BASELINE

ENVIRONMENTAL CONSULTING

15 April 1999
S9171-C1

Ms. Diane Heinz
Port of Oakland, EH&SC
530 Water Street, 2nd Floor
Oakland, California 94607

Subject: Transmittal of Information Requested by Alameda County for Seabreeze Yacht Center Study Area, Oakland, California

Dear Ms. Heinz,

Please find enclosed the information requested by the Alameda County Health Care Services Agency in their letter dated 3 March 1999. This report contains a concise summary of historic land uses at the site, a compilation of all soil, groundwater, and sediment collected from the site (minus those data representing soil that have been removed during previous remediation activities), and information on the relative aquatic toxicity of Bunker C and diesel. In addition, the report contains a proposed tunnel remediation work plan.

Please contact us if you have questions on this document.

Sincerely,

Yane Nordhav
Reg. Geologist No. 4009

Lydia Huang
P.E. No. 43995

YN:LH:km

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Emeryville Petaluma San Francisco

Compilation of Historic Site Data, Bunker C Toxicity, and Tunnel Remediation Work Plan

Seabreeze Yacht Center
Study Area
Oakland

APRIL 1999

For:

Port of Oakland
Oakland, California

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BASELINE Environmental Consulting
5900 Hollis Street, Suite D • Emeryville, California 94608
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INTRODUCTION

This report was prepared in response to the 3 March 1999 letter from Alameda County Health Care Agency (County) requesting information on the former Seabreeze Yacht Center study area. The site is located along the Oakland estuary near the intersection of Sixth Avenue and the Embarcadero (Figure 1). The study area consists of the location of the former Seabreeze Yacht Center, the former PG&E power plant site, and the adjacent Clinton Basin Canal (Figure 2). The County letter requested six items:

- Concise historical site summary.
- Compilation of all soil and groundwater chemical quality of samples that represent materials remaining on the site.
- Compilation of chemical data on all sediment samples colleted at the site including a map showing the high tide line.
- Compilation of chemical data on all soil samples that were collected within the top one- to two feet of the ground surface (surface and near-surface) and associated map.
- Information on the aquatic toxicity and characteristics of Bunker C fuel relative to diesel.
- Proposal to remediate and seal the cooling water intake and discharge tunnels associated with the former PG&E power plant.

A copy of the letter is provided in Appendix A and the requested information is provided in the following four sections.

LAND USES

HISTORICAL LAND USES

The historical uses of the study area were researched by BASELINE by review of Port records, information available at the City of Oakland Public Library, Sanborn Fire Insurance maps, regulatory records, and historic aerial photographs. Sanborn maps of the study area reviewed were from the years 1911 (Figure 3), 1950 (Figure 4), and 1967 (Figure 5). The aerial photographs reviewed for this investigation were taken in 1930 (Figure 6), 1959 (Figure 7), 1969 (Figure 8), 1979 (Figure 9), 1985 (Figure 10), and 1992 (Figure 11).

The land use history of the study area was dominated by two activities, marine services facilities and operation of an electric power generating plant. The marine services activities were primarily centered in the area on the northwestern side of Clinton Basin. These activities included operation of wharves and storage and maintenance of boats at docks and on land. The land areas were predominantly unpaved. The electric power plant was operated from 1909 until the late 1950s. Power plant operations included the use of fuel from a large aboveground petroleum steel tank located adjacent to Clinton Basin. Pipelines from the fuel tank to the power plant and from the wharf to the tank traversed the southeastern portion of the site (Figure 2). The historic uses within the study area and potentially associated contaminants are summarized in Table 1. Below is a detailed description of the historic operations in the study area.

Electric Power Plant

PG&E's electric power generation plant was the dominant historical structure within the study area. The plant was apparently built in 1909 in the northern corner of the site by the California Electric Generating Company and leased to the Great Western Power Company to produce electricity using steam-driven turbines. The electricity was generated to supplement power delivered to Oakland from hydroelectric power plants located in the Sierra foothills. Ownership of the plant passed to PG&E in 1936. The plant was operated by PG&E on an intermittent basis as a standby power supply facility until 1950. The plant was apparently abandoned in 1959 and demolished sometime between 1977 and 1979.

The plant was identified on the 1911 and 1950 Sanborn Fire Insurance Maps (Figures 3 and 4). The building was constructed of reinforced concrete with a steel frame. Large boilers, fueled with petroleum hydrocarbons, produced steam to three 3,500-kilowatt power turbines at the plant . Two water supply wells were located southwest of the plant and provided groundwater for steam production. The water supply was stored in an elevated 25,000-gallon water tank. Salt water was pumped from intakes on the Inner Harbor (approximately 400 feet southwest of the plant) through a tunnel to provide cooling water for the steam condensers (Figure 2). Used cooling water was discharged to Clinton Basin via a separate tunnel (discharge tunnel).

A 135,000-gallon, steel-walled aboveground fuel storage tank was located approximately 250 feet south of the plant. This tank stored heavy petroleum (Bunker C) for fueling the plant boilers. The tank was located in a concrete containment structure. An aboveground pipeline linked the wharf on

Clinton Basin, the power plant, and the fuel tank. The arrangement suggests that petroleum was unloaded at the wharf on Clinton Basin, pumped to the tank for storage, then pumped to the boilers in the power plant. The age of the tank is not known but was present in the 1930 aerial photograph and may have been present since the beginning of plant operations in 1909. The tank and pipelines were removed sometime between 1950 and 1959 as evident on the aerial photographs from these two years. Potential contaminants associated with tank operations include Bunker C and possibly metals (from sandblasting of the tank for repainting). The concrete containment structure for the tank was apparently filled with soil after the steel tank was removed. The soil in the containment structure was removed in 1991 and the structure and underlying soil was removed in 1996 as part of remedial actions undertaken by the Port. The power plant is present in aerial photos from 1930 through 1969 (Figures 6 through 8). Another aerial photo from 1977 shows the power plant in-place.

The 1959 and 1969 photographs show that significant filling occurred at the southwestern end of the site adjacent to the Inner Harbor between these years (Figures 7 and 8). Although details of the filling operations were not available in the Port records, the photos indicate that an area of approximately three-quarters of an acre was filled between 1959 and 1969. The 1969 photo (Figure 8) shows an active hydrofilling operation. Discharge of saturated sediment onto the site is suggested by piping structures and tonal patterns at the ends of the pipelines. A pipeline extending into Clinton Basin from the former location of the aboveground fuel tank may have been used to unload dredge spoils from barges.

By 1979 (Figure 9), the power plant and all associated aboveground structures had been removed from the site. Details of the demolition were not available in the Port files. By 1985 (Figure 10) most of the area occupied by the former power plant operations was used for storage of shipping containers. The study area in 1992 is shown on Figure 11.

Marine Services

Maintenance and storage facilities for boating and shipping activities are evident in the earliest records reviewed. The 1911 Sanborn map shows two wharves along the north and west edges of the Basin, and a lumber operation (identified as Oakland Sash and Door Co.) at the northern end of Clinton Basin (Figure 3).

In a 1930 aerial photo (Figure 6), the wharf on the west side of the Basin had been extended at least 400 feet northeastward and 80 feet southwestward of the wharf shown on the 1911 Sanborn map. The area behind (northwest of) the wharf was apparently filled. The structures associated with the power plant are visible but the southwestern portion of the area is obscured on the photo by cloud cover. The buildings associated with the cutlery manufacturing operation north of the study area were not evident in the 1930 photo; the buildings for the lumber operation were present. The remainder of the study area appeared unpaved and disturbed. Dry-docked boats are observable in the northwestern portion of the study area.

In 1959, tires used at the factory adjacent to the study area for the manufacture of shoe soles were stored in an approximate 18,000 square foot area adjacent to the northern shore of the Basin, about

halfway between the Inner Harbor and the northern end of the Basin (Figure 7). The tires were not present in the 1969 or subsequent aerials (Figure 8).

The storage area for boats had expanded along much of entire shoreline around the Basin by 1979, presumably dry docks (Figure 9). By 1985 (Figure 10), the wharf located in the Basin directly east of the former power plant had been removed and was replaced by additional boat berths.

CURRENT LAND USES

The northwestern margins of Clinton Basin are currently used for storage and maintenance of boats; the eastern margins of Clinton Basin consist of rip-rapped slopes (Figure 11). A café is operated in building H-113. The southwestern portion of the study area is used for storage of shipping containers. Berthing facilities for small boats are located within Clinton Basin. The remainder of the site is vacant.

COMPILATION OF SOIL, GROUNDWATER, AND SEDIMENT QUALITY DATA

Investigation in the study area has occurred in numerous phases since 1990. Since then, approximately 250 soil samples, 20 sediment samples, and groundwater samples from nine wells have been collected for analysis. The original data were documented in the following reports prepared by BASELINE:

- Preliminary Remedial Investigation, Seabreeze Yacht Center, Inc., 280 Sixth Avenue, Oakland, California, November 1990. (Preliminary)
- Phase II Remedial Investigation, Seabreeze Yacht Center, Inc., Oakland, California, March 1992. (Phase II)
- Phase III Remedial Investigation, Seabreeze Yacht Center, Inc., Oakland, California, September 1994. (Phase III)
- Subsurface Investigation, Interim Data Report, Seabreeze Yacht Center, Oakland, California, December 1994. (Interim)
- Subsurface Investigation, Second Interim Data Report, Seabreeze Yacht Center, Oakland, California, April 1995. (2nd Interim)
- Third Interim Report, Additional Subsurface Investigation, Seabreeze Yacht Center, Oakland, October 1995. (3rd Interim)
- Analytical Results for Soil Sampling, 4 October 1995, at Seabreeze Site, Oakland, 16 October 1995. (10/95 Data Report)
- Concrete Containment Structure Removal and Remediation Oversight, Seabreeze Yacht Center, Inc., 280 Sixth Avenue, Oakland, California, January 1997. (CC Removal)
- Quarterly and Annual Groundwater Monitoring Reports dated 19 August 1996, 18 October 1996, 22 January 1997, 14 May 1997, 29 July 1997, 25 February 1998, and January 1999. (Q-rpts)

SOIL QUALITY

Tables 2 through 7 summarize the analytical results of all soil samples collected at the site, except for those samples that have been removed as part of past remediation activities. Soil sampling locations are shown on Figures 12, 13, and 14.

GROUNDWATER QUALITY

Groundwater samples have been collected from nine wells installed at the site since 1991; these results are summarized in Tables 8 and 9. Well locations are shown on Figure 15.

NEAR-SURFACE SOIL QUALITY

Approximately 134 soil samples have been collected from the top two feet of soil. Chemical quality data for these samples are summarized in Tables 10 and 11 and the locations are shown on Figure 16.

SEDIMENT QUALITY

In response to the 3 March 1999 County request to demarcate the high tide on the site, BASELINE staked the limits of the high tide along the western and northern shore of the site on 16 March 1999. The stake locations were surveyed by Bates and Bailey surveyors. The surveyed high tide line is shown in Figures 12 through 17. The corresponding high tide height on that date was a 6.0 feet at the Golden Gate.

Sediment samples were collected at six locations around the edge of Clinton Basin and underneath the former concrete containment after removal (Figure 17). Chemical quality for these samples is summarized in Tables 12 through 14.

BUNKER C TOXICITY

The purpose of this section is to discuss the nature and composition of diesel fuel and Bunker C fuel oils, provide available bioassay data on the toxicity of these products to marine aquatic organisms, and qualitatively compare the relative aquatic toxicity of Bunker C to diesel fuels.

NATURE AND COMPOSITION OF DIESEL AND BUNKER C FUEL OILS

Diesel Fuels

Diesel fuels are products prepared for use in diesel engines for a variety of vehicles. Diesel products are from the middle distillate range and are variously referred to as diesel fuel or "oil" in recognition of the heavier hydrocarbon composition compared to gasoline. Distillate fuel oils may generally be of the boiling point range of 150 to 400 degrees Celsius, with the carbon range C9/C10 to C16/C20.

Millner, et al. (1992) describes diesel fuel No.1 as a straight run distillate in the boiling point range of 150 to 400 degrees Celsius, with a carbon range of C9 to C16. Diesel No. 2 is described as a blend of straight run and various other middle distillate runs, with a nominal boiling point range of 160 to 360 degrees Celsius, and a carbon range of C11 to C20.

Given the boiling point range, very low concentrations of light aromatic hydrocarbons (e.g., benzene) are expected in diesel fuels (Millner, et al., 1992). Additionally, the boiling point range of diesel fuels is below the boiling points of most of the 3-ring and larger polycyclic aromatic hydrocarbons (PAHs); therefore, PAHs in diesel are largely of the naphthalene class. Metals, including chromium, iron, lead, manganese, zinc, cadmium, molybdenum, and vanadium have also been encountered at residual levels in analysis of diesel fuels. The source for these metals include additives that act as ignition facilitators, combustion catalysts, antioxidants, flow improvers, metal complexing agents, detergents, and demulsifiers. Ignition improvers include alkyl nitrates and nitrites, as well as nitro and nitroso compounds and peroxides. Combustion catalysts include organo-metallic compounds of barium, calcium, manganese, and iron, in addition to oxides of manganese, magnesium, and aluminum.

Bunker C Fuel Oils

Hydrocarbon mixtures used for heating fuels include hydrocarbon mixtures comparable to diesel fuels and those materials remaining after the last distillate fraction have been taken from crude oil (boiling points greater than 550 degrees Celsius). Accordingly, fuel oils (particularly heavy fuel oils) are comprised primarily of the remains of crude oil and are called residuum (or residuals). The residuum can be catalytically cracked to generate a new distillate feedstock, used in asphalt production, or otherwise mixed with the other less viscous hydrocarbons to provide a more flowable hydrocarbon for use as a fuel in appropriately designed furnaces or ship boilers.

ASTM (1992) has specifications for seven grades of fuel oil. Grades 1 and 2 are lighter fuel oils representing distillate fuels for use in domestic and small industrial burners. Hydrocarbons in light fuel oils 1 and 2 typically fall in the C10 to C20 range; the specific boiling point criteria for these

grades (150 to 400 degrees C) are the same for diesel fuel grades 1 and 2, respectively, differing only in specifications such as density and viscosity.

