EAST WATERWAY - EVERETT, WASHINGTON
SITE MANAGEMENT PLANNING PROJECT

CONCEPTUAL SITE MANAGEMENT STRATEGIC PLAN

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Prepared By:

ECOLOGY AND ENVIRONMENT, INC.
1500 First Interstate Center
999 Third Avenue
Seattle, Washington 98104

Submitted To:

WASHINGTON STATE DEPARTMENT OF ECOLOGY
Toxics Cleanup Program

ecology and environment, inc.
1500 FIRST INTERSTATE BUILDING, 999 THIRD AVENUE, SEATTLE, WASHINGTON 98104, TEL. (206) 624-9537
International Specialists in the Environment

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1. INTRODUCTION

The Washington State Department of Ecology (Ecology) has initiated a remedial action on the East Waterway, Everett, Washington, in accordance with provisions of the Model Toxics Control Act (MTCA) Cleanup Regulation (WAC 173-340). This Conceptual Site Management Strategic Plan for remediation at the East Waterway site was prepared by Ecology and Environment, Inc. (E & E) under Ecology Contract No. C0089007, Work Assignment No. 16, as a part of the initial phases of this action. Presented site management strategies are based upon existing information on East Waterway, documented in a set of reports provided to E & E by Ecology for the purpose of completing this plan.

1.1 BACKGROUND

Heightened agency and public interest in the levels of contamination in East Waterway sediments was brought about by the United States Navy (Navy) proposal to construct, operate, and maintain a homeporting facility in Everett Harbor. The Navy's proposal for this project included dredging and disposal of approximately 375,000 cubic yards (yd^3) of contaminated sediment, primarily from the East Waterway (Navy 1985). Although a 1988 federal court injunction halted dredging and disposal of the most severely contaminated East Waterway sediments, initiatives of the Everett Harbor Action Program (EHAP) and ongoing Ecology regulatory programs have resulted in continued attention to the site. Both the Everett Harbor Action Team (EHAT) of EHAP and the Ecology Toxics Cleanup program have identified the East Waterway as a high priority for continued investigation and potential cleanup. The EHAT is comprised of representatives from the United States Environmental Protection Agency (EPA), City of Everett, Interagency Working Group, Citizens Advisory Committee, and Ecology.

Specific objectives of the EHAP include:

- Identifying specific toxic areas of concern in sediments of Everett Harbor based on chemical contamination and associated adverse biological effects;

- Identifying historical and ongoing sources of contamination;

- Ranking toxic problem areas and sources (to the extent possible) in terms of priority for development of corrective actions; and

- Implementing corrective actions to reduce or eliminate sources of ongoing pollution and restoring currently polluted areas so these areas can support natural resources and beneficial uses.

The September 1990 EHAP Action Plan cited the following specific action items for the East Waterway:

- Develop an approach for addressing infiltration of contaminants from the Norton Terminal storm drain (Ecology/EHAT);

- Reissue a new National Pollutant Discharge Elimination System (NPDES) permit for Scott Paper Company pulp and paper mills (Ecology);

- Remove underground storage tanks and cleanup soil at the Scott facility (Scott);

- Inspect sites and issue permits, if necessary, at Columbia Falls Aluminum Dome, Everett Cold Storage, Dunlap Towing, and TAT log sorting yard (Ecology);

- Perform independent cleanup actions at the Mobil Oil Company and American Distributing facilities (Mobil and American Distributing, respectively);

- Issue NPDES permits for the Puget Sound Homeport facility (EPA);

- Implement best management practices (BMPs) for the City of Everett combined sewer overflow (CSO) outfalls E006, E007, E008, E009, and E011 (City of Everett);

- Improve the Port of Everett Pier 1 through implementation of BMPs (Port of Everett); and

- Pursue remediation of East Waterway sediments through the MTCA (Ecology).

NPDES Permit

The Scott NPDES permit has been prepared by Ecology and they currently are pursuing issuance. Site inspections and permit issuances for Columbia Falls Aluminum Dome, Everett Cold Storage, Dunlap Towing, and TAT remain to be completed.

Independent Cleanup Action

Independent cleanup actions currently are underway at both the Mobil and American Distributing facilities.

CSO Controls

A 1987 CSO control plan, prepared by the City of Everett and approved by Ecology, calls for a 10-year implementation period, and includes the installation of new interceptor lines, inflow controls, construction of siphon and oxidation ponds, and improving stormwater/sewer separation at selected CSOs. Control efforts for the CSOs identified in the EHAP are not expected to commence until 1993 (PTI 1989).

MTCA Remediation

Ecology activities, to date, on the East Waterway site have included:

- An East Waterway Cleanup Reconnaissance Study conducted by URS (URS 1989a, 1989b);
- Initial assessment and listing of the site (Ecology);
- Review of site background documents (E & E 1991);
- Issuance of early notice letters (Ecology mailing);
- Initiation of the Site Hazard Assessment (E & E, in preparation);
- Initiation of a SEDRANK evaluation (Ecology, in progress); and

- Preparation of this Conceptual Site Management Strategic Plan which will initiate the remedial investigation/feasibility study (RI/FS) process within the context of EHAP activities.

Disposition of other action items on the EHAP list is unknown to E & E at this time.

1.2 PURPOSE

This Conceptual Site Management Strategic Plan is intended for use as the basis for future site project planning within the regulatory framework of WAC 173-340. Primary focus of the plan has been directed toward RI/FS tasks and task phasing requirements. Presented information will be used as a management tool for overall direction of site remedial activities and determination of task implementation responsibilities. As such, the contents of this document will not be static. Rather, the plan will be revised as additional information is accumulated over the course of continued investigation.

1.3 SCOPE

Information and planning strategies presented herein are based upon the detailed document reviews conducted as the initial task of Work Assignment No. 16. A listing of reviewed documents is included in Appendix A. While additional documents that are expected to contain information pertinent to East Waterway investigations were identified during this review, sufficient information was obtained to complete this initial strategic plan.

In addition to presenting the conceptual RI/FS task framework for continued remedial work on the East Waterway site, this strategic plan includes:

- A discussion of existing information;
- Identification of data deficiencies;
- A discussion of data quality (for data presented in reviewed documents); and
- A strategy for conducting potentially liable persons (PLP) searches.

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2. EXISTING INFORMATION/DATA

Documents provided by Ecology (Table A-1) were reviewed for the following essential topics:

- Chronology of Events,
- Legal and Regulatory Issues,
- Demographics and Land Use,
- PLPs,
- Identification of Pollution Point Sources,
- Identification of Pollution Non-Point Sources,
- Chemical Data,
- Biological Data,
- Data Quality,
- Hydrologic and Hydrodynamic Information,
- Dredging and Disposal Issues and Data,
- Environmental Impacts,
- Interim Measures/Spill and Pollution Prevention Measures, and
- Community Relations Information.

In addition, each reviewer provided recommendations specific to reviewed documents, as appropriate. For complete information on individual reviews, refer to East Waterway - Everett, Washington, Site Management Planning Project, Technical Document Review, Document Control No. WD4040.1.0 (E & E 1991).

2.1 QUALITY OF EXISTING DATA

In general, supporting documentation necessary to evaluate and review/validate data quality was not included in reviewed documents. Data quality information presented in document reviews (E & E 1991) is summarized in Table 2-1. While portions of the existing information appear to be adequate, validity of the data cannot be evaluated with existing information. Validity of the data should be determined, as appropriate, if it is to be incorporated into the remedial process. Data review/validation should be conducted in accordance with data quality objectives (DQOs) established for data use.

Where supporting documentation is not obtainable or in lieu of conducting formal reviews, it may be more efficient and cost effective to conduct field verification sampling and analysis studies. Decisions of this nature should be made on a case-by-case basis for critical data sets.

