration reported for the analyte was less than five times the concentration found in the blank. Six 2,3,7,8-TCDF, six 2,3,4,6,7,8-HxCDF, five Total TCDF, three Total HxCDF, and two OCDF

results were qualified as estimated during the data review because the concentration of the analyte was greater than five times, but less than ten times, the concentration found in the blank. Results reported at concentrations greater than 10 times the concentration found in the blank are acceptable without qualification.

4. CONCLUSIONS

Sediment sampling under the PSDDA program is designed to characterize the bulk properties of the sediments to be dredged, transported, and discharged. Sediment cores are typically collected to characterize the sediment matrix to the depth of proposed dredging. Because dredging removes the material in bulk, the cores are typically segmented on a 4-ft basis (representative of a lift using a typical clamshell dredge) and composited across that segment (rather than further subdivided) to define a "dredged material management unit" or DMMU. For a dredging project in an area such as the East Site, the maximum volume of sediments that could be considered as a single DMMU and characterized by chemical analysis of a single sediment sample would be 4,000 yd^3. The single sediment sample to be analyzed could be a composite of two or more cores (up to 4 ft in length) from within a given DMMU. In general, it is advisable to collect and composite two or more cores from each DMMU to give a more accurate characterization of the bulk sediments and to ensure that a very localized chemical anomaly does not adversely affect a decision regarding the acceptability of the material for PSDDA disposal.

For this preliminary assessment of sediments offshore of the East Site, it was recognized by Weyerhaeuser and the Port that in the absence of actual plans for any future dredging project, DMMUs cannot yet be defined. Instead of collecting sediment cores from locations representative of individual DMMUs, the intent was to target locations near potential chemical sources, as well as to have a few stations distributed throughout the offshore portion of the East Site away from such potential sources, to provide a general indication of the likely suitability of the sediments for disposal at a PSDDA site. Sediment samples were composited over depth within a single core, but multiple cores were not composited together. If any observed contamination is highly localized, it should be recognized that the actual samples to be analyzed for a specific dredging project in the future could have lower chemical concentrations than those reported in this investigation because of the greater number of sediment cores that might be composited.

The PSDDA program typically uses a combination of chemical analyses and biological testing (i.e., sediment toxicity tests) to assess the suitability of sediments for disposal at an unconfined, open-water site in Puget Sound. The results of chemical analyses are first compared with the PSDDA screening levels, bioaccumulation trigger values, and maximum levels (Table 2). If all chemicals are found at concentrations below the screening levels, biological testing is generally not required, and the sediments are suitable for PSDDA disposal. If some chemicals are found at concentrations between the PSDDA screening levels and maximum levels, biological testing is required. If the sediments pass the biological tests, they would be considered suitable for PSDDA disposal even though there were exceedances of the PSDDA screening levels. If some chemicals are found at concentrations exceeding the PSDDA maximum levels, the sediments are generally con-

sidered unsuitable for PSDDA disposal, although in some cases, biological testing may be conducted to attempt to demonstrate a lack of adverse effects. Certain chemicals have also been assigned bioaccumulation trigger values (Table 2); exceedance of those bioaccumulation trigger values suggests an unacceptable risk of bioaccumulation of those chemicals if the sediments were disposed at a PSDDA site. Although it may still be possible through the use of bioaccumulation bioassays to demonstrate the suitability of those sediments for PSDDA disposal, such tests are expensive and have been used only rarely.

In general, the results of this investigation indicated that sediments offshore of the East Site exhibited a relatively low level of contamination for an urban site with a long history of industrial use. Five of the 10 stations exhibited no exceedances of the PSDDA screening levels for any chemical (Figure 3). Assuming that the samples from those five stations are representative of the sediments over a broad area around the sampling stations, those sediments should be suitable for PSDDA disposal without biological testing.

Four of the remaining five stations exhibited exceedances of the PSDDA screening levels for one to five chemicals each (Figure 3). In most cases, the concentrations of those chemicals only marginally exceeded the PSDDA screening levels, and in all cases were well below the PSDDA maximum levels (Table 2). Two of those four stations (WE-04 and WE-08) were in close proximity to storm water outfalls that could potentially have been the source of those chemicals (Figure 3). The other two of those four stations (WE-05 and WE-06) were somewhat removed from potential sources (Figure 3), but the number of chemicals exceeding PSDDA screening levels at those stations was small (one or two) and the magnitude of the exceedances was also relatively small. Recognizing that DMMUs to be defined for dredging in these areas would likely cover fairly large areas (i.e., 4,000 yd^3 represents an area of approximately 165 ft × 165 ft dredged to a depth of 4 ft), it may be possible to collect and composite two or more cores from within such a DMMU and have chemical concentrations less than those in a single core sample, as in this investigation. Even if such testing yielded concentrations that still exceeded the PSDDA screening levels, there is a reasonable expectation that the sediments could pass the biological tests and be suitable for PSDDA disposal because the chemical concentrations only marginally exceeded the PSDDA screening levels and were well below the PSDDA maximum levels.

The last station (WE-02) was located immediately offshore of the former wood treatment facility (Figure 3). Sediments from that station exhibited the highest number of chemicals (7) exceeding the PSDDA screening levels, and three of those chemicals also exceeded the PSDDA maximum levels. In addition, ethylbenzene exceeded the bioaccumulation trigger value. The presence of these chemicals in the sediments at that location is potentially associated with soil and groundwater contamination at the adjacent site of the former wood treatment facility (Figure 3). Although these results do not allow an interpretation of the spatial extent of the sediment contamination, they suggest a lower likelihood that sediments from the immediate area of Station WE-02 would be suitable for PSDDA disposal, even allowing for dilution through compositing a greater number of sediment cores. Biological testing through the conduct of sediment toxicity tests would almost certainly be

required, and bioaccumulation testing could also be required. It is important to recognize, however, that although these results suggest that sediments from the immediate vicinity of Station WE-02 may be unsuitable for disposal at a PSDDA site, they do not necessarily indicate that the sediments would require remediation in the absence of dredging. Previous sampling and analysis of surface sediments in this same area indicated relatively low levels of contamination. Designation of sediment cleanup sites under the Washington Sediment Management Standards (WAC 173-204) is based on surface sediment characteristics, not on the bulk sediment characteristics of underlying strata. If plans for redevelopment of the East Site did not include dredging immediately offshore of the former wood treatment facility, it is possible that subsurface sediment contamination there need not be remediated.

Overall, sediments offshore of the East Site were found to have relatively low levels of contamination, with the exception of the single sediment core collected adjacent to the former wood treatment facility. There is a reasonable expectation that most of the sediments offshore of the East Site could be dredged and found suitable for disposal at a PSDDA site. Exceedance of the PSDDA screening levels in some of the sediment samples analyzed suggests that biological testing of the sediments may be required for a PSDDA evaluation. However, careful definition of DMMUs and compositing of two or more sediment cores from each DMMU may result in lower chemical concentrations that would not exceed the PSDDA screening levels, and, therefore, not require biological testing. If dredged, sediments offshore of the former wood treatment facility may require an alternative to PSDDA disposal because of higher chemical concentrations. However, remediation of those sediments may not be required if they are left in place.

