City Waterway Environmental Review

Tacoma Planning Department

Phase I and Phase II Reports

June 1989

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CITY WATERWAY ENVIRONMENTAL REVIEW

June 1989

Prepared for:

CITY OF TACOMA
DEPARTMENT OF PLANNING

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INTRODUCTION

Summary

This report compiles available literature on contaminated upland waterfront properties along City Waterway in Tacoma, Washington. The information is presented in an annotated bibliography (Phase I) and organized according to the properties addressed (Phase II).

Of the 69 properties included in the study area, there are 13 that have documentation showing the presence of contaminants. Another eight properties are considered as possibly contaminated because of known historical uses. The literature search found only two reports that document the absence of contaminants at two sites.

Much of the literature on contaminated upland sites in City Waterway addresses four areas that have been subject to remedial investigation. Two of these sites are at the end of the waterway: one on the west side and the other on the east. The site on the west side of the waterway is referred to as the "Tacoma Spur Tar Pits" because of the coal-tar and oily sand encountered during the construction of I-705. The site on the east side of the waterway is the American Plating property that was contaminated with heavy metals and other substances of concern during 30 years of metal plating operations. The third area that has generated much of the literature cited in this report are the "D" Street Petroleum facilities. Petroleum tank leakages in this area have contaminated soil and groundwater. The fourth site, the Commencement Bay Tar Pits, is not located on City Waterway. However, it was included because contaminants at this site are suspected to be migrating toward City Waterway via groundwater.

The literature on the Tacoma Spur Tar Pits, American Plating, "D" Street Petroleum, and Commencement Bay Tar Pits sites is extensive since all three sites have been subject to remedial investigation. The Tacoma Spur site has been remediated within the I-705 right-of-way. At this writing, the U.S. Environmental Protection Agency is considering remediation alternatives for the American Plating, "D" Street Petroleum and Commencement Bay Tar Pits sites.

There is little information on the contamination status of other waterfront properties in the study area. This report recommends that the City of Tacoma proceed to determine the extent and severity of contamination in the vicinity of the Tacoma Spur site. It is also recommended that the City conduct a historical review of the City Waterway properties to document past historical practices. Based on this review, properties can be prioritized for evaluation. For example, properties with land uses likely to generate contaminants, such as plywood companies and fuel storage facilities, would be given a higher priority than properties that were used for warehousing.

Once properties have been prioritized the City should work with property owners and public agencies to determine if there are problems in targeted areas. If problem areas are identified, remedial actions should be developed and implemented. The goal of this effort should be documentation showing that all the waterfront properties along City Waterway have received the rating: Documented Absence of Contaminants.

Background

This report was prepared in response to recommendations set forth in the Tacoma Waterfront Analysis, Ruston Way - Schuster Parkway - City Waterway (June 1988). The Tacoma Waterfront Analysis examined the urban shoreline from the Town of Ruston south to City Waterway. Background information was provided on the character of the shoreline and conclusions were drawn about appropriate development possibilities. The Tacoma Waterfront Analysis also included recommendations on how the City of Tacoma can encourage appropriate development and address specific issues of concern.

With regard to City Waterway (see Figure A), the Tacoma Waterfront Analysis concluded that there is a perception in the community that the properties in this area have been contaminated by past industrial activity. This perception has been bolstered by the identification of three waterfront areas that have been subject to investigation and remedial action: the tar-pits uncovered during the construction of the Tacoma Spur (I-705); the heavy metal contamination at the American Plating site; and the petroleum leakages from the East "D" Street tank farms. The perception is that contamination is a prevalent if not pervasive problem in City Waterway and may well be one of the underlying reasons why development in the area has failed to occur as planned.

In order to encourage redevelopment along City Waterway, the Tacoma Waterfront Analysis recommended that the City of Tacoma seek ways to address existing environmental issues and problems. A Coastal Zone Management grant was obtained from the Washington State Department of Ecology to fund an effort to compile and summarize information on contamination of upland sites along City Waterway. This report is a result of that effort.

Information was obtained from several sources. The Tacoma Planning Department provided information from Shoreline Substantial Development Permit files and the Tacoma-Pierce County Health Department allowed access to files which documented water quality enforcement actions along City Waterway. The Puyallup Tribe responded with information on the Wheeler-Osgood Waterway and the Port of Tacoma assisted in identifying relevant documents. In addition, the Washington State Department of Ecology provided information on selected properties and the U.S. Environmental Protection Agency released documentation pursuant to the Freedom of Information Act.

Although the purpose of this study was to document upland contamination, some water quality and sediment data for City Waterway was reviewed. Most of this water quality and sediment information was prepared in response to Superfund investigations of the waterway. This information was included in the literature search to give some idea of how upland properties are contributing to water quality degradation and sediment contamination in City Waterway.

The City Waterway Environmental Review does not claim to have identified every site evaluation prepared in the area. The reviewers may not have encountered all the relevant files and there may be information contained in the records of public agencies that were not contacted. In addition, there are private parties may have conducted site evaluations which were not made public. There are also a number of clean-up efforts

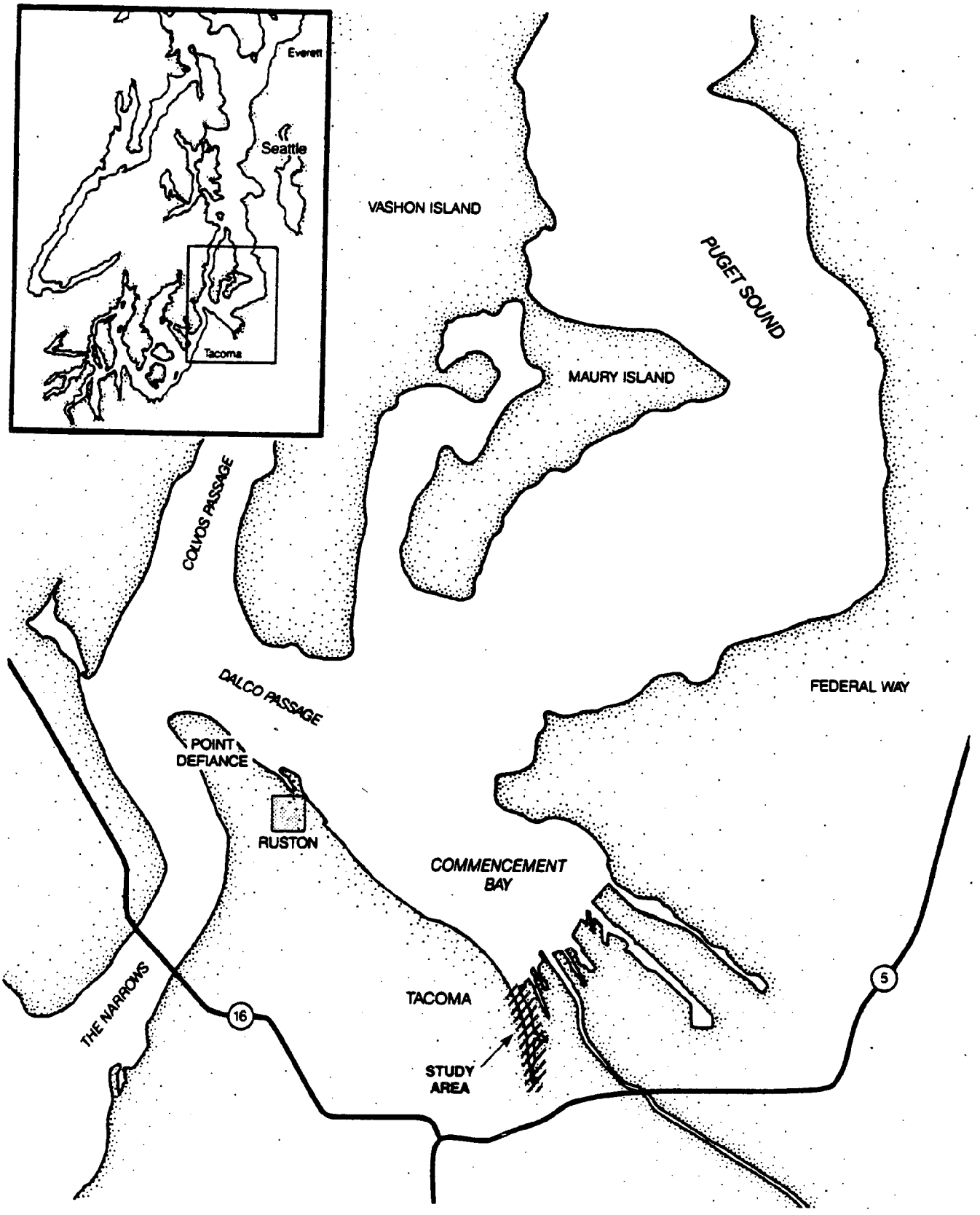

Figure A.
Vicinity Map

currently underway along City Waterway. Investigations, evaluations, and remedial actions are generating a constant flow of documentation, some of which was in draft form during the preparation of this report.

The City Waterway Environmental Review provides a comprehensive overview of the status of existing information on upland properties in the study area. This report should be updated as new studies are issued and clean-up efforts are completed. By building on this foundation report, progress can continue to be made toward redressing the contamination concerns along City Waterway.

Phase I

PHASE I

Phase I compiles all the references identified during this study and presents the information in an annotated bibliography. The references are listed in alphabetical order and the contents of the reports are summarized. If a report addresses properties outside the study area, only the information relevant to City Waterway is summarized.

Phase I also provides a map of City Waterway depicting all the waterfront parcels (Figure 1). A few properties outside the study area are also shown on the map. These properties were included on the map if references referred to these areas in relation to City Waterway.

Each parcel in Figure 1 is numbered. A key to Figure 1 gives the land use, ownership, and address for each number. The numbers given each parcel are referred to throughout the Phase I and Phase II reports.

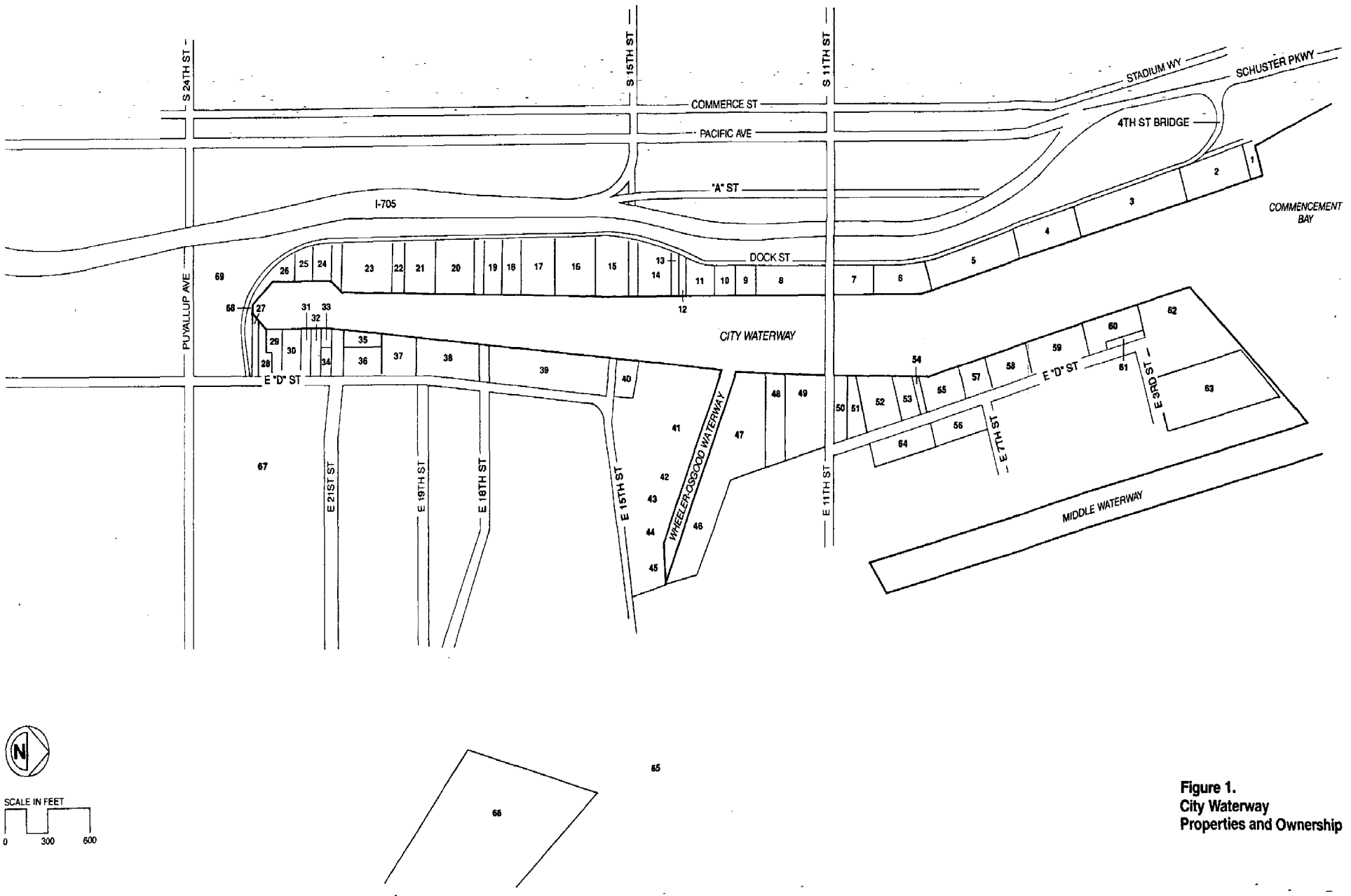

Figure 1.
City Waterway
Properties and Ownership

KEY FIGURE 1

LIST OF PROPERTIES ADJACENT TO CITY WATERWAY

	Land Use/Ownership	Address
1.	Vacant/Glacier Park Co.	401 Dock St.
2.	Vacant/Glacier Park Co.	431 Dock St.
3.	"The Dock"/Glacier Park Co.	535 Dock St.
4.	Puget Sound Freight/Glacier Park Co.	705 Dock St.
5.	Totem Marina/Glacier Park Co.	821 Dock St.
6.	Totem Marina/Glacier Park Co.	821 Dock St.
7.	Municipal Dock/City of Tacoma	1025 Dock St.
8.	Sea Explorers-Pacific Machine Shop-Totem Marina/City of Tacoma	1119 Dock St.
9.	Vacant (Steam Plant #1)/City of Tacoma	1141 Dock St.
10.	Vacant/Investco	1147 Dock St.
11.	Colonial Fruits & Produce/ Joe & Jean Trucco	1179 Dock St.
12.	Parking/Joe & Jean Trucco	1189 Dock St.
13.	Parking/Joe & Jean Trucco	1189 Dock St.
14.	Johnny's Seafood/City of Tacoma	1199 Dock St.
15.	Vacant (formerly Lone Star Concrete and Scofield Concrete)/Glacier Park Co.	1543 Dock St.
16.	Vacant (formerly Lone Star Concrete and Scofield Concrete)/Glacier Park Co.	1543 Dock St.
17.	Vacant (formerly North Pacific Plywood/ Glacier Park Co.	1549 Dock St.
18.	Vacant (formerly North Pacific Plywood)/ Glacier Park Co.	1549 Dock St.

19.	Vacant (formerly Scofield Concrete)/ Glacier Park Co.	1715 Dock St.
20.	Pacific Coast Oil (1801 Dock)- City Waterway Marina (1811 Dock)- Magnusen Marine Brokerages (1813 Dock)/ City Waterway Enterprises	1801, 1811, and 1813 Dock St.
21.	Vacant Building/Package Service Inc.	1821 Dock St.
22.	Vacant/Package Service Inc.	1833 Dock St.
23.	Harmon Cabinets/Harmon Cabinets, Inc.	1933 Dock St.
24.	Vacant/Glacier Park Co.	2101 Dock St.
25.	Vacant/Package Service Inc.	2115 Dock St.
26.	City Park/City of Tacoma	2201 Dock St.
27.	City of Tacoma Public Street Rights of Way	
28.	Berg Scaffolding/Lewis Jones	2130 E. "D" St.
29.	Berg Scaffolding/Lewis Jones	2130 E. "D" St.
30.	Berg Scaffolding/Lewis Jones	2130 E. "D" St.
31.	Berg Scaffolding/Lewis Jones	2130 E. "D" St.
32.	Vacant Building (American Plating, Inc.)/ Lewis Jones	2110 E. "D" St.
33.	Pickering Manufacturing/ Pickering Industries	1930 E. "D" St.
34.	Pickering Manufacturing/ Pickering Industries	1930 E. "D" St.
35.	Picks Cove Marina/Pickering Industries	1940 E. "D" St.
36.	Pickering Manufacturing/ Pickering Industries	1930 E. "D" St.

37.	Picks Cove Marina/Pickering Industries	1940 E. "D" St.
38.	Johnny's Restaurant-Dock Marina-Northwest Yacht Brokerage Celeste Pastry/Johnny Meaker	1900 E. "D" St.
39.	Port of Tacoma-City Marina/ Glacier Park Co.	1616 E. "D" St.
40.	J.M. Martinac Shipbuilding Corp./ Burlington Northern Railroad	1502 E. "D" St.
41.	J.D. English Steel Company/ Burlington Northern Railroad	465 E. 15th St.
42.	Cascade Drywall/ Burlington Northern Railroad	455 E. 15th St.
43.	Johnson and Postman Wood Specialties/ Burlington Northern Railroad	459 E. 15th St.
44.	The Johnson Group/Burlington Northern Railroad	459 E. 15th St.
45.	General Beer Distributors/ Burlington Northern Railroad	525 E. 15th St.
46.	Vacant (formerly Old St. Regis Door Mill)/ Stu Wattles	1215 E. "D" St.
47.	Western Steel Fabricators/Stu Wattles	1207 E. "D" St.
48.	Woodworth and Company	1200 E. "D" St.
49.	Petrich Marine/Marine Iron Works	1118 E. "D" St.
50.	Fireboat Station/City of Tacoma	302 E. 11th St.
51.	Globe Machine/Kathryn Bamford	1020 E. "D" St.
52.	Olympic Chemical	1002 E. "D" St.
53.	Pacific Pattern Works (formerly Fick Foundry)/ American Savings Bank	820 E. "D" St.