2.2 DEFICIENCIES IN EXISTING DATA

Existing information and data were considered to be deficient in the following general areas:

- o Site Facility Information
  1. Overall descriptions of operations conducted by site facilities, specifically, facility use, storage, and discharge of chemical contaminants.
  2. Location of underground chemical storage at facilities surrounding the waterway.
  3. Historical information related to chemical contaminant spills and releases.
  4. Accurate and definitive source/contaminant identification.
- o General Environmental Information
  5. Site geology.
  6. Site geohydrology.

Table 2-1

SUMMARY EVALUATION OF DATA QUALITY
FOR REVIEWED EAST WATERWAY DOCUMENTS

AUTHOR(S), DATE[1]	ANALYSES	QUALITY[2]	COMMENTS[3]
Anderson, J. W., 1985	Chemistry/Biology	Not verifiable	--
Anderson, J.W. and E.A. Crecelius, 1985	Chemistry/Biology	Not verifiable	--
Batelle Northwest, 1986	Chemistry/Biology		See review
Chapman, P.M. et al., 1984	Chemistry/Biology	Not verifiable	--
Crecelius, E.A. and and J.W. Anderson, 1986	Chemistry/Biology	Not verifiable	Report indicates that the QA plan was included in appendix but appendix was not received with the report.
Crecelius, E.A. et al., 1985	Chemistry	Not verifiable	--
Hart Crowser, 1987	Chemistry	Not verifiable	--
Malins, D.C. et al., 1982	Chemistry/Biology	Not verifiable	Data may be available from NOAA database; see review
Malins, D.C. et al., 1985	Chemistry/Biology	Not verifiable	See Malins et al. 1982 above
PTI, 1989	Chemistry/Biology	NA	No original data
SAIC, 1989	Chemistry/Biology	Not verifiable	Appended data from previous work
Storer, R.A. and P.M. Arsenault, 1987	Chemistry/Biology	Not verifiable	See review
Tetra Tech, 1986	Chemistry/Biology	NA	No original data; See review/included data qualifiers cannot be verified
Tetra Tech/PTI, 1988	Chemistry/Biology	NA	No original data; see review
URS Consultants, 1989a	Chemistry	NA	No original data
URS Consultants, 1989b	Chemistry/Biology	NA	No original data
United States Army Corps of Engineers, 1985a	Chemistry/Biology	NA	See Anderson 1985
United States Army Corps of Engineers, 1985b	Chemistry	Not verifiable	--
United States Army Corps of Engineers, 1986	Chemistry/Biology	NA	No original data

Table 2-1 - Cont.

AUTHOR(S), DATE[1]	ANALYSES	QUALITY[2]	COMMENTS[3]
United States Department of the Navy, 1985			
- Appendix A: Sediment Movement Evaluation	NA	NA	--
- Appendix B: Biological Species List	Biology	Not verifiable	See review
- Appendix C: Juvenile Salmonid Study	Biology	NA	See review
- Appendix D: Correspondence from the Washington State Office of Historic Preservation	NA	NA	--
- Appendix J: Water Quality Data	Chemistry	Not verifiable	--
- Appendix L: Regional Distribution of Water Birds	Biology	NA	See review
- Appendix M: Guidelines for Specification of Disposal Sites for Dredged or Fill Material	NA	NA	--
- Appendix N: Distribution of Contaminants in Everett Harbor	Chemistry	Not verifiable	--

Table 2-1 - Cont.

AUTHOR(S), DATE[1]	ANALYSES	QUALITY[2]	COMMENTS[3]
- Appendix R: Juvenile Salmonid Stomach Analysis	Biology	Not verifiable	See review
- Appendix S: Benthics	Biology	Not verifiable	--
- Appendix T: Epibenthics	Biology	Not verifiable	See review
- Appendix U: Demersal Fish	Biology	NA	See review
- Appendix V: Marine Mammal Study	Biology	Adequate	See review
- Appendix W: Seabird Survey	Biology	Not verifiable	See review
Washington State Department of Ecology, 1986	Chemistry/Biology	NA	No original data
Washington State Department of Ecology, 1990	Chemistry	NA	No original data

(1) Complete citations are provided in Appendix A
(2) Not verifiable: Supporting documentation necessary to evaluate data quality, such as analytical procedures and method numbers and/or QC sample information, was not provided.
NA: Not applicable
(3) See review: E & E 1991
--: No comments

- Upland/Waterway Interaction

  7. Dynamics of groundwater and seawater interaction (tidal flushing).

  8. Atmospheric toxic contaminant concentrations, if any, and atmospheric deposition.

- Waterway Characteristics

  9. Hydrodynamics of the East Waterway and surrounding water bodies affecting the hydrodynamics of the waterway.

In addition, documentation related to existing biological and chemical conditions in the waterway was somewhat dated in many aspects. Acquisition and review of additional site documentation may provide a more current characterization of the waterway environment, especially with respect to specific locations of sediment contamination and the existing status of biological communities.

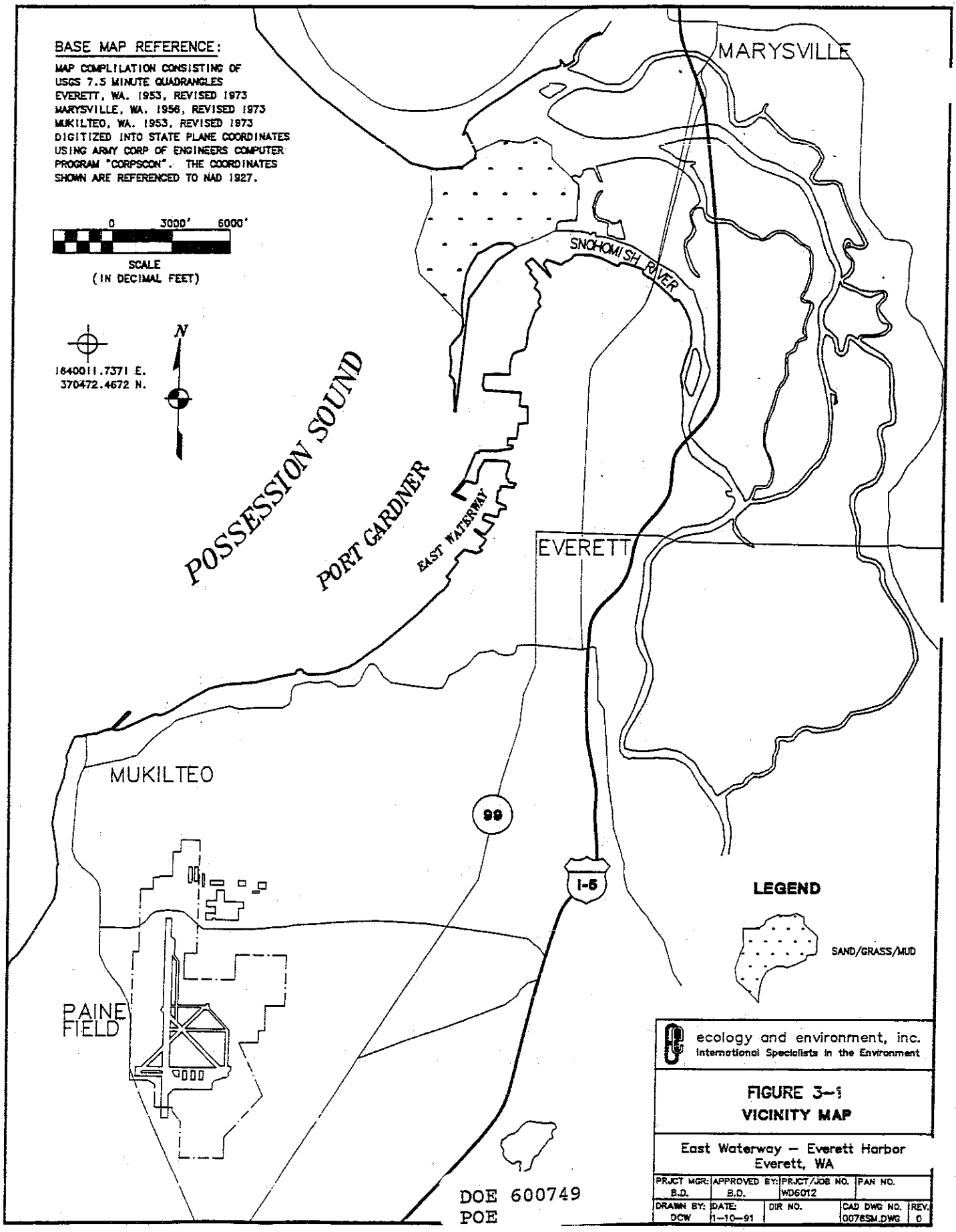
3. SITE DESCRIPTION

This site description is based upon information contained in the East Waterway - Everett, Washington, Site Management Planning Project, Technical Document Review report (E & E 1991). Due to deficiencies in existing information as described in the previous section (2.0), various topics could not be addressed or are incomplete. Conceptual tasks described in Section 5 address acquisition of missing information.