Heavy fuel oils include Nos. 4, 5, and 6 and are composed of hydrocarbons ranging from about C19 to C25. Heavy fuel oils have a boiling range of 350 to greater than 550 degrees Celsius. There are two grades of fuel oil No. 4 (with one described as a lighter fraction), both representing heavy distillates or distillate/residual blends used in commercial/industrial burners designed to handle the higher viscosity mixtures. Fuel oil Grade 5 (Light), Grade 5 (Heavy), and Grade 6 are residual fuels of increasing viscosity. Grade 6 is also known as "Bunker Fuel" or "Bunker "C," a gummy black product used in heavy industrial applications where high temperatures are available to fluidize the oil; its density and viscosity are greater than those of water. Grade Nos. 4 and 5 are commonly produced by blending Bunker C fuel oil with lighter distillates.

Based on their higher boiling range, Bunker C and heavy fuel oils typically contain significantly lower levels of monocyclic and (lower than 3-ring) polycyclic aromatics than lighter fuel oils and diesel fuels (Anderson et. al, 1974; and Montgomery Watson,1996). As a result of the distillation process, aromatic hydrocarbons in heavy fuel oils are dominated by heavier alkylated phenanthrenes, while aromatic hydrocarbons in diesel fuel oils are dominated by lighter naphthalenes (ASTM, 1995; Montgomery Watson, 1996). Polar compounds containing nitrogen, sulfur, and oxygen may comprise as much as 30 percent of heavy fuel oil composition.

As heavy residual oils are the remains of crude oil and metals are generally not volatile, Bunker C may contain reasonable amounts of metals at concentrations greater than those contained in diesel fuels. Levels of nickel and vanadium, in particular, are reasonable given that these metals are incorporated as complexes with the natural porphyrins in biogenic material that constitutes the crude oil; such metals would remain in the residuum after distillation.

Ecotoxicity of Diesel and Bunker C Fuel Oil

An extensive literature search[1] was conducted to identify aquatic bioassay sampling results for marine aquatic organisms exposed to Bunker C and diesel fuel. Substantially more bioassay analyses for marine aquatic receptors have been conducted for diesel than for Bunker C. In the absence of sufficient bioassay analyses for Bunker C, the literature search included compilation of bioassay results for crude oil; as previously indicated, Bunker C is comprised of the remains of crude oil and is accordingly used for comparison of aquatic toxicity with respect to diesel fuels.

The following bioassay tests were performed:

- Purple sea urchin (*Strongylocentrotus purpuratus*) embryo bioassay test to measure abnormal development over a 72-hour period. The fertilized echinoderm eggs were monitored to determine the rate of abnormal development, a measure of toxicity.

[1] MEC, 1997; Seur, 1997, 1999; National Oceanic and Atmospheric Administration (NOAA) 1979, as cited by Mims, 1997; Anderson et al., 1974; PRC, 1997a, b,c; AFA Construction, 1997; Burns & McDonnell, 1997.

- Blue mussel (*Mytilus edulis*) embryo-larval development to measure mortality and normal shell development over a 48-hour period. The fertilized bivalve eggs were monitored to determine the rate of mortality and abnormal shell development.
- Mysid shrimp (*Mysidopsis bahia*) bioassay testing to measure survival, growth and fecundity over a seven day period.
- Other species were tested by NOAA for sensitivity including mollusks, echinoderms, annelids, nemerteans, and fish.[2]

Results

Results of the bioassay testing from the most sensitive species at each site/source are provided in Table 15. In examining these data, larger concentrations indicate that the test material is less toxic to the test organism (so a larger concentration is tolerated by the specific organism). Smaller concentrations for the same test would be more toxic.

Data on mysid shrimp fecundity, growth, and survival for Point Molate, where diesel and diesel/bunker in groundwater were used in the bioassays, are shown in Table 15 and Figures B-1 through B-3 (Mims, 1997). In examining the plots in the figures, the larger peaks (larger concentration tolerated) indicate the test material is less toxic to the test organism; smaller peaks (lower concentration tolerated) would be considered relatively more toxic.

The results of bioassays performed for crude oil versus diesel fuel No. 2 by the National Ocean and Atmospheric Administration (NOAA, 1979) as discussed during a presentation by Ms. Diane Mims, SFRWQCB (Mims, 1997), are included in Figures B-4 to B-6. Larger peaks indicate the test material is less toxic to the aquatic organism, while smaller peaks indicate it is relatively more toxic.

Comparison and Discussion of Bioassay Results

A qualitative comparison of Bunker C/crude oil and diesel toxicity to marine aquatic receptors, based on the bioassay data, is provided. Limited comparisons can be drawn by the bioassay data presented in Table 15, because none of the studies directly tested Bunker C without diesel, because of the limited number of studies conducted using the same species, and because of different media tested in the bioassays.

However, based on the results, diesel/Bunker C may be considered less toxic than diesel alone for mysid shrimp growth, fecundity and survival for groundwater samples collected at Pt. Molate and Hunter's Point (Figures B-1 through B-3 and Table 15). The opposite was true for blue mussel larval development (Table 15). However, mysid shrimp are generally considered to be a more sensitive ecological receptor than bivalves, supporting the position that diesel/Bunker C is less toxic than diesel for sensitive marine receptors.

In the study conducted by NOAA (1979, as cited by Mims, 1997), diesel No. 2 fuel was more toxic to the marine aquatic species tested than crude oil (used here as a representative for Bunker C)

[2] The bioassay test procedure for sensitivity is unknown.

(Figures B-4 through B-6). Marine organisms may accordingly be expected to have less demonstrated toxicity to Bunker C fuel oil than diesel No. 2 fuel.

These limited data therefore suggest that Bunker C is less toxic than diesel for marine aquatic receptors in San Francisco Bay.

TUNNEL REMEDIATION WORK PLAN

An intake tunnel was used to pump salt water from the Inner Harbor to provide cooling water for the steam condensers of the former power plant (Figure 2). Used cooling water was then discharged to Clinton Basin through a separate discharge tunnel. In 1995, a subsurface investigation was performed by BASELINE to determine whether the tunnels were removed during power plant demolition activities; the investigation exposed the top of the intake and discharge tunnels, indicating that the tunnels were still present (BASELINE, 1995).

The intake tunnel is generally parallel with Fifth Avenue, extending from the northern boundary of the power plant concrete foundation toward the southwest shoreline of the site. The intake tunnel spans approximately 710 feet, with about 160 feet within the concrete foundation (Figure 2) (PG&E, undated a). A manway to the intake tunnel was exposed about 160 feet south of the concrete foundation during the 1995 subsurface investigation (BASELINE, 1995); the manway was approximately two feet below ground surface (bgs). Records indicate that a hatchway to the intake tunnel is located within the concrete foundation; the concrete foundation has been identified at approximately two inches bgs during past investigations.

The discharge tunnel extends from the southern boundary of the power plant concrete foundation to near the northwestern shoreline at the site, in the vicinity of the existing wharf. The discharge tunnel is about 410 feet long; of this length, about 160 feet is within the concrete foundation (parallel with the intake tunnel portion within the foundation). The tunnel bends 90 degrees at the northern boundary of the concrete foundation and then continues to the wharf. A hatchway, believed to be connected to the discharge tunnel, was exposed during the 1995 subsurface investigation; the top of the hatchway was encountered at two inches bgs. Beneath the hatchway was approximately four feet of soil, which was underlain by a plywood board.

Both the intake and discharge tunnels located outside the concrete foundation appear to be about three feet wide (internal width) and about six feet high; a horizontal concrete barrier may be present inside the tunnels at about three feet above the tunnel bottom (PG&E, undated b). The portions of the intake and discharge tunnels within the foundation appear to be 4.5 feet wide and 10.5 feet high. Records indicate that the intake and discharge tunnels may have been joined together at some point within the concrete foundation (PG&E, undated b).

The tunnel remediation approach is separated into two phases. In Phase One, existing conditions of the tunnels would be determined. This information would be used to prepare a detailed work plan for Phase Two. Phase Two would consist of implementation of the work plan following approval by the County.

PHASE ONE: DETERMINATION OF THE CONDITION OF INTAKE AND DISCHARGE TUNNELS

Information regarding the condition of the intake and discharge tunnels would be collected using a video camera and a hydrosystem locator unit (video and locator unit). The video and locator unit

would identify: 1) the presence of cracks, water, settled solids, and product throughout the tunnels;[3] 2) tunnel endpoint locations; 3) tunnel dimensions (i.e., height, depth to tunnel top and bottom); and 4) presence of horizontal barrier within the tunnels. The hydrosystem locator would travel along the tunnel interior using a water jetting mechanism.

During Phase One field activities, the existing hatchways and manway would be exposed and opened to access the intake and discharge tunnels. The video and locator unit would be lowered into the tunnels from these access points and would then travel along the length of the tunnels. The video camera would determine the presence of any horizontal barrier as it is lowered into the intake tunnel manway. If present, the barrier would be punctured to access the bottom intake tunnel segment.[4] The video and locator unit would then travel along the bottom and top segments of the tunnels to determine the tunnel conditions.

Soils generated during the manway and hatchway excavations would be stockpiled at the site. No groundwater is expected in the excavations since the manway and hatchways are above groundwater. The stockpile would be placed on top of, and covered with, visquene. Concrete generated from barrier puncturing activities would also be stockpiled at the site; we assume that less than one cubic yard of concrete would be generated. Soil characterization would be performed to dispose the stockpile accordingly.

The hatchways and manway excavation areas would be temporarily covered with trench plates to allow access during Phase Two activities. Barricades and warning tape would be placed around the excavation areas for safety purposes.

A report would be prepared to document field activities, observations, waste management, and discuss tunnel conditions determined from Phase One activities. The report would provide a detailed work plan for remediation of the tunnels based on the information collected during Phase One. The report would be submitted to the County.

PHASE TWO: TUNNEL REMEDIATION AND SEALING IMPLEMENTATION

The specific remediation approach has not been determined at this time, and would depend on the findings of the Phase One activities. However, the general approach discussed below may be applied.

Existing drawings indicate that the tunnel ends may extend beyond the shoreline and terminate within the estuary/basin. In addition, drawings show that the water level in Clinton Basin and the Inner Harbor may be higher than the top of the tunnels, except possibly during low low tide. Therefore, the tunnel shoreline ends may require sealing if settled solids were to be removed to

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[3] Cracks present below the water level in the tunnel would only be identified.

[4] It is assumed that the discharge tunnel is of similar construction since the hatchways (access points to the discharge tunnel) are located at the former power plant concrete foundation, where the horizontal barrier is not present in the tunnels.

prevent tidal water from entering the tunnels and to prevent discharge of potential contamination into the estuary/basin.

If the tunnels were to be sealed, a concrete seal could be pored near the shoreline ends of the tunnels. Water, settled solids, and free product that may be contained inside the tunnels could then be removed using a hydrovacuum system. The tunnel tops may need to be punctured at specific locations along each tunnel to create access for the hydrovacuum system. Pressurized water may be injected into the tunnels via the pump hoses to loosen settled solids; alternatively, water contained in the tunnels may be agitated with a hydrovacuum unit to loosen settled solids at the bottom. In either case, solids-containing water could then be pumped out of the tunnels using the vacuum pumps. Fresh water could then be circulated through the tunnels for a final rinse.

Generated water, product, and solids could be contained in vacuum trucks; the solids could then be separated from the water and product mixture (by settling), and transferred into a separate storage container. These wastes would be disposed off-site following adequate characterization. Dewatering would be necessary during construction of the seal and during excavation of the tunnel access points. Dewatered water could be pumped into storage tanks at the site and either discharged to a nearby East Bay Municipal Utilities District sanitary sewer under an approved permit or to an off-site disposal facility.

After tunnel cleaning, the access points would be sealed and the excavations backfilled with clean imported material. Soils generated during construction of the tunnel seals and excavation activities would be stockpiled at the site, characterized, and disposed of off-site. Concrete generated from tunnel puncturing activities could be recycled.

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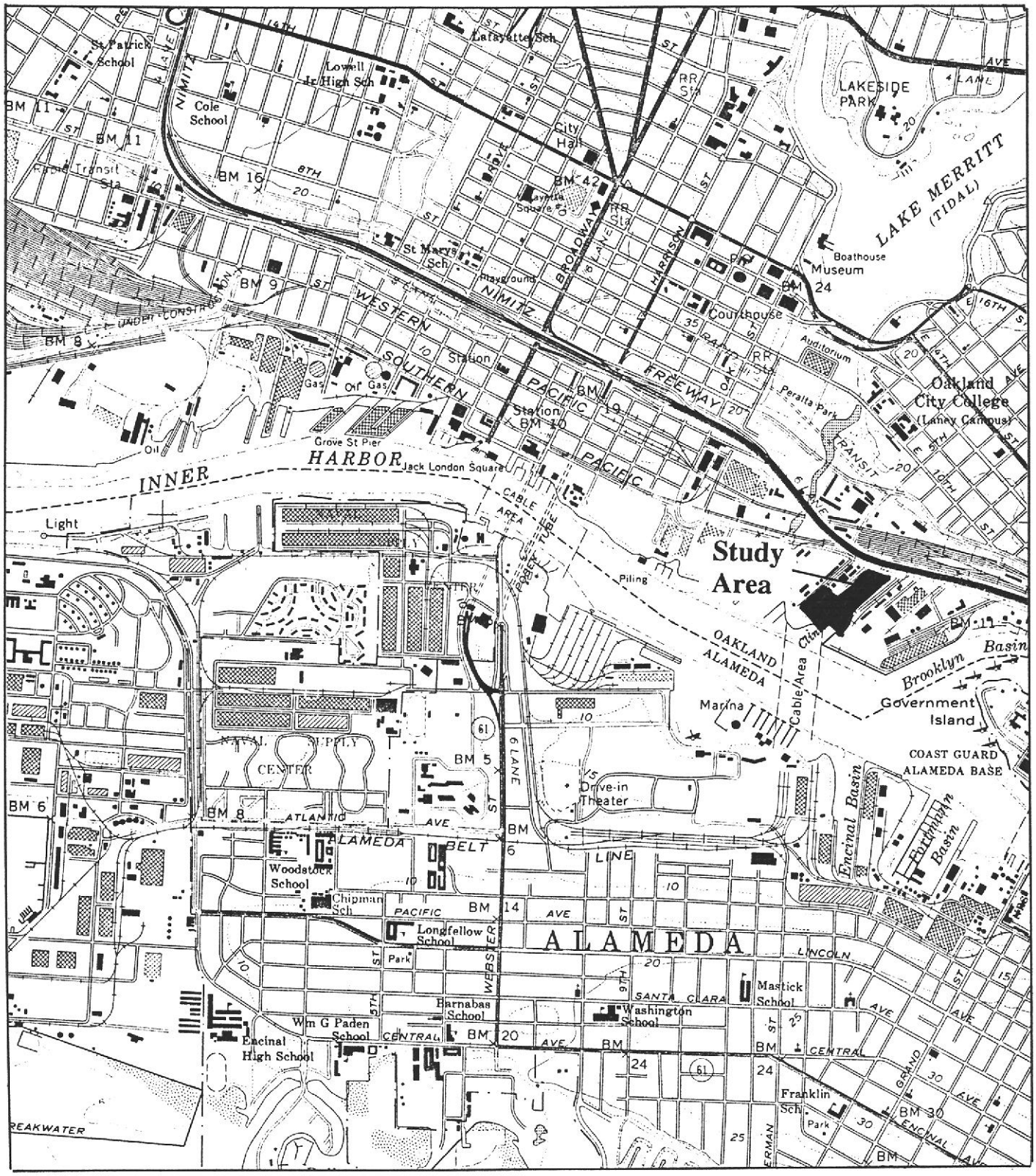
REGIONAL LOCATION