54.	Vacant (formerly Fick Foundry)/ American Savings Bank	820 E. "D" St.
55.	Globe Machine (Engineering Annex)/ Calvin and Joanne Bamford	702 E. "D" St.
56.	Globe Machine (Manufacturing Company)/ Calvin and Joanne Bamford	701 E. "D" St.
57.	Globe Machine (Manufacturing Annex)/ Calvin and Joanne Bamford	540 E. "D" St.
58.	Socony Mobil Oil Co./Mobil Oil Corp.	520 E. "D" St.
59.	Union Oil of California (UNOCAL)	516 E. "D" St.
60.	Puget Sound Plywood	326 E. "D" St.
61.	Puget Sound Plywood	302 E. "D" St.
62.	Superior Oil Company	250 E. "D" St.
63.	Puget Sound Plywood	228 E. "F" St.
64.	Vacant (formerly Fick Foundry)/ American Savings Bank	1005 E. "E" St.
65.	Hygrade Foods	1623 E. "J" St.
66.	Commencement Bay Tar Pits Site/ Joseph Simon & Sons, Inc.	2202 E. River St.
67.	Burlington Northern Railroad Car Wash/ Burlington Northern Railroad	East 21st St.
68.	Twin 96ers/City of Tacoma	East "C" St. and Dock St.
69.	Tacoma Spur Right of Way and vicinity (former coal gasification plant)/ State of Washington	East 23rd St. and "A" St.

ANNOTATED BIBLIOGRAPHY

Applied Geotechnology, Inc. 1989a. Proposed Final Closure and Post Closure Plan, American Plating, Inc. May 31, 1989. Prepared for Lewis R. Jones, Jones Construction Company in response to U.S. Environmental Protection Agency Consent Order 1087-09-07-3009. Bellevue, Washington.

See Kennedy/Jenks/Chilton, 1989. Kennedy/Jenks/Chilton Engineers prepared the proposed final closure and post closure plan for the Applied Geotechnology Inc. analysis of the American Plating site at 2101 East "D" Street.

Applied Geotechnology, Inc. 1989b. Phase II, Volume I and II - Soils and Groundwater Investigation, American Plating, Inc. May 1989. Prepared for Lewis R. Jones, Jones Construction Company in response to U.S. Environmental Protection Agency Consent Order 1087-09-07-3009. Bellevue, Washington.

Phase II represents a combination of the soil and groundwater information generated during the 1988 investigations (AGI, 1988c) for the American Plating site at 2101 East "D" Street. This report also provides the additional data requested by the U.S. EPA (AGI, 1989c). Volume I presents the data and analysis. Volume II is appendices with back-up documentation. See, Kennedy/Jenks/Chilton, 1989 for the Proposed Final Closure and Post Closure Plan.

Applied Geotechnology, Inc. 1989c. Proposed work plan for Phase II - Soils and Groundwater Investigation, American Plating, Inc. February 28, 1989. Prepared for Lewis R. Jones, Jones Construction Company in response to U.S. Environmental Protection Agency Consent Order 1087-09-07-3009. Bellevue, Washington.

After review of the Soil and Groundwater Investigation prepared for the American Plating site, 2110 East "D" Street (AGI, 1988c) the U.S. EPA indicated that additional data were needed before submittal of site closure and post-closure

plans. This work plan identifies the tasks which would be undertaken in response to the U.S. EPA comments.

There are seven tasks identified in this work plan.

- Task 1 involves soil sampling under both buildings on the American Plating site.

- Task 2 proposes to monitor the groundwater during extreme high tides to determine if the groundwater gradient reverses on these occasions.

- Task 3 is for additional monitoring wells and soil borings to assess potential off-site migration of contaminants to the east and to define conditions near the plating waste sump.

- Task 4 is an additional round of sampling of the nine existing wells and the three proposed wells.

- Task 5 addresses the leachability of metals. If it is shown that the metals contained in the soil do not leach, then it could be argued that the site has stabilized. If this determination is made, it may be possible to leave the soil on-site and cover it with a clean soil cap, instead of removing the soils.
- Task 6 is a revised report that will provide a single, comprehensive document containing the information generated during the 1988 investigation and that of the proposed work plan to satisfy USEPA comments. This document will be considered Phase II of the Soils and Groundwater Investigation of the American Plating site.

- Task 7 is the preparation of final closure and post-closure plans (Applied Geotechnology, Inc. 1988a).

Applied Geotechnology, Inc. 1988a. Quarterly Report - Third sampling round, American Plating, Inc. Report prepared for the U.S. Environmental Protection Agency, December 22, 1988. Bellevue, Washington.

This report contains the results of the third round of groundwater and surface water sampling collected on November 16, 1988 at the American Plating site. (2110 East "D" Street). The samples were taken from nine groundwater wells, from City Waterway, and from a seep on-site that flows into City Waterway. These results are presented in the Phase II report, submitted to the U.S. EPA in May 1989 (AGI, 1989b).

Applied Geotechnology, Inc. 1988b. Quarterly Report - Second sampling round, American Plating, Inc. Report prepared for the U.S. Environmental Protection Agency, October 13, 1988. Bellevue, Washington.

This report contains the results of the second round of groundwater and surface water sampling collected on November 16, 1988 at the American Plating site (2110 East "D" Street). The samples were taken from nine groundwater wells, from City Waterway, and from a seep on-site that flows into City Waterway. Analysis of these results are presented in the Phase II report, submitted to the U.S. EPA in May 1989 (AGI, 1989b).

Applied Geotechnology, Inc. 1988c. Soil and Groundwater Investigation, American Plating, Inc. August 1988. Report prepared for Lewis R. Jones, Jones Construction Company in response to Washington State Department of Ecology's Consent Order DE87-5178 and the U.S. Environmental Protection Agency Consent Order 1087-09-07-3009. Bellevue, Washington.

This report presents the results of the Soil and Groundwater Investigation of the American Plating Facility site. The American Plating site was operated as a metal plating facility by lessees of the property from 1955 to 1986. The site is located at 2110 East "D" Street, adjacent to City Waterway, and lies within the Commencement Bay Nearshore/Tideflats area, an EPA National Priorities List site.

This investigation was prompted by two separate Consent Orders: Order No DE87-5178 from the Washington State Department of Ecology and Order No. 1087-09-07-3009 from the U.S. EPA. These orders were issued against the property owner due to repeated violations and abandonment of the site by proprietors of American Plating. The violations included hazardous waste leaks, spills, and discharges on-site to surface waters and the City of Tacoma sanitary sewer system. In 1986, an EPA Technical Assistance Team collected soil samples from the site and inventoried the chemicals left on-site after operations had ceased.

The purpose of the investigation was to assess the extent of metals and chlorinated hydrocarbons within site soils, and to determine if groundwater quality beneath the facility had been impacted by the presence of these compounds.

The American Plating site occupies 1.4 acres in the Tacoma tideflats area. The site contains two large buildings and a concrete pad, which may have been used as a loading dock. Building No. 1 was used for office space, paint and chemical storage, non-destructive testing, and plating. Building No. 2 was used only for a short time for a zinc plating circuit; its major use was for chemical and waste storage.

Groundwater flow on the site is predominately to the west toward City Waterway. However, during periods of daily higher-high tide, the groundwater flow direction is reversed, indicating the groundwater in this area is being recharged at high tide.

A total of 7 surface soil samples, 35 subsurface soils samples, 10 groundwater, and 2 surface water samples were analyzed for metals, cyanide, and chlorinated hydrocarbons. Seventeen additional surface soil samples were also taken in 1986.

Metals: Metal concentrations in surface soil ranged from below background concentrations for the Tacoma area to up to one hundred times background levels. The observed pattern of metal concentrations appears to represent isolated spills of various plating solutions. The highest metal concentrations tended to be in the middle of the site between the two buildings where the traffic during plating operations was most heavy and near the Waterway where runoff tends to pool and infiltrate. Subsurface pockets of elevated metal concentrations were found in soils that are high in silt and/or wood-chips, and that are downgradient from surface contamination. Only very low metal concentrations were detected in groundwater and surface water samples.

Cyanide: The overall distribution of cyanide on-site follows the same distribution as the metal concentrations. The correlation is likely due to spillage of metal-cyanide plating solutions and may have resulted in the deposition of very stable and insoluble metal-cyanide complexes in the soil matrix. This is supported by the absence of cyanide in groundwater.

Volatile Chlorinated Hydrocarbons (CHCs): Several CHCs were detected in the soil samples. The compounds probably originated from degreasers used prior to plating. The general pattern of contamination is similar to that discussed for metals. However, the only CHC that violated primary drinking water standards was vinyl chloride, which was detected in two monitoring wells.

Contaminant transport off-site is expected to be minimal. Wind erosion of surface soils is not likely unless construction activities take place in dry weather. Surface water runoff could carry contaminants into City Waterway during storm events or high tides that have periodically flooded the site. These events are relatively infrequent and for the most part surface water drains to the southwest corner of Building No. 1, where it ponds and/or infiltrates into the Fill/Marsh Aquifer. The discharge of the Fill/Marsh Aquifer contributes low concentrations of chlorinated hydrocarbons to City Waterway. The solubility of metals is so low in groundwater on-site that metals do not appear to be migrating through this pathway. Groundwater discharge from the Lower Sand Aquifer also discharges into the Waterway. Tests indicate that this aquifer is uncontaminated.

Any vinyl chloride that leaves the site via groundwater will probably not have an impact on City Waterway. Vinyl chloride does not absorb onto sediments and

it volatilizes from surface water within a few hours. Once released into the air it degrades in a matter of hours. Vinyl chloride does not appear to bioaccumulate in individuals or in food chains.

Human or wildlife exposure would most likely occur by direct dermal contact or ingestion of surface soil or water. Human contact is limited because the site is secured. Animal contact is limited to birds.

Allen A., Pierce, D., Coble, K., and Payton, N. 1988. Final Report: Preliminary Environmental Assessment of the Surplus Steam Plant No. 1 Site. Prepared for the Tacoma Light Division by the Tacoma-Pierce County Health Department. Tacoma, Washington.

The Tacoma-Pierce County Health Department conducted a preliminary environmental assessment of surplus Steam Plant #1 (1141 Dock Street). The purpose was to identify potential public health and environmental risk associated with the site.

The steam plant was constructed in 1922 and was used to a maintain supply of power to the central business district during peak demand and in case of transmission line trouble. It was also used as a voltage regulator and a supplement to the Consumer Central Heating plant on the adjacent parcel. In 1979, the Consumer Central Heating plant was closed and was torn down the following year. According to former employees, Steam Plant No. 1 was used approximately two years out of the thirty-four years it was in operation. The plant was last run during a test in 1968 and has had no maintenance in the last 19 years. In 1982, the Tacoma Department of Public Works declared the building dangerous under City Ordinance No. 15742.

Twenty samples were collected in areas of the site where oils and solvents were known to be used and stored, at discharge points, where containers holding possible harmful or unknown materials were found, and in specific areas that appeared to be contaminated. Samples were analyzed for polychlorinated biphenyls (PCBs), halogenated hydrocarbons (HHs), polycyclic aromatic hydrocarbons (PAHs), oils and greases/pH (O&G/pH), and priority pollutant metals (PPMs).

The results showed that Washington State Dangerous Waste Criteria (WAC 173-303) were not met or exceeded. A preliminary health risk assessment indicated that contaminant levels at the site would not pose a health risk if ingested. In addition, the assessment of carcinogenic risk from ingested arsenic did not indicate a risk.

This report concluded that based on results from this limited environmental assessment, demolition of Steam Plant No. 1 presents minimal threat to public health

and the environment. This is assuming PCB content in oil removed from electrical machinery on the site does not meet or exceed Washington State Dangerous Waste Criteria.

Comstock, Andy. Tacoma-Pierce County Health Department. 1988. Letter of July 13, 1988 to Gordon Pickering, Pickering Corp. Re: Glue Water Discharge. Tacoma, Washington.

A letter informing Mr. Pickering that the discharge of glue wastewater at 1930 East "D" Street, into City Waterway, should be diverted to the sanitary sewer system.

Eaton, Thomas, G. Washington State Department of Ecology. 1986. Letter to Fred Thompson, Tacoma Department of Public Works. Re: Response to Ron Nelson's Letter of April 8, 1986. Olympia, Washington.

Ron Nelson's letter of April 8, 1986 (Nelson, 1986) requested information on contaminated waterfront sites on City Waterway. This letter responds to Tacoma's request and documents the status of investigations for parcels from East 15th Street, on the west side of the Waterway, south to the end of the Waterway, including the American Plating site.

As of July 8, 1986, the only sites on the west side of the Waterway, south of 15th Street where preliminary site assessments had been made, were 1821 Dock Street and 2115 Dock Street (Hart Crowser, 1985a). The letter summarizes the findings of the Hart Crowser report. The American Plating parcel (2110 East "D" Street) had also undergone preliminary site investigation by EPA on March 13, 1986 (Weston, 1986).

Dames and Moore. 1982. Historic Land Use Survey of the Tacoma Tideflats. Prepared for the Washington State Department of Ecology. #07927-003-05. Olympia, Washington.

One hundred and seventeen sites were identified as areas where past waste disposal practices may pose a water pollution problem. Further investigation into the waste practices of the 117 sites was undertaken and 49 target sites were identified.

Commencement Bay and the Tacoma tideflats area have been a major harbor and industrial area since the 1920s. During this time, the area has been intensively used by several hundred commercial and industrial enterprises.

Developments located along City Waterway and addressed in this report include:

Superior Oil	250 East "D" Street: Discharge from the on-site boiler may have been spilled on the ground.
Phillips Oil Union Oil Mobil Oil Shell Oil Penco Oil	516 East "D" Street: 520 East "D" Street: 702 East "D" Street: (now Globe Machine) Fuel storage tanks have been located here since the 1940s. Many fuel spills have occurred on this site. Oil residue resulting from tank cleaning may have been discharged on the site. Pooled oil exists on the water table below the tank farms. Obvious signs of soil contamination are noted by the oil sheen on City Waterway adjacent to these tank farms.
Fick Foundry	1005 E. "E" St.: Fick Foundry's processes resulted in the production of many types of slag as by-product. In the past, this slag was deposited along the banks of the City Waterway as fill.
Wheeler-Osgood	The Wheeler-Osgood Waterway constitutes the receiving water for industries in the area.
Martinac Shipyard	1502 East "D" Street: J.M. Martinac Shipbuilding Corp. manufactures tuna boats. Paint, solvents, and sandblasting material (granulated slag from ASARCO, Inc.) might enter City Waterway from this industry.
American Plating, Inc.	2110 East "D" Street: American Plating, previously Puget Sound Plating, has been subject to DOE and City of Tacoma enforcement action. Concern about past and present chemical storage and waste disposal practices have led to the closure of this electroplating industry.
Twin 96er's	Foot of City Waterway between East "C" Street and Dock Street: Storm drainage from the Nalley Valley and the area around I-5 north of South 38th Street enters the City Waterway via these drains. Occasionally sewage has been observed coming through the pipe, and the effluent has a solvent odor.
Harmon Cabinets	1933 Dock Street: There is no evidence that Harmon Cabinets has disposed waste materials on this site.

North Pacific Plywood, Inc.	1549 Dock Street: The disposal of glues and wood waste have been associated with this industry since the 1960s. During the 1960s, the residual glue in the spreaders was deposited on land, although the exact location of deposition is not known. A common practice was to deposit the waste glue on sawdust piles. North Pacific Plywood, Inc. used the sawdust as hog fuel. They may have simultaneously eliminated the deposits of glue waste in the same manner. This practice of burning hog fuel was eliminated during the 1970s with the advent of air pollution controls. Glue wastes are now recycled as makeup material. Numerous spills have occurred on this site.
Scofield Co.	1543 Dock Street: Scofield Co., a concrete batch plant, is supposed to recycle truck wash water but the system sometimes overflows.
Consumer Central Htg.	1147 Dock Street (Vacant): This was the steam generating heat plant for the City of Tacoma.

Dames and Moore. 1981a. Baseline Studies and Evaluations for Commencement Bay Study/Environmental Impact Assessment. Volume I, Summary and Synthesis. Prepared for U.S. Army Corps of Engineers, Seattle District, Contract No. DACW67-80-C-0101. Seattle, Washington.

The objectives of this study are:

- to collect baseline data and provide a detailed description of the natural and human systems of the Commencement Bay area,
- to present a method for evaluating the environmental impacts of proposed activities in any part of the study area, and
- to assess and describe the environmental impacts of various projects and plans in the study area.

City Waterway is included in the study area. Volume 1 summarizes information presented in subsequent volumes. This information includes descriptions of the physical oceanography of City Waterway, wave regime, water quality conditions, sediment analysis, air quality, and noise. The summary also describes the biological environment and human environment of the area.