3.1 LOCATION AND EXISTING SITE FACILITIES

The East Waterway is located in the Everett Harbor area which is situated adjacent to the eastern edge of Possession Sound in north-central Puget Sound (Figure 3-1). The site includes portions of sections 18, 19, and 30, Township 29 North, Range 5 East; and section 25, Township 29 North, Range 4 East (USGS 1975, 1976). The waterway covers an area of approximately 1/2 square mile and is bounded to the west by land forming a western breakwater and to the south by the open marine waters of Port Gardner. The eastern mainland boundary is composed of industrial, City of Everett, Port of Everett, and commercial properties extending for a distance of approximately 1 mile along the Everett waterfront. Much of the northern and northwestern shore of the waterway is occupied by naval facilities associated with the Navy's Norton Terminal, the proposed site for the Navy homeporting facility. Naval docking facilities are being constructed at the southern end of the western breakwater boundary.

Industrial facilities occupying the eastern boundary of the waterway include Scout Paper Company pulp and paper mills, the Hewitt Avenue Terminal, Anaconda Aluminum, and the Port Everett South Terminal. Weyerhaeuser's closed sulfite/thermomechanical plant is located east of the South Terminal.



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At this time, specific site boundaries have not been defined. It is expected that once additional information is obtained, preliminary boundaries can be established.

3.2 SITE BIOLOGICAL COMMUNITIES

The East Waterway provides juvenile and adult habitat areas for over 30 species of marine and anadromous fish. Commercially important species include pacific cod, pacific hake, walleye polluck, rock fish species, and flatfish species (URS 1989b). In addition, juvenile pink, chum, and chinook salmon have been reported to utilize the nearshore areas of the East Waterway between May and June as an early nursery and foraging ground (Schadt and Weitkamp 1985).

The benthic invertebrate communities of the East Waterway are dominated primarily by species known to thrive in environmentally perturbed habitats (Navy 1985). Investigations of these communities generally agree that species diversity in the waterway is greatest in the area where it meets with Port Gardner, with diversity tending to decrease substantially toward the head of the East Waterway (Osborn and Weitkamp 1985a, 1985b).

Surveys of marine mammals conducted in and around the East Waterway area indicate that California sea lions are the most abundant group using the area habitat. Harbor seals and northern sea lions also were observed, but in substantially lower numbers than the California sea lion. Marine mammal use of East Waterway habitat was found to be much lower than observed use in surrounding areas (i.e., Possession Sound) (Parametrix 1985).

Forty-five species of seabirds have been reported to commonly utilize East Waterway habitats (Richter and Dragavon 1985). Densities of up to 223 birds/km^2 have been observed.

3.3 SITE SEDIMENT CHARACTERISTICS

The East Waterway has been identified as a depositional environment with sediments characterized by a high percentage of silt, clay, and total organic carbon (Navy 1985). The United States Army Corps of

Engineers (COE) first dredged the East Waterway in 1978, removing an estimated 132,000 yd^3 of silt and clay. It has been estimated that approximately 3,000 yd^3 of sediment is deposited in the East Waterway each year.

In addition to the observed fine-grain characteristics of East Waterway sediments, numerous investigations have reported the occurrence of a high percentage of wood fragments in various areas of the waterway impacted by log rafting and storage, and elevated concentrations of toxic contaminants. Sediment contamination is discussed in Section 4.

3.4 SITE HYDRODYNAMICS

Available information on the hydrodynamics of the East Waterway system is limited in scope. The following brief synopsis highlights gross characteristics only.

The formation of the East Waterway was the result of dike construction projects during the early 1900s which shaped the waterway's western margin, and diverted the Snohomish River flow southward. The modern river system has four main distributary channels, with the Snohomish River channel maintaining the greatest flow. It has been reported that during the dry season tidal saltwater intrusion has been observed upstream in the river as far as 11 km from Peterson Point (PTI 1989).

The Snohomish River is the largest freshwater source for Port Gardner and the second largest freshwater source for the Puget Sound. The river discharges a mean 290 M^3/sec across the mouth of the East Waterway. Although there is limited freshwater drainage directly into the waterway (storm drain), proximity of the Snohomish River creates an unusual estuarine environment in which freshwater from the river is pushed into the waterway with the rising tide, so that the source of freshwater for this "estuary" is at it's mouth rather than its head (URS 1989b).

In an initial effort to define the hydrodynamic system of the East Waterway, URS (1989b) conducted a computer simulated circulation and flushing modeling study. Results of this effort and a previous investigation indicate that there is a mean water exchange per tidal

cycle of 30 percent due to tidal prism and eddy effects at the mouth of the waterway, with up to a seven-fold variability due to changing density effects (URS 1989b; Downing et al. 1987).

In addition to the Snohomish River, one additional drainage system, Pigeon Creek #1, empties directly into the East Waterway/Port Gardner system. The creek opens to Port Gardner immediately south of the South Terminal.

3.5 SITE GEOLOGY/SOILS

Insufficient information was provided to prepare a description of existing site geology. This section should be added in a subsequent revision of this Conceptual Site Management Strategic Plan.

3.6 SITE HYDROGEOLOGY

Insufficient information was provided to complete a descriptive narrative of site geohydrology. This section should be added in a subsequent revision of this Conceptual Site Management Strategic Plan.

3.7 SITE ATMOSPHERE

Insufficient information was provided to complete a descriptive narrative of site atmospheric conditions. This section should be added in a subsequent revision of this Conceptual Site Management Strategic Plan.

4. NATURE AND EXTENT OF PROBLEM

East Waterway documents provided by Ecology for review primarily were related to contamination of site sediments. Site documentation provided did not address upland environmental considerations, such as site geology and geohydrology; or the nature of many past and current industrial practices, including use, storage, and release of toxic substances. Therefore, the following description of the nature and extent of the contamination has been focused on the waterway sediments and known impacts from pollution source discharge.

4.1 POTENTIAL POLLUTION SOURCES FROM SITE FACILITIES

Figure 4-1 depicts locations of surface water discharges into the East Waterway. Ownership of both active and inactive discharge facilities has been summarized below by current property owners.

City of Everett

The City of Everett's North End Sewer System maintains five CSOs that discharge directly into the East Waterway. Industrial use of the wastewater treatment facilities was not described in site documentation.

Port of Everett

The Port of Everett maintains three active storm sewer outfalls from the Hewitt Avenue Terminal. There are four inactive industrial outfalls in the South Terminal area: two from which the closed Weyerhaeuser thermomechanical plant discharged untreated washing, bleaching, and drying process wastewater (WT002 and WT003); one from which Weyerhaeuser discharged limestone cleaning water along with storm water (WT004); and one from which Weyerhaeuser discharged storm water (WT006).