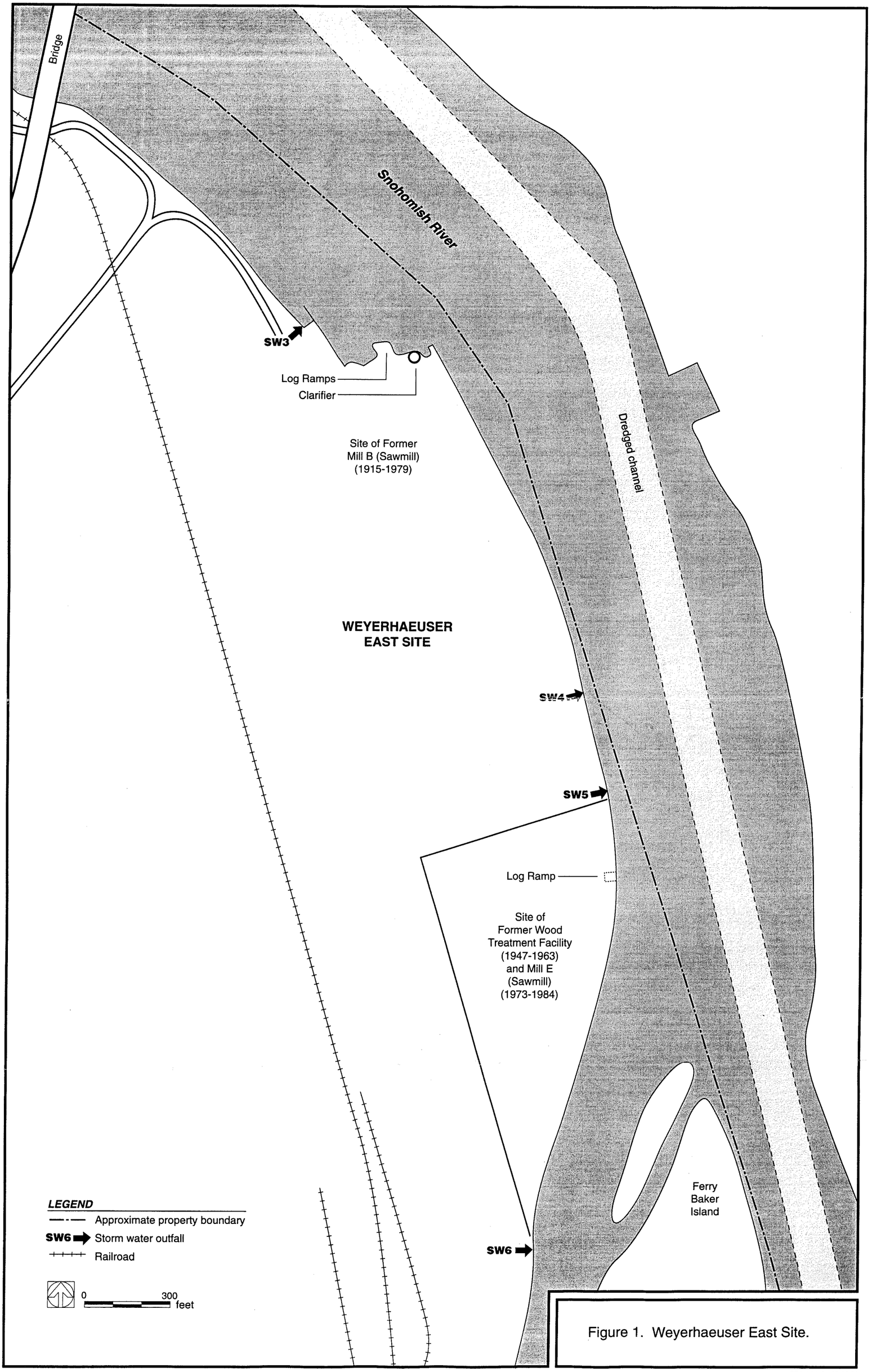

Figure 1. Weyerhaeuser East Site.

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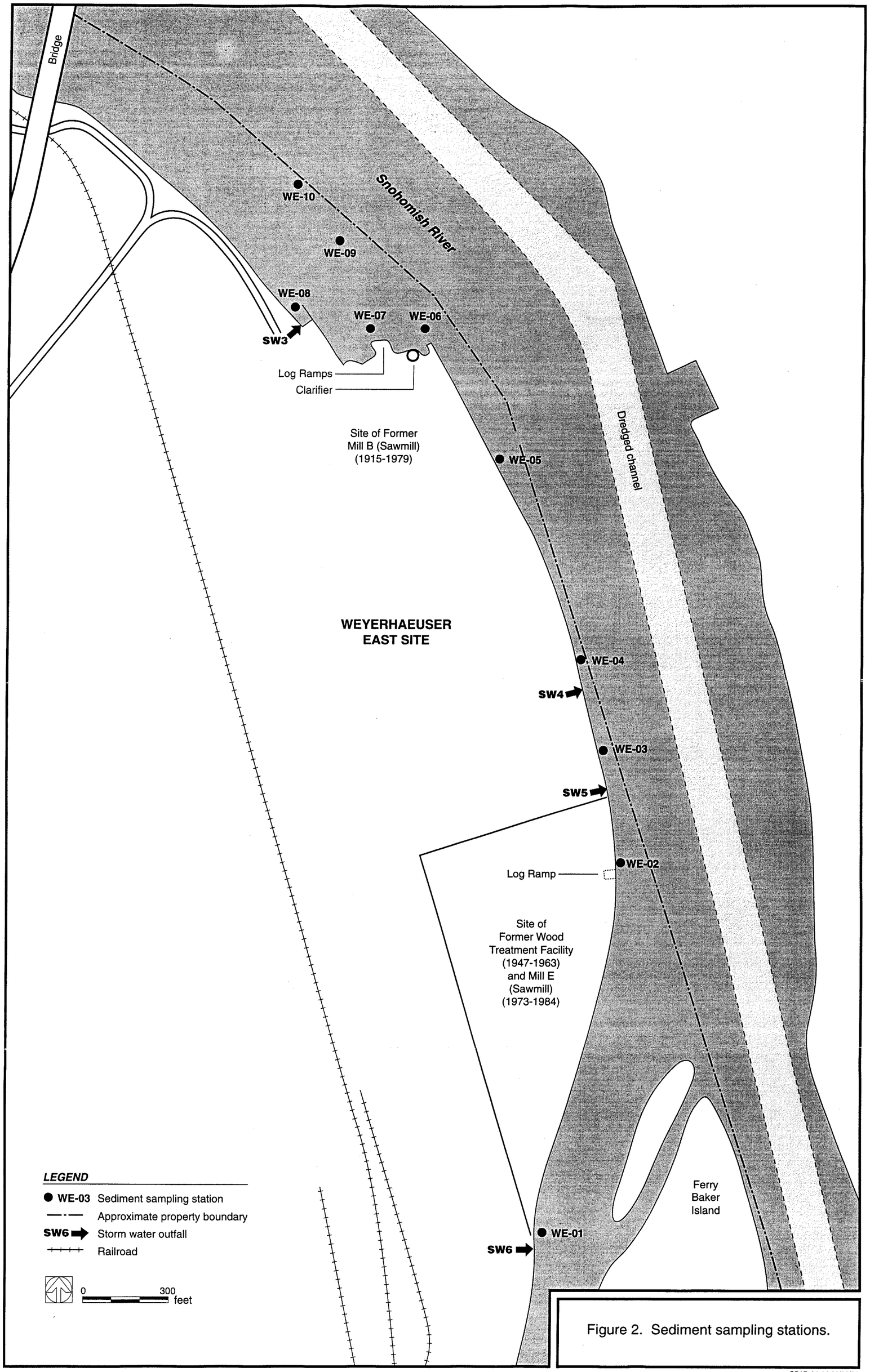

Figure 2. Sediment sampling stations.

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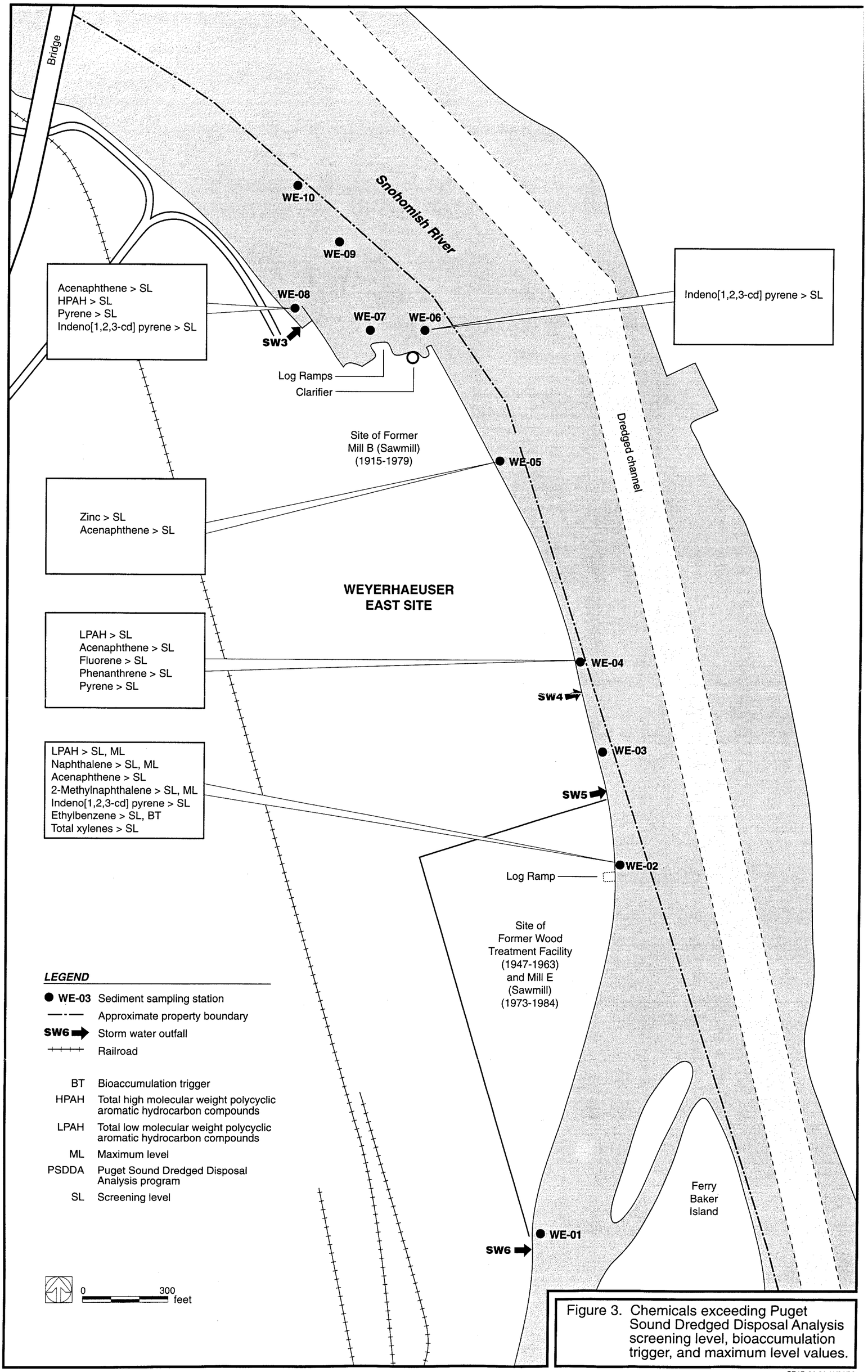

Figure 3. Chemicals exceeding Puget Sound Dredged Disposal Analysis screening level, bioaccumulation trigger, and maximum level values.