Dames and Moore. 1981b. Baseline Studies and Evaluations for Commencement Bay Study/Environmental Impact Assessment. Volume II, Land And Water Use. Prepared for U.S. Army Corps of Engineers, Seattle District, Contract No. DACW67-80-C-0101. Seattle, Washington.

Volume II, Land and Water Use, establishes biological and human environmental data on the existing conditions in the Commencement Bay study area. The land uses adjacent to City Waterway are described and all applicable land use regulations are listed. A general historical perspective of the area is given along with information regarding past dredging operations in City Waterway.

Dames and Moore. 1981c. Baseline Studies and Evaluations for Commencement Bay Study/Environmental Impact Assessment. Volume V, Water Quality. Prepared for U.S. Army Corps of Engineers, Seattle District, Contract No. DACW67-80-C-0101. Seattle, Washington.

Volume V, Water Quality, characterizes water quality of Commencement Bay, the industrial waterways, and the lower Puyallup River. This report determines existing conditions in terms of traditional water quality parameters. Vertical stratification in the study area is characterized and ongoing activities affecting water quality are identified. In addition, the study characterizes seasonal variations in water quality throughout the study area.

The report begins with a review of past and ongoing water quality studies. Sampling results of data collected for this study are also presented. Three sampling stations were set up in City Waterway: one at the end of the waterway near the twin-96ers; one at the entrance to the Wheeler-Osgood Waterway, and one at the entrance to City Waterway.

Water quality data for specific discharge points into City Waterway include:

American Plating, Inc.	2110 East "D" Street
Atlas Foundry & Machine	3021 South Wilkeson Street
Fick Foundry	1005 East "E" Street
Scofield Concrete	1543 Dock Street
Mobil Oil Co.	520 East "D" Street
North Pacific Plywood	1549 Dock Street
Olympic Chemical	1002 East "D" Street
Puget Sound Plywood	228 East "F" Street
Shell Oil (now Globe Machine)	702 East "D" Street
Union Oil Co.	516 East "D" Street
Woodworth and Co.	1200 East "D" Street

Ecology and Environment, Inc. 1988. Site Inspection Report for Tacoma Spur, Tacoma, Washington. Report No. TDD F10-8809-01 and PAN FWA0598SA. Prepared for the U.S. Environmental Protection Agency. Seattle, Washington.

In 1984, contaminated soils within the Washington State Department of Transportation (WDOT) right-of-way (ROW) were removed following studies by Hart Crowser & Associates, Inc. (Hart Crowser, 1984). This report recommends that the remainder of the contaminated soils in areas outside of the ROW also be removed to reduce the potential threat to the environment and human health. Properties along City Waterway which could be affected include, 2101 and 2115 Dock Street as well as the City Park at 2201 Dock Street. Portions of the City Park where contamination is exposed at the surface should be restricted from public access.

Prior to the construction of the Tacoma Spur (I-705) in 1984, geotechnical exploration within the I-705 ROW revealed unexpected coal-tar contamination. Under contract with the WDOT, Hart Crowser researched historical data and conducted a hydrogeologic investigation in 1984 and 1986 which revealed soil and groundwater contamination. Characterization of wastes and groundwater beneath the site and on adjacent properties indicated the presence of polycyclic aromatic hydrocarbons (PAHs) and metals.

WDOT, in conjunction with local, state, and federal agencies, conducted removal of the contaminated wastes within the WDOT ROW. Contaminated soils outside of the ROW were documented as beyond the scope of the WDOT removal. Using a procedure agreed upon by WDOT, the Washington State Department of Ecology, and Hart Crowser, the extent of the removal was determined by visual identification of contamination. No analytical data were collected to verify the extent of the contamination.

Excavated waste with more than 1 percent PAH was classified as hazardous and taken to the Arlington Hazardous Waste Disposal facility. Soils with less than 1 percent PAH were classified as problem wastes and disposed of in three concrete storage vaults constructed in the state ROW in an area south of the removal project.

According to Hart Crowser, the removal of contaminated wastes at the Tacoma Spur site will probably significantly reduce surface water and groundwater contamination. However, due to the irregular and discontinuous distribution of the wastes, the extent of the surface and subsurface soil contamination has not been clearly defined. Due to the lack of analytical data documenting the horizontal and vertical extent of contamination, Ecology and the Environment, Inc. concluded that it cannot be determined if remedial actions completely removed the contamination.

Evans Hamilton, Inc. and D.R. Systems, Inc. 1987. Puget Sound Environmental Atlas, Volume 2. Prepared for Environmental Protection Agency, Puget Sound Water Quality Authority and U.S. Army Corps of Engineers. Seattle, Washington.

Maps for Commencement Bay (Region 11) are provided for a range of information. Pertinent to this study are maps showing sediment chemistry for a range of pollutants in City Waterway. Pollutants of concern for City Waterway sediments include: polycyclic aromatic hydrocarbons (low and high molecular weight); PCBs; arsenic; cadmium; copper; mercury; lead; zinc; and total organic carbon. The atlas also includes a map of areas of concern within City Waterway based on overall levels of organic and metal contamination. Ten sites within the waterway are identified as areas of concern with levels of pollutants considerably higher than reference areas. The atlas also identifies both ends of the waterway as areas of concern for bioaccumulation. These areas received the maximum score per station from either organic or inorganic chemicals. Because of the potential for diseased bottomfish, a sport fishing advisory applies to all of City Waterway. In fact, the atlas shows all of the nearshore tideflats in Commencement Bay (except the eastside north of the Hylebos Waterway) as sport fishing advisory areas.

Hanowell, Ray. Tacoma-Pierce County Health Department. 1986. Letter of May 6, 1986 to Bill Backous, Washington State Department of Ecology. Re: Analysis report of phenols at Harmon Cabinets, 1933 Dock Street. Tacoma, Washington.

A soil sample was taken on April 10, 1986, following an anonymous complaint concerning the possible dumping of phenolic wastes at Harmon Cabinets, 1933 Dock Street. The sample was taken at an outfall that discharges from the property. The sample was found to contain total phenols in concentrations greater than 7 times the apparent effect threshold established by Tetra Tech.

Hart Crowser and Associates, Inc. 1989a. Work Plan -- "D" Street Petroleum Site. Prepared for Shell Oil Company, Mobil Oil Corporation, and Union Oil Company of California. May 1989. J-1587-12. Seattle, Washington.

This work plan was prepared in response to a Washington State Department of Ecology draft consent order dated March 28, 1988.

The work plan describes petroleum leakage occurring in the vicinity of the "D" Street Petroleum facilities. The site is located between "F" Street and City Waterway, near East 7th Street. In 1982, petroleum product appeared concentrated along "D" Street between Globe Machine (1020 E. "D" St.) and Union Oil (516 E. "D" St.) properties, and along East 7th Street between "D" and "E" Streets (Hart Crowser, 1982). Further analysis, in 1987, indicated a potential product lens extending approximately 600 feet in a north-south direction and anywhere

from 100 to 200 feet in an east-west direction (Hart Crowser, 1987a). These analyses also indicated that product thickness above the water table ranged from zero to several feet.

Initial remedial actions to recover free petroleum involved two recovery wells on the old Shell distribution site in 1983. A new recovery system was designed in 1987 to replace the two wells and was put into operation in late January 1988. From January 1988 to June 1988, the systems recovered 30,000 gallons of product. This amount represents an average of 200-300 gallons per day.

There are four phases of work described in the work plan.

Phase I:
- Install free petroleum recovery system
- Obtain final approval of recovery system
- Test pipes and vessels for leaks
- Develop SPCC plans

Phase II:
- Define extent of subsurface free petroleum product
- Sample and analyze free petroleum product
- Sample and analyze upper limit groundwater
- Prepare waste handling plan
- Assess water quality of lower sand unit
- Monitor hydrogeology
- Sample soil and analyze
- Identify receptors and conduct risk assessment
- Prepare site hydrogeologic characterization

Phase III:
- Operate and monitor free petroleum product recovery system

Phase IV:
- Develop remedial action objectives
- Identify and screen remedial action techniques
- Evaluate remedial action alternatives
- Prepare interim, draft, and final reports.

Hart Crowser and Associates, Inc. 1989b. Letter of May 15, 1989 to Shell Oil Company. Re: "D" Street Petroleum Monthly Progress for April 1, through April 30, 1989. Seattle, Washington.

Hart Crowser and Associates, Inc. 1989c. Letter of April 15, 1989 to Shell Oil Company. Re: "D" Street Petroleum Monthly Progress for March 1, through March 31, 1989. Seattle, Washington.

Hart Crowser and Associates, Inc. 1989d. Letter of March 16, 1989 to Shell Oil Company. Re: "D" Street Petroleum Site Monthly Progress for February 1, through February 28, 1989. Seattle, Washington.

Hart Crowser and Associates, Inc. 1989e. Letter of February 14, 1989 to Shell Oil Company. Re: "D" Street Petroleum Site Monthly Progress for January 1, through January 31, 1989. Seattle, Washington.

The four progress reports give the number of gallons of petroleum product recovered from the groundwater beneath the "D" Street Petroleum site.

Hart Crowser and Associates, Inc. 1989f. Engineering Upgrade Report. Free Petroleum Product Recovery System, "D" Street Petroleum Site. Tacoma, Washington. Prepared for Shell Oil, Mobil Oil Corp., and Unocal Inc. J-2300-1. Seattle, Washington.

This report summarizes studies conducted at the "D" Street Petroleum sites between Globe Machine (1002 E."D" St.) and Union Oil (516 E. "D" St.) and along 7th Street between "D" and "E" Streets. The studies accomplish work required under Task 1.2, Phase I of the "D" Street Petroleum work plan (Hart Crowser, 1989a). The studies represent work necessary to obtain final approval for the petroleum recovery system. In summary, the studies evaluate:

- existing water treatment systems' effluent in light of changing NPDES per criteria.
- reasonable and practical means to improve the quantity of effluent being discharged to City Waterway.
- moving the current water treatment system from the Globe Machine site to Mobil property.
- consolidating the effluent streams from the two existing recovery systems for combined treatment.

Hart Crowser and Associates, Inc. 1987a. Current Situation Report, City Waterway Petroleum Product Migration Assessment, Port of Tacoma, Washington. Report No. J-1587-02. Prepared for Shell Oil Company, Mobil Oil Corporation, and Union Oil Company of California for submittal to the Washington State Department of Ecology. Seattle, Washington.

The purpose of this study was to assess the current status of the extent and migration of petroleum products beneath properties adjacent to the City Waterway. The site is bordered by City Waterway on the southwest, Middle Waterway on the northeast, and lies between East "D" and East "F" Streets. Bulk petroleum storage and distribution facilities are present in this area, including a buried distribution pipeline owned by Olympic Pipeline company. Other facilities in the area include Globe Machinery, buried sewer lines, and abandoned buried product distribution lines.

Petroleum product seepage into City Waterway has been observed for at least 17 years. In 1970, Mobil Oil installed an interceptor drain after a spill. Five

thousand gallons of product were reportedly pumped from the drain during the first year of operation. The drain is still operating and is reportedly pumping minor amounts of product on an intermittent basis. In 1982, petroleum was observed seeping into City Waterway adjacent to property owned by Globe Machinery and Union Oil (Hart Crowser, 1982). In response to these findings, 34 monitoring wells were installed in the area of East "D", East "E", and East "F" Streets. Sampling results showed that petroleum levels varied considerably between wells. Since 1982 the number of sampling wells has increased to 74.

Data compiled since 1982 shows that the distribution and thickness of petroleum in the groundwater has fluctuated with time. In 1982, product thickness did not exceed 2 inches in any well, and was limited to a small area near the intersection of East "D" Street and East 7th Street. By 1985, the extent and thickness of the product appeared to have increased extensively. A thickness of almost 5 feet was detected in the Globe Machine yard.

To address this problem, Shell installed a recovery system in 1984. The system pumps the product from wells to an oil water separator. The oil accumulates at the top of the tank where it is periodically pumped to a tanker truck. In 1986, 235 gallons were removed by this method.

Specific findings of this report are summarized below:

- Measurements made in 1982 detected petroleum products in the water table. Measurements made in 1987 indicated that petroleum product is still present. Available data indicates that groundwater generally flows toward the City Waterway.

- Petroleum recovery operations implemented by Shell and Mobil were implemented as a result of the 1982 findings. It appears that petroleum product is still present beneath the area and seems to have increased in thickness as compared with data collected in 1982.
- Recent pumping tests show that the recovery wells on the Globe property are only marginally effective. These tests indicated a very small radius of influence is affected by pumping from the wells.

- The report recommends that recovery operations should consider the use of interception trenches hydraulically connected to a recovery well. Two letters from Hart Crowser are attached to the report: one to the Department of Ecology; the other to the Shell Oil Company. These letters present the conceptual and final design for the petroleum recovery trench system proposed to address the groundwater contamination problem.

Hart Crowser and Associates, Inc. 1987b. Letter of May 19, 1987 to Hank Appleton of Commencement Bay Properties. Report No. J-1616-01. Seattle, Washington.

The purpose of this letter is to clarify findings related to the potential contamination at 1821 Dock Street, Parcel #1 identified in the Hart Crowser Report No. J-1616 (Hart Crowser, 1985a). This clarification is necessary because the earlier report contained an error in the halogenated hydrocarbon concentrations. This letter does not discuss the contamination on Parcel #2 (2115 Dock Street) as the relevant recommendations in Report No. J-1616 are still valid.

Based on this subsequent evaluation, Parcel #1 was found to have low concentrations of halogenated hydrocarbons. In fact, all concentrations were below the Washington "dangerous waste" action limit of 100 ppm. This means that the expected level of contamination from halogenated hydrocarbons is not substantial and should not be a cause for concern.

Tests do show contamination of the soils around at least two of the underground storage tanks. The existence of four underground tanks on Parcel #1 raises concerns about proper decontamination and tank removal. Existing information indicates that three of these tanks contain, or did contain, diesel fuel. The fourth tank contains, or did contain, waste solvents.

In a separate report prepared by Geo Engineers and referenced in this letter, it is noted that the diesel fuel soils contamination does not occur at concentrations of concern. Hart Crowser disagrees with these findings, pointing out that the conclusion must be substantiated with further analysis.

This Hart Crowser report concludes that there is some degree of soils contamination in the vicinity of the underground tanks. However, additional analysis will be needed to determine whether or not the tanks are leaking and to define the extent of soils contamination around each of the tanks. If the tanks are leaking or are otherwise unsafe, tank removal would be recommended.

Hart Crowser and Associates, Inc. 1985a. Contamination and Geotechnical Site Feasibility Assessment: Waterway Village Development, Tacoma, Washington. Prepared for Commencement Bay Properties. Report No. J-1616. Seattle, Washington.

This report presents the geochemical and geotechnical site feasibility assessment for Waterway Village Development Parcels #1 (1821 Dock Street)and Parcel #2 (2115 Dock Street), located on the south end of the City Waterway. The purpose is to assess soil contamination and foundation support for the development of the project.

Four 25-foot-deep exploration borings were made and soil samples were collected at 2.5 foot intervals. Each boring sample was analyzed for trace metals,

organohalide pesticides, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, and halogenated hydrocarbons.

Parcel #1 (1821 Dock Street): Prior use of the site as a flour mill (Albers Bros. Milling 1900-1943) and warehouse (JH Galbraith Co. 1943-1980s) does not suggest sources of contamination. However, there are four underground storage tanks, three reportedly containing diesel oil and one containing solvents. Also, trucks were washed on the site. This practice was stopped because it was fouling the waterway. Concentrations of extractable metals, organohalide pesticides, polychlorinated biphenyls and polycyclic aromatic hydrocarbons were not found at levels of concern. However, halogenated hydrocarbons in all four boring samples were above the WAC 173-303 threshold for dangerous waste. If this material were to be excavated, it would have to be disposed of at a hazardous waste facility.

Parcel #2 (2115 Dock Street): Prior investigation (see Hart Crowser J-1210-9 and J-1210-10) determined that Parcel #2 is contaminated with organic compounds similar in nature to those detected in the vicinity of the coal gasification plant during the construction of I-705. It has been suggested that waste from the coal gasification plant was dumped on the site. Other possible sources of contamination were identified, including a coal and wood fired power generating station, an equipment storage yard, and petroleum storage tanks, all located, at one time, immediately to the east of the site. From what is known about Parcel #2, it does not appear that industrial waste was generated at the site itself. From old maps and photographs, the only building on this property was a small structure entitled S.P.R.M. The structure was posted on the Sanborn Fire Insurance Maps sometime in the late 1930s and 1940s. Today Parcel #2 is a gravel lot.

The contaminants detected on Parcel #2 include tar and tar-like material, oily silt and sand, and samples having creosote-like odors but no visual indications of contamination. The tar-like material had elevated concentrations of polychlorinated aromatic hydrocarbons (PAHs). The Washington State Department of Ecology required removal to a hazardous waste disposal facility of similarly contaminated soils at the I-705 site. The oily silt and sand contained somewhat elevated concentrations of PAHs. The Washington State Department of Ecology required removal of similar material from the construction site at I-705 and placement in a concrete vault with a 30-year groundwater monitoring program.

Hart Crowser and Associates, Inc. 1985b. Groundwater Quality Monitoring Report I-705 Tacoma Spur. Report J-1210-10. Prepared for the Washington State Department of Transportation. Seattle, Washington.

This report presents a summary of the groundwater quality monitoring results for the Tacoma Spur investigation near East 23rd and "A" Streets. The monitoring was performed during the period from December 1984 through June 1985. The purpose of this groundwater monitoring program was to further define the composition and concentration of contaminants detected during the previous phase

of work. Additionally, the purpose of this work was to observe and document any seasonal fluctuations in groundwater quality, new conditions, or other discernable trends associated with the groundwater contamination at the Tacoma Spur site.