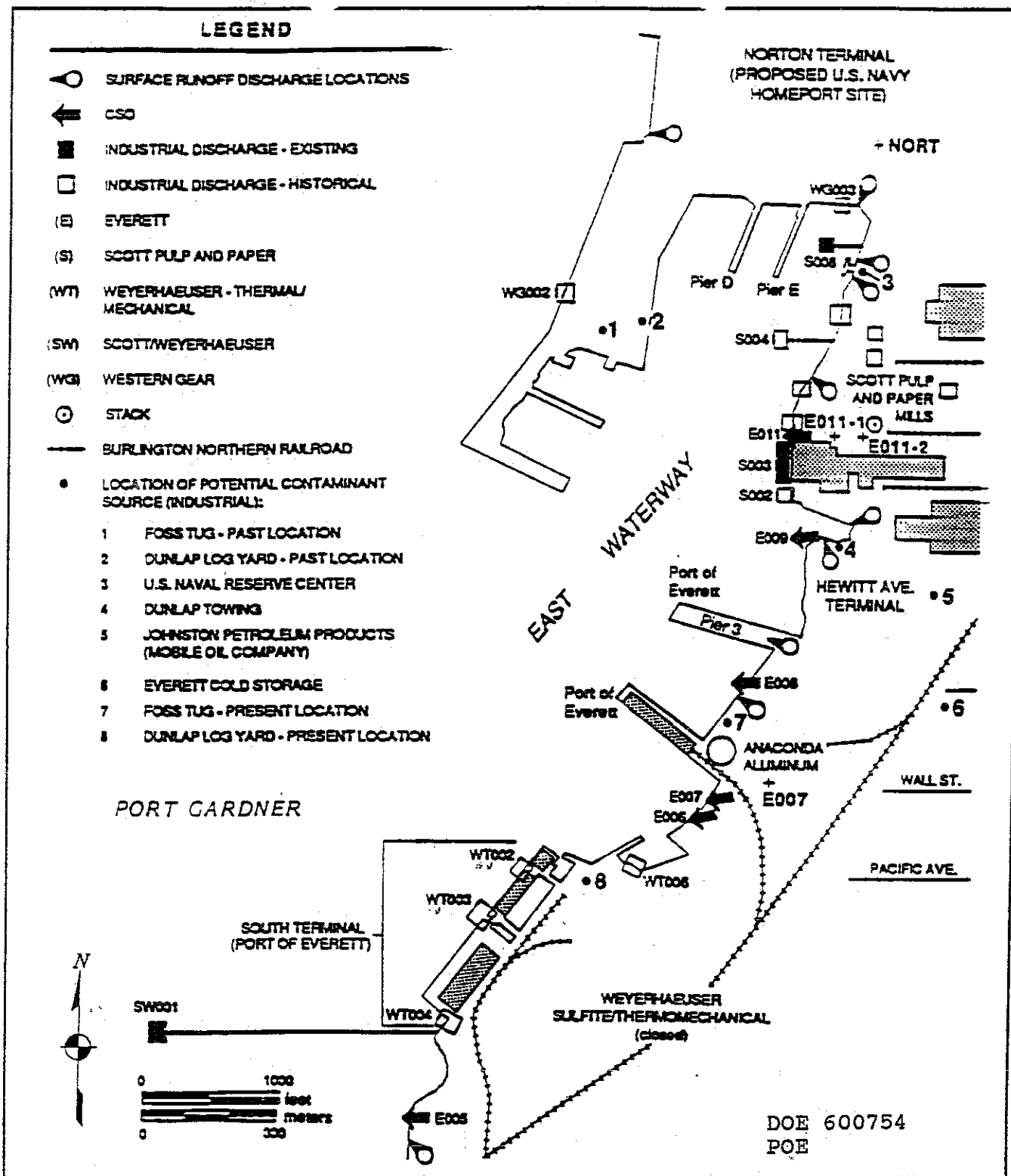

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FIGURE 4-1
OUTFALL LOCATION MAP

East Waterway – Everett Harbor
Everett, WA

PRJCT MGR:	APPROVED BY:	PRJCT/JOB NO.	PAN NO.
C.O.	C.O.	WD4040	
DRAWN BY:	DATE:	DIR NO.	CAD DWG NO.	REV.
DCW	3-26-91		0350LM.DWG	0

SOURCE REFERENCE: Adapted from Tetra Tech, 1988

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Scott Paper Company

The Scott Paper Company maintains four storm sewer outfalls from its main plant, and a fifth is shared with the Navy. All five outfalls drain into the East Waterway. The Scott Paper Company is currently the sole user of the offshore industrial outfall (SW001), which discharges the bulk of the primary treated mill effluent. The company also maintains two industrial outfalls that discharge into the East Waterway: outfall S003, a nearshore diffuser of primary treated mill effluent that overflows from the offshore outfall (SW001); and outfall S008, a nearshore main discharge of secondary treated mill effluent. There are two industrial outfalls from the Scott Paper Company mill that were abandoned in 1980: outfall S002, which was used to discharge untreated pulp bleaching wastewater; and outfall S004, which was used to discharge untreated bayline floor trench waters.

Navy

The Navy shares one storm water discharge with Scott Paper Company and has no active industrial outfalls. There is one abandoned industrial outfall from Western Gear that was used for noncontact cooling water (WG003) in the eastern portion of the Navy parcel of property.

Information on additional sources of pollution was not available in provided site documentation.

4.2 EFFECTS ON BIOLOGICAL COMMUNITIES

Diagnostic measurements taken to evaluate the effects of elevated concentrations of toxic contamination in East Waterway sediments on biological communities have included evaluation of:

- Benthic invertebrate community structure (i.e., abundance, diversity, trophic structure) (Navy 1985; Tetra Tech/PTI 1988);
- Sediment toxicity using bioassay techniques;
- Bioaccumulation of toxic contaminants in fish and invertebrates (Tetra Tech/PTI 1988); and

- Occurrence and prevalence of heptatic lesions in fish (primarily English Sole) (Tetra Tech/PTI 1988).

Resulting data from tests of this nature have been compared to habitat sediment characteristics (e.g., contaminant concentration and physical properties) and equivalent test results from selected references areas. Port Susan commonly is used as the reference area against which East Waterway measurements are compared. Results of biological investigation in the East Waterway area are briefly summarized below.

Infaunal Macroinvertebrate Community Structure

Tetra Tech/PTI (1988) identified stations in the East Waterway as being the most impacted habitat in Everett Harbor with respect to depression of major taxa abundance (i.e., polychaetes, pelecypods, gastropods, and total crustaceans). In addition, waterway habitat primarily has been found to support subsurface detritus feeding communities which have lower diversities than reference areas and are dominated by pollution tolerant species (Navy 1985; Tetra Tech/PTI 1988).

Sediment Toxicity Bioassays

Sediment toxicity test results reported by Tetra Tech/PTI (1988) suggest that East Waterway sediments are more toxic than sediments in others areas of Everett Harbor and the Port Susan reference area. Mean amphipod mortality results for waterway sediment bioassay analysis was found to average 63 percent, and ranged from 13 to 100 percent.

Bioaccumulation

Information on bioaccumulation of contaminants in East Waterway and other locations in Everett Harbor organisms is somewhat limited. Tetra Tech/PTI (1988) reported results for analyses of concentrations of polychlorinated biphenyls (PCBs), selected chlorinated pesticides, and mercury in muscle tissues from English sole and Dungeness crab. Only levels of PCBs in tissues of both groups of organisms were found to be higher than the Port Susan reference areas.

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Occurrence and Prevalence of Hepatic Lesions

Malins et al. (1982) have suggested that there is a strong correlation between concentrations of chemical contaminants in sediments and the occurrence of hepatic lesions in fish species. In general, investigations of hepatic lesions in English sole have indicated that hepatic prevalence is greater in the Everett Harbor area than in the Port Susan reference area (Tetra Tech/PTI 1988). Information specifically related to the East Waterway was not encountered in reviewed documents.