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Figures

TABLE 1. SUMMARY OF SEDIMENT STATIONS AND SAMPLE IDENTIFICATIONS

Station	Date	Latitude	Longitude	Sample ID
WE-01	10-Jul-96	48° 00.254'	122° 10.790'	SD0010
WE-02	10-Jul-96	48° 00.452'	122° 10.716'	SD0009
WE-03	10-Jul-96	48° 00.520'	122° 10.733'	SD0001
WE-04	11-Jul-96	48° 00.577'	122° 10.747'	SD0008
WE-05	10-Jul-96	48° 00.707'	122° 10.827'	SD0003
WE-06	11-Jul-96	48° 00.763'	122° 10.880'	SD0007
WE-07	11-Jul-96	48° 00.772'	122° 10.930'	SD0006
WE-08	11-Jul-96	48° 00.790'	122° 11.010'	SD0002
WE-09	11-Jul-96	48° 00.834'	122° 10.978'	SD0004
WE-10	11-Jul-96	48° 00.856'	122° 11.004'	SD0005

Note: The latitude and longitude values are provided in NAD-27 datum.

TABLE 2. COMPARISON OF THE CHEMICAL RESULTS TO PSDDA SCREENING LEVELS, BIOACCUMULATION TRIGGERS, AND MAXIMUM LEVELS

Chemical	Station(s): / Sample number:	WE-01 SD0010		WE-02 SD0009		WE-03 SD0001		WE-04 SD0008		WE-05 SD0003		PSDDA SL	PSDDA BT	PSDDA ML
Conventional Variables														
Total volatile solids (%)		2.7		10.4		6.5		16.0		3.7		--	--	--
Total organic carbon (%)		1.04		5.54		3.30		2.18		1.30		--	--	--
Percent Sand		62.9		65.5		83.4		65.8		74.0		--	--	--
Percent Silt		27.7		25.4		11.7		25.7		20.3		--	--	--
Percent Clay		9.5		9.1		4.9		8.6		5.8		--	--	--
Total solids (%)		61.0		66.3		64.5		56.4		69.2		--	--	--
Total Sulfides (mg/kg)		39		72		35		60		26		--	--	--
Ammonia (N-mg/kg)		10		48		9		19		7		--	--	--
Metals (mg/kg dry weight)														
Antimony			*R*		*R*		*R*		*R*		*R*	20	146	200
Arsenic		9.2	*J*	10.2	*J*	16.2	*J*	9.5	*J*	6.4	*J*	57	507	700
Cadmium		0.63	*U*	0.21		0.45	*U*	0.40	*U*	0.41	*U*	0.96	--	9.6
Copper		39.3	*J*	32.6	*J*	26.2	*J*	28.7	*J*	32.0	*J*	81	--	810
Lead		4.2		7.4		8.3		6.9		7.9		66	--	660
Total mercury		0.04		0.05		0.03		0.06		0.04		0.21	1.5	2.1
Nickel		36.3		30.7		24.1		27.8		29.4		140	1,022	--
Silver		0.61	*U*	0.37		0.44	*U*	0.57		0.39		1.2	4.6	6.1
Zinc		58.3		64.6		52.7		53.8		180		160	--	1,600
Semivolatile Organic Compounds (µg/kg dry weight) [c]														
Polycyclic aromatic hydrocarbon compounds														
Total LPAH [d]		9	*U*	10,000		370		880		490		610	--	6,100
Naphthalene		9	*U*	9,300		48		110		69		210	--	2,100
Acenaphthylene		9	*U*	24		11		10	*U*	9	*U*	64	--	640
Acenaphthene		9	*U*	170		28		250		190		63	--	630
Fluorene		9	*U*	20		40		110		58		64	--	640
Phenanthrene		9	*U*	86		140		330		120		320	--	3,200
Anthracene		9	*U*	26		84		39		34		130	--	1,300
2-Methylnaphthalene		9	*U*	850		22		45		17		67	--	670
Total HPAH [e]		9	*U*	780		490		1,100		880		1,800	--	51,000
Fluoranthene		9	*U*	130		110		340		210		630	4,600	6,300
Pyrene		9	*U*	150		200		450		310		430	--	7,300
Benz[a]anthracene		9	*U*	43		40		72		58		450	--	4,500
Chrysene		9	*U*	62		44		62		94		670	--	6,700

TABLE 2. (cont.)

Chemical	Station(s):	WE-01		WE-02		WE-03		WE-04		WE-05		PSDDA		
	Sample number:	SD0010		SD0009		SD0001		SD0008		SD0003		SL	BT	ML
Total benzofluoranthenes [f]		9	U	121		30		66		84		800	--	8,000
Benzo[a]pyrene		9	U	110		20		32		52		680	4,964	6,800
Indeno[1,2,3-cd]pyrene		9	U	75		20		20		35		69	--	5,200
Dibenz[a,h]anthracene		9	U	20		9	U	10	U	9	U	120	--	1,200
Benzo[ghi]perylene		9	U	69		23		22		37		540	--	5,400
Chlorinated benzenes														
1,3-Dichlorobenzene		9	U	10	U	9	U	10	U	9	U	170	1,241	--
1,4-Dichlorobenzene		9	U	10	U	9	U	10	U	9	U	26	190	260
1,2-Dichlorobenzene		9	U	10	U	9	U	10	U	9	U	19	37	350
1,2,4-Trichlorobenzene		9	U	10	U	9	U	10	U	9	U	13	--	64
Hexachlorobenzene		9	U	10	U	9	U	10	U	9	U	23	168	230
Phthalate Esters														
Dimethyl phthalate		9	U	10	U	9	U	10	U	9	U	160	1,168	--
Diethyl phthalate		9	U	6	J	9	U	10	U	9	U	97	--	--
Di-n-butyl phthalate		9	U	10	U	9	U	10	U	9	U	1,400	10,220	--
Butylbenzyl phthalate		9	U	10	U	9	U	10	U	350		470	--	--
Bis[2-ethylhexyl]phthalate		24	U	18	U	16	U	56	U	50	U	3,100	13,870	--
Di-n-octyl phthalate		93	U	97	U	91	U	96	U	88	U	6,200	--	--
Phenols														
Phenol		9	U	58		9	U	10	U	9	U	120	876	1,200
2-Methylphenol		9	U	10	U	9	U	10	U	9	U	20	--	72
4-Methylphenol		9	U	39		22		10	U	23		120	--	1,200
2,4-Dimethylphenol		9	U	10	U	9	U	10	U	9	U	29	--	50
Pentachlorophenol		9	U	10	U	9	U	10	U	9	U	100	504	690
Miscellaneous Oxygenated Compounds														
Benzyl alcohol		9	U	10	U	9	U	10	U	9	U	25	--	73
Benzoic acid		12		51		23		25		20		400	--	690
Dibenzofuran		9	U	8	J	11		50		23		54	--	540
Chlorinated Aliphatic Hydrocarbon Compounds														
Hexachloroethane		9	U	10	U	9	U	10	U	9	U	1,400	10,220	14,000
Hexachlorobutadiene		9	U	10	U	9	U	10	U	9	U	29	212	290
Organonitrogen Compounds														
N-nitrosodiphenylamine		9	U	10	U	9	U	10	U	9	U	28	161	220

TABLE 2. (cont.)

Chemical	Station(s): / Sample number:	WE-01 SD0010	WE-02 SD0009	WE-03 SD0001	WE-04 SD0008	WE-05 SD0003	PSDDA SL	PSDDA BT	PSDDA ML
Pesticides (µg/kg dry weight)									
4,4'-DDD		0.36 U	4.4 U	0.37 U	0.38 U	0.36 U	--	--	--
4,4'-DDE		0.36 U	4.4 U	0.37 U	0.38 U	0.36 U	--	--	--
4,4'-DDT		0.36 U	4.4 U	0.37 U	0.38 U	0.36 U	--	--	--
Total DDT [g]		0.36 U	4.4 U	0.37 U	0.38 U	0.36 U	6.9	50	69
Heptachlor		0.18 U	2.2 U	0.19 U	1.1 U	0.18 U	10	37	--
Chlordane (alpha only)		0.36 U	4.4 U	0.19 U	0.38 U	0.18 U	10	37	--
Aldrin		0.18 U	2.2 U	0.19 U	0.19 U	0.18 U	10	37	--
Dieldrin		0.36 U	4.4 U	0.37 U	0.38 U	0.36 U	10	37	--
Lindane		0.18 U	2.2 U	0.19 U	0.19 U	0.18 U	10	--	--
Total Polychlorinated Biphenyls (µg/kg dry weight)									
Polychlorinated biphenyls		7.2 U	8.8 U	7.5 U	7.6 U	7.1 U	130	--	2,500
TOC-normalized PCBs (ppm/OC) [h]		0.69 U	0.16 U	0.23 U	0.35 U	0.55 U	--	38 [h]	--
Volatile Organic Compounds (µg/kg dry weight)									
Trichloroethene		4 U	5 U	5 U	5 U	4 U	160	1,168	1,600
1,1,2,2-Tetrachloroethene		6 U	7 U	6 U	6 U	6 U	14	102	210
Ethylbenzene		5 U	40	6 U	6 U	5 U	10	27	50
Total Xylenes		5 U	14	5 U	5 U	5 U	12	--	160

TABLE 2. (cont.)