Findings of this report indicate:

- All organic contaminants detected originated on site.
- No apparent consistent seasonal trends in the indicator parameters were detected.
- Concentrations of contaminants varied by as much as a factor of two in samples taken from the same location at different times, possibly due to precipitation.
- While none of the organic chemicals detected onsite were found in the City Waterway, it is likely that the loadings projected in the previous report (J1210-09) are still representative.
- Metal concentrations may have been caused by leakage of leaded gasoline from an underground storage tank.
- Another source of groundwater contamination exists in the northeast corner of the site associated with an abandoned structure.
- Soil contamination in the form of oily sawdust, oily silt, and tar exists between the WDOT right-of-way and the City Waterway and is likely contributing a portion of the contamination loadings to the City Waterway from the site.
- Observations indicate that rates of contaminant transport to the City Waterway have not changed.
- Outside the WDOT right-of-way, it is likely that the actual contaminated soil volumes are greater than predicted.

Hart Crowser and Associates, Inc. 1984. Soil and Groundwater Quality Evaluation I-705 Tacoma Spur. Report No. J-1210-09. Prepared for the Washington State Department of Transportation. Seattle, Washington.

This report presents the results of soil and groundwater quality studies on an area bounded by Puyallup Avenue, "A" Street, East 21st Street, and City Waterway. Concern over possible soil contamination arose during drilling to assess roadway foundation requirements for the Tacoma Spur. During this drilling, a tar-like substance was encountered in several borings, Analysis determined the substance was similar to coal tar waste probably generated from a coal gasification plant operated at the site between 1884 and 1924. Petroleum was also detected. Likely sources include an abandoned gasoline filling station, storage tanks (which may have contained diesel fuel), and an equipment storage yard, all of which were located in the study area at one time.

The coal tar byproduct contamination takes the form of oily soil and tar-like material containing numerous aromatic and polynuclear aromatic hydrocarbons.

The petroleum product contamination takes the form of distinctly different, oily odorous soil, and also contains aromatic hydrocarbons. These contaminants could be identified visually to a depth of 27 feet.

Groundwater was encountered between 5 and 30 feet. It is estimated that 100 grams of combined aromatic hydrocarbons and about 50 grams of trace metals per day are contributed to City Waterway via shallow groundwater transport. All groundwater flowing from the site likely discharges to City Waterway.

Hart Crowser and Associates, Inc. 1982. City Waterway Oil Migration Study. August 12, 1982. Seattle, Washington.

The purpose of this report was to define the hydrogeologic system beneath the "D" Street Petroleum project area (between 1020 East "D" and 516 East "D" Streets and along East 7th Street between East "D" and East "E" Streets), so that measures could be taken to stop leakages.

Petroleum leakages along "D" Street had been observed over the past twelve years.

1970-71: Mobil Oil installed an interceptor drain to intercept petroleum product that had spilled. Over 5,000 gallons were pumped out of the interceptor drain and minor amounts on an intermittent basis.

1977: Gasoline was detected entering the sewage treatment plant. The source was traced to a break in the sewer line beneath "D" Street. The line was repaired.

1978: During the installation of an oil water separator at Union Oil, petroleum was observed seeping into the excavation.

June 1982: Petroleum was observed seeping into City Waterway adjacent to the properties owned by Globe Machine and Union Oil.

This report documents that petroleum product is moving on the watertable surface within a silty, fine sand unit and possibly along sewer line pipe bedding. The groundwater is moving toward City Waterway. The source of the petroleum could not be identified, but the Union Oil and Globe Machine properties are suspect. The report indicates that interceptor drains should be able to correct the problem and recommends that a baseline study be conducted under the petroleum storage area.

JRB Associates. 1984. Preliminary Hazardous Waste Site -- Preliminary Assessment of American Plating, Inc. 2110 East "D" Street. Report prepared for the Washington State Department of Ecology. Seattle, Washington.

This report characterizes the operational practices at the American Plating site (2110 East "D" Street) and the substances used and discharged. The report recommends soil and groundwater sampling to determine the extent of environmental contamination.

This preliminary assessment makes the following observations:

- The firm has the capability to plate zinc, copper, nickel, chromium, and cadmium.
- Process water containing these metals, cyanides, and acids is discharged to the sanitary sewer. Prior to 1978, the firm discharged to City Waterway. There is a potential for contamination of marine sediments.
- Sludges from the plating process accumulate in a concrete sump and are infrequently removed by an authorized carrier.
- Contamination of sanitary sewers has been repeatedly documented and the sewer utility has threatened cessation of service. Soil and surface water contamination has been repeatedly observed.
- Plating operations are performed within the building but wastes have periodically been kept in drums outside. There is a history of leaking drums and spills at the site.
- The potential exists for groundwater contamination, although no monitoring has been done to date.

Johnson, Art and Norton, Dale. 1985. Memorandum of January 25, 1985 to Jim Krull, PTI, Inc. Completion Report on WQIS Project 5 (Part 3) for the Commencement Bay Nearshore/Tideflats Remedial Investigation: Aromatic Hydrocarbons and Other Organic Compounds in Groundwater Beneath "D" Street Petroleum Storage Facilities and in Nearby City Waterway Sediments, April 1983-84. Water Quality Investigations Section, Washington State Department of Ecology. Olympia, Washington.

The Water Quality Investigations Section (WQIS) had responsibility for five projects in the Commencement Bay Nearshore/Tideflats Remedial Investigation. Project 5 involved investigating sources of contaminants to City Waterway. Part 3 of the project is reported here and describes the results of organics analyses of groundwater beneath the petroleum storage facilities along Tacoma's "D" Street and of marine sediments in City Waterway bordering the storage area. The

objective of the investigation was to determine if these sediments have been contaminated by petroleum known to be entering City Waterway from this aquifer.

Petroleum, groundwater, and adjacent subtidal marine sediment at petroleum storage facilities near the mouth of City Waterway were analyzed for aromatic hydrocarbons and other organic priority pollutants.

Substantial amounts of oil continue to be present in groundwater beneath the "D" Street storage facilities. Petroleum constituents detected in groundwater were benzene, ethylbenzene, toluene, xylenes, naphthalene, 2-methylnaphthalene, phenanthrene, phenol, and cresols. Concentrations of specific aromatics ranged from 0.024 to 30 mg/L, single-ring compounds being present in the highest concentrations.

Although petroleum has been seeping into the waterway from beneath the "D" Street storage facilities for a number of years, results of waterway sediment analysis showed an aromatic hydrocarbon distribution dominated by four- and five-ring compounds which is characteristic of combustion sources, not petroleum. Debris from waterfront fires and creosote are two possible sources. Concentrations of these high molecular weight aromatic hydrocarbons in sediment at the entrance to City Waterway and immediately adjacent to the petroleum storage facilities are the highest reported for the waterway.

The data sets fail to show substantial input of petroleum to sediment in this part of City Waterway. Most of the petroleum seeping into the waterway from the "D" Street facilities probably evaporates. Approximately, 75 percent of No. 2 fuel oil hydrocarbons and almost 100 percent of gasoline hydrocarbons are rapidly volatilized (National Academy of Sciences, 1975).

Johnson, Art and Norton, Dale. 1984. Memorandum of December 13, 1984 to Jim Krull, PTI. Completion Report on WQIS Project 5 (Part 1) for the Commencement Bay Nearshore/Tideflats Remedial Investigation: Priority Pollutants and Other Contaminants in City Waterway Storm Drains, September-November 1983. Water Quality Investigations Section, Washington State Department of Ecology. Olympia, Washington.

The Water Quality Investigations Section (WQIS) had responsibility for five projects in the Commencement Bay Nearshore/Tideflats Remedial Investigation. Project 5 involved investigating sources of contaminants to City Waterway. Part 1 of this project is reported here. The objective was to determine if any of the storm drains were active sources of the toxicants known to be present at elevated levels in City Waterway sediments. This memorandum reports the results of dry- and wet-weather sampling of the ten major storm drains to the waterway.

Twenty-two samples of discharge collected from ten storm drains to City Waterway between September and November of 1983 were analyzed for EPA priority

pollutants/hazardous substances. Twenty organic priority pollutants and three compounds on the hazardous substances list were detected. The most frequently detected organic compounds were chloroform and toluene, which were detected in 41 percent and 32 percent of the samples collected, respectively. The drain below Harmon Cabinets (1933 Dock Street) appeared to be a chronic low-level source of four chlorinated solvents. The remaining compounds, primarily phthalates, chlorinated ethylenes and ethanes, polyaromatic hydrocarbons, and pesticides, were detected only once or twice.

Concentrations of organics and metals were low, and generally within EPA receiving water criteria for protection of marine life. Maximum loads to the waterway were calculated to be 0.37 pound/day of organics and 1.5 pounds/day of metals. The pollutant input detected in storm drain discharges during this survey did not appear sufficient to bring about the level of sediment contamination currently existing in City Waterway.

Kato, Gary. Tacoma-Pierce County Health Department. 1989. Letter of February 23, 1989 to Joe Moulders, J.M. Martinac Shipbuilding Corporation, Re: Testing of sandblasting material. Tacoma, Washington.

This letter indicates that the analysis of sandblast waste (1502 East "D" Street) showed elevated levels of zinc and copper. It is possible that the material could be designated a dangerous waste. Therefore, it could not be considered clean fill. The letter requests that a fish bioassay be run to properly designate the material.

Kennedy/Jenks/Chilton Engineers. 1989. Letter of May 30, 1989 to Rod Struck, Applied Technology, Inc. Re: Site Closure Approach -- American Plating, Inc. Tacoma, Washington.

The purpose of this report is to recommend an approach for closing the American Plating Site (2110 East "D" Street) in accordance with current RCRA guidance and requirements. This report provides a background discussion of the problem, a description of the applicable regulatory guidelines and requirements, an evaluation of potential closure methods, and a recommendation for closure.

Kennedy/Jenks/Chilton prepared a preliminary closure and post-closure plan for the American Plating site in May 1988. This closure plan was based on preliminary soil and groundwater data and presents two options for site closure: "clean closure" or a "RCRA cap". At the time, the data was insufficient to assess which closure alternative was preferred for the site. Since that time, Applied Geotechnology, Inc. has more completely assessed the nature and extent of contamination (AGI, 1989b). Prior to resubmitting the closure plan, the U.S. EPA must approve the closure method.

The two closure methods evaluated in this report are "clean closure" and the "RCRA cap". The clean closure option would entail treating the facility is treated as a surface impoundment and removing all wastes at closure. If clean closure is shown to be technically difficult or not cost effective, the site could be closed as a landfill. Closure as a landfill would require post-closure monitoring. Corrective action would be implemented if contaminants are found to be migrating off-site in concentrations that would threaten human health and the environment.

Given cost considerations, closing of the site as a landfill via capping appears to be the preferred closure option. Construction of the cap would minimize offsite migration by limiting infiltration and would provide a barrier to human exposure. Should groundwater monitoring show that contaminants entering City Waterway exceed ambient concentrations, a pump and treatment system will be required. In conjunction with the cap, deed restrictions would require long-term maintenance of the facility.

Two RCRA cap options are discussed in this report. The first involves the removal of several hot spots where high concentrations of leachable metals and cyanide were detected. The site would then be covered with two inches of sand and gravel, two inches of asphalt, geotextile fabric (for structural strength), and finally two inches of asphalt designed to handle traffic and equipment. The asphalt will minimize infiltration, prevent direct human contact with soils, and provide a wearing surface. All excavated soils would be disposed of at the hazardous waste disposal facility in Arlington, Oregon.

Under the second RCRA cap option, no soil would be removed. Instead the site would be graded to provide a smooth surface and a slope to allow for drainage. Asphalt would be applied to the ground surface over the clean-up area and a synthetic liner would be placed on top. Then, another layer of asphalt, geotextile fabric, and an asphalt wearing surface would be added. This alternative provides another layer of protection by providing a layer of essentially no permeability.

While a specific concept is proposed for closure, this report does not serve as a final closure plan for the facility. Specific details on how demolition will be accomplished and where materials will be sent for disposal, as well as a detailed cost estimate, are necessary to complete the closure plan. However, the USEPA must first agree to a closure alternative.

Kennedy/Jenks Engineers. 1983. Soil and Groundwater Contamination Assessment of Commencement Bay Tar Pits. Report K/J2117. Prepared for Burlington Northern Railroad and Hygrade Food Products Corporation. Tacoma, Washington.

This report summarizes the results of an initial groundwater and soil contamination assessment performed by Kennedy/Jenks Engineers at the Commencement

Bay Tar Pits at 2202 East River Street, Tacoma, Washington. The report concludes that tar found in five borings on the site is probably the byproduct of the coal gasification plant which operated at the site between 1924 and 1965. (This plant replaced the gasification plant built in 1884 at East 23rd and "A" Streets.) Contaminants found in groundwater were identified as known or potential coal gasification process byproducts. It is believed that byproducts in the form of ash and tar were deposited in on-site ponds.

Fifteen organic priority pollutants and seven non-priority pollutants were identified in groundwater at the site. Concentrations of two organic priority pollutants exceeded federal water quality criteria for freshwater aquatic life, for saltwater aquatic life, or for human consumption. Since the mobility of these organics are not retarded by soil adsorption, it is possible that some organics have been transported off site.

The two potential groundwater contaminant migration paths are within a near-surface fill aquifer extending to a depth of 7.5 feet and a sand aquifer which extends from between 8.5 and 16.5 feet to a depth of 86 feet below ground surface. Both aquifers contain various amounts of a tar-like substance. Groundwater in the surface fill aquifer is unconfined and is estimated to be flowing in a south-southeasterly direction. Groundwater in the sand aquifer is estimated to be flowing in a southeasterly direction at rate of 0.23 feet/day.

The concentration of only one inorganic pollutant in one well exceeded the EPA drinking water standard.

Most surface samples contained relatively high concentrations of lead. Surface soil and materials could be classified as hazardous waste. One surface sample contained greater than 50 ppm polychlorinated biphenyls (PCBs). According to the Toxic Substances Control Act, materials containing amounts of PCB greater than 50 ppm must be removed and secured in a specially designed landfill.

Kerslake, Rodney, M. Tacoma Planning Department. 1981. Letter of November 4, 1981 to J.M. Martinac Shipbuilding Corporation. Re: Sandblasting material, City Waterway. Tacoma, Washington.

This letter notifies J.M. Martinac Shipbuilding located at 1502 East "D" Street that the black pumice-like sandblasting material cannot be stored on the shoreline. The sandblasting material must be removed from the intertidal area and secured in such a manner that it does not enter the water by any means.

Magee, Kelly. 1987. BENLAB'S water quality analysis of Scofield Company's effluent wastewater and recommended environmental quality assurance program. BENLAB Inc. Tacoma, Washington.

BENLAB's analyses of Scofield Company's (1543 Dock Street) effluent waste water indicated that the company is in compliance with WSDOE waste water permit regulations for oil and grease, chemical oxygen demand, and turbidity. However, the report states that turbidity could be a problem in the future since accepted levels of turbidity vary with the turbidity of the background water.

BENLAB's analyses indicates that one third of the time the pH level of the Scofield Company's effluent waste water exceeded the WSDOE acceptable limit of 9. Of all the variables in question, pH has the most dramatic effect on the marine environment.

BENLAB suggests that by increasing the dilution factor of the waste water both turbidity and pH will be kept to within acceptable levels.

Miyamoto, Joe and Thayer, Dan. Puyallup Tribe of Indians. May 5, 1980. Letter to Mr. Jack Creighton. Re: Shoreline Permit No. 141.228. The Wattles Company, Tacoma, Washington.

This letter documents the findings of beach seine sampling in the Wheeler-Osgood Waterway. The Puyallup Tribe Fisheries Division indicates that the waterway is utilized by juvenile salmonids as a nursery area. In fact, it is believed that the Wheeler-Osgood Waterway may be one of the more productive nursery areas for pink salmon and possibly others.

The letter indicates that these findings are preliminary and will be followed up by additional sampling. However, the presence of juvenile salmonid food organisms in the substrate of the waterway has been established by the Fisheries Research Institute of the University of Washington. Since these food organisms are in the surface layers of the sediments, the dredging activity proposed by this shoreline permit application would destroy both the organisms and their habitat. With so little natural or suitable tidelands remaining in Commencement Bay, productive areas should be protected.

Morrison, Scott and Stasch, Paul. Washington State Department of Ecology. 1987. Drop-in Inspection Report. June 12, 1987. Picks Cove/Pickering Industries. Olympia, Washington.

The WSDOE officials arrived at Pickering Industries, 1930 East "D" Street, to observe white material being washed down the storm drain. Jeff Pickering informed them that it was PVA glue that is washed off the rollers on the glue

spreaders after every shift. The WSDOE officials also observed several drums of solvent and adhesive stored next to a storm drain that discharges to City Waterway. Jeff Pickering agreed to move the drums away from the drain.

Nelson, Ron, Tacoma Department of Community Development. 1986. Letter of April 8, 1986 and Letter of June 30, 1986 to Tom Eaton, Washington State Department of Ecology. Re: Request for information regarding underground contamination on waterfront properties on City Waterway. Tacoma, Washington.

In the letter dated April 8, 1986, the Department of Ecology is asked if Ecology has any documentation of health-threatening contamination on waterfront properties along City Waterway. Specifically, the letter asks for information that may be available on properties that extend from East 15th Street to the end of the waterway on the west side, and the American Plating property on the east side.