Figure 1



0 2000 Feet

Seabreeze Yacht Center Study Area
Oakland, California

BASELINE

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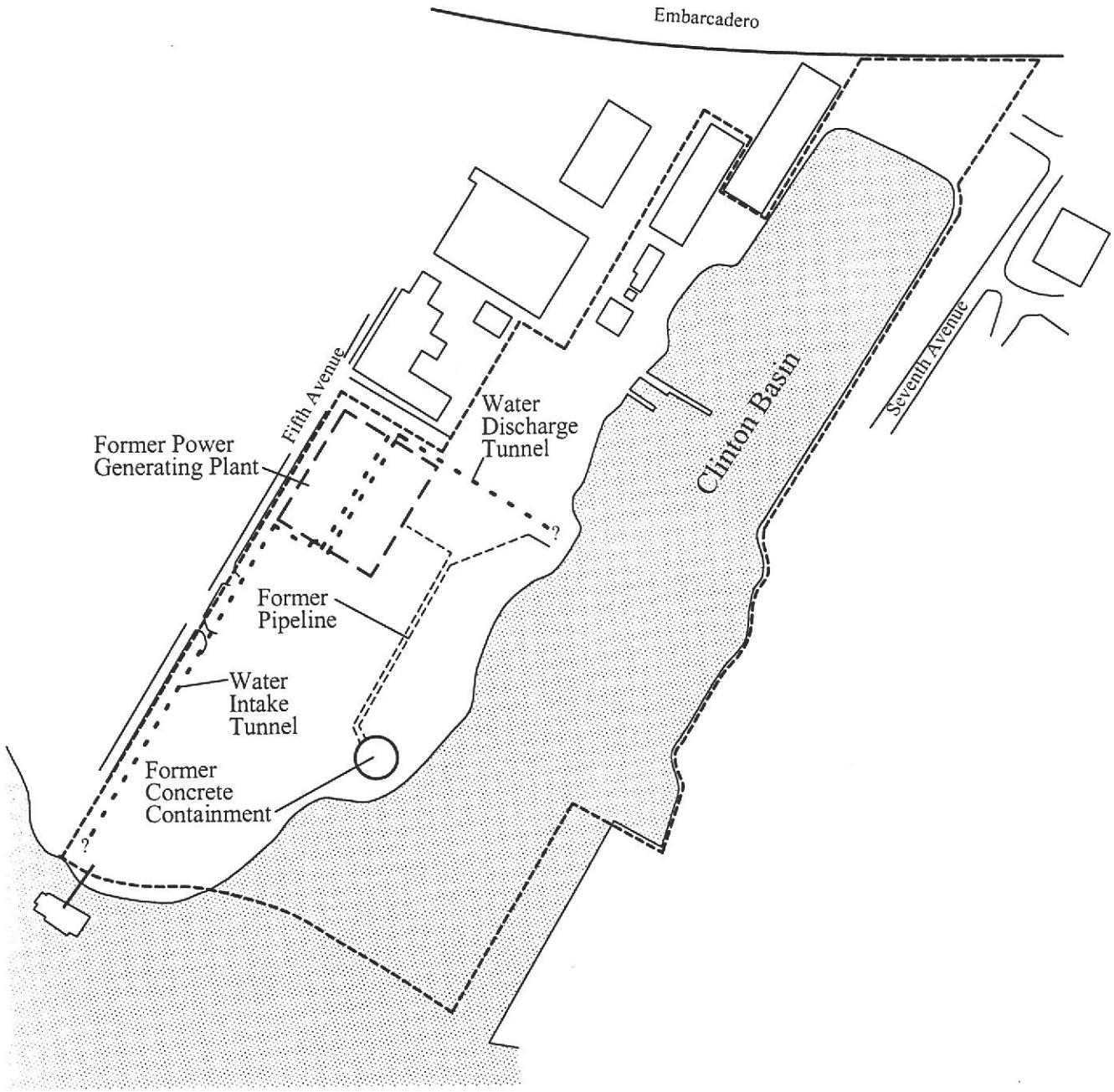
STUDY AREA

Figure 2



Legend

------ Seabreeze Yacht Center Study Area Boundary

Seabreeze Yacht Center Study Area
Oakland, California

0 200 Feet

BASELINE

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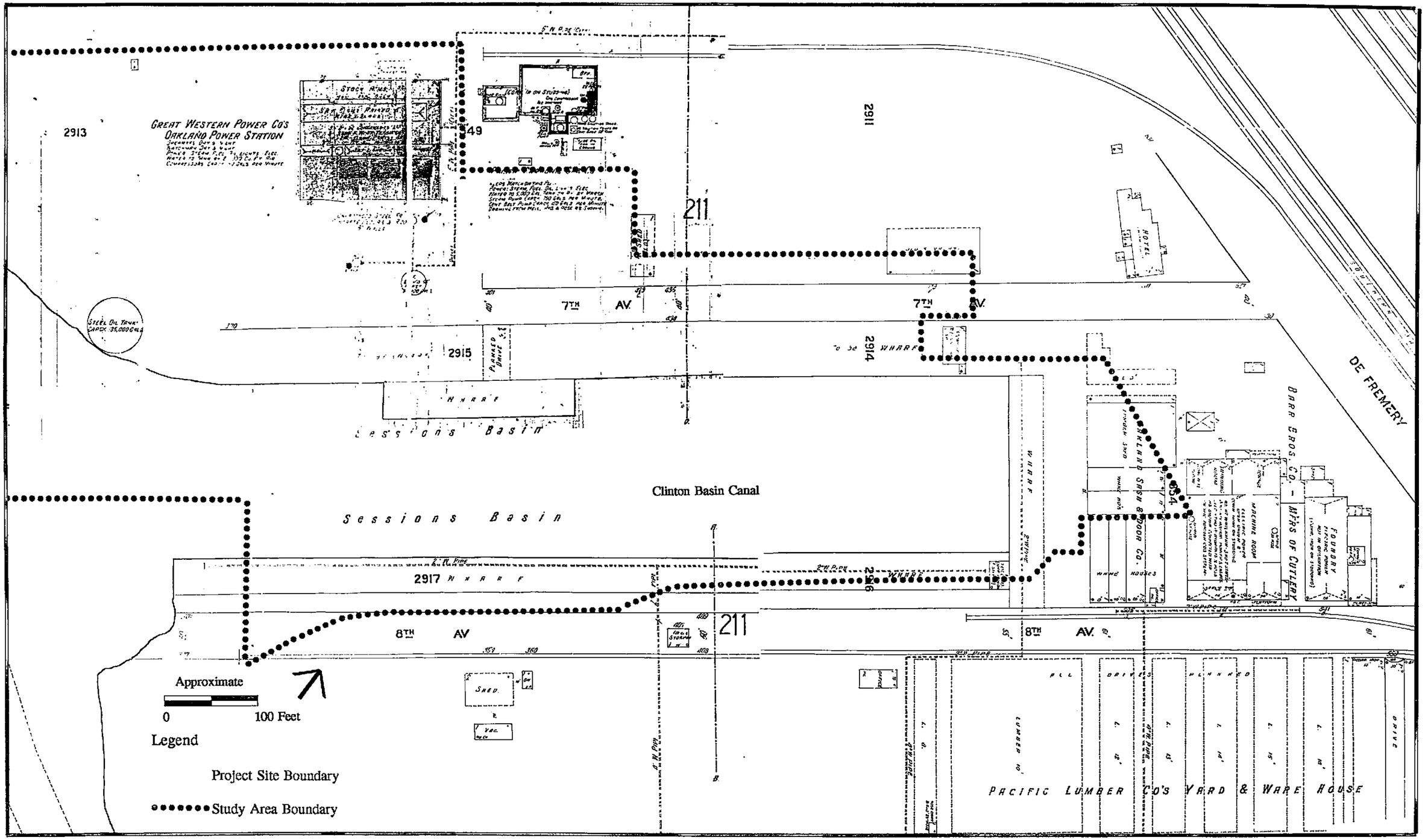
COMPOSITE SANBORN MAP - 1911

Figure 3



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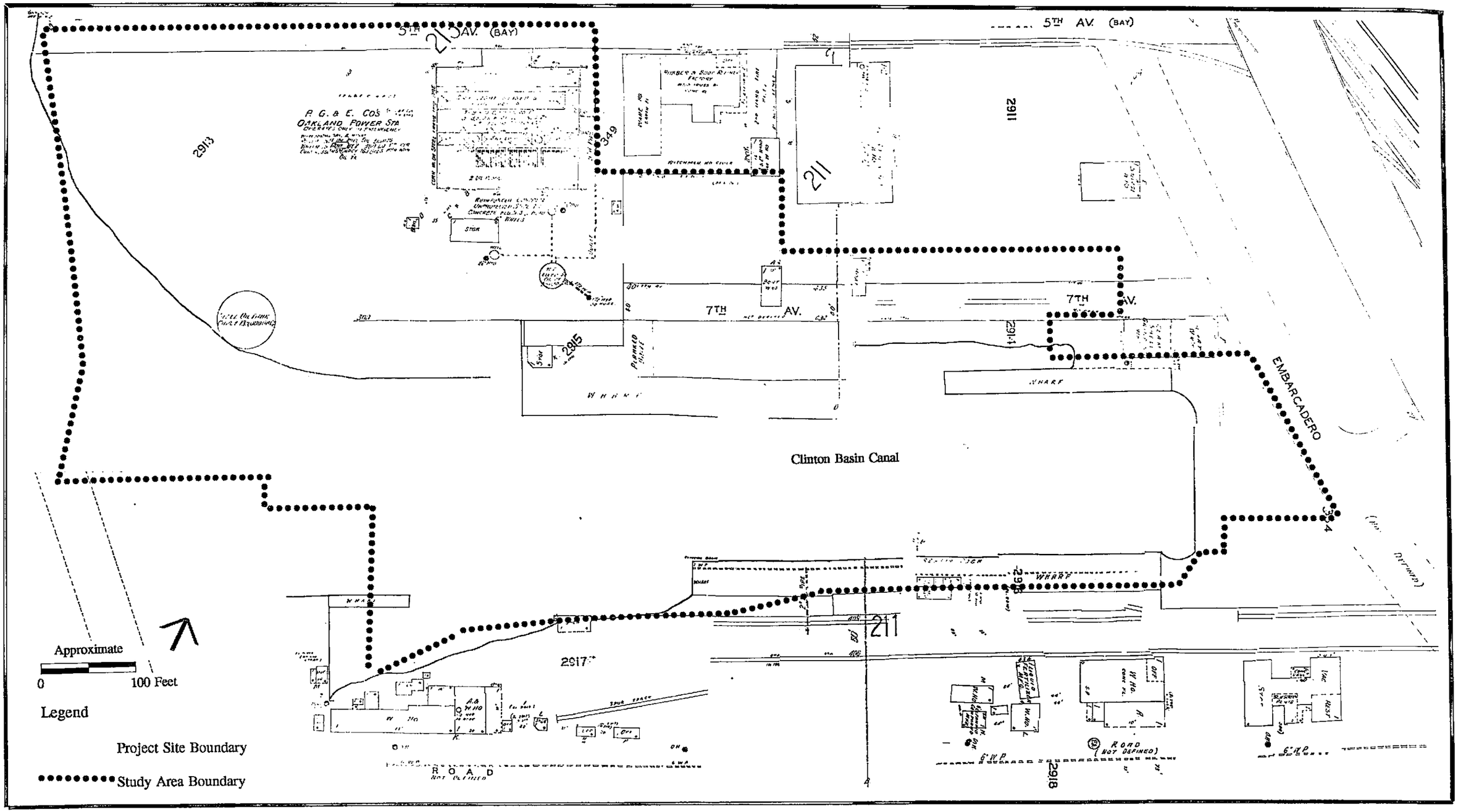
COMPOSITE SANBORN MAP - 1950