Chemical	Station(s): / Sample number:	WE-06 SD0007		WE-07 SD0006		WE-08 SD0002		WE-09 SD0004		WE-10 SD0005		PSDDA SL	PSDDA BT	PSDDA ML
Conventional Variables														
Total volatile solids (%)		12.5		9.6		10.2		3.4		5.9	[a]	--	--	--
Total organic carbon (%)		5.56		4.02		4.87		1.36		2.86	[b]	--	--	--
Percent Sand		90.5		24.5		25.5		84.4	[a]	60.2		--	--	--
Percent Silt		6.0		54.2		55.8		11.0	[a]	28.0		--	--	--
Percent Clay		3.5		21.3		18.7		4.7	[a]	11.7		--	--	--
Total solids (%)		50.1		67.1		55.2		72.4		67.4	[a]	--	--	--
Total Sulfides (mg/kg)		36		31		56		39	[b]	29		--	--	--
Ammonia (N-mg/kg)		4		106		106		25		55	[a]	--	--	--
Metals (mg/kg dry weight)														
Antimony			*R*		*R*		*R*		*R*		*R*	20	146	200
Arsenic		4.2	*J*	15.2	*J*	13.6	*J*	6.3	*J*	9.3	*J* [a]	57	507	700
Cadmium		0.13	*U*	0.27		0.41		0.42	*U*	0.57	[a]	0.96	--	9.6
Copper		20.7	*J*	45.4	*J*	54.9	*J*	22.1	*J*	39.3	*J* [a]	81	--	810
Lead		5.3		17.9		20.7		4.7		10.6	[a]	66	--	660
Total mercury		0.04	*U*	0.14		0.12		0.04	*U*	0.06	[a]	0.21	1.5	2.1
Nickel		25.1		37.6		44.9		24.7		34.0	[a]	140	1,022	--
Silver		0.27		0.49		0.48		0.41	*U*	0.56	*U* [a]	1.2	4.6	6.1
Zinc		40.4		65.2		81.0		47.0		67.1	[a]	160	--	1,600
Semivolatile Organic Compounds (µg/kg dry weight) [c]														
Polycyclic aromatic hydrocarbon compounds														
Total LPAH [d]		324		190		560		25	*J*	45		610	--	6,100
Naphthalene		27		16		45		8	*J*	12		210	--	2,100
Acenaphthylene		37		10	*U*	22		8	*UJ*	10	*U*	64	--	640
Acenaphthene		11		23		70		8	*UJ*	10	*U*	63	--	630
Fluorene		16		20		49		8	*UJ*	10	*U*	64	--	640
Phenanthrene		140		87		280		17	*J*	33		320	--	3,200
Anthracene		79		32		74		8	*UJ*	10	*U*	130	--	1,300
2-Methylnaphthalene		14		10		18		8	*UJ*	10	*U*	67	--	670
Total HPAH [e]		1,500		750		3,000		210	*J*	560		1,800	--	51,000
Fluoranthene		260		150		530		42	*J*	73		630	4,600	6,300
Pyrene		300		240		780		57	*J*	130		430	--	7,300
Benz[a]anthracene		91		64		290		19	*J*	56		450	--	4,500
Chrysene		120		84		620		30	*J*	110		670	--	6,700

TABLE 2. (cont.)

Chemical	Station(s): / Sample number:	WE-06 SD0007	WE-07 SD0006	WE-08 SD0002	WE-09 SD0004	WE-10 SD0005	PSDDA SL	PSDDA BT	PSDDA ML
Total benzofluoranthenes [f]		219	93	389	20 J	72	800	--	8,000
Benzo[a]pyrene		140	42	170	18 J	43	680	4,964	6,800
Indeno[1,2,3-cd]pyrene		140	40	130	11 J	32	69	--	5,200
Dibenz[a,h]anthracene		40	10 U	29	8 UJ	10	120	--	1,200
Benzo[ghi]perylene		160	34	99	11 J	31	540	--	5,400
Chlorinated benzenes									
1,3-Dichlorobenzene		10 U	10 U	10 U	8 UJ	10 U	170	1,241	--
1,4-Dichlorobenzene		10 U	10 U	10 U	8 UJ	10 U	26	190	260
1,2-Dichlorobenzene		10 U	10 U	10 U	8 UJ	10 U	19	37	350
1,2,4-Trichlorobenzene		10 U	10 U	10 U	8 UJ	10 U	13	--	64
Hexachlorobenzene		10 U	10 U	10 U	8 UJ	10 U	23	168	230
Phthalate Esters									
Dimethyl phthalate		10 U	10 U	10 U	8 UJ	10 U	160	1,168	--
Diethyl phthalate		10 U	10 U	10 U	8 UJ	10 U	97	--	--
Di-n-butyl phthalate		10 U	10 U	10 U	8 UJ	10 U	1,400	10,220	--
Butylbenzyl phthalate		10 U	10 U	10 U	8 UJ	10 U	470	--	--
Bis[2-ethylhexyl]phthalate		120 J	110 J	84 J	12 UJ	29 U	3,100	13,870	--
Di-n-octyl phthalate		96 U	95 U	97 U	82 UJ	96 U	6,200	--	--
Phenols									
Phenol		20	10 U	10 U	8 UJ	29	120	876	1,200
2-Methylphenol		10 U	10 U	10 U	8 UJ	10 U	20	--	72
4-Methylphenol		97	32	82	21 J	63	120	--	1,200
2,4-Dimethylphenol		10 U	10 U	10 U	8 UJ	10 U	29	--	50
Pentachlorophenol		10 U	10 U	10	8 UJ	10 U	100	504	690
Miscellaneous Oxygenated Compounds									
Benzyl alcohol		10 U	10 U	10 U	8 UJ	10 U	25	--	73
Benzoic acid		170	23	33	27 J	22	400	--	690
Dibenzofuran		10 U	12	22	8 UJ	10 U	54	--	540
Chlorinated Aliphatic Hydrocarbon Compounds									
Hexachloroethane		10 U	10 U	10 U	8 UJ	10 U	1,400	10,220	14,000
Hexachlorobutadiene		10 U	10 U	10 U	8 UJ	10 U	29	212	290
Organonitrogen Compounds									
N-nitrosodiphenylamine		10 U	10 U	10 U	8 UJ	10 U	28	161	220

TABLE 2. (cont.)

Chemical	Station(s): / Sample number:	WE-06 SD0007	WE-07 SD0006	WE-08 SD0002	WE-09 SD0004	WE-10 SD0005	PSDDA SL	PSDDA BT	PSDDA ML
Pesticides (µg/kg dry weight)									
4,4'-DDD		0.43 U	0.51 U	0.47 U	0.35 U	0.37 U	--	--	--
4,4'-DDE		0.43 U	0.51 U	0.47 U	0.35 U	0.37 U	--	--	--
4,4'-DDT		0.43 U	0.51 U	0.47 U	0.35 U	0.37 U	--	--	--
Total DDT [g]		0.43 U	0.51 U	0.47 U	0.35 U	0.37 U	6.9	50	69
Heptachlor		0.22 U	2.9 U	0.23 U	0.18 U	0.19 U	10	37	--
Chlordane (alpha only)		0.44 U	0.26 U	0.35 U	0.18 U	0.19 U	10	37	--
Aldrin		0.22 U	0.26 U	0.23 U	0.18 U	0.19 U	10	37	--
Dieldrin		0.43 U	0.51 U	0.47 U	0.35 U	0.19 U	10	37	--
Lindane		0.22 U	0.26 U	0.23 U	0.18 U	0.19 U	10	--	--
Total Polychlorinated Biphenyls (µg/kg dry weight)									
Polychlorinated biphenyls		8.7 U	10 U	9.3 U	7.0 U	7.5 U	130	--	2,500
TOC-normalized PCBs (ppm/OC) [h]		0.16 U	0.25 U	0.19 U	0.51 U	0.26 U	--	38 [h]	--
Volatile Organic Compounds (µg/kg dry weight)									
Trichloroethene		5 U	6 U	6 U	4 U	5 U	160	1,168	1,600
1,1,2,2-Tetrachloroethene		7 UJ	8 U	8 U	6 U	6 U	14	102	210
Ethylbenzene		7 UJ	8 U	7 U	5 U	6 U	10	27	50
Total Xylenes		6 UJ	7 U	7 U	5 U	5 U	12	--	160

Notes:

-- - no PSDDA level has been established for these chemicals
BT - bioaccumulation trigger
DMMU - dredged material management unit
HPAH - high molecular weight polycyclic aromatic hydrocarbon compounds
LPAH - low molecular weight polycyclic aromatic hydrocarbon compounds
ML - maximum level
PSDDA - Puget Sound Dredged Disposal Analysis program
SL - screening level

Exceedance of the SL is indicated by outlining.
Exceedance of the SL and the BT is indicated by shading.
Exceedance of the SL, BT (if available), and ML is indicated by outlining and shading.

Footnotes on next page.

TABLE 2. (cont.)

[a] Value represents the mean of the laboratory duplicate analyses for this sample.

[b] Value represents the mean of laboratory triplicate analyses for this sample.

[c] Where SLs, BTs, and MLs in this table represent the sums of individual compounds (e.g., total LPAHs and total HPAHs) or groups of isomers (e.g., total PCBs), only the detected concentrations are used for calculating the sum of the respective compounds or groups of isomers. When all individual compounds or groups of isomers are undetected, the highest individual detection limit is reported.

[d] Total LPAH represents the sum of the concentrations of the following LPAH compounds: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, and 2-methylnaphthalene. The total LPAH SLs, BTs, and MLs are not the sums of the corresponding SLs, BTs, and MLs listed for the individual LPAH compounds.

[e] Total HPAH represents the sum of the concentrations of the following HPAH compounds: fluoranthene, pyrene, benz[a]anthracene, chrysene, total benzofluoranthenes, benzo[a]pyrene, indeno[1,2,3-cd]pyrene, dibenz[a,h]anthracene, and benzo[g,h,i]perylene. The total HPAH SLs, BTs, and MLs are not the sums of the corresponding SLs, BTs, and MLs listed for the individual HPAH compounds.