This letter also requests that if there are hazardous conditions of concern, then Ecology is to advise the City of Tacoma of appropriate of mitigating actions and of how Ecology would be involved.

In the letter of June 30, 1986 it is requested that Ecology give precedence to the request in the letter of April 8, 1986.

Norton, Dale. 1988. Memorandum of April 15, 1988 to Scott Morrison, Review of Metals and Organics Data of Sediment Samples collected by the Washington State Department of Ecology, June 9-10, 1987, from Tacoma Tideflats Storm Drains. Washington State Department of Ecology. Olympia, Washington.

Sediment samples from several storm drains in the Tacoma Tideflats were analyzed for metals and organics. The purpose was to determine if the drains sampled are ongoing sources of priority chemicals to the waterways. Three drains in City Waterway (south of the 11th Street Bridge), and one in the Hylebos Waterway, exceeded the apparent effects threshold (AET) criteria for priority 1 chemicals (primarily metals). In addition, a number of Priority 2 and 3 chemicals were detected in discharges to City, Middle, Sitcum, and Hylebos Waterways. Finally, other chemicals not listed as priorities but present in sufficient levels to cause some concern, are as follows: City Waterway (PCB-near City Park, DDD & PCB near American Plating); Sitcum Waterway (aluminum, pentachlorophenol); and Hylebos Waterway (4-methylphenol).

This memorandum recommends that sources of the above contaminants be identified, isolated and controlled.

Norton, Dale, and Stinson, Margaret. 1987. Investigation of Stormwater Discharges to Wheeler-Osgood Waterway. Water Quality Investigations Section, Washington State Department of Ecology. Olympia, Washington.

Wheeler-Osgood Waterway is a remnant of the old west channel of the Puyallup River. The waterway was historically the site of a number of industries, the largest of which was the old St. Regis Door Mill (1215 E. "D" St.). The waterway is now encircled by abandoned buildings and warehouses interspersed with a few small industries.

A few blocks east of the waterway is Hygrade Foods at 1623 E. "J" Street (formerly Carsten's Packing Company). This meat-packing plant was a major contributor of organic material to the waterway prior to diversion of process wastes to the sanitary sewer system in the 1970's. Hygrade now discharges only non-contact cooling water and surface runoff to the waterway via Wheeler-Osgood Storm Drain. Other industries include J.D. English Steel Company, Cascade Drywall, General Beer Distributors, Western Steel Fabricators, and a number of small industries that rent space from the Wattles Company in the old St. Regis Door Mill building. None of these companies currently discharges process effluents to the waterway.

Although much of the sediment contamination in Wheeler-Osgood Waterway had been assumed to be historical, cores indicated that diversion of waste streams from the waterway has apparently not resulted in a decrease in contamination of surficial sediments. It is uncertain if current sources exist, or if contaminated sediments have simply not been covered with more recent material. The objective of this investigation was to determine if storm drains discharging to Wheeler-Osgood Waterway are current sources of the contaminants of concern.

Six discharges to Wheeler-Osgood Waterway were sampled to determine if they are current sources of copper, lead, arsenic, zinc, 4-methylphenol, and dichlorobenzenes. Metal concentrations were similar to those typically seen in urban runoff. 4-Methylphenol was detected at 2.3 ug/L in the Western Steel Fabricators Drain sample. The source of this contaminant is thought to be runoff from a yard used for treating and painting fabricated metal parts. Also, 1,2-dichlorobenzene was detected at an estimated concentration of 0.7 ug/L in Wheeler-Osgood Storm Drain. It has been suggested that Hygrade may use this compound as a degreasing agent, but this has not been documented. Based on a single sampling, it cannot be determined if these data are typical of discharges to the waterway, or are sufficient sources of 4-methylphenol and 1,2-dichlorobenzene to be responsible for contamination found in earlier studies in Wheeler-Osgood Waterway sediments.

Oberlander, Jim. Washington State Department of Ecology. 1987. Memorandum of March 25, 1987 to Larry Sims, Lawrence Ashley, and John Conroy. Re: Tanks and waste from American Plating, Inc. Olympia, Washington.

Pursuant to a WSDOE consent order, wastes and tanks at American Plating, 2110 East "D" Street, Tacoma were removed between January and March, 1987. Tanks that were not scrapped or shipped to the Arlington, Oregon, hazardous waste disposal facility were sold to Tri Coating Inc., Everett. All tanks received a triple pressure rinse, plus close visual inspection on integrity prior to leaving the site. However, several tanks had a hard residue that required sandblasting. The tanks needed to be removed so other cleanup efforts could continue.

Oberlander, Jim. Washington State Department of Ecology. 1978. Memorandum to the file of May 26, 1978. Re: Mobil Oil - "D" Street, Tacoma. Olympia, Washington.

On May 16, 1978 a meeting was held with the U.S. Coast Guard and WSDOE officials to inspect the leaching oil from the Union Oil property (516 E. "D" Street) into City Waterway. During this inspection, four samples were taken from upland locations. However, on this day the quantity of oil seeping into the water was not enough to sample. A sample was scheduled to be taken off the Union Oil property at some later date during a minus tide.

Payton, Norman. Tacoma-Pierce County Health Department. 1989. Letter of May 11, 1989 to ACME Industries. Re: Underground Storage Tanks Located at 1821 Dock Street. Tacoma, Washington.

This letter informs ACME Industries that the Tacoma-Pierce County Health Department (TPCHD) has reviewed the soil tests results taken during the removal of underground storage tanks from 1821 Dock Street. Based on this information, the TPCHD considers the site clean. The contaminated soil excavated from this site will be remediated by Woodworth and Company.

Pierce, Douglas. Tacoma-Pierce County Health Department. 1988. Letter of October 28, 1988 to Kathryn C. Mills, City of Tacoma Planning Department. Re: Shoreline Management Permit No. 141.440, J.M. Martinac Shipbuilding Corporation, Tacoma, Washington.

This letter informs the Planning Department that the Tacoma-Pierce County Health Department has reviewed the sediment analysis results for material excavated at the Martinac Shipbuilding operation (1502 East "D" Street) and determined the material is not contaminated by heavy metals. The sediment analysis results are attached to the letter.

Property Counselors and Jones and Jones. 1988. Market Analysis & Development Plan for Glacier Park Properties on the West Side of City Waterway. Prepared for Glacier Park Company. Tacoma, Washington.

The purpose of this report was to present Glacier Park with a development strategy for the City Waterway properties. The report contains two interrelated parts. The first is the Highest and Best Use Market Analysis, and the second is the Physical Feasibility Analysis and Development Plan.

Glacier Park owns 21.5 acres along City Waterway. For purposes of this report only the sections relevant to previous site use are summarized.

North Parcel — 401 Dock Street: The Commercial Dock, located on the north parcel was consistently used as a warehouse for general cargo and a passenger terminal. A coal bunker was located on the north end of this property, but was removed before 1925. Normally coal bunkers are not considered to be a source of contamination; however this does depend upon coal source and the constituents of that particular coal. If coal was used in a boiler or furnace on the site, there is a possibility of some heavy metal contamination.

The Dock — 535 Dock Street: The Dock Building, formerly known as the Eureka Dock, was also used for general cargo, freight, and passengers. Cargos included vegetable oil (there were two 150,000-gallon storage tanks in the warehouse), copra, sesame seed and cake and other oil cakes. A plant for processing copra into coconut oil and meal operated there in the 1950s.

Balfour Dock — 705 Dock Street: The Balfour Dock, now a parking lot for the Dock Building, was used as a grain elevator or terminal. The Balfour Dock property also included the Puget Sound Freight Terminal building for many years and was used primarily for grain handling and other general cargos.

The historic use analysis did not identify any uses that might result in significant site contamination problems. The coal bunker site may require some more detailed historic analysis and possibly some site testing.

Totem Marina — 821 Dock Street: The entire site is developed as Totem Marina. The marina consists of 130 open slips and 375 covered slips. Upland development includes warehouse storage, boat sales area and a haul out area. The improvements are owned by Totem Marina Associates.

Between 1912 and the present, this property was used for warehouse and moorage. The London Dock was located north of 9th Street;

it was used for a grain elevator, and later a milling company for feed. The Northwestern Dock on the south end was used as a freight and grain warehouse and, by the 1950s, was also providing moorage.

None of the historic site uses indicate the potential for site contamination problems.

Lone Star

1543 Dock Street (Lots 1-11 of Block 59): Lone Star Cement recently purchased the Scofield Company that operated a building materials company at this location since before 1920. The operation always involved handling building materials, including the receipt of sand, gravel, and crushed rock and a ready-mix concrete plant. Prior to 1925, the site was used for a coal and wood yard. The Tacoma-Pierce County Health Department indicated that the by-product of concrete operations might be an unacceptably high soil pH content; however, any problem would probably be confined to the surface area.

A small portion of this property is leased for private boat moorage (Lots 1-3 of Block 59).

North Pacific Plywood

1549 Dock Street (Lots 12-19 of Block 59): Since 1912, uses of this site included a machine shop and foundry, fuel handling wharf, sand and gravel storage, and North Pacific Plywood mill and log storage. The property is now vacant, although concrete slabs and other remnants of the plywood mill remain. Possible contaminants on the site include: heavy metals, chlorinated solvents, and slag or ash. Leakages from fuel storage and inadequate handling may have penetrated soils and ground water contamination. Phenolic resins, used in plywood glue, could be a contaminant remaining on the site.

Lone Star

1715 Dock Street (Lots 20-22 of Block 59): A batch plant was formerly located on the site as well as a barge to land operation. Because the operation created off-site dust and sand problems, the operation was discontinued. The batching facility is being demolished.

At the very south end of the block, possibly Lot 22 or even further to the south (off Glacier Park property) an asphalt company operated in the early 1900s. The operation included asphalt heater and oil tanks. This use could be a possible source of contamination. By 1925 the site was used for a bunker coal plant, including coal storage. This plant was in operation until at least 1952. Coal storage normally is not a contamination source; however, it does depend upon the constituents of the coal. If coal is used in a boiler

or furnace, as it apparently was on this site, there may be potential contamination.

Vacant

2101 Dock Street (Lots 1-6 of Block 57): Complete historic records are currently lacking for this site. In 1912, this was the location of Pacific Coast Coal company. The use had moved to 1801 Dock Street by 1925. Normally coal bunkers are not considered a contamination problem. However, if the coal was used in a boiler or furnace on the site, there may be some contamination from heavy metals.

Although records are incomplete, this is reputed to be one of the most contaminated sites on City Waterway. However, the results of soil tests performed by Hart Crowser around the edges of this property for the Tacoma Spur project show that problems on this site may not be as serious as assumed. The source of the suspected contamination is a former coal gasification plant located in the vicinity of East 23rd Street and "A" Street. Two test borings were placed on the west and south edges of the Glacier Park property. The boring on the west showed no signs of contamination. Hart Crowser concluded, however, that this boring may be close to the northernmost extent of the contaminated area (Hart Crowser, 1984). Further investigation is warranted.

Ray, Emily. Washington State Department of Ecology. 1986. Memorandum of June 27, 1986 to Tom Eaton, Washington State Department of Ecology. Re: Preliminary Assessments -- City Waterway, Tacoma. Olympia, Washington.

This memorandum was written in response to the City of Tacoma's request for any information that may be available regarding upland contamination along City Waterway (See Nelson, 1986 and Eaton, 1986).

This memorandum explains that a Preliminary Assessment (PA) is essentially a file search/office review of available data for potential hazardous waste sites. On-site investigation is limited to a windshield survey and the outcome is a recommendation that no further action is required or that a site inspection (SI) and sampling should be conducted. A SI documents the release of contaminants in order to score the site by the Hazardous Ranking System (HRS) for possible inclusion on the National Priorities List (NPL). Since the Tacoma City Waterway lies within the boundaries of the Commencement Bay Superfund Site, it is already on the National Priorities List.

The letter states that it is the EPA, not Ecology, that has the jurisdiction to carry out SIs for a Superfund-designated area. However, the process can take 6 months

or more. The memo recommends that the City of Tacoma work with the involved property owners in the selection of a suitable consultant contractor in order to expedite property development goals.

This memorandum also points out that the designation of an entire area as a Superfund site puts the onus on even "innocent" property owners to establish their own "clean bill of health" regardless of their not having ever contributed to a hazardous waste site. The role of EPA and Ecology is not clear in these situations.

Robinson, Ronald, S. Washington State Department of Ecology. 1977. Letter of December 19, 1977 to Mobil Oil Corporation. Re: Tacoma Bulk Plant. Olympia, Washington.

This letter notes that action taken during the summer of 1977 failed to resolve the seepage of oil from the Mobil Oil (520 E."D" St.) and Union Oil ((516 E."D" St.) properties along "D" Street. Apparently, the shallow infiltration well installed to intercept oil adjacent to the Mobil property was not effective. The letter points out that the pollution problem has been around for several years and it is time to resolve the situation completely. A meeting is requested to discuss ways to solve the problem.

Tetra Tech, Inc. 1988. Commencement Bay Nearshore/Tideflats Feasibility Study. Public Review Draft, Volume 1. Prepared for Washington State Department of Ecology (TC 3218-10) and the U.S. Environmental Protection Agency. Seattle, Washington.

This report documents the feasibility study (FS) prepared for the waterways/shoreline of the Commencement Bay Nearshore/Tideflats Superfund site in Tacoma, Washington. The purpose of the FS is to develop and evaluate the most appropriate remedial strategies for correcting the human health and environmental impacts associated with contaminated sediments in the Commencement Bay. Remedial actions for City Waterway fall into three categories: the head of City Waterway, the Wheeler-Osgood branch, and the mouth of City Waterway.

The Head of City Waterway: Remedial action for this end of the waterway includes source control measures and sediment cleanup. Source control measures will include reducing the amount of metals and hydrocarbons in storm drain discharge, investigating suspect groundwater contributions and implementing control technologies if necessary, and monitoring on a regular basis. Clamshell dredging with confined aquatic disposal is recommended as the preferred alternative for remediation of sediments not expected to recover within 10 years following implementation of all known, available, and reasonable control technologies.

Wheeler-Osgood Waterway: Remedial action for the Wheeler-Osgood branch includes controlling problem chemicals (metals and hydrocarbons) discharging to the waterway through storm drains and conducting routine monitoring. Clamshell dredging with confined aquatic disposal is recommended as the preferred alternative for remediation of sediments not expected to recover within 10 years following implementation of source control measures.

The Mouth of City Waterway: The primary identified sources of problem chemicals to this area are the "D" Street petroleum storage facilities and the storm drains that service these facilities. Source control measures required to correct these problems and ensure the long term success of sediment cleanup in the problem area include capping and removal of contaminated materials and surface water runoff control. Clamshell dredging with confined aquatic disposal is recommended if additional refinement of the contaminated area identifies areas of sediment remediation.

Tetra Tech, Inc. 1985. Commencement Bay Nearshore/Tideflats Remedial Investigation. Volume 1 and Volume 2. Prepared for Washington State Department of Ecology (TC-3752) and the U.S. Environmental Protection Agency (EPA-910/9-85-134B). Seattle, Washington.

This report was prepared in response to significant public health and environmental threats associated with the release of hazardous substances from uncontrolled waste sites and from chemical spills in Commencement Bay. Commencement Bay has been designated the highest priority site in the State of Washington on the EPA list of sites targeted for cleanup under Superfund. In April 1983, the EPA reached agreement with Ecology to conduct a remedial investigation of the hazardous substance contamination of the upland environment near the ASARCO smelter (Ruston/Vashon tasks) and the marine environment (Waterways/Shoreline tasks). This report deals with the Waterways/Shoreline tasks.

Volume 1 provides a chemical characterization of problem areas within City Waterway. The methodology for sampling and analyzing sediment chemistry, water column chemistry, benthic macroinvertebrates, sediment bioassays, fish histopathology and bioaccumulation are discussed. Also the methods used in source investigations are described.

Volume II provides a brief historical sketch of City Waterway and identifies the industries located along the shoreline. In addition, dredging activity is documented and storm drains entering the waterway are identified. Volume II expands on the Volume I discussion of sediment data specific to City Waterway, provides an analysis of loading estimates, and identifies probable sources of contamination.

Some of the conclusions reached in this two-volume report are summarized below:

Sediments: Major discharges from stormwater drains at the head of City Waterway contribute to the observed accumulation of fine-grained sediments in that waterway.

Metals: City Waterway is distinguished by having some of the highest sediment lead concentrations found in the waterways. Lead concentrations decreased consistently from the head to the mouth of that waterway. Intertidal sediments along the eastern shoreline of City Waterway (south of Wheeler-Osgood) have high concentrations of copper, zinc, and, near the head of the waterway, nickel.

Concentrations of priority pollutant metals (e.g., lead and copper) did not vary substantially with depth in cores from Wheeler-Osgood Waterway and the middle of City Waterway. Concentrations of metals in the deepest interval of cores from the head of City Waterway exceeded Puget Sound reference conditions by less than a factor of two. Concentrations of at least one metal in the bottom of cores from Wheeler-Osgood, and the mouth of City Waterways exceeded the range of Puget sound reference conditions by more than a factor of two.

Organics: Some of the highest concentrations of oil and grease in the Commencement Bay study area were found at the head of City Waterway, suggesting a substantial contribution from drains at the head of the waterway.

Sediments in Wheeler-Osgood are highly enriched (18 percent) with total organic carbon (TOC). TOC levels in the rest of City Waterway consistently declined from 8.9 percent at the head of the waterway to 1.2 percent at the mouth. This pattern of organic enrichment indicates at least one source of organic carbon at the head of the waterway and another in the Wheeler-Osgood branch. Core samples show that current organic carbon discharges to the lower waterway are considerably less than historical discharges.