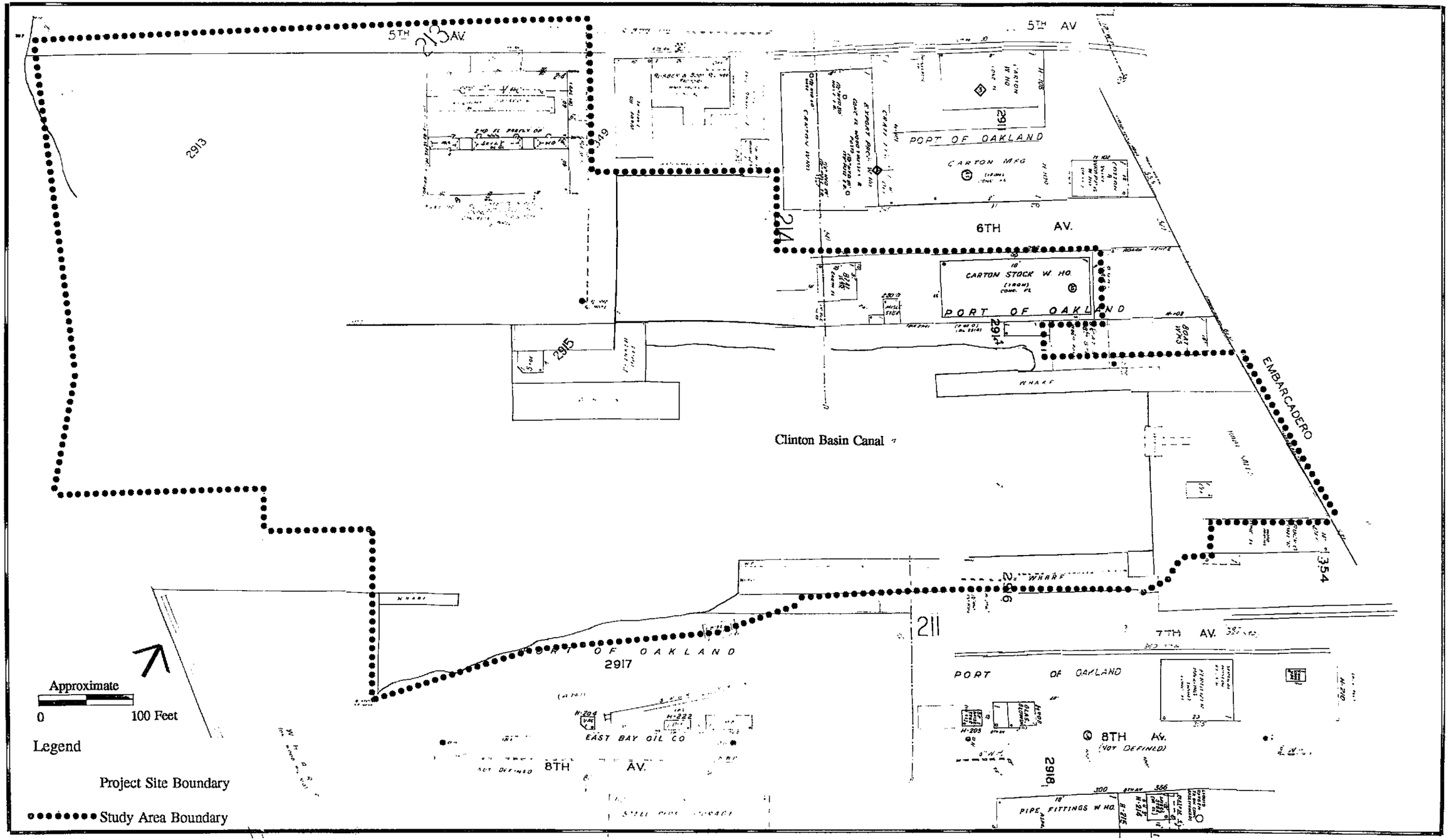
Figure 4



BASELINE

COMPOSITE SANBORN MAP - 1967

Figure 5

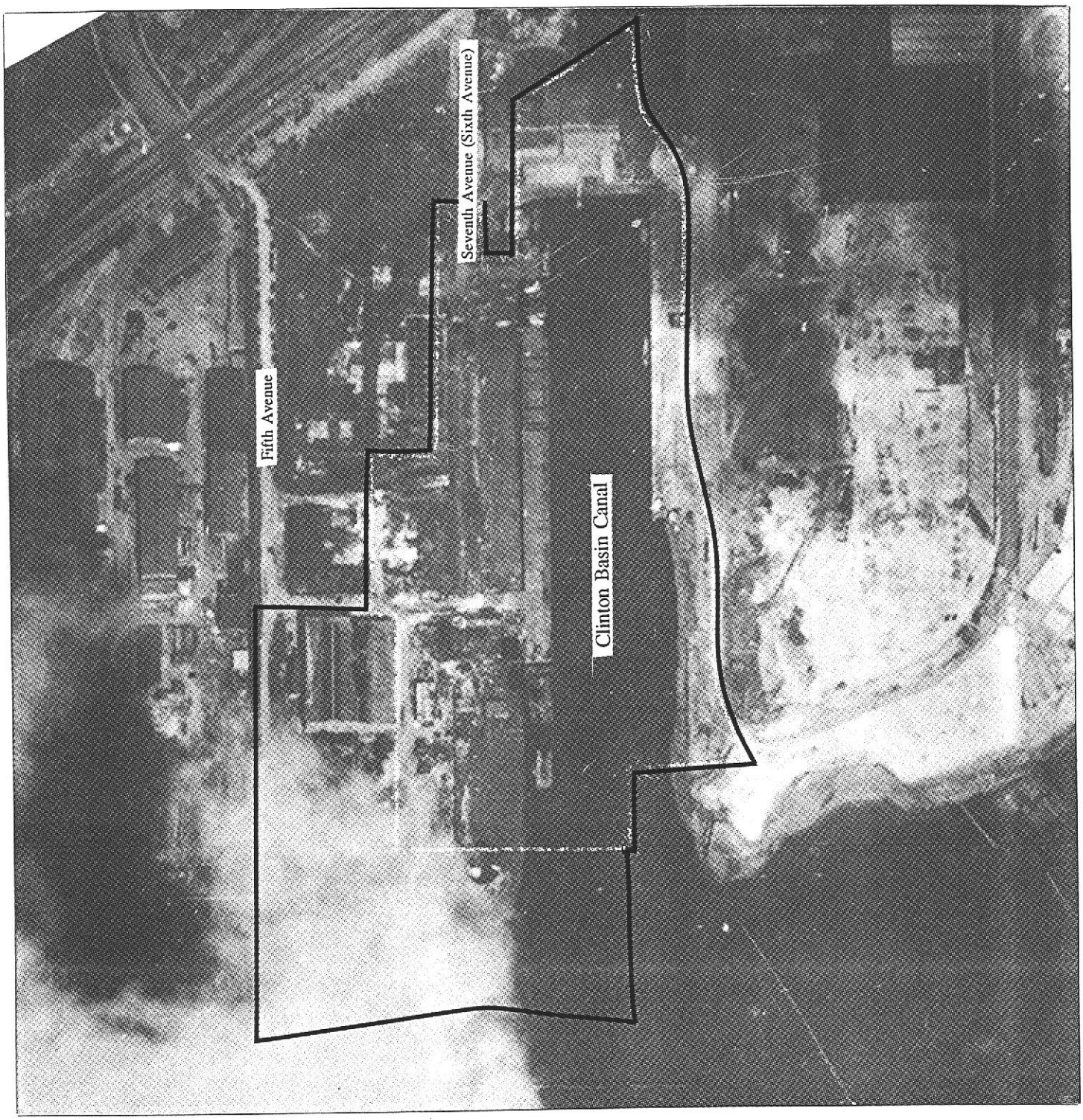


BASELINE

S9171-00.01 &.02 7/7/94

AERIAL PHOTOGRAPH - 1930

Figure 6



Legend

Approximate Study Area Boundary

Approximate

0 200 Feet

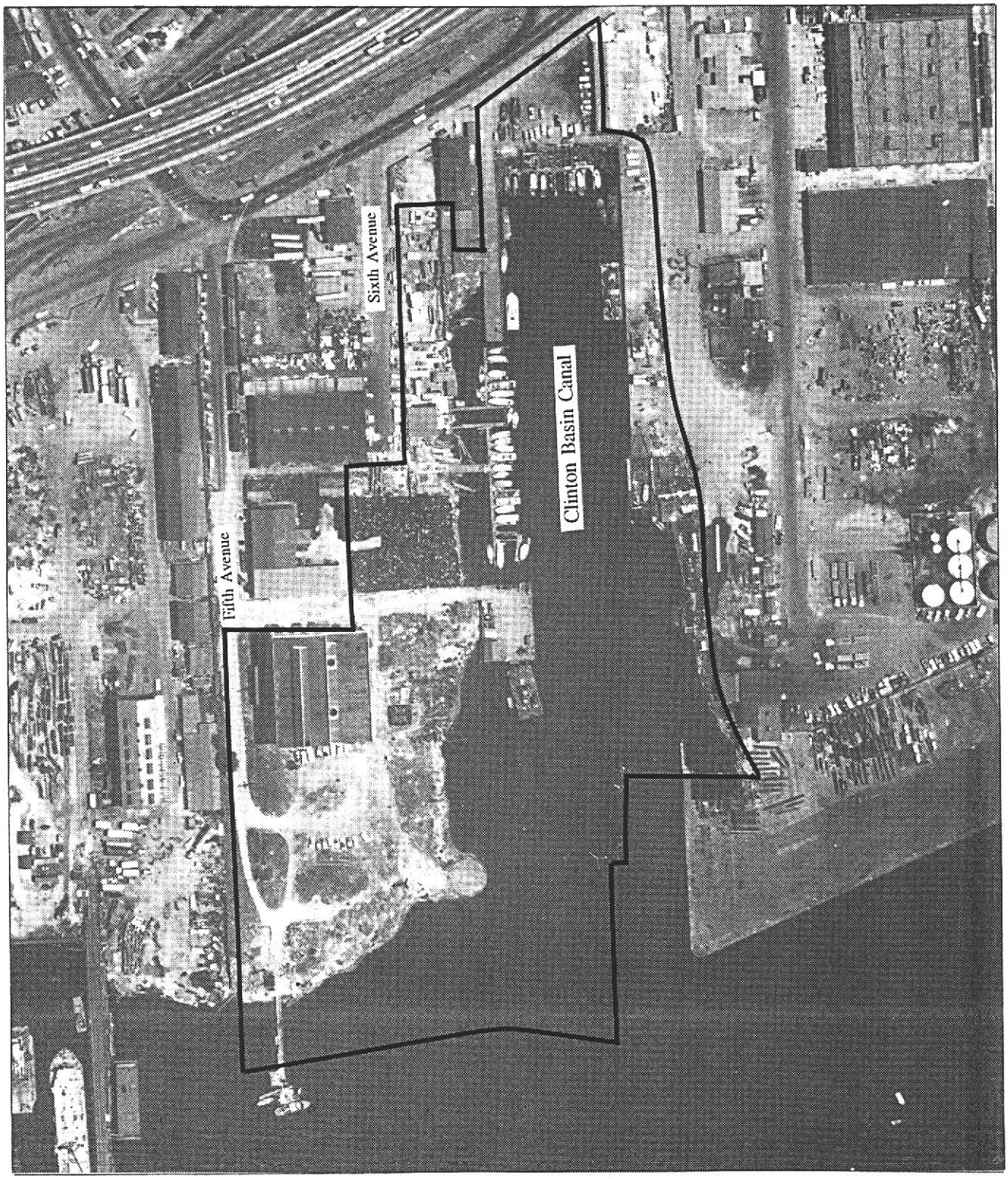
Seabreeze Yacht Center Study Area
Oakland, California

BASELINE

S9171AO 7/11/94

AERIAL PHOTOGRAPH - 1959

Figure 7



Legend

Approximate Study Area Boundary

Approximate

0 200 Feet

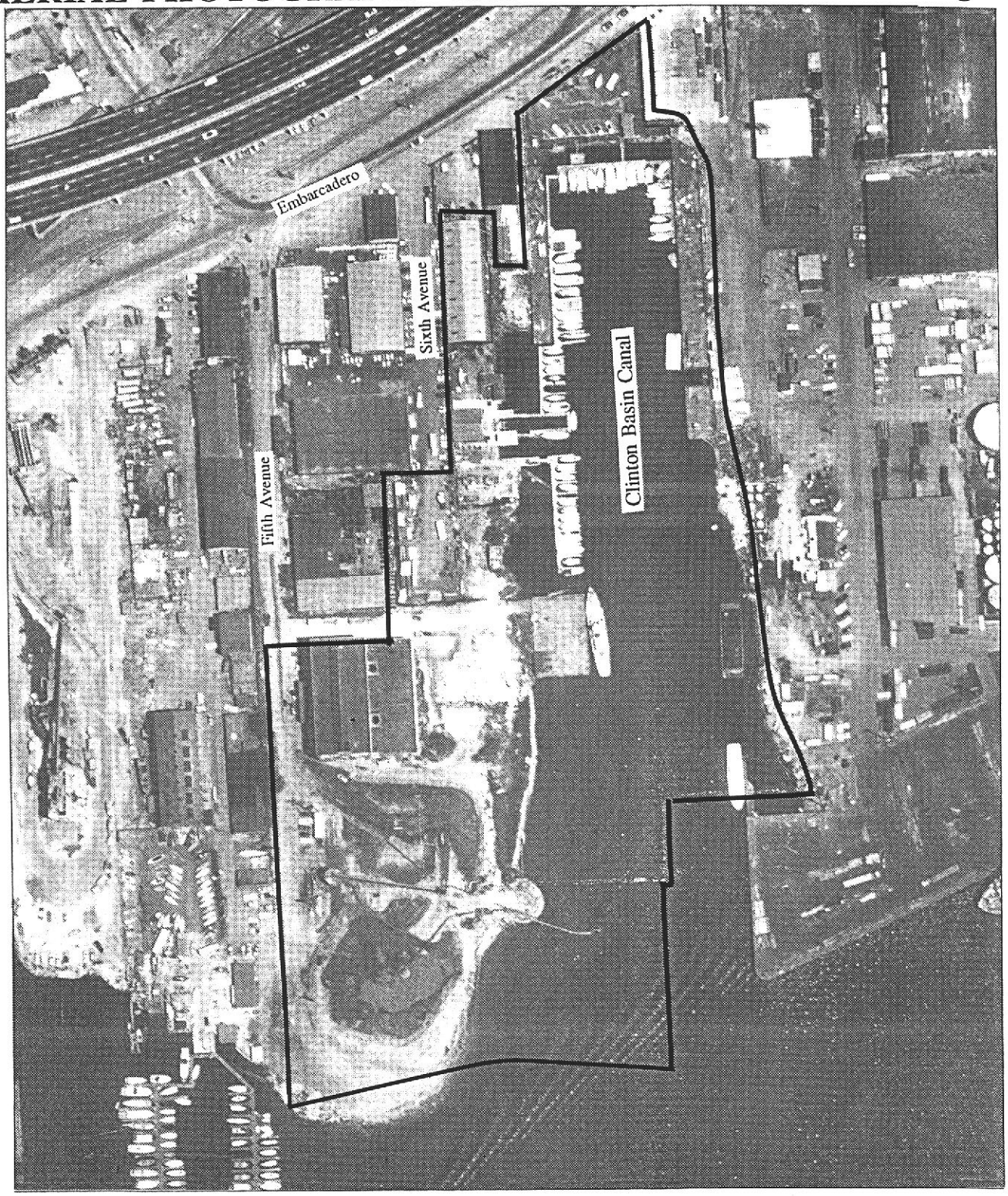
Seabreeze Yacht Center Study Area
Oakland, California