4.3 SEDIMENT CONTAMINATION

Results of investigations of the chemical characteristics of East Waterway sediments conducted by the National Oceanic and Atmospheric Administration (NOAA), the EPA, the COE, the Navy, and other investigators have reported elevated concentrations of both organic and inorganic toxic contaminants. The following major classes of contaminants have been reported as occurring in East Waterway sediments:

- Low molecular weight polycyclic aromatic hydrocarbons (LPAHs),
- High molecular weight polycyclic aromatic hydrocarbons (HPAHs),
- PCBs,
- Resin acids,
- Phenols and guaiacols,
- Chlorinated benzenes,
- Phthalate esters, and
- Heavy metals.

A summary of chemical contaminants in East Waterway sediments is included in Table 4-1. Table 4-1 compares maximum sediment concentrations (Maximum Concentration) summarized from previous investigations (URS 1989b) to SMS Marine Sediment Quality Standards -

Table 4-1

CHEMICAL CONTAMINANTS IN EAST WATERWAY SEDIMENTS

Substance	SMS Standard	Maximum Concentration	SMS Cleanup Level
	µg/kg		
LPAH	370,000	100,000	780,000
naphthalene	99,000	17,000	170,000
acenaphthylene	66,000	800	66,000
acenaphthene	16,000	5,200	57,000
fluorene	23,000	4,300	79,000
phenanthrene	100,000	8,100	480,000
anthracene	220,000	6,100	1,200,000
HPAH	960,000	200,000	5,300,000
fluoranthene	160,000	3.700	1,200,000
pyrene	1,000,000	5,500	1,400,000
benz(a)anthracene	110,000	3,200	270,000
chrysene	110,000	3,200	460,000
benzofluoranthene	230,000	4,100	450,000
benzo(a)pyrene	99,000	1,700	210,000
indeno(1,2,3-c,d)pyrene	34,000	730	88,000
dibenzo(a,h)anthracene	12,000	270	33,000
benzo(g,h,i)perylene	31,000	550	78,000
Total PCBs	12,000	9,600	65,000
Resin Acids			
abietic acid	N/A	98,000	N/A
dehydroabietic acid	N/A	83,000	N/A
isopimaric acid	N/A	11,000	N/A
neoabietic acid	N/A	14,000	N/A
sandaracopimaric acid	N/A	14,000	N/A
12-chlorodehydroabietic acid	N/A	11,000	N/A
14-chlorodehydroabietic acid	N/A	3,400	N/A
dischlorodehydroabietic acid	N/A	3,400	N/A
Phenols and Guaiacols			
phenols	420	2,900	1,200
2-methyphenol	63	1,200	63
4-methyphenol	670	98,000	670
2,4-dimethyphenol	29	520	29
2-chlorophenol	N/A	160	N/A
2,4-dichlorophenol	N/A	320	N/A
2,4,6-trichlorophenol	N/A	290	N/A
2,4,5-trichlorophenol	N/A	120	N/A
2,3,4,6-tetrachlorophenol	N/A	120	N/A

Table 4-1 - Cont.

Substance	SMS Standard	Maximum Concentration	SMS Cleanup Level
	µg/kg		
Phenols and Guaiacols (Cont.)			
pentachlorophenol	360	460	690
3,4,5-trichloroguaiacol	N/A	110	N/A
4,5,6-trichloroguaiacol	N/A	48	N/A
tetrachloroguaiacol	N/A	50	N/A
Chlorinated Benzenes			
1,2-dichlorobenzene	2,300	96	2,300
Phthalate Esters			
butyl benzyl phthalate	4,900	70	64,000
bis(2-ethylhexyl)phthalate	47,000	930	78,000
	mg/kg		
Metals			
antimony	--	203	--
arsenic	57	685	93
cadmium	5.1	7.9	6.7
copper	390	1,010	390
lead	450	517	530
mercury	0.41	3.5	0.59
zinc	410	5,910	960

N/A - Not available

Source: URS 1989b

Chemical Criteria (SMS Standards) and to the SMS Puget Sound Marine Sediment Cleanup Screening Levels and Minimum Cleanup Levels - Chemical Criteria (SMS Cleanup Levels). The SMS Standards and Minimum Cleanup Levels are contained in Table I and Table III, respectively, of the SMS. No comparison values are provided in the SMS for any of the resin acids, antimony, or some of the phenols and guaiacols, including 2-chlorophenol; 2,4-dichlorophenol; 2,4,6- and 2,4,5-trichlorophenol; 2,3,4,6-tetrachlorophenol; 3,4,5- and 4,5,6-trichloroguaiacol; and tetrachloroguaiacol. Comparison of the East Waterway Maximum Concentrations to the

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SMS Standards and Cleanup Levels indicates that East Waterway sediment concentrations of the following substances exceeds the Standards and Cleanup Levels: total phenols; 2- and 4-methyphenol; 2,4-dimethyphenol; arsenic; cadmium; copper; lead (exceeds Cleanup Level only); mercury; and zinc.

LPAHs and HPAHs are common contaminants throughout the Puget Sound system. While their origin has not been linked specifically to a particular East Waterway site source, LPAHs usually are associated with petroleum products and HPAHs normally are considered to be combustion byproducts.

Concentrations of PCBs and phthalate esters have not been linked to specific East Waterway potential sources of contamination.

Resin acids and phenolic compounds occurring in waterway sediments have been linked to natural decomposition of wood debris and released effluent from pulp and paper mill operations, while chlorinated resin acids and chlorinated phenolic compounds have been reported to occur as a result of pulp and paper mill effluent release only.

Specific mechanisms for release of toxic metals to East Waterway sediments have not been established firmly.

URS (1989b) and Tetra Tech/PTI (1988) compiled and summarized the available chemical analysis data for East Waterway sediments. This information has been excerpted from the URS document and included in Appendix B of this report.

4.4 EFFECTS ON SITE HYDRODYNAMICS

Changes in waterway hydrodynamics over time in response to changes in site characteristics were not addressed in reviewed documents. This section should be supplemented in a subsequent revision of this plan.

4.5 EFFECTS ON SITE GEOLOGY/SOILS

No information was available on site geology or soils in reviewed site documentation. This section should be supplemented in a subsequent revision of this plan.

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4.6 EFFECTS ON SITE GEOHYDROLOGY

Changes in site geohydrology over time in response to changes in site characteristics were not addressed in reviewed documents. This section should be supplemented in a subsequent revision of this plan.

4.7 EFFECTS ON ATMOSPHERE

No atmospheric information was available in reviewed documents. This section should be supplemented in a subsequent revision of this plan.

4.8 SITE CONCEPTUAL MODEL

A preliminary site conceptual model has been developed on the basis of existing information. The model is depicted schematically in the flow diagram presented in Figure 4-2. The boxes in the diagram represent potential primary sources of contamination, primary release mechanisms, secondary release mechanisms, affected media, and contaminant receptors. Where existing information was insufficient to develop the model fully, professional judgment was employed to estimate conceptual mechanisms. Professional assumptions and model dynamics are discussed in the following sections.

4.8.1 Potential Primary Sources

Potential primary sources of contamination have been identified tentatively as those industrial, municipal, and port operations currently and historically existing as a part of the upland environment of the East Waterway site (see Section 4.1 and Figure 4-1). In addition to these sources, potentially contaminated fill material has been placed on uplands bordering the northern section of East Waterway (Nazy, personal communication).

While source/contaminant linkage has not been defined clearly by existing information, sufficient data have been gathered to establish a correlation between existing contamination in East Waterway sediments and industrial discharge of contaminants related to wood pulp and paper processing, rafting and storage of logs, and contaminant discharge from CSOs (SAIC 1989; URS 1989a, 1989b; Storer and Arsenault 1987; Crecelius et al. 1985; Navy 1985; Malins et al. 1982).