[f] Total benzofluoranthenes represents the sum of the concentrations of the b and k isomers of benzofluoranthene.

[g] Total DDT represents the sum of 4,4'-DDD, DDE, and DDT.

[h] Total PCBs BT value in ppm carbon-normalized.

TABLE 3. SEDIMENT CONCENTRATIONS (DRY-WEIGHT BASIS) OF POLYCHLORINATED DIBENZO-*p*-DIOXINS (PCDDs) AND POLYCHLORINATED DIBENZOFURANS (PCDFs)

Chemical	Station Number / Sample Number	WE-01 SD0010	WE-02 SD0009	WE-03 SD0001	WE-04 SD0008	WE-05 SD0003	WE-06 SD0007	WE-07 SD0006	WE-08 SD0002	WE-09 SD0004	WE-10 SD0005
PCDDs (ng/kg dry weight)											
2378-TCDD		0.17 *U*	0.24 *U*	0.32 *U*	0.29 *U*	0.33 *U*	0.27 *U*	0.32 *U*	0.42 *U*	0.24 *U*	0.25 *U*
12378-PeCDD		0.41 *U*	0.75 *U*	1.12	0.32 *U*	0.70 *U*	0.33 *U*	1.82	3.41	0.36 *U*	0.73
123478-HxCDD		0.40 *U*	1.28	1.42	0.81	3.14	0.37 *U*	2.06	6.53	0.42	1.08
123678-HxCDD		1.15	5.24	9.72	3.72	29.4	0.65	21.2	47.3	2.92	8.90
123789-HxCDD		0.61	3.31	4.68	2.54	9.47	0.37 *U*	8.08	20.0	1.40	4.02
1234678-HpCDD		15.3	94.8	219	79.9	439	7.50	248	806.0	37.8	116
OCDD		135	744	2738	700	3703	67.6	1925	3852	327	1021
PCDFs (ng/kg dry weight)											
2378-TCDF		0.23 *U*	2.96 *J*	3.14 *J*	1.37 *U*	3.23 *J*	0.91 *U*	5.14 *J*	11.5 *J*	1.26 *U*	3.23 *J*
12378-PeCDF		0.26 *U*	0.92	1.71	0.32	4.00	0.20 *U*	0.45 *U*	4.65	0.48 *U*	0.88
23478-PeCDF		0.26 *U*	0.98	0.94	0.42	1.46	0.20 *U*	1.50	3.03	0.48 *U*	0.61
123478-HxCDF		0.22 *U*	4.56	7.07	2.32	11.2	0.25 *U*	5.27	18.0	1.23	3.90
123678-HxCDF		0.22 *U*	2.02	2.95	0.77	6.92	0.25 *U*	3.64	14.0	0.68	2.04
123789-HxCDF		0.22 *U*	0.32 *U*	0.50 *U*	0.34 *U*	0.39 *U*	0.25 *U*	0.37 *U*	0.50 *U*	0.25 *U*	0.25 *U*
234678-HxCDF		0.54 *U*	2.16 *J*	3.00 *J*	1.17 *U*	8.94 *J*	0.25 *U*	4.62 *J*	12.0 *J*	0.83 *U*	2.13 *J*
1234678-HpCDF		3.74	27.8	60.0	26.1	81.7	2.06	44.3	168	8.09	24.7
1234789-HpCDF		0.34 *U*	2.09	3.75	1.10	6.65	0.24 *U*	2.72	12.7	0.55	2.08
OCDF		8.52 *J*	95.9	203	71.5	139	3.37 *J*	86.4	414	18.0	56.3
Total TCDD		1.41	14.2	15.4	5.76	16.7	0.93	23.5	58.8	4.12	8.91
Total PeCDD		0.41 *U*	9.80	3.16	2.27	3.07	0.33 *U*	17.4	51.7	2.08	3.83
Total HxCDD		7.43	41.1	69.0	32.5	197	3.58	133	337	22.1	62.4
Total HpCDD		36.2	197	519	209	1134	17.2	578	1755	82.7	244
Total TCDF		0.23 *U*	20.8 *J*	18.8 *J*	2.07 *U*	16.7 *J*	1.77 *U*	22.3 *J*	53.6	1.96 *U*	8.76 *J*
Total PeCDF		1.74	22.2	20.7	6.25	59.0	0.49	47.5	71.8	3.64	14.4
Total HxCDF		3.21 *J*	24.0	34.6	14.4 *J*	91.6	0.72 *U*	56.4	247	7.1 *J*	21.1
Total HpCDF		11.1	95.1	217	81.8	303	6.53	136	624	29.9	97.3

Appendix A

Cruise Report, Weyerhaeuser East Site, Everett, Washington

CRUISE REPORT, WEYERHAEUSER EAST SITE, EVERETT, WASHINGTON

OVERVIEW

The preliminary sediment assessment survey for PSDDA parameters was conducted at Weyerhaeuser's East Site in Everett, Washington from July 10 to July 11, 1996, aboard the *Adventure*. Sediment core samples were collected at 10 stations for analysis of PSDDA chemical parameters. The sediment cores were extruded from the core liners onshore at PTI's Overlake field office on July 12, 1996. The sediment samples were submitted for laboratory analyses immediately following field operations and sample preparation. The sediment cores were stored at 4°C from the time of collection until sample receipt at the testing laboratory.

Station locations are presented in Figure 1. Most stations were located as close as possible to shore (within 20 feet of the bulkhead). The only stations that were not located as close as possible to shore were stations WE-09 and WE-10, which were located away from shore near the center of the river (see Figure 1). Where applicable, the stations that were located near an outfall were placed approximately 50 feet downstream of the outfall. Station locations were documented using a differential global positioning system (DGPS).

In general, the cruise was conducted efficiently. However, a few conditions were encountered that affected sampling operations. A layer of sand near the top of the core was observed at several of the sampling stations (i.e., Stations WE-03, WE-09, WE-10). Apparently, this layer of sand caused increased compaction of the underlying sediment in the core tube. Several coring attempts at the above mentioned stations were discarded due to this compaction. In addition, sample collection was impeded at several stations by logs and debris on the bottom of the river and near the shore; requiring increased time for sampling.

Excellent weather prevailed throughout the cruise. These weather conditions facilitated vessel positioning at each station and minimized time between stations.

Station and sample logs are provided in Appendix B.

The remainder of this report describes departures from the sampling plan and significant conditions encountered during sampling.

DEPARTURES FROM THE SAMPLING AND ANALYSIS PLAN

Several departures from the sampling plan were made. The departures included the following:

- The specified minimum of 4 ft (48 in) of recovered sediment was not obtained at some stations (i.e.,. Stations WE-03, WE-05, WE-09). As specified in the sampling plan, the PTI project manager was notified and a sediment recovery range of 3.5–4 ft (42–48 in) was approved. All sediment cores were within this approved range.
- Station positioning photographs were only taken if PTI's chief scientist (J. Sexton) determined that these photographs would provide useful information. Photographs taken during the sampling event are on file at PTI.

SIGNIFICANT CONDITIONS ENCOUNTERED DURING SAMPLING

Relevant conditions that should be considered if additional sampling at the site is planned are as follows:

- An overlying sand layer was observed at several of the sampling stations. This caused increased compaction of the underlying soft sediment in the bottom of the core tube. In the future, the use of alternative coring equipment (e.g., impact corer), which can cut through this sand layer, should be considered.

Appendix B

Station and Sample Logs

PTI ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

CRUISE: _____ STATION: WE-01 DATE: 7/10/96 GEAR: Vibracore

Cast #	Time	Water Depth (ft)	Coordinates			Sample		Penetration Depth (cm)/in	o
			Latitude	Longitude		Sample No.	Tag No.		
1	1741	5	48° 00.254	122° 10.790		SD0010	99411	63	1-28 silt
							99412		20-25 mostly sand w/silt
							99413		25-40 silt w/wood
							99414		40-43 mostly sand w/silt
							99415		43-48 silt.

TEXTURE:	Cobble	Gravel	Sand	Silt	Clay
COLOR:	Black	Brown		Grey	Green
ODOR:	Normal	Sewage	H_2S	Petroleum	None

Wood debris

COMMENTS: Good penetration, good mud.

PHOTO: Roll _____ No: _____

INITIALS: _____

FF 11/22/95

PTI ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

CRUISE: Weyerhaeuser PSDDA STATION: ~~WE-03~~ WE-02 DATE: 7/10/96 GEAR: Vibracore

Cast #	Time	Water Depth (ft)	Coordinates Latitude	Coordinates Longitude		Sample No.	Tag No.	Penetration Depth (cm)in	
1	1546	~~X~~7	48°00.452	122°10.716	A	SD0009	99406	59 - accepted	1-12 silt
							99407		12-14 wood
							99408		14-59 ~~silt~~ wood/sand
							99409		
							99410		

TEXTURE: Cobble Gravel (Sand w/ some Silt) Clay

COLOR: Black Brown to Grey DK Green

ODOR: Normal Sewage H_2S Petroleum None

Discarded piece of wood approx. Creosote smell. More wood fiber (30%)

COMMENTS: Good penetration

PHOTO: Roll _____ No: _____

INITIALS: _____

FF 11/22/95

PTI ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

CRUISE: Weyerhaeuser PSDDA STATION: ~~WE04~~ WE-03 DATE: 7/10/96 GEAR: Vibracore

Cast #	Time	Water Depth ( )	Coordinates Latitude	Coordinates Longitude		Sample No.	Tag No.	Penetration Depth (cm) in
1	1318	10'	48°00.501'	122°10.719'	A	SD0001	99155	38 - discarded away from statio
2	1410		48°00.520	122°10.733	~~B~~		99156	30 - discarded away from stati
3	1453	15'			B		99157	42.5" - accepted
							99158	0-14 silt
							99159	14 15-23 sand
								23-25 sand/silt mix
								25-42.5 silt

HOMOGENATE.