BASELINE

S9171AO 7/11/94

AERIAL PHOTOGRAPH - 1969

Figure 8



Legend

Approximate Study Area Boundary

Approximate

0 200 Feet

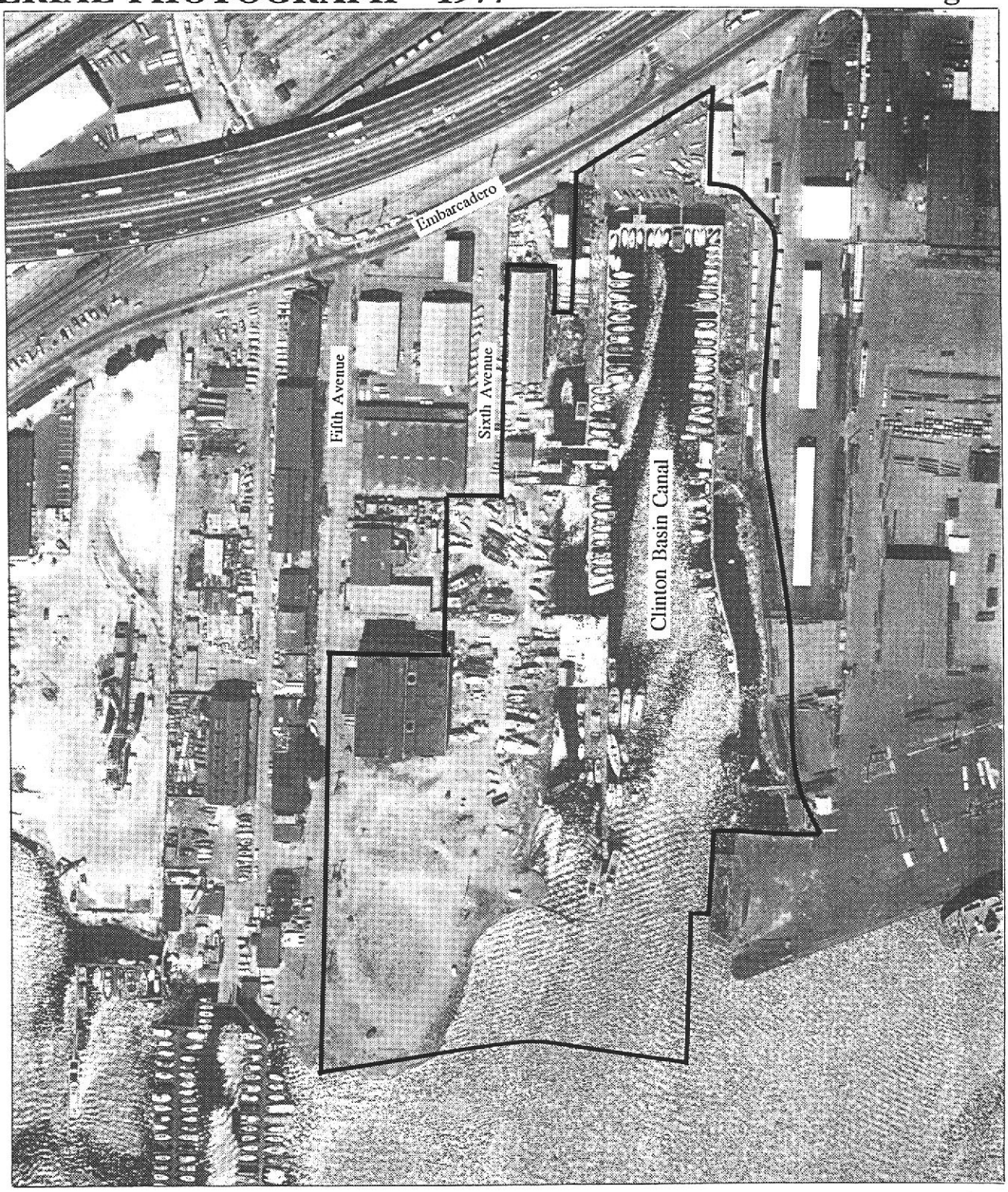
Seabreeze Yacht Center Study Area
Oakland, California

BASELINE

S9171AO 7/11/94

AERIAL PHOTOGRAPH - 1977

Figure 9



Legend

Approximate Study Area Boundary

Approximate

0 200 Feet

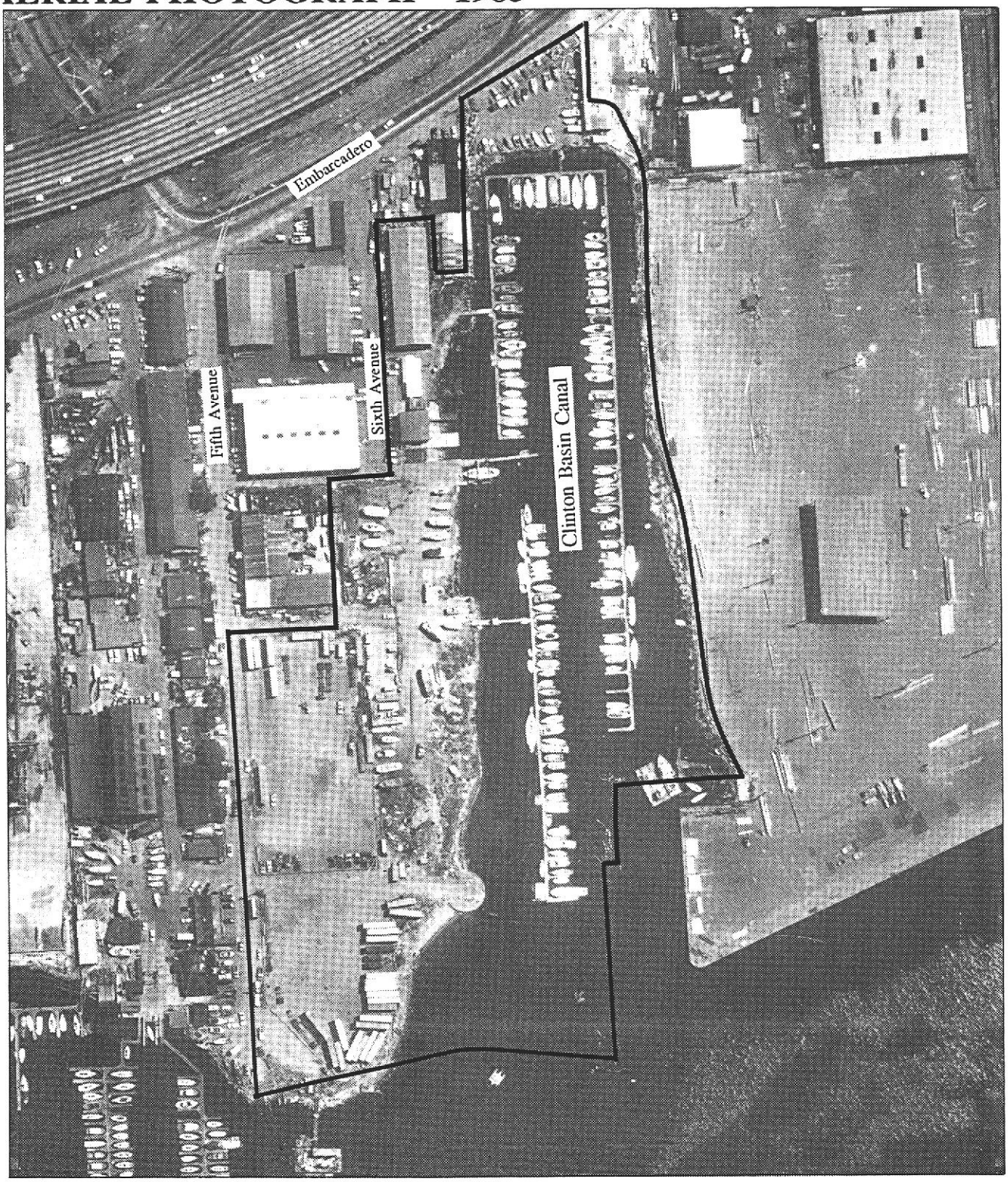
Seabreeze Yacht Center Study Area
Oakland, California

BASELINE

S9171AO 7/11/94

AERIAL PHOTOGRAPH - 1985

Figure 10



Legend

Approximate Study Area Boundary

Approximate

0 200 Feet

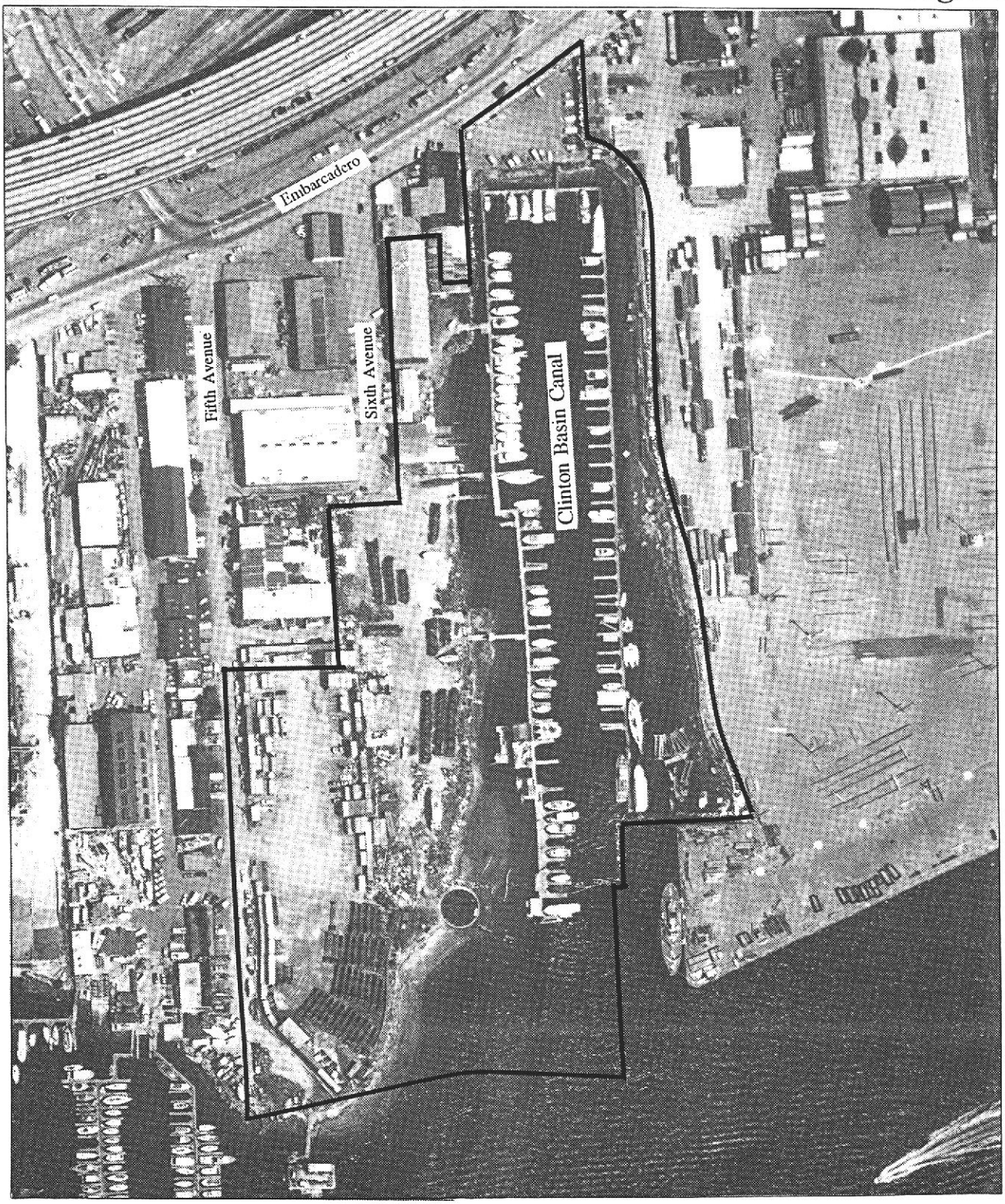
Seabreeze Yacht Center Study Area
Oakland, California

BASELINE

S9171AO 7/11/94

AERIAL PHOTOGRAPH - 1992

Figure 11



Legend

——— Approximate Study Area Boundary

Approximate

0 200 Feet

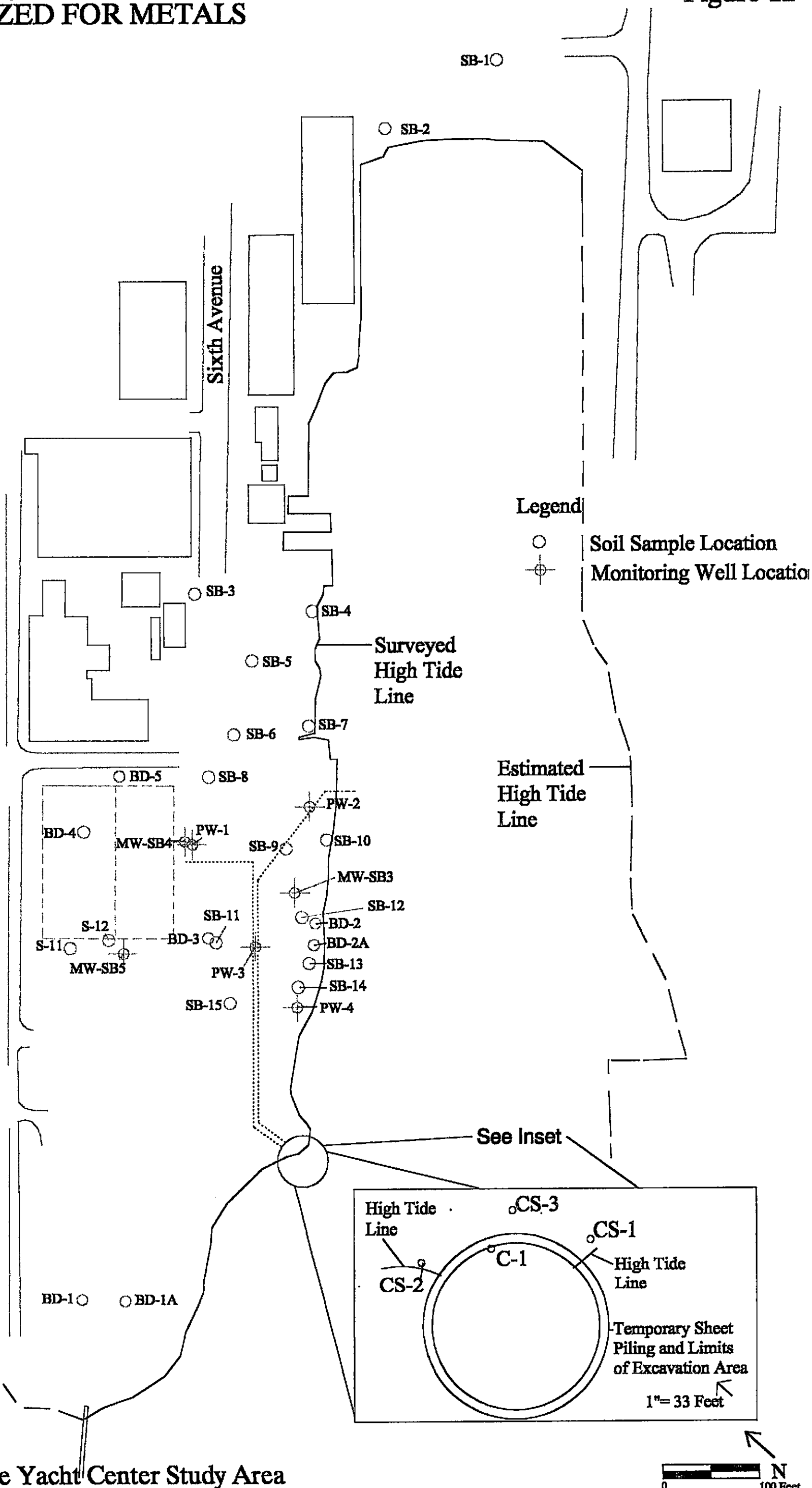
Seabreeze Yacht Center Study Area
Oakland, California