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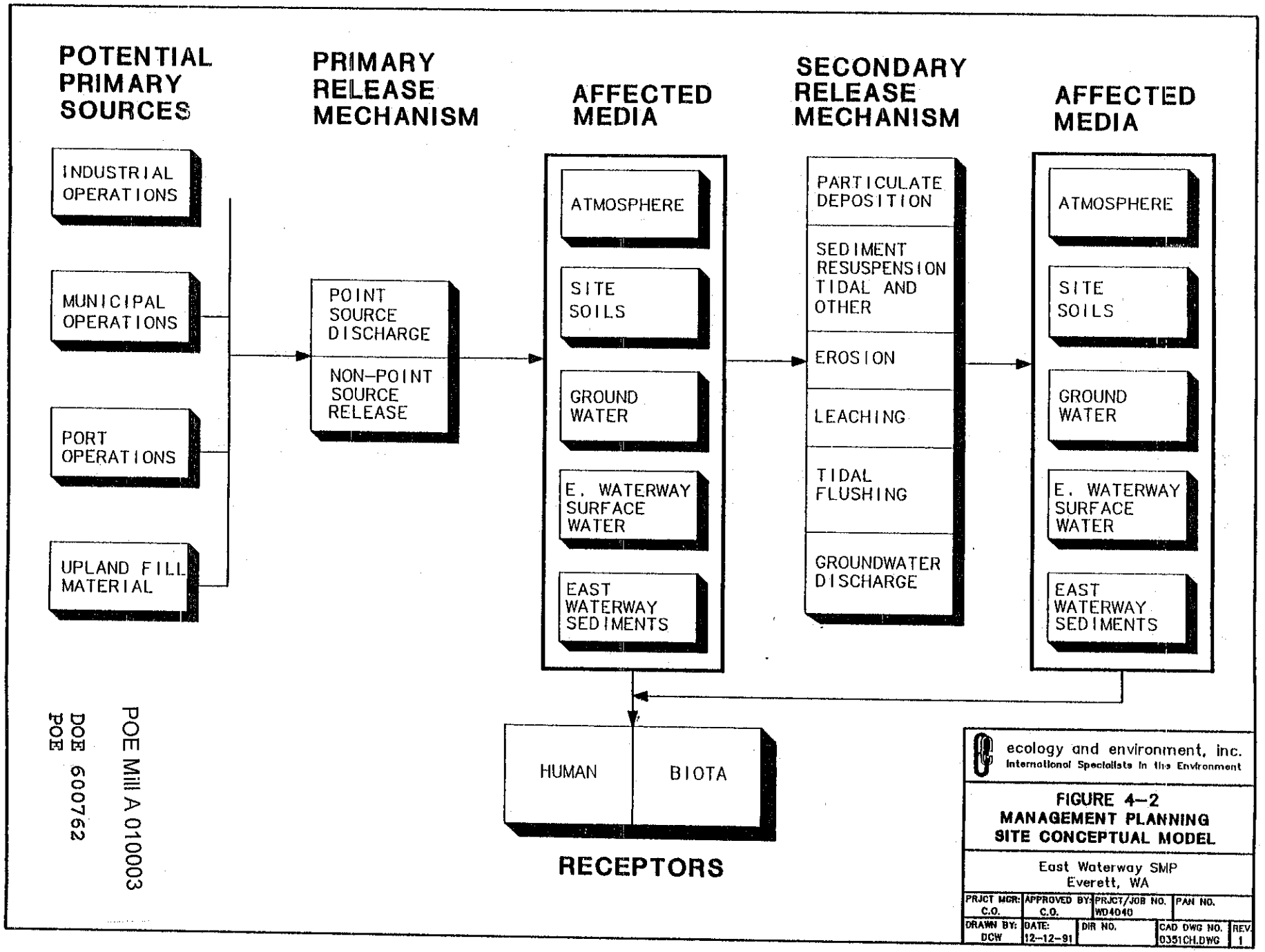

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FIGURE 4-2
MANAGEMENT PLANNING
SITE CONCEPTUAL MODEL

East Waterway SMP
Everett, WA

PRJCT MGR: C.O.	APPROVED BY: C.O.	PRJCT/JOB NO. WD4040	PAN NO.
DRAWN BY: DCW	DATE: 12-12-91	DIR NO.	CAD DWG NO. 0351CH.DWG	REV. 1

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An essential task of the RI/FS process, as implemented by independent cleanup operations and Ecology funded initiatives, will be establishing clearly defined source/contaminant linkage (where possible). Tasks necessary to complete this aspect of the RI/FS process are presented in Section 5 of this report.

4.8.2 Primary Release Mechanisms

Primary release mechanisms of contaminants to East Waterway sediments have been identified as point and non-point discharges. Potential point discharges include effluent discharge from permitted outfalls, and atmospheric discharge from existing and historic non-permitted facility stacks. Discharge from non-point sources includes overland stormwater runoff, CSO discharge, potential spills of contaminants, and infiltration and leaching from uncontrolled spills and upland disposal of contaminated materials.

4.8.3 Affected Media

Potentially affected media at the East Waterway site include the atmosphere, site soils, groundwater, and East Waterway surface waters and sediment. While sediment contamination has been documented in a number of previous investigations, potential contamination of the atmosphere, site soils, groundwater, and East Waterway surface water was not sufficiently addressed in the literature furnished by Ecology for site evaluation. Further definition of contaminated media, especially site soils and groundwater, will be required by the RI/FS process conducted for the East Waterway site. Specific characteristics of affected media, specifically groundwater and site soils, have not been identified in previous East Waterway studies.

4.8.4 Secondary Release Mechanisms

Potential secondary release mechanisms for the East Waterway site include:

- Particulate deposition from the water column which affects sediment composition and levels of contamination;

- Sediment resuspension, affecting the water column and ultimately down-current sediments not directly influenced by source particulate deposition. This mechanism involves currents moving along the bottom and tidal influences;

- Surface soil erosion, resulting from stormwater impacts and wind-blown dispersion potentially affecting waterway surface waters and sediments, and atmospheric concentrations of contaminants;

- Contaminant leaching to the groundwater resources from potentially contaminated site soils;

- Direct transport of soil contaminants into the waterway from stormwater runoff potentially affecting surface waters and sediments; and

- Contaminant transport from both soil and groundwater media resulting from saltwater intrusion and tidal flushing.

Literature related to these mechanisms was not available in the documents supplied by Ecology for preparation of this Conceptual Site Management Strategic Plan. While the primary pathway for distribution of contaminants to the East Waterway is through water-born delivery, relatively little is known about atmospheric suspension/dispersion mechanisms.

4.8.5 Potential Contaminant Receptors

The primary receptors of waterway contamination are marine biota occurring in the water column and sediments of the site (see Section 3.1). While bio-magnification of contaminants has not been well studied in site biological communities, contamination effects have been documented by various investigators (Navy 1985; Anderson 1985; Batelle Northwest 1986; Chapman et al. 1984; Crecelius and Anderson 1986; Tetra Tech/PTI 1988; COE 1985, 1986).

Pathways from biota to humans conceptually occur as a direct result of consumption of contaminated seafood. An additional pathway for human receptors would be by direct contact with contaminated sediments, surface waters, soils, and groundwater.

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5. SITE MANAGEMENT TASKS

The overall approach for conduct of remedial work at the East Waterway site includes division of tasks into five interrelated phases as follows:

- o Phase I - Remedial Action Initiation Tasks;
- o Phase II - Site Remediation Final Scoping and Planning Tasks;
- o Phase III - RI/FS Tasks (Independent Cleanup and State Funded Remediation);
- o Phase IV - Remedial Design/Site Remediation/Cleanup; and
- o Phase V - Post Cleanup Monitoring.