High sulfide sediments were also found throughout the organically enriched City Waterway, except at two sampling stations at the mouth of the waterway.

Several parts of City Waterway are characterized by high levels of low and high molecular weight polyaromatic hydrocarbons (LPAH and HPAH), as well as chlorinated benzenes. PAHs generally decreased from the head of the waterway along the main channel of City Waterway.

HPAHs in the Wheeler-Osgood branch were similar to those found in adjacent areas in the main channel of City Waterway. However, selected chlorobenzenes and 4-methylphenol were found at high concentrations in this problem area, with a clear gradient decreasing from the head of the Wheeler-Osgood branch to the mouth.

A potential hot spot at the mouth of City Waterway was identified. High levels of 2-methoxyphenol were present. It is possible that this contaminant was transported into the waterway from the St. Paul Waterway problem area.

High PCB concentrations which had been previously reported at a single station near the mouth of City Waterway were not evident in this sampling effort.

Biological Effects:

The most adversely affected benthic assemblages in Commencement Bay were found off ASARCO, off Champion International, and at the head of City Waterway. At the head of City Waterway, the benthic assemblages were dominated by nematodes and the polychaete Capitella capitata. Dominance of these taxa indicates organic enrichment of the sediments. However, some improvement in benthic conditions does appear to have occurred, as these areas are no longer devoid of benthic macroinvertebrates, as the limited historical data indicate.

Fish Ecology:

Fish assemblages in Commencement Bay were found to be more abundant and more diverse than the reference area, Carr Inlet. A possible explanation for this pattern is that most of the Commencement Bay study areas support considerably higher standing crops of English sole prey (i.e. benthic invertebrates) than does Carr Inlet. Studies of English sole in Commencement Bay have shown that they prefer as food items the polychaete worms and clams that are enhanced in abundance in the waterways.

Benthic communities along the length of City Waterway changed markedly in species abundance and composition. Near the head of City Waterway and in the Wheeler-Osgood branch multiple benthic depressions were found. A benthic species was considered numerically depressed if its abundance was significantly lower or absent from the site. No benthic depressions were found at the mouth of City Waterway.

Results showed that the condition of most fish in Commencement Bay was improved over that of fish from Carr Inlet. Thus, there is no evidence that chemical contamination in Commencement Bay is substantially affecting the populations of resident English sole.

The livers of English sole collected in the study area were examined for pathological disorders. It is possible that such disorders (liver lesions) are induced by chemical contaminants in the environment. Liver lesions were found in English sole from almost every study area, including City Waterway. However, even though polycyclic aromatic hydrocarbon (PAH) concentrations in City Waterway were ranked second and third in magnitude in the entire study area, the prevalence of liver lesions in fish from City Waterway were not exceptionally high. This pattern differs from the results obtained in other waterways.

Bioaccumulation studies were also conducted to determine if contaminants were present in the muscle tissues of fish or shellfish living in Commencement Bay. Copper was statistically elevated in English sole, but not in samples collected from City Waterway. However, throughout the study area, lead and mercury were found in elevated concentrations in crab muscle tissue. Most of the organic compounds analyzed were not detected in any of the English sole or crab muscle samples. However, PCB's were consistently detected. Highest average concentrations of PCB's were measured in English sole from Hylebos and City Waterways.

Based on PCB contamination, risks associated with eating fish from Hylebos and City Waterways are about 10 times higher than for fish from Carr Inlet. Although the maximum estimated risk of one in one hundred is associated with a high consumption rate, even much less frequent consumption of fish livers would result in a substantial predicted risk. As a result of the public health assessment, the Tacoma-Pierce County Health Department issued an advisory, recommending against the consumption of fish from the Commencement Bay waterways.

Bioassays were conducted to test the toxicity of the sediments. An amphipod bioassay was used to measure a direct lethal response, while the oyster larvae bioassay was used to measure induction of abnormal development in embryos. Significant amphipod and oyster responses were found in City Waterway.

In prioritizing the Commencement Bay problem areas, the south half of City Waterway, including Wheeler-Osgood, was designated among the highest priority problem areas. The nearshore area adjacent to

the "D" Street petroleum companies was designated a secondary priority problem area. Another secondary priority problem was identified just north of the Wheeler-Osgood Waterway.

Sources: Source investigations were conducted in City Waterway. Several industries and storm drains have been identified as probable contributors of metals, PAH, or total organic carbon (TOC) to City Waterway.

The Nalley Valley and south Tacoma drains are the major contributors of many of the contaminants of concern to City Waterway. They are ongoing sources of all metals of concern in the waterway, contributing 87, 88, and 81 percent of the quantified loadings of lead, copper, and zinc, respectively. One or both of these drains is also the major historical, and potentially ongoing, source of organic materials to the waterway. Discharge from the 15th Street drain contributes metals and PAH to the waterway, but in much lower amounts than the two storm drains at the head of the waterway. The 15th Street drainage basin is much smaller, and average flows are much lower.

Another probable source of metal contaminants is the American Plating, Inc. (2110 East "D" Street), which operated near the end of City Waterway from 1955 to January 1986. Metals used in plating operations include cadmium, copper, nickel, and zinc. Prior to 1978, American Plating had an NPDES permit to discharge directly to City Waterway. Subsequent to 1978, American Plating was connected to the Tacoma sewer utility sanitary sewer. However, the Washington State Department of Ecology has documented at least 10 plating waste spills on the property. Although operations have ceased and hazardous materials removed from the site, contaminants in the soil may be transported to the waterway via overland runoff or groundwater.

The sediment core data at the head of City Waterway suggest a historical source of PAH, possibly the coal gasification plant at East 23rd and "A" Streets. It has been estimated that the contaminated area in the vicinity of the coal gasification plant contributes 0.22 lb/day of total aromatic hydrocarbons to City Waterway via shallow groundwater.

The report concludes that the drains at the end of City Waterway (Twin-96ers between East "C" and Dock Streets) and the South Tacoma drain that discharges into the Wheeler-Osgood Waterway have been major sources of organic enrichment in surficial sediments. However, it is difficult to determine the extent to which these drains

serve as ongoing sources of organic material. Discharge of significant amounts of organic material from these drains should have ceased in the 1970's, yet organic enrichment of 9-18 percent total organic carbon was apparent in surficial sediments. Similar elevations in organic carbon concentrations were not apparent at the outfalls of other storm drains in the tideflats areas. In addition, the sediment cores at the head of City Waterway and in Wheeler-Osgood Waterway showed no evidence of any reduction in the rate of organic carbon input over time. It is possible that decaying wood and vegetation in the stagnated Wheeler-Osgood Waterway may contribute to the substantial organic enrichment observed.

Storm drains to Wheeler-Osgood Waterway are sources of copper, lead, and zinc. Possible sources of 4-methylphenol to the Wheeler-Osgood Waterway are groundwater from the Tar Pits located to the southeast, and degradation of wood chip debris in the sediments.

Martinac Shipbuilding (1502 East "D" Street), near the juncture between City and Wheeler-Osgood Waterways, is a probable source of copper and zinc to City Waterway. Sandblasting and antifouling paints are suspected contributors.

North Pacific Plywood (1549 Dock Street), Puget Sound Plywood (228 E. "F" Street), the Commencement Bay Tar Pits (2202 E. River Street), and the Tacoma Spur (at East 23rd and "A" Streets) are all possible sources of 4-methylphenol to City Waterway. Additionally, the Tacoma Spur and possibly the Commencement Bay Tar Pits site (2202 E. River Street) are potential ongoing sources of 4-methylphenol and light PAHs through groundwater. Discharges from North Pacific Plywood may have occurred via groundwater or from spills of phenolic glues that entered the storm sewer leading to the 15th Street drain. Glue wastes from Puget Sound Plywood may be contributing to elevated sediment levels of 4-methylphenol seen near the mouth of City Waterway.

The "D" Street petroleum facilities between Globe Machine (1020 E. "D" Street) and Union Oil (516 E. "D" Street) contribute light PAH to the waterway via shallow groundwater seeping from the bank of the waterway. The problem has been ongoing for 12 years, if not longer. The tank farms in this area of the waterway store leaded gasoline, unleaded gasoline, and diesel fuel. Examination of groundwater has shown contamination resembling these products, and seepage of product from the banks along the waterway has been observed. At high tide, this seepage is submerged and the product bubbles to the surface, creating a sheen. The contaminants involved probably reach City Waterway sediments, but most undergo

volatilization and some dissolution because the product is dominated by lighter PAHs. The sediments off the "D" Street facilities were dominated by heavier PAHs suggesting that the leaking petroleum tanks are not the source of contamination. No relationship can be established between the chemical contaminants in groundwater and the chemical contaminants in the sediments. The actual source of the heavier PAHs has not been definitively identified.

The surficial sediment chemistry data suggest a source of both light and heavy PAH near the mouth of City Waterway. The sediment core data indicate that sources of PAH have historically had a greater proportion of heavy PAH relative to light PAH. Three potential historical sources of these heavy PAH have been identified: (1) marina fires, (2) Fick Foundry, and (3) Woodworth and Company (asphalt). However, PAH contamination in surficial sediments suggests an ongoing source, but the three identified sources are all historical.

Investigations are necessary to determine the sources of the petroleum products observed in the storm drains near West coast Grocery and in the vicinity of East 15th Street. Potential sources include several old gasoline stations, a historical railroad roundhouse, and Chevron. A historical source of PAH that will probably never be quantified is spills and bilge pumping.

Eight problem areas within the Commencement Bay study area received highest priority for source evaluation, including two within City Waterway. One of these problem areas is at the head of City Waterway, and the other is within the Wheeler-Osgood branch. A second priority site or "hot spot' was identified at the mouth of City Waterway.

Tracey, Harry. Washington State Department of Ecology. 1984. Commencement Bay Small Business Discharge Survey. Inspection Report Form. March 5, 1984. Pickering Industries. Olympia, Washington.

This inspection report describes the operations at Pickering Industries and Picks Cove Marina (1930 and 1940 East "D" Street). Details include the chemicals used, the products of the operation, the characteristics of the effluents, the storage facilities, and the condition of the grounds. Remarks at the end of the report include recommended actions to prevent contamination of City Waterway: a method for preventing spilled fuel and boat cleaning water from reaching the storm drain; discontinuing the discharge of glue wastes; removing all signs of adhesives and resins that have been discharged to the storm drain; and a sign near the storm drain that reads "Absolutely No Dumping".

U.S. Coast Guard. 1979. Letter to Mobil Oil Corporation. Re. Notice of Violation. Seattle, Washington.

This letter notes that since February 1975, the Coast Guard has been receiving notices of violation that oil is being discharged from "D" Street properties into City Waterway. Originally, Union Oil (516 East "D" Street) was considered to be the source as the oil was leaching into the water from the bank of the Union Oil facility. However, at a hearing held in May 1978, Union Oil stated that they had identified the product as a Mobil Oil wood treating oil. Subsequent analysis showed that Mobil Oil (520 East "D" Street) is the source of the petroleum product and Union Oil's facility is acting as a conduit.

This letter notifies Mobil Oil that these uncontrolled discharges represent a violation of the Federal Water Pollution Control Act. A penalty of $1,000 is proposed. (The maximum civil penalty that can be assessed by the Coast Guard is $5,000.) The fine can be contested at a hearing.

U.S. District Court. Western District of Washington at Tacoma. 1988. United States of America v. The George Scofield Company, Inc. Information No. CR88-73FDB, June 30, 1988. Prepared by the United States Attorney General. Seattle Washington.

The U.S. Attorney General charges that the Scofield ready mix concrete plant (1543 Dock Street) allowed waste concrete and wastewater from cement truck washing to enter into City Waterway. The alkaline nature of concrete can effect the pH of receiving waters. These activities represent a violation of the Federal Clean Water Act which prohibits the discharge of pollutants from a point source into any navigable waters of the United States unless in accordance with a National Pollutant Discharge Elimination System Permit. The dates of the violations are noted.

U.S. Environmental Protection Agency. January 18, 1983. Letter to the Chief of the Regulatory Branch of the U.S. Corps of Engineers. Seattle, Washington.

This letter states that sediment analyses for dredging in front of Superior Oil at 250 East "D" Street in Tacoma show that the dredge material would be suitable for open water disposal. Sediment analysis results are attached to the letter.

Weston, Roy F. 1986. American Plating, Inc.: Preliminary Site Assessment. Prepared by Region X Technical Assistance Team TDD #10-8512-05, for Region X, Environmental Protection Agency. Seattle, Washington.

This report describes the historical use of the American Plating Site (2110 East "D" Street) and the initial sampling efforts that were undertaken to determine levels of contamination.

The American Plating, Inc. (AP) operated from 1976 until January of 1986. During this period the firm conducted zinc, copper, chromium, and cadmium plating operations. Prior to 1976, other metal plating companies conducted similar operations. Many significant instances of poor housekeeping practices and permit discharge violations at AP have been documented in files with the Washington State Department of Ecology and the City of Tacoma.

Attempts to bring AP into compliance with RCRA regulations and NPDES permit requirements were unsuccessful. As a result, in mid-January of 1986, Washington State Department of Ecology filed an action in Superior Court demanding that AP cease operations until compliance is achieved. Also in mid-January, the City of Tacoma held a show-cause hearing to give AP an opportunity to give reasons why the City would not void the facility's discharge permit and disconnect the facility's sanitary sewer. AP did not contest these charges, and on February 3, 1986 the City of Tacoma disconnected the sewer and considers the case to be closed.

The report concludes that the AP site poses a serious environmental threat. Evidence for metal and organic solvent contamination in the near surface soil was observed and there is the potential for environmental release of hazardous products and wastes stored on site. The report recommends subsequent investigations to determine the extent of the contamination.

Phase II

PHASE II

Phase II summarizes the information presented in Phase I and organizes the information by specific parcels in the study area. Based on this information, a rating is given to each parcel. Four possible ratings were used: 1) documented presence of contaminants; 2) possible presence of contaminants; 3) documented absence of contaminants; and 4) insufficient data. A list of the references that were used to arrive at the rating are included in the discussion of the identified parcel. Figure 2 shows the parcels that have information referenced in Phase I and depicts the approximate contaminant boundaries at two locations.

Phase II also presents conclusions and recommendations. The conclusions summarize the status of existing information on upland properties along City Waterway. The recommendations suggest ways the City of Tacoma can proceed to address the contamination issues.

PARCELS REFERENCED IN THE PHASE I REPORT

The following information is compiled from the references cited in Phase I. The information is organized according to parcel number and address (see Figure 1).

9. **1141 Dock Street: Vacant (formerly Tacoma Steam Plant #1)/ City of Tacoma**

RATING: Documented Absence of Contaminants

LAND USE: Former site of Tacoma Steam Plant No. 1. The plant was last run during a test in 1968 and has had no maintenance in the last 19 years. In 1982, the Tacoma Department of Public Works declared the building dangerous under City Ordinance No 15742. In 1988, the steam plant was leveled for a proposed new office building.

(Allen, Pierce, Coble, and Payton 1988): Twenty samples were collected in areas of the site where oils and solvents were known to be used and stored, at discharge points, where containers holding possible harmful or unknown materials were found, and in specific areas that appeared to be contaminated. The results showed that Washington State Dangerous Waste Criteria (WAC 173-303) were not met or exceeded. A preliminary health risk assessment indicated that contaminant levels at the site would not pose a health risk if ingested. It was concluded that contaminants on this site pose minimal threat to public health and the environment.

15. **1543 Dock Street:** **Vacant (formerly Lone Star Concrete and Scofield Concrete)/Glacier Park Co.**

16. **1543 Dock Street:** **Vacant (formerly Lone Star Concrete and Scofield Concrete)/Glacier Park Co.**

RATING: Possible Presence of Contaminants.

LAND USE: A concrete batch plant was located on these properties. The properties are now vacant.

(Property Counselors, Inc., 1988): Lone Star Cement recently purchased the Scofield Co. that operated a building materials company at this location since before 1920. Prior to 1920, the site was used for a coal and wood yard. The Tacoma-Pierce County Health Department indicated that the by-product of concrete operations might be an unacceptably high soil pH content; however, any problem would probably be confined to the surface area.

(U.S. District Court, 1988): U.S. Attorney General charges that the Scofield concrete operations allowed cement truck washing water to enter into City Waterway. The alkaline nature of concrete can affect the pH of receiving waters. These activities represent a violation of the Federal Clean Water Act.

(Magee, 1987): Laboratory analysis determined that one third of the time the pH level of the Scofield Company's wastewater exceeded acceptable limits. Of the variables tested, pH could have the most dramatic effect on the marine environment.

(Dames and Moore, 1982): Scofield Co., Inc. is supposed to recycle truck wash water but the system sometimes overflows.

17. **1549 Dock Street:** **Vacant (formerly North Pacific Plywood/ Glacier Park Co.**

18. **1549 Dock Street:** **Vacant (formerly North Pacific Plywood)/ Glacier Park Co.**

RATING: Possible Presence of Contaminants

LAND USE: Since 1912, uses of this site included a machine shop and foundry, fuel handling, sand and gravel storage, and North Pacific Plywood. The property is now vacant.

(Property Counselors, Inc., 1988): Possible contaminants on the site include: heavy metals, chlorinated solvents, and slag or ash. Fuel storage and handling may have caused soils and groundwater contamination. Phenolic resins, used in plywood glue, could be a contaminant remaining on the site.