BASELINE

S9171AO 7/11/94

LOCATION OF SOIL SAMPLES ANALYZED FOR METALS

Figure 12



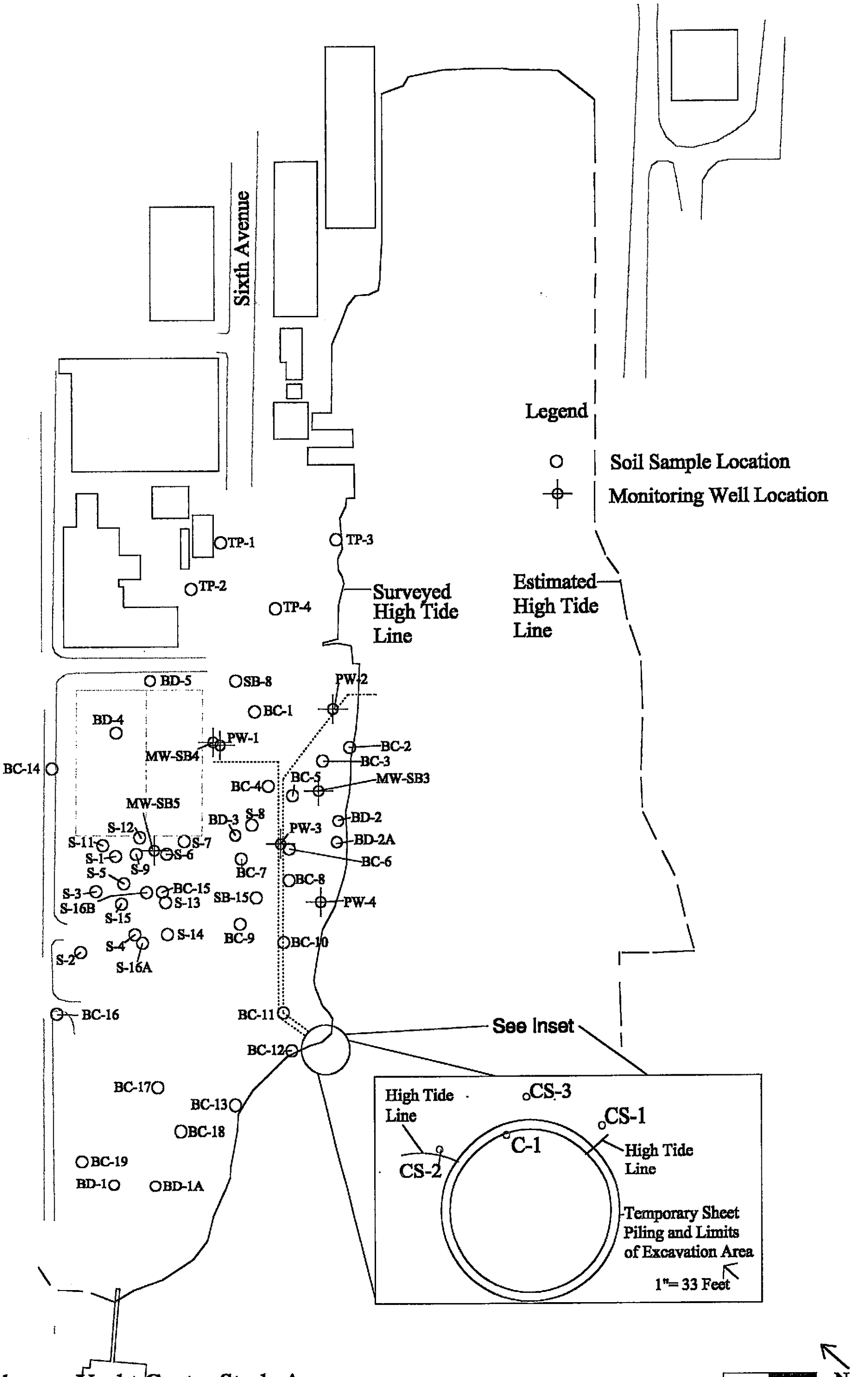
Seabreeze Yacht Center Study Area
Oakland, California

BASELINE

D:\GRAPHICS\Seabreeze\METAL LTcadd 4/5/99

LOCATION OF SOIL SAMPLE ANALYZED FOR PETROLEUM

Figure 13



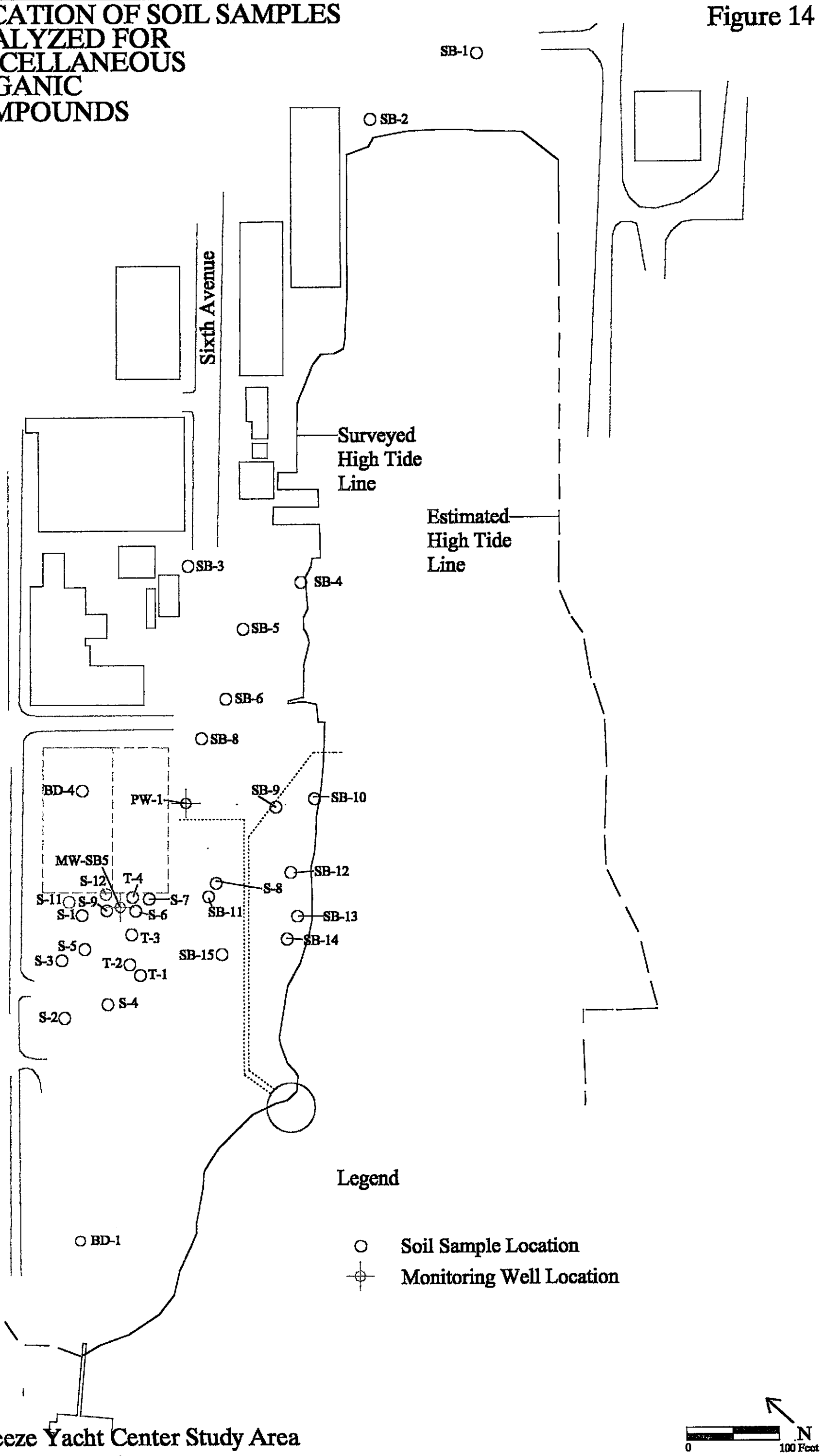
Seabreeze Yacht Center Study Area
Oakland, California

BASELINE

D:\GRAPHICS\Seabreeze\Petroluem. LTcadd 4/5/99

LOCATION OF SOIL SAMPLES ANALYZED FOR MISCELLANEOUS ORGANIC COMPOUNDS

Figure 14



Seabreeze Yacht Center Study Area
Oakland, California

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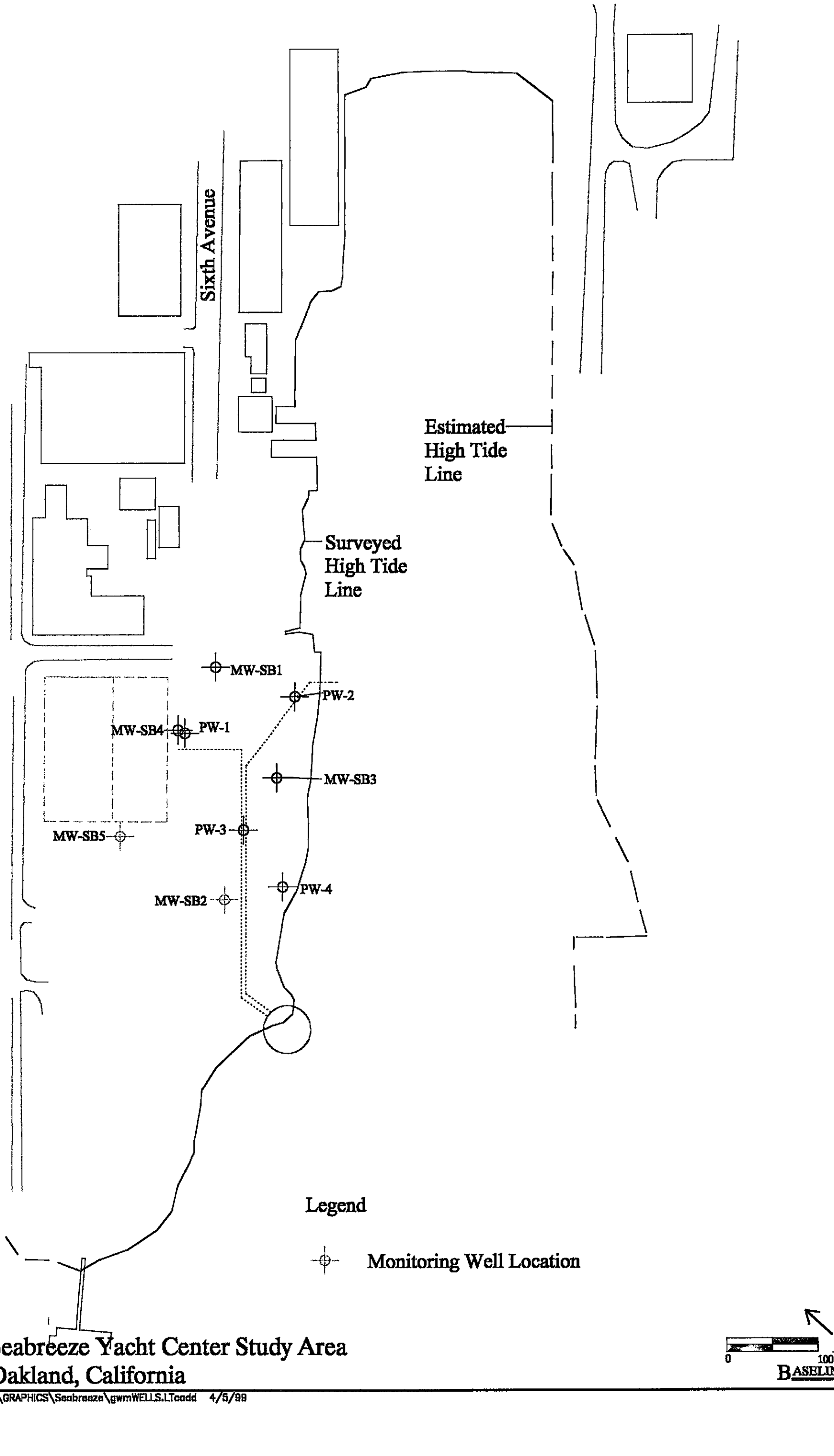
LOCATION OF GROUNDWATER MONITORING WELLS