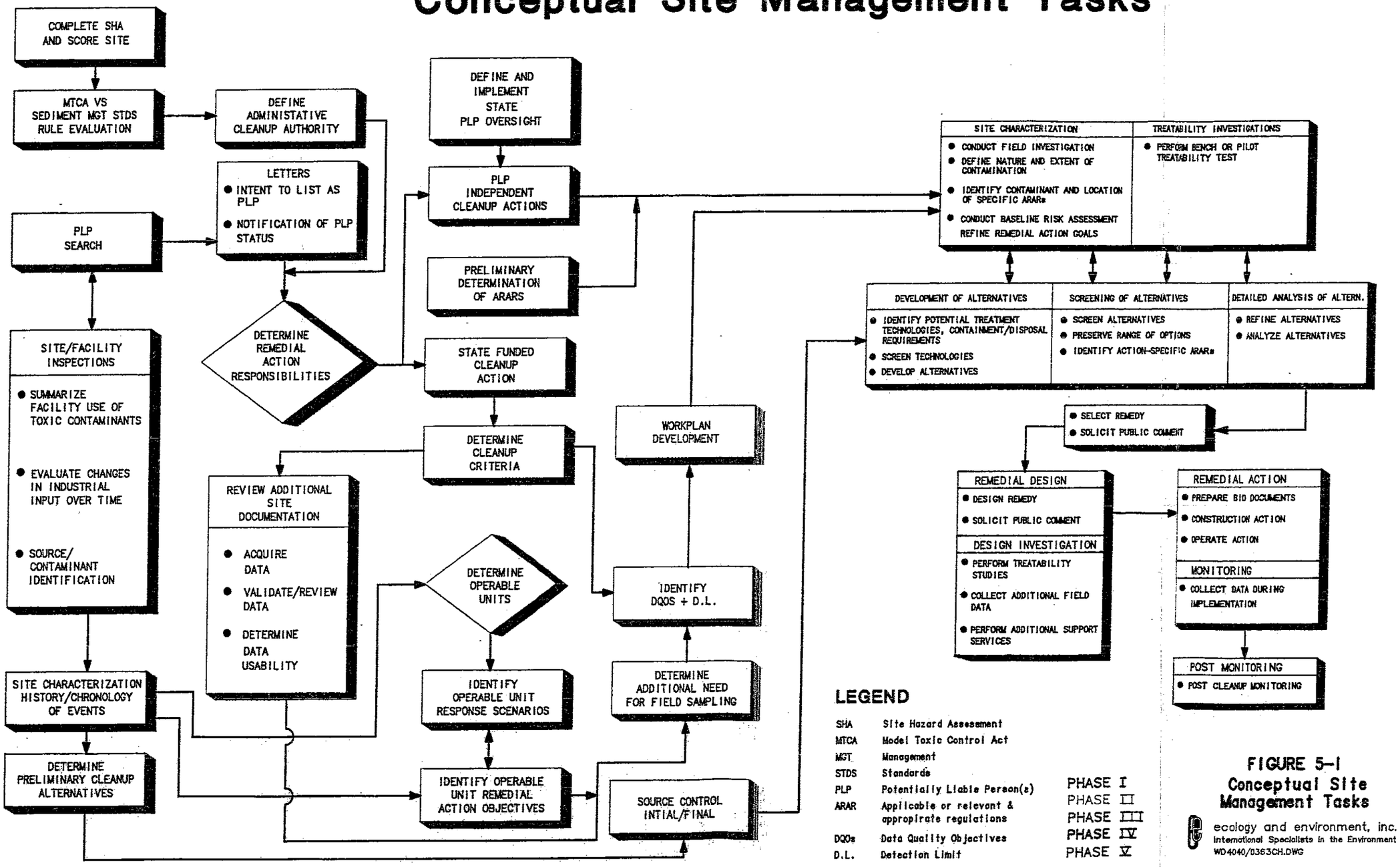
Tasks associated with each phase of East Waterway remedial work are graphically presented in the flow diagram depicted in Figure 5-1.

5.1 PHASE I TASKS

Phase I of the remedial action includes all those tasks that can and should be completed during the initiation of remedial work. These are:

- o Complete Site Hazard Assessment (SHA) and score site;
- o Evaluate the interrelation of the requirements of the MTCA Cleanup Regulation and the Sediment Management Standards Rule (Chapter 173-240 WAC);
- o Complete PLP search;
- o Conduct site/facility inspection as indicated by the EHAP Action Plan;
  - Summarize facility use of toxic contaminants.

Conceptual Site Management Tasks



LEGEND

SHA	Site Hazard Assessment	
MTCA	Model Toxic Control Act	
MGT	Management	
STDS	Standards	
PLP	Potentially Liable Person(s)	PHASE I
ARAR	Applicable or relevant & appropriate regulations	PHASE II
		PHASE III
DQOs	Data Quality Objectives	PHASE IV
D.L.	Detection Limit	PHASE V

FIGURE 5-1
Conceptual Site Management Tasks

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- Evaluate changes in industrial operations over time (use, storage, and discharge of toxic contaminants detected in East Waterway sediments).

- Identify source contaminant linkage (as possible).

o Develop site history/chronology of events; and

o Determine preliminary cleanup alternatives.

Information obtained from completion of Phase I tasks will be used to initiate those tasks included in Phase II operations. Completion of the PLP search is of particular importance, in that resulting information will be instrumental in assisting Ecology in it's efforts to determine remedial responsibilities and initiate independent cleanup operations.

5.2 PHASE II TASKS

Phase II includes all those tasks important to the final scoping and planning of RI/FS work requirements. Phase II tasks follow:

o Define cleanup administrative authority on the basis of the MTCA/Sediment Management Standards Rule Evaluation performed during Phase I;

o Issue intent to list as PLP and PLP notification letters on the basis of the PLP search and site/facility inspections;

o Determine remedial action responsibilities in terms of PLP independent cleanup actions and state funded remedial activities;

o Define and initiate state PLP oversight activities for new independent cleanup actions;

o Delineate site operable units, if appropriate;

o Identify operable unit response scenarios;

o Identify operable unit remedial action objectives;

o Determine and define cleanup criteria based on project objectives;

o Preliminary determination of ARARs.

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- o Determine project data objectives:
  - Identify data use objectives (i.e. risk assessment, site screening, verification sampling and analysis. etc.).
  - Identify data quality objectives based on data use.
  - Determine detection limits.
- o Acquire additional site documentation as identified during the initial document review (E & E 1991);
- o Review additional site documentation and identify data.
  - Acquire all obtainable data identified as pertinent to the state funded remedial work both from the initial and phase II document reviews.
  - Validate/review data, as necessary and appropriate to data quality objectives and data use (see section 2.1).
  - Determine data usability.
- o Document additional need for field sampling; and
- o Prepare work plan documents (sampling and analysis plan, quality assurance plan, etc.).

Completion of Phase II tasks leads directly into the formal RI/FS process.

5.3 PHASE III TASKS

Phase III includes the following RI/FS tasks:

- o Site characterization;
  - Conduct of necessary field investigations (i.e., site geology/soil characterization, hydrodynamics modeling requirements, geohydrology, verification sampling and analysis).
  - Refinement of the definition of the nature and extent of contamination.
  - Refinement of applicable or relevant and appropriate requirements (ARARs) determination in terms of contaminant identification and specific ARARs.
  - Conduct of baseline risk assessment.
  - Refinement of remedial action goals.

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- o Refine and develop cleanup alternatives;
- o Screen alternatives and identify action specific ARARs;
- o Conduct detailed analysis of alternatives; and
- o Perform treatability investigations.

Activities associated with the latter four tasks are interactive as indicated in figure 5-1.

5.4 PHASE IV

Phase IV tasks include all those activities associated with the selection of a remediation alternative, remedial design, design investigation and the remediation/cleanup. Specific activities are included in Figure 5-1.

5.5 PHASE V

Phase V includes all necessary post remediation monitoring. Inclusion of specific activities for this phase of remedial work would be premature at this time.

6. PLP SEARCH STRATEGY

In accordance with provisions of the MTCA Cleanup Regulation (WAC 173-340), the PLP search has been identified by the Ecology Toxic Cleanup Program as a high priority task. As such, it is recommended that the PLP search be undertaken as one of the first tasks initiated during Phase I operations of the East Waterway remedial process.