(Tetra Tech Inc., 1985): North Pacific Plywood is a possible source of 4-methylphenol to City Waterway.

(Dames and Moore, 1982): The disposal of glues and woodwaste have been associated with the plywood industry since the 1960s. During the 1960s, the residual glue in the spreaders was deposited on land, although the exact location of deposition is not known. A common practice was to deposit the waste glue on sawdust piles. North Pacific Plywood, Inc., used the sawdust as hog fuel. They may have simultaneously eliminated the deposits of glue waste in the same manner. This practice of burning hog fuel was eliminated during the 1970s with the advent of air pollution controls. Glue wastes are now recycled as makeup material. Numerous spills have occurred on this site.

19. **1715 Dock Street: Vacant (formerly Scofield Concrete)/ Glacier Park Co.**

RATING: Possible Presence of Contaminants.

LAND USE: A concrete batch plant was located on this property. Because the operation created off-site dust and sand problems, the operation was discontinued. At the south end of the block an asphalt company operated in the early 1900s. By 1925, the site was being used for a bunker coal plant, including coal storage. This plant was in operation until at least 1952.

(Property Counselors, Inc., 1988): The asphalt company operation included an asphalt heater and oil tanks. This use could be a possible source of contamination. Coal storage would not normally cause contamination. However, if the coal is used in a boiler or furnace, as it apparently was on this site, there may be potential contamination.

21. **1821 Dock Street: Vacant Building/Package Service Inc.**

RATING: Documented Absence of Contaminants

LAND USE: Vacant building. Prior use as a flour mill and a warehouse.

(Payton, 1989): The underground storage tanks were removed. Based on a review of soil tests taken during the removal operation, the Tacoma-Pierce County Health Department has determined that this site does not represent a threat to human health or the environment.

(Hart Crowser, 1987b): Subsequent investigations determined that the initial findings of halogenated hydrocarbons on this property were in error (Hart Crowser,

1985a). However, additional tests did show contamination of the soils around at least two of the underground storage tanks. Additional analysis is suggested to determine if the tanks are leaking or are otherwise unsafe.

(Hart Crowser, 1985a): Prior use of the site as a flour mill (Albers Bros. Milling 1900-1943) and warehouse (JH Galbraith Co. 1943-1980s) does not suggest sources of contamination. However, there are four underground storage tanks, three reportedly containing diesel oil and one containing solvents. Also, trucks were washed on the site, a practice which was stopped because it was fouling the waterway. Initial investigations detected halogenated hydrocarbons at levels of concern in four boring samples (Hart Crowser 1985b).

23. **1933 Dock Street: Harmon Cabinets/Harmon Cabinets, Inc.**

RATING: Insufficient Data

LAND USE: Harmon Cabinets manufacturing facility is located on this site.

(Hanowell, 1986): On April 10, 1986 a water quality sample taken at an outfall that discharges from the property was found to contain total phenols in concentrations greater than seven times the apparent effect threshold.

(Dames and Moore, 1982): There is no evidence that Harmon Cabinets has disposed waste materials on this site.

24. **2101 Dock Street: Vacant/Glacier Park Co.**

RATING: Possible Presence of Contaminants

LAND USE: In 1912, this was the location of the Pacific Coast Coal Company. By 1925, this use had moved to 1801 Dock Street. Currently the site is vacant.

(Ecology and the Environment, Inc., 1988): During the construction of I-705, contaminated soils were identified by Hart Crowser in the vicinity of East 23rd and "A" Streets (Hart Crowser, 1984). The contamination was attributed to the waste disposal practices of a former coal gasification plant located at this site. Field observations were conducted to determine the extent of the contamination. Tar and oily sand were observed along City Waterway, possibly affecting 2101 Dock Street. In 1984, contaminated soils within the Tacoma Spur right-of-way were removed. It is recommended that the remainder of the contaminated soils, in areas outside of the right-of-way, be removed to reduce the potential threat to the environment and human health. However, due to the irregular and discontinuous distribution of the waste, the extent of the surface and subsurface soil contamination has not been clearly defined. Ecology and the Environment, Inc., conclude that further investigation is warranted.

(Property Counselors, Inc., 1988): Coal storage would not normally cause contamination. However, if coal was used in a boiler or furnace on the site, there may be some contamination from heavy metal.

This report references the 1984 Hart Crowser investigations. Hart Crowser performed soil tests around the edges of this property for the Tacoma Spur project. These tests show that problems on this site may not be as serious as assumed. The source of the suspected contamination is a former coal gasification plant located to the southeast of the site. Two test borings were placed on the west and south edges of the 2101 Dock Street parcel. The boring on the west showed no signs of contamination. Hart Crowser concluded, however, that this boring may be close to the northernmost extent of the contaminated area.

(Hart Crowser, 1984): During drilling to assess roadway foundation for the Tacoma Spur, oily soil and a tar-like material was found. It is believed these substances were similar to coal tar waste probably generated from a coal gasification plant operated at the site between 1884 and 1924. Field observations determined that this contamination extended to 2115 Dock Street.

25. **2115 Dock Street: Vacant/Package Service Inc.**

RATING: Documented Presence of Contaminants.

STATUS: Investigations warranted.

LAND USE: From what is know about this parcel, it does not appear that industrial waste was generated at the site itself. From old maps and photographs, the only building on this property was a small structure entitled S.P.R.M. The structure was posted on the Sanborn Fire Insurance maps sometime in the late 1930s and 1940s. Today, this parcel is a vacant lot.

(Ecology and the Environment, Inc., 1988): During the construction of I-705, contaminated soils were identified by Hart Crowser in the vicinity of East 23rd and "A" Streets (Hart Crowser, 1984). The contamination was attributed to the waste disposal practices of a former coal gasification plant located at this site. Field observations were conducted to determine the extent of the contamination. Tar and oily sand were observed along City Waterway, affecting 2115 Dock Street. In 1984, contaminated soils within the Tacoma Spur right-of-way were removed. It is recommended that the remainder of the contaminated soils, in areas outside of the right-of-way, be removed to reduce the potential threat to the environment and human health. However, due to the irregular and discontinuous distribution of the waste, the extent of the surface and subsurface soil contamination has not been clearly defined. Ecology and the Environment, Inc. conclude that further investigation is warranted.

(Hart Crowser, 1985a): Prior investigation conducted by Hart Crowser (Hart Crowser, 1984) determined that 2115 Dock Street is contaminated with organic compounds similar to those detected in the vicinity of the coal gasification plant. It has been suggested that waste from the coal gasification plant was dumped on the site. The contaminants detected at 2115 Dock Street include tar and tar-like material, oily silt and sand, and samples having creosote-like odors but no visual indications of contamination. The tar-like material had elevated concentrations of PAHs. The Washington State Department of Ecology required removal to a hazardous waste facility of similarly contaminated soils at the Tacoma Spur site. The oily silt and sand contained somewhat elevated concentrations of PAHs. The Washington State Department of Ecology required removal of similar material from the Tacoma spur site and placement in a concrete vault with a 30-year groundwater monitoring program.

(Hart Crowser, 1984): During drilling to assess roadway foundation for the Tacoma Spur, oily soil and a tar-like material was found. It is believed these substances were similar to coal tar waste probably generated from a coal gasification plant operated at the site between 1884 and 1924. Field observations determined that this contamination extended to 2115 Dock Street

26. **2201 Dock Street: City Park/City of Tacoma**

RATING: Documented Presence of Contaminants

STATUS: Investigations warranted.

LAND USE: City Park

(Ecology and the Environment, Inc., 1988): During the construction of I-705, contaminated soils were identified by Hart Crowser in the vicinity of East 23rd and "A" Streets (Hart Crowser, 1984). The contamination was attributed to the waste disposal practices of a former coal gasification plant located at this site. Field observations were conducted to determine the extent of the contamination. Tar and oily sand were observed along City Waterway, affecting 2201 Dock Street. In 1984, contaminated soils within the Tacoma Spur right-of-way were removed. It is recommended that the remainder of the contaminated soils, in areas outside of the right-of-way, be removed to reduce the potential threat to the environment and human health. However, due to the irregular and discontinuous distribution of the waste, the extent of the surface and subsurface soil contamination has not been clearly defined. Ecology and the Environment, Inc. conclude that further investigation is warranted.

(Hart Crowser, 1984): The City Park is located less than 100 feet east of the Tacoma Spur Tar Pits Site. Surface tar deposits have been identified in the park owned by the City of Tacoma on the east side of Dock Street. Soil contamination in the form of oily sawdust, oily silt, and tar exists between the Tacoma Spur right-of-way and City Waterway and is likely contributing contamination loadings to the waterway.

32. **2110 E. "D" Street: Vacant Building (formerly American Plating, Inc.)/Lewis Jones**

RATING: Documented Presence of Contaminants

STATUS: Soil and groundwater investigation complete and recommended site closure plan now under consideration by the U.S. EPA.

LAND USE: Metal plating operations occurred on the site from 1955 to 1986. Failure to comply with RCRA regulations and NPDES permit requirements resulted in the closure of this facility in 1986. The site contains two large buildings, which were used for office space, plating, and chemical and waste storage.

(Kennedy/Jenks/Chilton Engineers, 1989): Recommended site closure plan. Two options are being considered: "clean closure" and a "RCRA cap." "Clean closure" involves the removal of all contaminated soils to an approved landfill. A "RCRA cap" involves treating the site as a landfill, covering the surface with impermeable layers, and monitoring the groundwater to determine if contaminants are migrating off-site.

(Applied Geotechnology, Inc., 1989a), (Applied Geotechnology, Inc., 1989b), (Applied Geotechnology, Inc., 1989c), (Applied Geotechnology, Inc., 1988a), (Applied Geotechnology, Inc., 1988b), (Applied Geotechnology, Inc., 1988c): Soil and Groundwater Investigations. Metal concentrations in surface soil ranged from below background concentrations for the Tacoma area to up to one hundred times background levels. The pattern of metal concentrations appears to represent isolated spills of various plating solutions. Cyanide concentrations followed the same distribution pattern as the metals. Volatile Chlorinated Hydrocarbons (CHCs) were also detected in soil samples. It is believed these compounds originated from degreasers used prior to plating.

Contaminant transport off-site is expected to be minimal. The solubility of the metals in the groundwater is so low that metals do not appear to be transported through this pathway. Low concentrations of CHCs may be discharged to City Waterway from the shallow Fill/Marsh aquifer. However, these compounds do not absorb onto sediments and volatilize from surface water within a few hours.

Once released into the air, CHCs degrade in a matter of hours. Tests indicate that the Lower Sand Aquifer that also discharges into City Waterway, is uncontaminated.

If it is determined that the metals in the soil do not leach, then it may be possible to leave the contaminated soil on-site and cover it with a clean "RCRA cap," instead of removing the soils to an approved disposal facility.

(Oberlander, 1987): This memorandum confirms the removal of tanks from the American Plating site. The tanks containing wastes were removed pursuant to a Washington State Department of Ecology consent order.

(Weston, 1986): This preliminary site assessment prepared for the U.S. EPA concludes that the American Plating site poses a serious environmental threat. Evidence for metal and organic solvent contamination was observed in the near surface soil. It is also noted that there is potential for the release of hazardous products and wastes stored on site.

(Tetra Tech, 1985): One probable source of metal contaminants in the sediments at the end of City Waterway is attributed to plating operations at 2110 E. "D" Street. It is noted that prior to sanitary sewer hook-up in 1978, American Plating had an NPDES permit to discharge directly to City Waterway. Also, the Washington State Department of Ecology had documented at least 10 plating waste spills on the property.

(JRB Associates, 1984): This preliminary assessment of the American Plating site recommends soil and groundwater sampling to determine the extent of environmental degradation.

(Dames and Moore, 1982): It is noted that American Plating, Inc. has been subject to Washington State Department of Ecology and City of Tacoma enforcement action. Concerns about past and present chemical storage and waste disposal practices have led to the closure of this electroplating industry.

33,34, & 36. **1930 E. "D" Street: Pickering Manufacturing/Pickering Industries**

RATING: Insufficient Data

LAND USE: Cabinet manufacturer

(Comstock, 1988): Pickering is asked to divert the discharge of glue wastewater to the sanitary sewer rather than discharge it into City Waterway.

(Morrison, Stasch, 1987): Washington State Department of Ecology officials observed glue wastewater being discharged into City Waterway.

(Tracey, 1984): Washington State Department of Ecology inspection officials recommend that Pickering Industries discontinue discharging glue wastewater into City Waterway.

40. **1502 E. "D" Street: J.M. Martinac Shipbuilding Corp./ Burlington Northern Railroad**

RATING: Possible Presence of Contaminants.

LAND USE: Shipbuilding operation.

(Kato, 1989): This letter indicates that the analysis of sandblast waste showed elevated levels of zinc and copper. Fish bioassays must be conducted to determine if the material must be disposed at a hazardous waste disposal facility.

(Pierce, 1988): Analysis of material excavated at the Martinac Shipbuilding operation does not contain heavy metals at levels of concern.

(Tetra Tech, 1985): Martinac Shipbuilding is a probable source of copper and zinc found in the sediments at the mouth of the Wheeler-Osgood Waterway. Sandblasting and antifouling paints are suspected contributors.

(Dames and Moore, 1982): Martinac Shipbuilding Corp. manufactures tuna boats. Paint, solvents, and sandblasting material might enter City Waterway from this industry. In the past, granulated slag from ASARCO was used as sandblasting material.

(Kerslake, 1981): Martinac Shipbuilding is notified that sandblast material cannot be stored on the shoreline.

46. **1215 E. "D" Street: Vacant (formerly St. Regis Door Mill)/Stu Wattles**

RATING: Insufficient Data

LAND USE: Vacant. Formerly door mill.

(Dames and Moore, 1982): Glues used in the door manufacture plant are taken to a disposal site. The exact location of this site is not known. The glues from the sump may have been deposited on land prior to being hauled away.

"D" STREET PETROLEUM FACILITIES

52.	**1002 E. "D" Street:**	**Olympic Chemical**
53.	**820 E. "D" Street:**	**Pacific Pattern Works (formerly Fick Foundry)/American Savings Bank**
54.	**820 E. "D" Street:**	**Vacant (formerly Fick Foundry)/American Savings Bank**
55.	**702 E. "D" Street:**	**Globe Machine (Engineering Annex)/ Calvin and Joanne Bamford**
56.	**701 E. "D" Street:**	**Globe Machine (Manufacturing Company)/ Calvin and Joanne Bamford**
57.	**540 E. "D" Street:**	**Globe Machine (Manufacturing Annex)/ Calvin and Joanne Bamford**
58.	**520 E. "D" Street:**	**Socony Mobil Oil Co./Mobil Oil Corp.**
59.	**516 E. "D" Street:**	**Union Oil of California (UNOCAL)**
64.	**1005 E. "E" Street:**	**Vacant (formerly Fick Foundry)/American Savings Bank**

RATING: Documented Presence of Contaminants

STATUS: Recommended remediation under consideration

LAND USE: Mixed industrial

(Hart Crowser, 1989a): The work plan defines the tasks to be undertaken including steps to be taken to determine the extent of subsurface free petroleum and to define the remedial actions alternatives.

(Hart Crowser, 1987a): Petroleum product seepage into City Waterway has been observed for at least 17 years. In 1970, Mobil Oil installed an interceptor drain after a spill. Reportedly, five thousand gallons of product were pumped from the drain during the first year of operation. The drain is still operating and is reportedly pumping minor amounts of product on an intermittent basis. In 1982, petroleum was observed seeping into City Waterway adjacent to property owned by Globe Machine and Union Oil. In response to these findings, 34 monitoring wells were installed in the area of East "D", "E", and "F" Streets. Since 1982, the number of sampling wells has been increased to 74.

Data compiled since 1982 shows the extent and thickness of petroleum detected in the wells has increased from 2 inches to five feet in places. To address this problem, recovery systems were installed using pumps and oil-water separators. In 1986, 235 gallons were removed by this method. Recent testing shows that this method is not effective as only a very small effective radius of influence is affected by pumping from the wells. It is recommended that recovery operations use interception trenches hydraulically connected to a recovery well.

(Tetra Tech, 1985): The "D" Street petroleum facilities contribute light PAH to the waterway via shallow groundwater seeping from the bank of the waterway. The problem has been ongoing for 12 years, if not longer. The tank farms in this area store leaded gasoline, unleaded gasoline, and diesel fuel. Examination of

groundwater has shown contamination resembling these products and seepage of product from the banks along the waterway has been observed. Most contaminants probably volatilize.

(Johnson and Norton, 1985): Petroleum, groundwater, and adjacent subtidal marine sediments at petroleum storage facilities were analyzed. Substantial amounts of oil continue to be present in groundwater beneath the "D" Street facilities. The data fail to show substantial input of petroleum to sediment in this part of City Waterway.. Most of the petroleum seeping into the waterway is rapidly volatilized.

(Dames and Moore, 1982): Fuel storage tanks have been located here since the 1940s. Many fuel spills have occurred on this site. Oil residue resulting from tank cleaning may have been discharged on the site. Pooled oil exists on the water table below the tank farms. Obvious signs of soil contamination are noted by the oil sheen on City Waterway adjacent to these bulk plants. Discharge from the on-site boiler may have been spilled on the ground at the Superior Oil site.

In addition, the Fick Foundry at 1005 East "E" Street used many types of slag that was deposited along the banks of City Waterway.

(Hart Crowser, 1982): Petroleum product is measured moving on the watertable surface within a silty fine sand unit and possibly along sewer line pipe bedding. The groundwater is moving toward City Waterway. The Union Oil and Globe Machine properties are suspected sources.