Figure 15

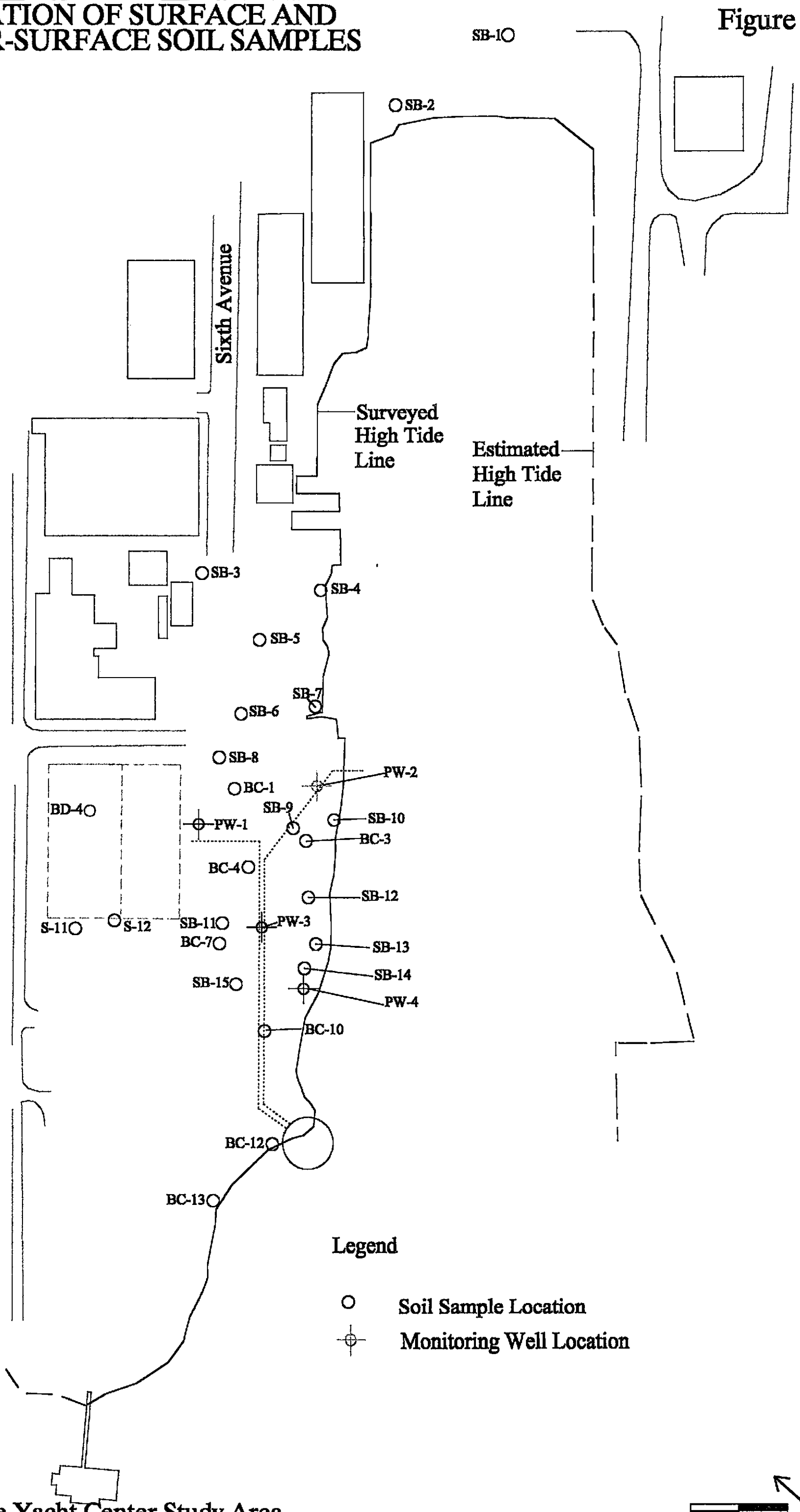


Seabreeze Yacht Center Study Area
Oakland, California

D:\GRAPHICS\Seabreeze\gwmWELLS.LTcadd 4/5/99

LOCATION OF SURFACE AND NEAR-SURFACE SOIL SAMPLES

Figure 16



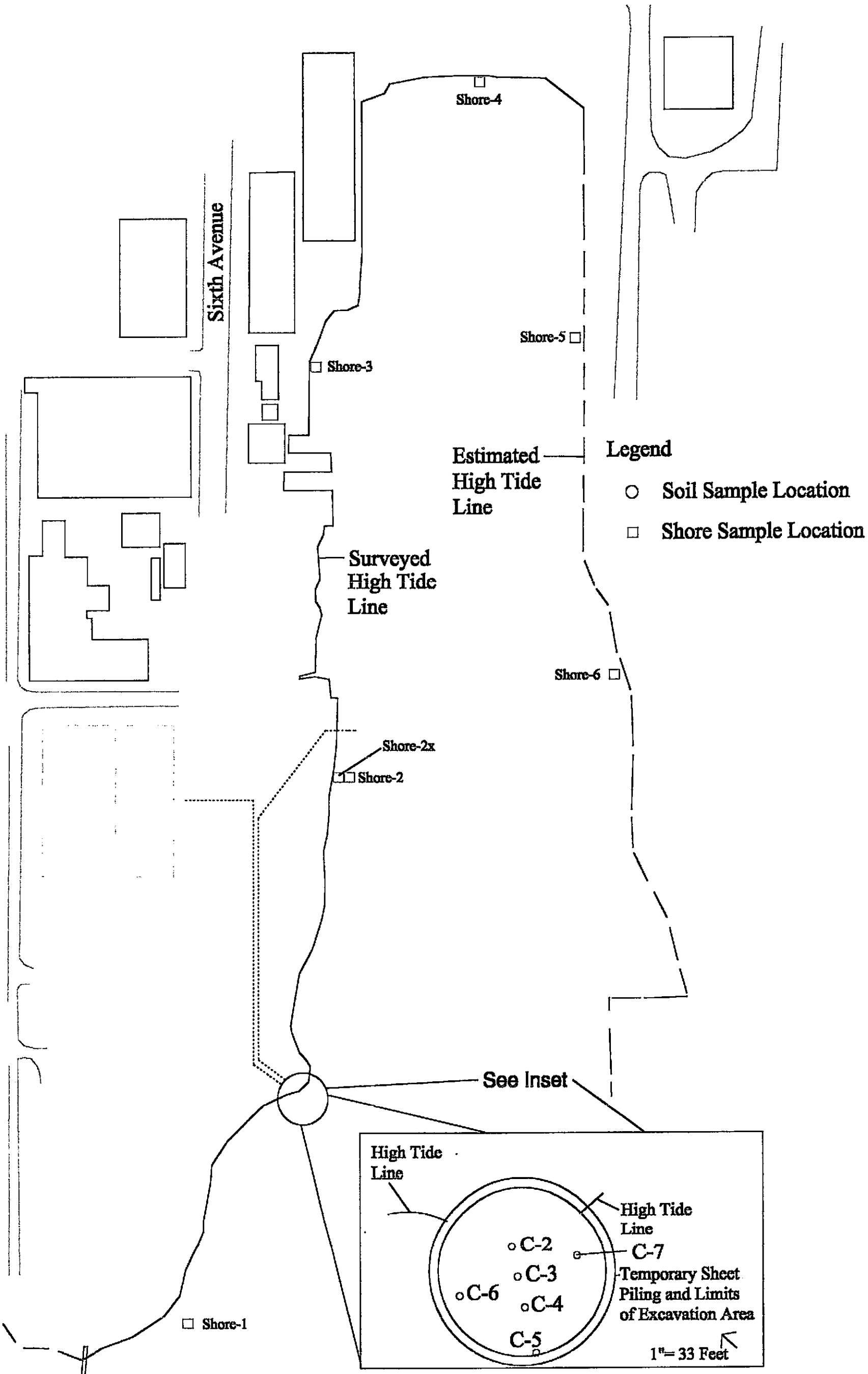
Seabreeze Yacht Center Study Area
Oakland, California

N
0
100 Feet
BASELINE

D:\GRAPHICS\Seabreeze\NEAR-SURFACE SOIL SAMPLE. LTcadd 4/5/98

LOCATION OF SEDIMENTS SAMPLES

Figure 17



Seabreeze Yacht Center Study Area
Oakland, California

BASELINE

D:\GRAPHICS\Seabreeze\Sediments.LTcadd 4/5/99

TABLE 1
Summary of Historical Land Uses
Seabreeze Yacht Center Study Area, Oakland, California

Year	Source	Study Area Land Uses	Potential Contamination
1909-1930	Sanborn Map, Aerial photographs	• Electrical power plant was owned and operated by the Great Western Power Company. A large steel oil tank was located approximately 200 feet south of the power plant. Pipelines connect tank to plant and wharf. • Operation of a lumber facility at north end of Clinton Basin. • Wharves along northwestern side of Clinton Basin.	TPH, metals, solvents, waste oil, paints, aromatic hydrocarbons
1930-1959	Sanborn Map, Aerial photographs, Port of Oakland records	• Power plant owned and operated by PG&E (by 1936). Continued operation of fuel tank. • Wharves and dry-docking facilities (D. LaBruzzi & Son, Kamelart Boat Works) along northwestern side of Clinton Basin; wharves along northeastern and southeastern margins of Clinton Basin. Boat repair and maintenance operations.	TPH, aromatic hydrocarbons, waste oil, paints, metals
1959-1978	Aerial photographs, Port of Oakland records	• Power plant is abandoned. Fuel tank, pipelines, and small structures removed from site; significant fill placed in Area A. • Wharves and dry-docking operations (Kamelart Boat Works, Hans Glaser Boat Service, Seabreeze Yacht Center) on margins of Clinton Basin; boat storage and automobile parking.	Possible contaminated fill TPH, aromatic hydrocarbons, waste oil, solvents, paints, metals
1978-present	Aerial photographs, Port of Oakland records	• Predominantly vacant until early 1980s when storage of shipping containers is begun; automobile and truck parking. • Wharves, dock, and dry-docking operations on margins of Clinton Basin; boat storage and maintenance, automobile parking.	TPH, aromatic hydrocarbons, waste oil, metals TPH, aromatic hydrocarbons, waste oil, solvents, paints, metals

Note: TPH = Total Petroleum Hydrocarbons

TABLE 2
SUMMARY OF METALS CONCENTRATIONS IN SOIL
(Except for Lead and Copper)
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Sample Date	Depth (feet bgs)	Total Sn	Total Sb	Total As	Total Ba	Total Be	Total Cd	Total Cr	Total Co	Total Hg	Total Mo	Total Ni	Total Se	Total Ag	Total Tl	Total V	Total Zn
Preliminary	SB-1	9/6/90	0.5	<5.0					<0.5	9.1				8.1					
Preliminary	SB-1	9/6/90	1	<5.0					<0.5	14				25					
Preliminary	SB-1	9/6/90	3.5	<5.0					<0.5	<2.5				2.9					
Preliminary	SB-2	9/6/90	0.5	<5.0					<0.5	<2.5				<2.5					
Preliminary	SB-2	9/6/90	1	<5.0					<0.5	<2.5				<2.5					
Preliminary	SB-2	9/6/90	3	<5.0					<0.5	18				27					
Preliminary	SB-2	9/6/90	5	<5.0					<0.5	4.5				13					
Preliminary	SB-3	9/6/90	0.5	<5.0					<0.5	<2.5				<2.5					
Preliminary	SB-3	9/6/90	1	<5.0					<0.5	<2.5				<2.5					
Preliminary	SB-3	9/6/90	3.5	<5.0					<0.5	<2.5				2.5					
Preliminary	SB-4	9/6/90	0.5	<5.0					0.5	11				24					
Preliminary	SB-4	9/6/90	1	<5.0					<0.5	6.7				15					
Preliminary	SB-4	9/6/90	3.5	<5.0					<0.5	3.5				6.6					
Preliminary	SB-5	9/6/90	0.5	<5.0					0.6	18				19					
Preliminary	SB-5	9/6/90	1	<5.0					<0.5	<2.5				<2.5					
Preliminary	SB-5	9/6/90	3.5	<5.0					<0.5	13				17					
Preliminary	SB-6	9/6/90	0.5	11					1.6	22				120					
Preliminary	SB-6	9/6/90	2	<5.0					<0.5	6.6				21					
Preliminary	SB-7	9/6/90	1	<5.0					<0.5	19				27					
Preliminary	SB-8	9/6/90	0.5	<5.0					0.8	9.1				14					
Preliminary	SB-8	9/6/90	1	<5.0					<0.5	20				20					
Preliminary	SB-8	9/6/90	2.5	<5.0					<0.5	20				32					
Preliminary	SB-9	9/6/90	0.5	<5.0					<0.5	36				26					
Preliminary	SB-9	9/6/90	1	<5.0					<0.5	9.2				15					
Preliminary	SB-9	9/6/90	3.5	<5.0					<0.5	12				14					
Preliminary	SB-10	9/6/90	0.5	<5.0					<0.5	6.0				14					
Preliminary	SB-10	9/6/90	1	<5.0					<0.5	4.0				9.5					

TABLE 2
SUMMARY OF METALS CONCENTRATIONS IN SOIL
(Except for Lead and Copper)
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Sample Date	Depth (feet bgs)	Total Sn	Total Sb	Total As	Total Ba	Total Be	Total Cd	Total Cr	Total Co	Total Hg	Total Mo	Total Ni	Total Se	Total Ag	Total Tl	Total V	Total Zn
Preliminary	SB-10	9/6/90	3	<5.0					<0.5	12				38					
Preliminary	SB-11	9/7/90	0.5	<5.0					<0.5	21				38					
Preliminary	SB-11	9/7/90	1	<5.0					<0.5	26				69					
Preliminary	SB-11	9/7/90	3	<5.0					<0.5	28				28					
Preliminary	SB-12	9/7/90	0.5	6.2					1.5	22				37					
Preliminary	SB-12	9/7/90	1	<5.0					0.5	5.4				7.4					
Preliminary	SB-12	9/7/90	2.5	<5.0					<0.5	22				26					
Preliminary	SB-13	9/7/90	0.5	<5.0					<0.5	23				17					
Preliminary	SB-13	9/7/90	1	<5.0					<0.5	13				18					
Preliminary	SB-13	9/7/90	2.5	<5.0					<0.5	17				28					
Preliminary	SB-14	9/7/90	0.5	<5.0					0.7	23				35					
Preliminary	SB-14	9/7/90	1	<5.0					<0.5	15				25					
Preliminary	SB-14	9/7/90	3	<5.0					<0.5	25				20					
Preliminary	SB-15	9/7/90	0.5	<5.0					<0.5	12				25					
Preliminary	SB-15	9/7/90	1	<5.0					<0.5	14				28					
Preliminary	SB-15	9/7/90	3.5	<5.0					<0.5	14				32					
Interim	BD-3	11/22/94	5		<3.0	<2.5	33	0.40	<0.25	41	5.5	<0.10	<0.99	35	<2.5	<0.50	<2.5	31	43
Interim	BD-4	11/10/94	0		<5.9	11	360	0.63	0.77	31	8.2	0.29	<2.0	39	<2.5	<0.99	<2.5	40	300
Interim	MW-SB4	11/22/94	5		<3.0	3.9	35	0.33	<0.25	37	4.5	<0.091	<1.0	28	<2.5	<0.50	<2.5	29	32
Interim	MW-SB4A	11/10/94	5		<6.0	13	440	1.0	<0.50	29	8.1	<0.091	<2.0	34	<2.5	<1.0	<2.5	30	30
Interim	MW-SB5	11/22/94	3		<3.0	11	200	1.2	2.4	38	11	0.40	1.7	180	<2.5	<0.50	<2.5	250	280
2nd Interim	PW1 36"	1/31/95	3			2.6	54		<0.25	48		<0.095			<2.5	<0.50			
2nd Interim	PW1 B5'	1/31/95	5			5.0	120		0.49	22		<0.091			<2.5	<0.50			
2nd Interim	PW2 4.5-6B	1/30/95	4.5			<2.5	28		<0.25	55		<0.10			<2.5	<0.50			
2nd Interim	PW2 12"	1/30/95	1			4.9	190		0.53	140		0.22			<2.5	<0.50			

TABLE 2
SUMMARY OF METALS CONCENTRATIONS IN SOIL
(Except for Lead and Copper)
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Sample Date	Depth (feet bgs)	Total Sn	Total Sb	Total As	Total Ba	Total Be	Total Cd	Total Cr	Total Co	Total Hg	Total Mo	Total Ni	Total Se	Total Ag	Total Tl	Total V	Total Zn
2nd Interim	PW3 12"	1/30/95	1			5.7	140		0.58	35		<0.091			<2.5	<0.50			
2nd Interim	PW3 5.6'	1/30/95	5.6			4.4	61		<0.25	51		0.18			<2.5	<0.50			
2nd Interim	PW4 12"	1/30/95	1			5.5	86		0.40	31		<0.10			<2.5	<0.50			
2nd Interim	PW4 42"	1/30/95	3.5			6.7	180		0.25	33		0.13			<2.5	<0.50			

Notes: bgs = below ground surface.