TEXTURE:	Cobble	Gravel	(Sandy w/ Silt)		Clay
COLOR:	Black	Brown	(Grey)	Dark	Green
ODOR:	Normal	Sewage	H_2S	Petroleum	(None)

COMMENTS:

Attempt 1: Top 6 in of core very sandy; maybe plugging penetration of tube. Bottom portion of core silty sed.

Attempt 2: Again inadequate penetration. Repositioned boat 30 m downstream of original location

Attempt 3: Used 10ft of core tube; compaction of sediment definately occurring.

PHOTO: Roll _____ No: _____

INITIALS: _____

FF 11/22/95

PTI ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

(*) Sample not collected retry on 7/11/96

CRUISE: Weyerhaeuser PSDDA STATION: WE-04 DATE: 7/10/96 GEAR: Vibracore

Cast #	Time	Water Depth (ft)	Coordinates Latitude	Longitude		Sample No.	Tag No.	Penetration Depth (cm)	
1	1633	11	48°00.568'	122°10.743'	A			0 - hitting something solid	
2	1639							0 - hitting solid mass	
3	1643							0 - hitting solid mass	
4	1652							0 - hitting solid mass	
5	1703							0 - hitting solid mass 3½ in in bottom of core tube.	

TEXTURE:	Cobble	Gravel	Sand	Silt	Clay
COLOR:	Black	Brown		Grey	Green
ODOR:	Normal	Sewage	H_2S	Petroleum	None

COMMENTS:

Attemps 1 & 2: Hit something solid before Vibracore could begin (i.e., at sediment surface)

Attemp 3: Repositioned about 10' downstream, but hit solid mass again.

Attemp 4: Turned raft away from bulkhead and still hit solid object.

Attempt 5: Repositioned 5' downstream with raft still furthest from bulkhead. (corer is approx. 10' from shore). ~~will be repositioned 20' from shore for attempt 6~~ (SW) 7/10/96

Will do reconnaissance during low tide tomorrow morning (7-11-96). Moving onto WE-01.

PHOTO: Roll _____ No: _____

INITIALS: _____

FF 11/22/95

PTI
ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

CRUISE: Weyerhaeuser PSDDA STATION: WE-04(B) DATE: 7/11/96 GEAR: Vibracore

Cast #	Time	Water Depth ( )	Coordinates			Sample		Penetration Depth (cm)	
			Latitude	Longitude		Sample No.	Tag No.		
1	0952	6'	48°00.577	122°10.747	B	SD0008	99401	0-1.5 flocculent	
							99402 Cast	1.5-34 silt	
							99403 1	34-38 silt mixed w/ sand	
							99404	38-77.5 sand	
							99405		

TEXTURE:	Cobble	Gravel	Sand	Silt	Clay
COLOR:	Black	Brown		Grey	Green
ODOR:	Normal	Sewage	H_2S	Petroleum	None

Discard 1 lg. piece of wood (≈ 3 in long)

COMMENTS: Good penetration

PHOTO: Roll _____ No: _____

INITIALS: _____

PTI ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

CRUISE: Weyerhaeuser PSDDA STATION: WE05 DATE: 7/10 GEAR: Vibracore

Cast #	Time	Water Depth ( )	Coordinates			Sample		Penetration Depth (cm) in	
			Latitude	Longitude		Sample No.	Tag No.		
1	1156	2'	48°00.702'	122°10.827		SD0003	99165	None - hit log	
2	1217						99166	46 in	
							99167		
							99168		
							99169		

TEXTURE:	Cobble	Gravel	Sand	Silt	Clay
COLOR:	Black	Brown		Grey	Green
ODOR:	Normal	Sewage	H_2S	Petroleum	None

COMMENTS: Core in stratified layers; with sand (coarse) in bottom 11 in. Silty sand on surface. Large flocculant layer on surface.

Using 10ft of tube penetration. sediment compaction occurring; possibly due to sand layer on surface

PHOTO: Roll _____ No: _____

INITIALS: _____

FF 11/22/95

PTI ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

CRUISE: Weyerhaeuser PSDDA STATION: WE-Ø7 DATE: 7/11/96 GEAR: Vibracore

Cast #	Time	Water Depth ( )	Coordinates			Sample		Penetration Depth (cm)	
			Latitude	Longitude		Sample No.	Tag No.		
1	1409	14	48°00.772	122°10.930		SDØØØ6	99189	0-4.5 very fine silt	
							99190 (composite)	4.5-70 silt	
							99191	70-74.5 wood chips	
							99192		
							99193		

HOMOGENATE

TEXTURE: Cobble Gravel little Sand — Silt Clay

COLOR: little Black Brown Grey DK Green

ODOR: Normal Sewage strong H_2S Petroleum None

wood chips in homogenate

COMMENTS:

PHOTO: Roll _____ No: _____ INITIALS: _____

FF 11/22/95

PTI
ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

CRUISE: Weyerhaeuser PSDDA STATION: WE-08 DATE: 7/11/96 GEAR: Vibracore

Cast #	Time	Water Depth (ft)	Coordinates			Sample		Penetration Depth (cm) in	
			Latitude	Longitude		Sample No.	Tag No.		
1	1614	7	48°00.790	122°11.010		SD0002	99160	48 in -	all silty clay w/ wood chips in btm
							99161		
							99162		
							99163		
							99164		

HOMOGENATE.

TEXTURE:	Cobble	Gravel	(Sandy)	Silt	Clay
COLOR:	Black	Brown DK → to → Grey DK			Green
ODOR:	Normal	Sewage	H_2S	Petroleum	None

some organic material, slight reducing odor.

COMMENTS:

PHOTO: Roll _____ No: _____

INITIALS: _____

PTI ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

CRUISE: Weyerhaeuser PSDDA STATION: WEØ9 DATE: 7/11/96 GEAR: Vibracore

Cast #	Time	Water Depth (ft)	Coordinates Latitude	Coordinates Longitude		Sample No.	Tag No.	Penetration Depth (cm)	
1	1036	~~5~~	48°00.834	122°10.978		SDØØØ4	99170	Cast 1 { 0-5 Sand; 5-22.5 silt	
—	—						99171		
2	1054						99172	Cast 2 -36 total { 0-4 Sand; 4-33 silt; 33-36 Sand	
—	—						99173		
3	1110						99174	Cast 3 { 0-5.5 Sand	
							99175	5.5-18 silt	
						LAB QC for Volatile Organic compounds	99176	18-22 silt w/ sand	
							99177	22-42 sand	
						LAB QC for grain size	99178		
							99179		

TEXTURE:	Cobble	Gravel	coarse Sand w/ trace of Silt		Clay
COLOR:	Black	Brown		Grey DK	Green
ODOR:	Normal	Sewage	H_2S	Petroleum	None

COMMENTS:

Attempt 3 was collected using 8' ~~10'~~ 7-11-96 of pipe for penetration. Compaction evident.

PHOTO: Roll _____ No: _____

INITIALS: _____

FF 11/22/95

PTI ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

CRUISE: Weyerhaeuser PSDDA STATION: WE-10(A) DATE: 7/11/96 GEAR: Vibracore

Cast #	Time	Water Depth ( )	Coordinates Latitude	Coordinates Longitude		Sample Sample No.	Sample Tag No.	Penetration Depth (cm)	
1	1150	5'	48°00.860	122°11.017			Cast 1	0-8 Sand 8-21.5 silt	
-	-								
2	1205						Cast 2	0-4 Sand 4-12.5 silt	

TEXTURE:	Cobble	Gravel	Sand	Silt	Clay
COLOR:	Black	Brown		Grey	Green
ODOR:	Normal	Sewage	H_2S	Petroleum	None

COMMENTS: Repositioned after 2nd attempt. Moved

PHOTO: Roll _____ No: _____

INITIALS: _____

FF 11/22/95

PTI
ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

CRUISE: Weyerhaeuser PSDDA STATION: WE-10(B) DATE: 7/11/96 GEAR: Vibracore

Cast #	Time	Water Depth (ft)	Coordinates			Sample		Penetration Depth (cm)	
			Latitude	Longitude		Sample No.	Tag No.		
1	1228	6	Not available.					11 1/2 in sand/silt mix.	

TEXTURE:	Cobble	Gravel	Sand	Silt	Clay
COLOR:	Black	Brown		Grey	Green
ODOR:	Normal	Sewage	H_2S	Petroleum	None

COMMENTS: Repositioned boat.

PHOTO: Roll _____ No: _____

INITIALS: _____

FF 11/22/95

PTI
ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

CRUISE: Weyerhaeuser PSDDA STATION: WE-1(C) DATE: 9/11/96 GEAR: Vibracore

Cast #	Time	Water Depth ( )	Coordinates			Sample		Penetration Depth (cm)	
			Latitude	Longitude		Sample No.	Tag No.		
1	1253		Not available.					33 in {1-5 Sand, 5-33 Silt	

TEXTURE:	Cobble	Gravel	Sand	Silt	Clay
COLOR:	Black	Brown		Grey	Green
ODOR:	Normal	Sewage	H_2S	Petroleum	None

COMMENTS: Repositioned Station #.