63. **228 E. "F" Street: Puget Sound Plywood**

RATING: Insufficient Data

LAND USE: Plywood manufacturing

(Tetra Tech, 1985): Glue wastes may be contributing to elevated sediment levels of 4-methylphenol detected near the mouth of City Waterway.

(Dames and Moore, 1982): Puget Sound Plywood stores glues and resins on-site. It is not known where the glue from the glue sump was discharged. It was also reported that phenols were spilled on the ground on this site.

65. **1623 East "J" Street: Hygrade Foods**

RATING: Insufficient Data

LAND USE: Food processor

(Dames and Moore, 1982): Hygrade Foods produces a waste effluent high in organic material. In the past, this waste was discharged to the Wheeler-Osgood Waterway. Presently it is pretreated before discharge to the sanitary sewer system. Rodenticides are used on site; however, the handling practices of the rodenticides is not known.

66. **2202 E. River Street: Commencement Bay Tar Pits Site/ Joseph Simon & Sons, Inc.**

RATING: Documented Presence of Contaminants

STATUS: Remediation underway

LAND USE: Recycling facility

(Tetra Tech, 1985): The Commencement Bay Tar Pits are a possible source of 4-methylphenol to City Waterway via groundwater.

(Kennedy/Jenks Engineers, 1983): In 1924, H.M. Byllesby Co. built a gasification on the project site. This plant replaced a gasification plant built in 1884 at East 23rd and "A" Streets. The Byllesby facility's gas holders (i.e. storage tanks) had a capacity of 4.5 million cubic feet. In 1927, the Byllesby Co. was acquired by Washington Gas and Electric Company. By 1934, about 20,000 tons of coal per month were processed by the plant. The major byproducts of this process are tar and ash. In 1965, the United Steel and Metal Corporation dismantled and removed the plant facilities from the 12-acre site and in 1967, Joseph Simon and Sons purchased the property. Simon and Sons currently operate an iron and metal recycling plant on the site.

Tar Pit: Historical information shows that a small pond existed in the southeast corner of the site. This pond is filled with tar and may have served as a repository for process byproducts generated at the gasification plant.

Tar at Large Pond: Historical information shows that a large pond exited on the western portion of the site. Although the pond is no longer evident, sampling around the historical perimeter indicated tar in both the upper and lower aquifers.

Groundwater Contamination: Fifteen organic priority pollutants and seven non-priority pollutants were identified in groundwater at the site. The mobility of these organics are not significantly retarded by soil absorption. It is possible that some organics may have been transported off-site.

Surface Water Contamination: Most surface samples contained relatively high concentrations of lead. One surface sample contained polychlorinated biphenyls

(PCBs) at levels that according to the Toxic Substances Control Act must be removed and secured in a specially designed landfill.

67. **East 21st Street: Burlington Northern Railroad Carwash/Burlington Northern Railroad**

RATING: Insufficient Data

LAND USE: Railroad siding

(Dames and Moore, 1982): The residue of material washed out of the railroad cars was dredged in piles on the ground. The material was composed of everything transported by railroad cars, including grains, solvents, chemicals, and oils. Many spills and leaks have been reported at this site.

68. **East "C" Street and Dock Street: Twin 96ers (Dual 96" Storm Drain)/City of Tacoma**

RATING: NA (not an upland site)

LAND USE: City of Tacoma storm drains

(Tetra Tech, 1988): Remedial action for this end of the waterway includes source control measures and sediment cleanup. Source control measures will include reducing the amount of metals and hydrocarbons in storm drain discharge, investigating suspect groundwater contributions and implementing control technologies if necessary, and monitoring on a regular basis. Clamshell dredging with confined aquatic disposal is recommended as the preferred alternative for sediments that are not expected to recover within 10 years following implementation of all known, available, and reasonable control technologies.

(Tetra Tech, 1985): The Twin 96ers have been a major source of organic enrichment in surficial sediments. Discharge of significant amounts of organic material from these drains should have ceased in the 1970s, yet organic enrichment of 9-18 percent total organic carbon was apparent in surficial sediments. Similar elevations in organic carbon concentrations were not apparent at the outfalls of the other storm drains in the area. In addition, the sediment cores showed no reduction in the rate of organic carbon input over time.

69. **East 23rd and "A" Streets: Tacoma Spur Right of Way and vicinity (former coal gasification plant)/State of Washington**

RATING: Documented Absence of Contaminants (within I-705 ROW)

LAND USE: Tacoma Spur (I-705). Formerly the location of a coal gasification plant.

(Ecology and the Environment, Inc., 1988): The Federal Highway Administration and the Tacoma-Pierce County Health Department coordinated the removal of contaminated soils within the I-705 right-of-way. Contaminated soils were excavated up to 5 feet beyond the right-of-way. The wastes were disposed of in accordance with state regulations.

(Tetra Tech, 1985): The sediment core data at the head of City Waterway suggest a historical source of polychlorinated aromatic hydrocarbons. The former coal gasification plant at East 23rd and "A" Streets is the probable source. It has been estimated that the contaminated area in the vicinity of the coal gasification plant contributes 0.22 lb/day of total aromatic hydrocarbons to City Waterway via shallow groundwater.

(Hart Crowser, 1985a): Soil contamination in the form of oily sawdust, oily silt, and tar exists between the I-705 right-of-way and City Waterway and is likely contributing a portion of the contamination loadings to the waterway. Observations indicate that rates of contaminant transport to City Waterway has not changed since the remedial action was taken within the I-705 right-of-way. Outside of the right-of-way, it is likely that the actual contaminated soil volumes are greater than predicted. (See 24, 25, and 26 above)

(Hart Crowser, 1985b): Groundwater investigations at the Tacoma Spur site determined that all organic contaminants originated on site and that there were no apparent seasonal trends.

(Hart Crowser, 1984): The site is the former location of a coal gasification plant which operated on the property between 1884 and 1924. The plant was owned by H.M. Byllesby, who sold it to Washington Natural Gas and Electric in 1924. In addition to the coal gasification plant, a review of historical information for adjacent properties indicates the former presence of a coal and wood electricity generating plant, an abandoned gasoline filling station with underground storage tanks, and an equipment storage yard. (Hart Crowser 1984)

The majority of the gasification plant was built adjacent to "A" Street between East 21st and East 23rd Streets. A combustible fuel gas known as water gas was manufactured by passing pressurized, superheated steam through a bed of mixed coke and coal. Waste products generated from this process are likely to have included ash, slag, tar, sludges, wastewater, and spent iron oxides.

coke and coal. Waste products generated from this process are likely to have included ash, slag, tar, sludges, wastewater, and spent iron oxides.

Geotechnical exploration with the I-705 right-of-way in 1984 revealed unexpected coal-tar contamination. Soil contamination in the form of coal tar and its related by-products, and petroleum related products (gasoline) were detected in soil and water samples. The coal tar contamination takes the form of oily soil and tar-like material containing numerous aromatic and polynuclear aromatic hydrocarbons. The petroleum product contamination takes the form of distinctly different, oily, odorous soil and also contains aromatic hydrocarbons.

Groundwater beneath the site contained low levels of several contaminants. The site is estimated to contribute about 100 grams of combined aromatic hydrocarbons and about 50 grams of trace metals per day to the City Waterway via shallow groundwater transport. All groundwater flowing from the site likely discharges to City Waterway.

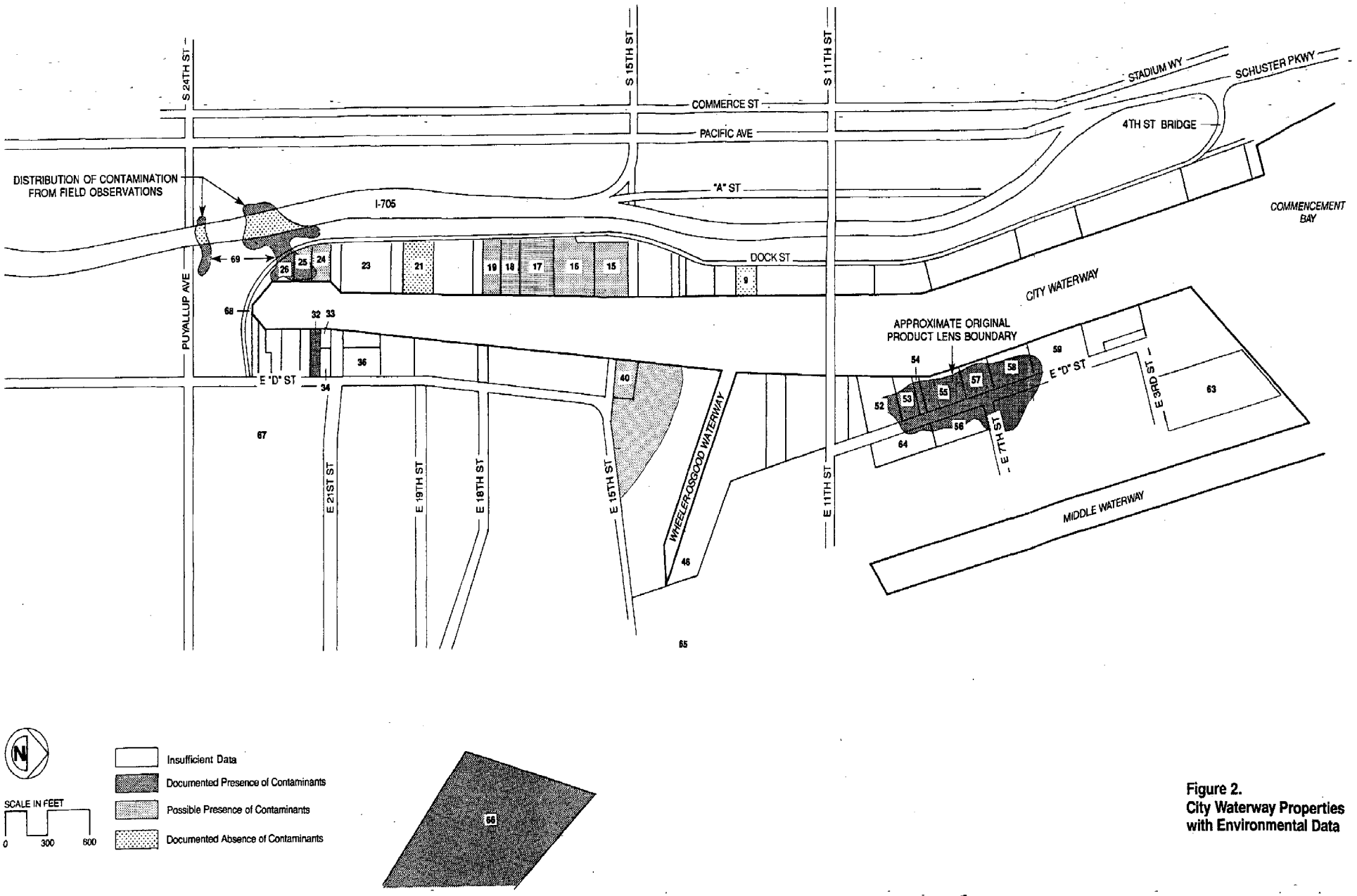

Figure 2.
City Waterway Properties with Environmental Data

KEY: FIGURE 2

CITY WATERWAY PROPERTIES WITH ENVIRONMENTAL DATA

	Address	Property/Ownership	Reference
9.	1141 Dock St.	Vacant (formerly Tacoma Steam Plant #1)/City of Tacoma	(Allen, Pierce, Coble, Payton, 1988)
15.	1543 Dock St.	Vacant (formerly Lone Star Concrete and Scofield Concrete)/ Glacier Park Co.	(Property Counselors, Inc., 1988) (U.S. District Court, 1988) (Magee, 1987)
16.	1543 Dock St.	Vacant (formerly Lone Star Concrete and Scofield Concrete)/ Glacier Park Co.	(Dames and Moore, 1982)
17.	1549 Dock St.	Vacant (formerly North Pacific Plywood)/Glacier Park Co.	(Property Counselors, Inc., 1988) (Tetra Tech, 1985)
18.	1549 Dock St.	Vacant (formerly North Pacific Plywood)/Glacier Park Co.	(Dames and Moore, 1982)
19.	1715 Dock St.	Vacant (formerly Scofield Concrete)/Glacier Park Co.	(Property Counselors, Inc., 1988)
21.	1821 Dock St.	Vacant Building/Package Service Inc.	(Payton, 1989) (Hart Crowser, 1987b) (Hart Crowser, 1985a)
23.	1933 Dock St.	Harmon Cabinets, Inc.	(Hanowell, 1986) (Dames and Moore, 1982)
24.	2101 Dock St.	Vacant/Glacier Park Co.	(Ecology and the Environment, Inc., 1988) (Property Counselors, Inc., 1988) (Hart Crowser, 1984)
25.	2115 Dock St.	Vacant/Package Service Inc.	(Ecology and the Environment, Inc., 1988) (Hart Crowser, 1985b) (Hart Crowser, 1984)
26.	2201 E. 22nd St.	City Park/City of Tacoma	(Ecology and the Environment, Inc., 1988) (Hart Crowser, 1984)
32.	2110 E. "D" St.	Vacant Building (formerly American Plating, Inc.)/Lewis Jones	(Kennedy/Jenks/Chilton, 1989) (Applied Geotechnoligy, Inc., 1989a, 1989b, 1989c, 1988a, 1988b, 1988c) (Oberlander, 1987) (Weston, 1986) (Tetra Tech, 1985) (JRB Assoc., 1984) (Dames & Moore, 1982)
33.	1930 E. "D" St.	Pickering Manufacturing/ Pickering Industries	(Comstock, 1988) (Morrison, Stasch, 1987)
34.	1930 E. "D" St.	Pickering Manufacturing/ Pickering Industries	(Tracey, 1984)
36.	1930 E. "D" St.	Pickering Manufacturing/ Pickering Industries	

40.	1502 E. "D" St.	J.M. Martinac Shipbuilding Corp./ Burlington Northern Railroad	(Kato, 1989) (Pierce, 1988) (Tetra Tech, 1985) (Dames and Moore, 1982) (Kerslake, 1981)
46.	1215 E. "D" St.	Vacant (formerly St. Regis Door Mill)/Stu Wattles	(Dames and Moore, 1982)

"D" STREET PETROLEUM FACILITIES

52.	1002 E. "D" St.	Olympic Chemical	(Hart Crowser, 1989a)
53.	820 E. "D" St.	Pacific Pattern Works (formerly Fick Foundry)/American Savings Bank	(Hart Crowser, 1987a) (Tetra Tech, 1985) (Johnson and Norton, 1985)
54.	820 E. "D" St.	Vacant (formerly Fick Foundry)/ American Savings Bank	(Dames and Moore, 1982) (Hart Crowser, 1982)
55.	702 E. "D" St.	Globe Machine (Engineering Annex)/Calvin Joanne Bamford	
56.	701 E. "D" St.	Globe Machine (Manufacturing Co.)/Calvin and Joanne Bamford	
57.	540 E. "D" St.	Globe Machine (Manufacturing Annex)/Calvin and Joanne Bamford	
58.	520 E. "D" St.	Socony Mobil Oil Co./Mobil Oil Corp.	
59.	516 E. "D" St.	Union Oil of California (UNOCAL)	
64.	1005 E. "E" St.	Vacant (formerly Fick Foundry/ American Savings Bank)	
63.	228 E. "F" St.	Puget Sound Plywood	(Tetra Tech, 1985) (Dames and Moore, 1982)
65.	1623 E. "J" St.	Hygrade Foods	(Dames and Moore, 1982)
66.	2202 E. River St.	Commencement Bay Tar Pits Site/ Joseph Simon & Sons, Inc.	(Tetra Tech, 1985) (Kennedy/Jenks, 1983)
67.	East 21st St.	Burlington Northern Railroad Carwash/Burlington Northern Railroad	(Dames and Moore, 1982)
68.	East "C" St. and Dock St.	Twin 96ers/City of Tacoma	(Tetra Tech, 1988) (Tetra Tech, 1985)
69.	East 23rd St. and "A" St.	Tacoma Spur Right of Way and vicinity (former coal gasification plant)/State of Washington	(Ecology and the Environment, Inc., 1988) (Tetra Tech, 1985) (Hart Crowser, 1985a) (Hart Crowser, 1985b) (Hart Crowser, 1984)

CONCLUSIONS

- Significant progress has been made toward addressing the contamination issues at the American Plating, "D" Street Petroleum, and Commencement Bay Tar Pits sites.
- In two instances, actual site investigations have shown that the soils are clean (1141 Dock Street - Tacoma Steam Plant #1 and 1821 Dock Street - Package Services, Inc.).
- Very little additional data is available on the other properties along City Waterway:
  - The Tacoma Spur site has been cleaned up within the I-705 right-of-way.
  - The extent and severity of contamination from the former coal gasification plant beyond the I-705 right-of-way is not clearly defined.
  - There are some properties where past or present industrial activities may have caused soil contamination: plywood companies, concrete operations, and shipyards. No conclusions can be drawn until actual analysis has been done.

RECOMMENDATIONS

- Determine the extent and severity of contamination from the coal gasification plant at the end of City Waterway.
- Conduct a thorough historical review to document past land use activities along City Waterway.
- Based on this historical review and the studies reported here, identify and prioritize sites to evaluate.
- Work with property owners and public agencies to identify problem areas. Implement testing programs and assist in remedial actions. Identify properties with a clean bill of health.
- Goal: A map of City Waterway that shows all properties rated: Documented Absence of Contaminants.

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