The overall objective of the PLP search will be to gather information on industrial, federal, and municipal facilities, and other persons, either currently or historically conducting operations, that may have potentially contributed to existing contamination in the East Waterway. PLP search task strategy presented herein has been focused on activities which will result in a sufficiently comprehensive base of information that can be used to meet Ecology's goal of encouraging PLP participation in the remedial process.

It is expected that information gathered during the PLP search may be used as:

- The basis for preparation of PLP notification letters;
- Documentary evidence to establish liability;
- Supporting documentation for decisions regarding cleanup responsibilities;
- A source for identification of the substances and amounts of substances used, sent to/disposed of, or stored at site facilities, and if available, the locations and consequences of any disposals;
- Supporting documentation for assessment of site ARARs;
- A contributing source of data for assessment of settlement costs; and
- Evidence in cost recovery and other legal actions.

6.1 EXISTING PLP INFORMATION

Existing literature (Crecelius et al. 1985; SAIC 1990; Tetra Tech 1988; URS 1989b) has identified the following industrial, federal, and municipal facilities whose operations potentially may have contributed, either currently or historically, to East Waterway contamination.

- Scott Paper Company Pulp and Paper Mills (existing location);
- City of Everett CSOs (existing location);
- Weyerhaeuser Thermomechanical plant (historical);
- Foss Tug (existing location);
- Foss Tug (historical location);
- Dunlap Log Yard (existing location);
- Dunlap Log Yard (historical location);
- Dunlap Towing (existing location);
- U.S. Navel Reserve Center (existing location);
- Johnston Petroleum Products/Mobil Oil (existing location);
- Port of Everett (existing location);
- Everett Cold Storage; and
- Western Gear (historical location).

In addition to these facility identifications, URS (1989b), based on the work conducted by Tetra Tech (1988), identified current ownership of parcels of land adjacent to the East Waterway site as being controlled by three principal entities: the United States Navy; Scott Paper Company; and the Port of Everett. The City of Everett was identified as owning one small parcel of land along the eastern shore of the waterway, near the foot of Hewitt Avenue south of the Hewitt Avenue Terminal. In an effort to document ownership issues, URS also identified all those entities engaged in general land use of properties adjacent to the East Waterway site during the period from 1930 to 1989 (see document review - E & E 1991).

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At this time, Ecology has mailed early notice letters delineating the agency's intent to conduct a remedial action at the East Waterway site to the United States Navy, Scott Paper Company, Weyerhaeuser, the Port of Everett, City of Everett, and Bucyrus Erie (Western Gear). As previously stated, independent cleanup operations currently are being conducted at the Mobil Oil (Johnston Petroleum Products) and the American Distributing sites.

6.2 PROPOSED PLP SEARCH STRATEGY

The general approach to the PLP search task will be to build upon existing information to the greatest extent possible. Task initiation would involve searches for information related to previously identified facilities, beginning with those already notified by Ecology through early notification letter mailings.

Task initiation would commence with development of a work plan. The following work plan elements would be addressed:

- o Delineation of specific task activities (briefly outlined below);
- o Delineation of roles and responsibilities;
- o Describe proposed information management system;
- o Develop task/activity schedule; and
- o Provide estimated cost.

It is anticipated that the following activities would be necessary to complete the PLP search:

- o Development of baseline information;
  - Review of Ecology Toxic Cleanup Program and other pertinent Ecology section records (i.e., sediment management, and industrial section files, NPDES records, surface water quality management information, Ecology archive files, etc.).
  - Title searches.

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- Written information requests to identified entities and request for interviews with facility and government officials.

- Interviews with facility and government officials.

- Expand list of PLPs as appropriate.

- Prepare preliminary site history of operations including entity financial status as appropriate.

o Prepare baseline report;

- Gather additional documentation to develop baseline information, including aerial photographs, Sanborn Maps, and Pollution Control Commission Reports.

o Baseline report review;

o Issuance of intent to list as PLP notification letters;

o Review of identified facility records;

- Refine site histories.

- Define records of ownership/operation over period of identified development by parcels.

- Identify specific generators/transporters.

- Delineate special site information such as potential area-wide or specific location contamination that cannot be attributed to a specific source or sources.

o Compile supporting documentation by identified sources;

o Expand PLP list as appropriate and issue additional intent list notification letters, if necessary;

o Prepare draft PLP search report;

o Review of draft PLP search report;

o Issue final PLP search report; and

o Issue final PLP notification letters.

It should be noted that the PLP search is an iterative process, requiring addition, and repetition of activities as necessary during development of the information base.

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Appendix A

DOCUMENTS PROVIDED BY ECOLOGY
AND REVIEWED BY E & E

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Table A-1

EAST WATERWAY
DOCUMENTS REVIEWED BY E & E

Author(s), Date*	E & E Review Document Control No.
o Anderson, J.W., 1985	WD4030.1.0-A
o Anderson, J.W. and E.A. Crecelius, 1985	WD4030.1.0-B
o Batelle Northwest, 1986	WD4030.1.0-C
o Chapman, P.M. et al., 1984	WD4030.1.0-D
o Crecelius, E.A. and J.W. Anderson, 1986	WD4030.1.0-E
o Crecelius, E.A. et al., 1985	WD4030.1.0-F
o Hart Crowser, 1987	WD4030.1.0-G
o Malins, D.C. et al., 1982	WD4030.1.0-H
o Malins, D.C. et al., 1985	WD4030.1.0-I
o PTI, 1989	WD4030.1.0-J
o SAIC, 1989	WD4030.1.0-K
o Storer, R.A. and P.M. Arsenault, 1987	WD4030.1.0-L
o Tetra Tech, 1988	WD4030.1.0-M
o Tetra Tech/PTI, 1988	WD4030.1.0-N
o URS Consultants, 1989a	WD4030.1.0-O
o URS Consultants, 1989b	WD4030.1.0-P
o United States Army Corps of Engineers, 1985a	WD4030.1.0-Q
o United States Army Corps of Engineers, 1985b	WD4030.1.0-R
o United States Army Corps of Engineers, 1986	WD4030.1.0-S

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Table A-1 - Cont.

Author(s), Date*			E & E Review Document Control No.
o	United States Department of the Navy, 1985		WD4030.1.0-T
	- Appendix A:	Sediment Movement Evaluation	WD4030.1.0-T1
	- Appendix B:	Biological Species List	WD4030.1.0-T2
	- Appendix C:	Juvenile Salmonid Study	WD4030.1.0-T3
	- Appendix D:	Correspondence from the Washington State Office of Historic Preservation	WD4030.1.0-T4
	- Appendix J:	Water Quality Data	WD4030.1.0-T5
	- Appendix L:	Regional Distribution of Water Birds	WD4030.1.0-T6
	- Appendix M:	Guidelines for Specification of Disposal Sites for Dredged or Fill Material	WD4030.1.0-T7
	- Appendix N:	Distribution of Contaminants in Everett Harbor	WD4030.1.0-T8
	- Appendix R:	Juvenile Salmonid Stomach Analysis	WD4030.1.0-T9
	- Appendix S:	Benthics	WD4030.1.0-T10
	- Appendix T:	Epibenthics	WD4030.1.0-T11
	- Appendix U:	Demersal Fish	WD4030.1.0-T12
	- Appendix V:	Marine Mammal Study	WD4030.1.0-T13
	- Appendix W:	Seabird Survey	WD4030.1.0-T14
o	Washington State Department of Ecology, 1986		WD4030.1.0-U
o	Washington State Department of Ecology, 1990		WD4030.1.0-V

* Complete citations are provided in Appendix C.

Appendix B

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Anderson, J.W. and E.A. Crecelius, February 1985, Analysis of Sediments and Soils for Chemical Contamination for the Design of U.S. Navy Homeport Facility at East Waterway of Everett Harbor, Washington, prepared by Battelle, Marine Research Laboratory, Sequim, Washington.

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