PHOTO: Roll _____ No: _____ INITIALS: _____

FF 11/22/95

PTI ENVIRONMENTAL SERVICES

STATION/SAMPLE LOG

CRUISE: Weyerhaeuser PSDDA STATION: WE-1(D) DATE: 7/11/96 GEAR: Vibracore

Cast #	Time	Water Depth (FT)	Coordinates Latitude	Coordinates Longitude		Sample No.	Tag No.	Penetration Depth (~~cm~~) in	
1	1315	9	48°00.856	122°11.004		SDDDD5	99180	51 - all sand & silt	
							99181		
							99182		
							99183		
							99184		
						LAB QC for ABNs etc →	99185		
							99186		
						LAB QC for total sulfides + total volatile solids	99187		
							99188		

HOMOGENATE

TEXTURE: Cobble Gravel (Sand W/ Silt) Clay

COLOR: (Black) Brown DK → to Grey DK Green

ODOR: Normal Sewage (slight H2S) Petroleum None

COMMENTS:

PHOTO: Roll _____ No: _____ INITIALS: _____

FF 11/22/95

Appendix C

Sediment Core Sample Descriptions

SEDIMENT CORE SAMPLE DESCRIPTIONS, WEYERHAEUSER EAST SITE, EVERETT, WASHINGTON

On behalf of the Weyerhaeuser Paper Company, PTI Environmental Services (PTI) collected one sediment core from each of 10 stations offshore of the Weyerhaeuser East Site in Everett, Washington. Field sampling procedures and the results of physical and chemical analyses of the sediment samples are described in detail in *Preliminary Sediment Assessment for PSDDA Parameters, Weyerhaeuser East Site, Everett, Washington* (PTI 1996). Although the intent was to collect the uppermost 48 in. of sediments at each station for homogenization and analysis, core compaction encountered at three stations (WE-03, WE-05, and WE-09) limited the amount of sediment that could be recovered. After multiple coring attempts, sediment cores of 42.5, 46, and 42 in. were finally obtained at those stations. It was not the intent of this survey to construct detailed boring logs similar to those routinely constructed for soil borings on land. However, the field crew recorded characteristics (e.g., texture, appearance, odor) of the individual sediment cores upon extraction of the sediments from the core liners prior to homogenization. The narrative descriptions that follow are based on notes taken both at the time of sample collection and at the time of sediment extraction from the core liners and subsequent sample homogenization.

STATION WE-01

The sediment core collected at Station WE-01 had a total depth of 63 in. The sediments from 1 to 20 in. were primarily silt, changing to mostly sand with some silt between 20 and 25 in. Silt with some wood debris was observed from 25 to 40 in., followed by a layer of mostly sand with some silt from 40 to 43 in., and then primarily silt from 43 to 48 in. Observations of the sediment core between 48 and 63 in. were not recorded. The sediment from 0 to 48 in. was homogenized and identified as Sample SD0010. No separate observations of the sediment sample after homogenization were recorded.

STATION WE-02

The sediment core collected at Station WE-02 had a total depth of 59 in. Observations of the sediment core included a layer of silt from 1 to 12 in., a layer of wood debris from 12 to 14 in., and a mixture of sand and wood debris from 14 to 59 in. The homogenized sediment from 0 to 48 in. was described as dark gray to black sand with some silt. A creosote odor was noted, and the homogenized sediment was estimated to contain approximately 30 percent wood debris. The sediment was identified as Sample SD0009.

STATION WE-03

The sediment core collected at Station WE-03 had a total depth of only 42.5 in. despite penetration of 10 ft of core tube into the bottom, suggesting significant core compaction. Observations of the sediment core included a layer of silt from 0 to 14 in., a layer of sand from 14 to 23 in., a mixture of sand and silt from 23 to 25 in., and silt from 25 to 42.5 in. The homogenized sediment from 0 to 42.5 in. was described as dark gray "sand with silt," with no odor. The sediment was identified as Sample SD0001.

STATION WE-04

The sediment core collected at Station WE-04 had a total depth of 77.5 in. Observations of the sediment core included a flocculent layer from 0 to 1.5 in., a silt layer from 1.5 to 34 in., a mixture of silt and sand from 34 to 38 in., and a sand layer from 38 to 77.5 in. The sediment from 0 to 48 in. was homogenized and identified as Sample SD0008. No separate observations of the sediment sample after homogenization were recorded.

STATION WE-05

The sediment core collected at Station WE-05 had a total depth of only 46 in. despite penetration of 10 ft of core tube into the bottom, suggesting significant core compaction. The sediment core consisted of stratified layers with a large flocculent layer at the surface, along with silty sand. Coarse sand was noted in the bottom 11 in. of the sediment core. The sediment from 0 to 46 in. was homogenized and identified as Sample SD0003. No separate observations of the sediment sample after homogenization were recorded.

STATION WE-06

The sediment core collected at Station WE-06 had a total depth of 72 in. Observations of the sediment core included a layer of silt from 0 to 8 in., a layer of silty sand from 8 to 18 in., a mixture of wood chips and sand from 18 to 32 in., a gap with silty water from 32 to 35 in. (suggesting separation of the sediment core within the core liner after collection), wood chips from 35 to 40 in., a mixture of wood chips and sand from 40 to 44 in., and a layer of sand alone from 44 to 72 in. The homogenized sediment from 0 to 48 in. was described as dark gray to black coarse sand with a trace of silt and a strong hydrogen sulfide odor. Wood debris was estimated to represent approximately 20 to 25 percent of the homogenized sediment sample. The sediment was identified as Sample SD0007.

STATION WE-07

The sediment core collected at Station WE-07 had a total depth of 74.5 in. Observations of the sediment core included a layer of very fine silt from 0 to 4.5 in., a layer of silt from 4.5 to 70 in., and wood chips from 70 to 74.5 in. The homogenized sediment from 0 to 48 in. was described as dark gray to black silt with a little sand and a strong hydrogen sulfide odor. The sediment was identified as Sample SD0006.

STATION WE-08

The sediment core collected at Station WE-08 had a total depth of 48 in. The entire sediment core was observed to be silty clay with a few wood chips near the bottom. The homogenized sediment from 0 to 48 in. was described as dark brown to dark gray sandy silt with some organic material and a slight hydrogen sulfide odor. The sediment was identified as Sample SD0002.

STATION WE-09

The sediment core collected at Station WE-09 had a total depth of only 42 in. despite penetration of 8 ft of core tube into the bottom, suggesting significant core compaction. Observations of the sediment core included a layer of sand from 0 to 5.5 in., a layer of silt from 5.5 to 18 in., a mixture of silt and sand from 18 to 22 in., and layer of sand from 22 to 42 in. The homogenized sediment from 0 to 42 in. was described as dark gray coarse sand with a trace of silt and a hydrogen sulfide odor. The sediment was identified as Sample SD0004.

STATION WE-10

The sediment core collected at Station WE-10 had a total depth of 51 in. The entire sediment core was observed to be a mixture of sand and silt. The homogenized sediment from 0 to 48 in. was described as dark brown to dark gray sand with silt, with a slight hydrogen sulfide odor. The sediment was identified as Sample SD0005.

Appendix D

Chain of Custody Records

PTI
ENVIRONMENTAL SERVICES

5501

CHAIN OF CUSTODY RECORD/SAMPLE ANALYSIS REQUEST FORM

Project: (Name and Number) EVERETT / CWID-02-01

Samplers: (Signature) SEXTON, FERRARI, LORAN, SEXTON

Sampling Contact: JANE SEXTON
Phone: 206-442 9513
Ship Samples to: WESTERN LABORATORY
Attn: LORNE GMAILING

Sample No.	Tag No.	Date	Time	Sample Matrix: Groundwater	Soil	Surface Water	Sediment	Other	Concentration (L M H)	Composite or Grab	Analyses Requested: Ammonia, Sulfides, Total Solids, Volatile Solids, Conventionals	TOC, metals, grain size, total solids	Conventionals	Total Solids Extra Container (2)	Volatile Solids Archive (3)	Remarks
SD0001	99155	7/11/96	1453				✓			C	✓					500 mL; 4°C
	99156						✓			C		✓				500 mL; 4°C
	99157						✓			C			✓			500 mL; 4°C
	99158						✓			C				✓		125 mL; 4°C
	99159						✓			C					✓	60 mL; 4°C
SD0002	99160	7/11/96	1614				✓			C	✓					500 mL; 4°C
	99161						✓			C		✓				500 mL; 4°C
	99162						✓			C			✓			500 mL; 4°C
	99163						✓			C				✓		125 mL; 4°C
	99164						✓			C					✓	60 mL; 4°C
SD0003	99165	7/10/96	1217				✓			C	✓					500 mL; 4°C
	99166						✓			C		✓				500 mL; 4°C
	99167						✓			C			✓			500 mL; 4°C
	99168						✓			C				✓		125 mL; 4°C

Method of Shipment: COURIER

Condition of Samples Upon Receipt:

Custody Seal Intact: Yes ☐ No ☐ None ☐ Broken by:

Relinquished by: Jane Sexton 7/12/96 (Signature)

Received by: [signature] (Signature)

Date/Time 7/12/96 1530

Relinquished by: (Signature)

Received by: (Signature)

Date/Time

Relinquished by: (Signature)

Received by Mobile Lab for Field Analysis: (Signature)

Date/Time

Received for Lab by: (Signature)

Date/Time

Distribution: Original and One Copy - Accompany Shipment; One Copy - Project File

FF 04/15/96

PTI ENVIRONMENTAL SERVICES

5502

CHAIN OF CUSTODY RECORD/SAMPLE ANALYSIS REQUEST FORM

Project: (Name and Number) EAST EVERETT / CB1D-02-01

Samplers: (Signature) SCATTON, BERTRAM, [illegible] & SEXTON

Sampling Contact: JANE SEXTON
Phone: 206-643-9803
Ship Samples to: WEYERHAEUSER LABORATORY
Attn: DENNIS [illegible]

Sample No.	Tag No.	Date	Time	Groundwater	Soil	Surface Water	Sediment	Other	Concentration (L M H)	Composite or Grab	AENs, Pest/PCBs, PCDDs/PCDFs	TOC, metals, ammonia, total solids	Grain size	Total sulfides, ~~Extra Container~~ Total volatile solids	Volatile organic compounds ~~Archive~~	Remarks
SDØØ43	99169	7/10/96	1217				✓			C					✓	60 mL; 4°C
SDØØ44	99170	7/11/96	1110				✓			C	✓					500 mL; 4°C
↓	99171	↓	↓				✓			C		✓				500 mL; 4°C
↓	99172	↓	↓				✓			C			✓			500 mL; 4°C
↓	99173	↓	↓				✓			C				✓		125 mL; 4°C
↓	99174	↓	↓				✓			C					✓	60 mL; 4°C
↓	99175	↓	↓				✓			C					✓	60 mL; LAB QC; 4°C; 1 of 3
↓	99176	↓	↓				✓			C					✓	60 mL; LAB QC; 4°C; 2 of 3
↓	99177	↓	↓				✓			C					✓	60 mL; LAB QC; 4°C; 3 of 3
↓	99178	↓	↓				✓			C			✓			500 mL; LAB QC; 4°C; 1 of 2
↓	99179	↓	↓				✓			C			✓			500 mL; LAB QC; 4°C; 2 of 2
SDØØ45	99180	7/11/96	1315				✓			C	✓					500 mL; 4°C
↓	99181	↓	↓				✓			C		✓				500 mL; 4°C
↓	99182	↓	↓				✓			C			✓			500 mL; 4°C

Method of Shipment: COURIER

Condition of Samples Upon Receipt: ____

Custody Seal Intact: Yes ☐ No ☐ None ☐ Broken by: ____

Relinquished by: Jane Sexton (Signature) 7/12/96 — Received by: [signature] (Signature) — Date/Time 7/12/96 1530

Relinquished by: ____ (Signature) — Received by: ____ (Signature) — Date/Time ____

Relinquished by: ____ (Signature) — Received by Mobile Lab for Field Analysis: ____ (Signature) — Date/Time ____

Received for Lab by: ____ (Signature) — Date/Time ____

Distribution: Original and One Copy - Accompany Shipment; One Copy - Project File

FF 04/15/96

PTI
ENVIRONMENTAL SERVICES

5503

CHAIN OF CUSTODY RECORD/SAMPLE ANALYSIS REQUEST FORM

Project: (Name and Number): ENT EVERETT / CLID-02-01

Samplers: (Signature): SCHLEN, LEHMANN, DUNN & SEXTON

Sampling Contact: JANE SEXTON
Phone: 206-643-9512
Ship Samples to: WEYERHAEUSER LABORATORY
Attn: DENNIS CAMILLAND

Sample No.	Tag No.	Date	Time	Sample Matrix: Groundwater	Soil	Surface Water	Sediment	Other	Concentration (L M H)	Composite or Grab	Analyses Requested: AEN, TEST/HCBs PCDDs/PCDFs	TOC, metals, ammonia, total solids	Grain size	Total sulfides (1) Extra Container for volatile solids	Volatile organics (2) Archive	Remarks
SD4445	99183	7/11/96	1315				✓			C				✓		125 mL; 4°C
↓	99184	↓	↓				✓			C					✓	60 mL; 4°C
	99185						✓			C	✓					500 mL; LAB QC; 4°C
	99186						✓			C				✓		125 mL; LAB QC; 4°C; 1 of 3
	99187						✓			C				✓		125 mL; LAB QC; 4°C; 2 of 3
	99188						✓			C				✓		125 mL; LAB QC; 4°C; 3 of 3
SD4446	99189	7/11/96	1409				✓			C	✓					500 mL; 4°C
	99190						✓			C		✓				500 mL; 4°C
	99191						✓			C			✓			500 mL; 4°C
	99192						✓			C				✓		125 mL; 4°C
↓	99193	↓	↓				✓			C					✓	60 mL; 4°C
SD4447	99194	7/11/96	1529				✓			C	✓					500 mL; 4°C
↓	99195	↓	↓				✓			C		✓				500 mL; 4°C
	99196						✓			C			✓			500 mL; 4°C

Method of Shipment: COURIER

Condition of Samples Upon Receipt: _____

Custody Seal Intact: Yes ☐ No ☐ None ☐ Broken by: _____

Relinquished by: Jane Sexton - 7/12/96 (Signature)
Relinquished by: _____ (Signature)
Relinquished by: _____ (Signature)

Received by: _____ (Signature) Date/Time 7/12/96 0915
Received by: _____ (Signature) Date/Time _____
Received by Mobile Lab for Field Analysis: _____ (Signature) Date/Time _____
Received for Lab by: _____ (Signature) Date/Time _____

Distribution: Original and One Copy - Accompany Shipment; One Copy - Project File

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CHAIN OF CUSTODY RECORD/SAMPLE ANALYSIS REQUEST FORM

Project: (Name and Number): EAST EVERETT / CEID-02-01

Samplers: (Signature): COLLIN, ECKSTRAM, DUNAN & SEXTON

Sampling Contact: JANE SEXTON
Phone: 206-442-9813
Ship Samples to: WEYERHAEUSER LABORATORY
Attn: DENNIS CATALANO

Sample No.	Tag No.	Date	Time	Groundwater	Soil	Surface Water	Sediment	Other	Concentration (L M H)	Composite or Grab	Analyses Requested: AEHs, PAHs/PCBs/PCDFs	Metals (arsenic, mercury, lead, silver)	Grain Size	Total Sulfides / ~~Extra Containers~~ Total Volatile Solids	Volatile Organics / ~~Archive~~	Remarks
SD0007	99197	7/11/96	1529				✓			C				✓		125 mL; 4°C
↓	99198	↓	↓				✓			C					✓	60 mL; 4°C
SD0008	99401	7/11/96	~~1548~~ 0952				✓			C	✓					500 mL; 4°C
	99402						✓			C		✓				500 mL; 4°C
	99403						✓			C			✓			500 mL; 4°C
	99404						✓			C				✓		125 mL; 4°C
↓	99405	↓	↓				✓			C					✓	60 mL; 4°C
SD0009	99406	7/10/96	1546				✓			C	✓					500 mL; 4°C
	99407						✓			C		✓				500 mL; 4°C
	99408						✓			C			✓			500 mL; 4°C
	99409						✓			C				✓		125 mL; 4°C
↓	99410	↓	↓				✓			C					✓	60 mL; 4°C
SD0010	99411	7/10/96	1741				✓			C	✓					500 mL; 4°C
↓	99412	↓	↓				✓			C		✓				500 mL; 4°C

Method of Shipment: COURIER

Condition of Samples Upon Receipt: _____

Custody Seal Intact: Yes ☐ No ☐ None ☐ Broken by: _____

Relinquished by: Jane Sexton 7/12/96 (Signature)

Relinquished by: _____ (Signature)

Relinquished by: _____ (Signature)

Received by: _____ (Signature) Date/Time 7/12/96 1537

Received by: _____ (Signature) Date/Time _____

Received by Mobile Lab for Field Analysis: _____ (Signature) Date/Time _____

Received for Lab by: _____ (Signature) Date/Time _____

Distribution: Original and One Copy - Accompany Shipment; One Copy - Project File

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ENVIRONMENTAL SERVICES

5505

CHAIN OF CUSTODY RECORD/SAMPLE ANALYSIS REQUEST FORM

Project: (Name and Number): EAST EVERETT / CRID-02-01

Samplers: (Signature): SEMTEN, BERTRAM, DORAN & SEXTEN

Sampling Contact: JANE SEXTEN
Phone: 206-643-4503
Ship Samples to: WEYERHAEUSER LABORATORY
Attn: DENNIS CATALANO

Sample No.	Tag No.	Date	Time	Sample Matrix: Groundwater	Soil	Surface Water	Sediment	Other	Concentration (L M H)	Composite or Grab	Analyses Requested: ABNs, PEST/PCBs / PCDDs/PCDFs	TCL phenols, ammonia, TAL metals	Grain size	Total solids Extra Container (?) TOC Volatile Solids	Volatile organics Archive (?) conventionals	Remarks
SD0010	99412	7/10/96	1741				✓			C			✓			500 mL; 4°C
↓	99414	↓	↓				✓			C				✓		125 mL; 4°C
↓	99415	↓	↓				✓			C					✓	60 mL; 4°C

Method of Shipment: COURIER

Condition of Samples Upon Receipt: _____

Custody Seal Intact: Yes ☐ No ☐ None ☐ Broken by: _____

Relinquished by: Jane Sexton 7/12/96 (Signature)

Relinquished by: _____ (Signature)

Relinquished by: _____ (Signature)

Received by: _____ (Signature) Date/Time 7/12/96 1537

Received by: _____ (Signature) Date/Time _____

Received by Mobile Lab for Field Analysis: _____ (Signature) Date/Time _____

Received for Lab by: _____ (Signature) Date/Time _____

Distribution: Original and One Copy - Accompany Shipment; One Copy - Project File

FF 04/15/96