<x = Metal not identified above laboratory reporting limit of x.

xx/yy = Results of two separate analyses of same sample.

See Figure 12 for sample locations.

Sn = Tin
Sb = Antimony
As = Arsenic
Ba= Barium
Be = Beryllium
Cd = Cadmium
Cr = Chromium
Co = Cobalt
Hg = Mercury
Mo = Molybdenum
Ni = Nickel
Se = Selenium
Ag = Silver
Tl = Thallium
V = Vanadium
Zn = Zinc
Fe = Iron

TABLE 3
SUMMARY OF LEAD AND COPPER CONCENTRATIONS IN SOIL
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Sample Date	Depth (feet bgs)	Lead			Copper	
				Total (mg/kg)	WET (mg/L)	TCLP (mg/L)	Total (mg/kg)	WET (mg/L)
Preliminary	SB-1	9/6/90	0.5	40			31	
Preliminary	SB-1	9/6/90	1.0	36			20	
Preliminary	SB-1	9/6/90	3.5	14			12	
Preliminary	SB-2	9/6/90	0.5	<2.5			17	
Preliminary	SB-2	9/6/90	1.0	<2.5			19	
Preliminary	SB-2	9/6/90	3.0	36			19	
Preliminary	SB-2	9/6/90	5.0	87	1.1		11	
Preliminary	SB-3	9/6/90	0.5	<2.5			10	
Preliminary	SB-3	9/6/90	1.0	3			12	
Preliminary	SB-3	9/6/90	3.5	2.5			9.0	
Preliminary	SB-4	9/6/90	0.5	69	2.7		100	
Preliminary	SB-4	9/6/90	1.0	<2.5			21	
Preliminary	SB-4	9/6/90	3.5	14			16	
Preliminary	SB-5	9/6/90	0.5	6.5			34	
Preliminary	SB-5	9/6/90	1.0	<2.5			26	
Preliminary	SB-5	9/6/90	3.5	11			19	
Preliminary	SB-6	9/6/90	0.5	650	28		140	
Preliminary	SB-6	9/6/90	2.0	<2.5			11	
Preliminary	SB-7	9/6/90	1.0	67	0.34		37	
Preliminary	SB-8	9/6/90	0.5	51	1.6		79	
Preliminary	SB-8	9/6/90	1.0	2.9			7.3	
Preliminary	SB-8	9/6/90	2.5	5.9			16	
Preliminary	SB-9	9/6/90	0.5	200	19		18	
Preliminary	SB-9	9/6/90	1.0	160	12		12	
Preliminary	SB-9	9/6/90	3.5	2.5			9.5	
Preliminary	SB-10	9/6/90	0.5	12			130	
Preliminary	SB-10	9/6/90	1.0	<2.5			79	
Preliminary	SB-10	9/6/90	3.0	25			18	
Preliminary	SB-11	9/7/90	0.5	72	3.7		33	
Preliminary	SB-11	9/7/90	1.0	22			18	
Preliminary	SB-11	9/7/90	3.0	5.5			29	
Preliminary	SB-12	9/7/90	0.5	340	9.0		730	44
Preliminary	SB-12	9/7/90	1.0	17	0.72		20	
Preliminary	SB-12	9/7/90	2.5	67	2.2		19	
Preliminary	SB-13	9/7/90	0.5	31			10	
Preliminary	SB-13	9/7/90	1.0	19			9.9	
Preliminary	SB-13	9/7/90	2.5	33			76	
Preliminary	SB-14	9/7/90	0.5	61	6.6		47	
Preliminary	SB-14	9/7/90	1.0	55	1.4		81	
Preliminary	SB-14	9/7/90	3.0	<2.5			18	
Preliminary	SB-15	9/7/90	0.5	12			8.4	

TABLE 3
SUMMARY OF LEAD AND COPPER CONCENTRATIONS IN SOIL
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Sample Date	Depth (feet bgs)	Lead			Copper	
				Total (mg/kg)	WET (mg/L)	TCLP (mg/L)	Total (mg/kg)	WET (mg/L)
Preliminary	SB-15	9/7/90	1.0	39			9.8	
Preliminary	SB-15	9/7/90	3.5	14			11	
Phase II	SB-6A	4/9/91	0.5	990	155			
Phase II	SB-6A	4/9/91	1.0	101	4.8			
Phase II	SB-6B	4/9/91	0.5	145	3.1			
Phase II	SB-6B	4/9/91	1.0	16.8	0.27			
Phase II	SB-6C	4/9/91	0.5	11.3	0.19			
Phase II	SB-6C	4/9/91	1.0	3.5	0.14			
Phase II	SB-6D	4/9/91	0.5	8.5	0.16			
Phase II	SB-6D	4/9/91	1.0	7.9	0.25			
Phase II	SB-6E	4/9/91	0.5	7.8	0.29			
Phase II	SB-6E	4/9/91	1.0	142	2.8			
Phase II	SB-6F	4/9/91	0.5	9.3	0.16			
Phase II	SB-6F	4/9/91	1.0	8.4	<0.06			
Phase II	SB-6G	4/9/91	0.5	<3.0	0.10			
Phase II	SB-6G	4/9/91	1.0	67.3	<0.06			
Phase II	SB-6H	4/9/91	0.5	50.5	1.5			
Phase II	SB-6H	4/9/91	1.0	102	7.3			
Phase II	SB-9A	4/9/91	0.5	<3.0	0.06			
Phase II	SB-9A	4/9/91	1.0	<3.0	<0.06			
Phase II	SB-9B	4/9/91	0.5	60.8	5.6			
Phase II	SB-9B	4/9/91	1.0	34.8	1.4			
Phase II	SB-9C	4/9/91	0.5	483	28.3			
Phase II	SB-9C	4/9/91	1.0	45.3	3.0			
Phase II	SB-9D	4/9/91	0.5	119	2.3			
Phase II	SB-9D	4/9/91	1.0	82.4	8.6			
Phase II	SB-9E	4/9/91	0.5	138	8.6			
Phase II	SB-9E	4/9/91	1.0	125	2.9			
Phase II	SB-9F	4/9/91	0.5	152	9.1			
Phase II	SB-9F	4/9/91	1.0	509	61.6			
Phase II	SB-9G	4/9/91	0.5	217	38.8			
Phase II	SB-9G	4/9/91	1.0	53.7	11.7			
Phase II	SB-9H	4/9/91	1.0	382	11.1			
Phase II	SB-12A	4/9/91	0.5	413	39.8		1,780	21.2
Phase II	SB-12A	4/9/91	1.0	490	8.3		40	9.2
Phase II	SB-12B	4/9/91	0.5	116	0.26		368	7.6
Phase II	SB-12B	4/9/91	1.0	70.5	3.9		87	4.6
Phase II	SB-12C	4/9/91	0.5	86.8	2.9		237	11.9
Phase II	SB-12C	4/9/91	1.0	97.0	5.7		55	1.7
Phase II	SB-12D	4/9/91	0.5	82.2	3.3		418	11.0

TABLE 3
SUMMARY OF LEAD AND COPPER CONCENTRATIONS IN SOIL
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Sample Date	Depth (feet bgs)	Lead			Copper	
				Total (mg/kg)	WET (mg/L)	TCLP (mg/L)	Total (mg/kg)	WET (mg/L)
Phase II	SB-12D	4/9/91	1.0	68.5	2.5		51	1.2
Phase II	SB-12E	4/9/91	0.5	128	7.7		2,280	61.4
Phase II	SB-12E	4/9/91	1.0	51.7	2.7		210	5.0
Phase II	SB-12F	4/9/91	0.5	115	2.6		95	2.0
Phase II	SB-12F	4/9/91	1.0	17.9	2.5		23	1.9
Phase II	SB-12G	4/9/91	0.5	68.6	2.0		164	4.9
Phase II	SB-12G	4/9/91	1.0	28.1	2.4		33	2.5
Phase II	SB-14A	4/8/91	0.5	52	3.1			
Phase II	SB-14A	4/8/91	1.0	73	4.0			
Phase II	SB-14B	4/8/91	0.5	6.4	0.09			
Phase II	SB-14B	4/8/91	1.0	51	2.8			
Phase II	SB-14C	4/8/91	0.5	105	3.6			
Phase II	SB-14C	4/8/91	1.0	91	5.3			
Phase II	SB-14D	4/8/91	0.5	90	2.9			
Phase II	SB-14D	4/8/91	1.0	52	1.7			
Phase II	SB-14E	4/8/91	0.5	38.1	0.74			
Phase II	SB-14E	4/8/91	1.0	91.3	3.5			
Phase II	SB-14F	4/8/91	0.5	36.5	3.2			
Phase II	SB-14F	4/8/91	1.0	70.1	3.8			
Phase II	SB-14G	4/9/91	0.5	126	1.8			
Phase II	SB-14G	4/9/91	1.0	79.8	3.7			
Phase III	SB-6H	1/7/94	1.5	<4.9				
Phase III	SB-6I	1/7/94	0.5	80	5.4			
Phase III	SB-6I	1/7/94	1.0	45				
Phase III	SB-6J	1/7/94	0.5	24				
Phase III	SB-6K	1/7/94	0.5	180/3,700	--/340	10		
Phase III	SB-6L	1/7/94	1.0	49				
Phase III	SB-9	1/7/94	1.5	26				
Phase III	SB-9D	1/7/94	1.5	120	11	0.22		
Phase III	SB-9F	1/7/94	1.5	75	4.7			
Phase III	SB-9G	1/7/94	1.5	34				
Phase III	SB-9H	1/7/94	1.5	270	5.5			
Phase III	SB-9I	1/7/94	0.5	310	15	0.48		
Phase III	SB-9J	1/7/94	0.5	110	3.1			
Phase III	SB-9J	1/7/94	1.0	84	2.7			
Phase III	SB-9K	1/7/94	0.5	240	7			
Phase III	SB-9K	1/7/94	1.0	93	6.8			
Phase III	SB-9K	1/7/94	1.5		4.1			
Phase III	SB-9L	1/7/94	1.0	<4.9				
Phase III	SB-9M	1/7/94	0.5	87	5.4			

TABLE 3
SUMMARY OF LEAD AND COPPER CONCENTRATIONS IN SOIL
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Sample Date	Depth (feet bgs)	Lead			Copper	
				Total (mg/kg)	WET (mg/L)	TCLP (mg/L)	Total (mg/kg)	WET (mg/L)
Phase III	SB-9M	1/7/94	1.0	74/93	--/3			
Phase III	SB-9N	1/7/94	1.0	180	2.8			
Phase III	SB-9O	1/7/94	0.5	<5				
Phase III	SB-9O	1/7/94	1.0	<5				
Phase III	SB-9O	1/7/94	1.5	58	2			
Phase III	SB-12A	1/7/94	1.5	140	5.1		350	27
Phase III	SB-12C	1/7/94	1.5	340	26	0.5	360	30
Phase III	SB-12H	1/7/94	0.5	150	5.9		190	
Phase III	SB-12H	1/7/94	1.0	300	8		3,500	
Phase III	SB-12H	1/7/94	1.5	23	4.2		23	
Phase III	SB-12I	1/7/94	0.5	230	7.5		100	
Phase III	SB-12I	1/7/94	1.0	200	8		150	
Phase III	SB-12I	1/7/94	1.5		3.4			
Phase III	SB-12J	1/7/94	0.5	48			86	
Phase III	SB-12J	1/7/94	1.0	63	3.4		240	
Phase III	SB-12K	1/7/94	1.0	19			170	
Phase III	SB-12L	1/10/94	0.5	220	8.6		240	
Phase III	SB-12L	1/10/94	1.0	75	7.4		120	
Phase III	SB-12L	1/10/94	1.5	140	1.2		39	
Phase III	SB-14C	1/7/94	1.5	65	3.5			
Phase III	SB-14H	1/7/94	1.0	120	3			
Phase III	SB-14I	1/7/94	1.0	230	3.1			
Interim	BD-1	11/10/94	2.0	<5.0			7.6	
Interim	BD-1	11/10/94	6.0	190			15	
Interim	BD-1A	11/10/94	2.0	21			13	
Interim	BD-1A	11/10/94	4.0	23			14	
Interim	BD-2	11/10/94	2.0	230			18	
Interim	BD-2	11/10/94	4.0	130			20	
Interim	BD-2A	11/10/94	2.0	590			23	
Interim	BD-2A	11/10/94	4.5	91			28	
Interim	BD-3	11/22/94	2.5	160			2,300	
Interim	BD-3	11/22/94	5.0	8.1			19	
Interim	BD-4	11/10/94	0.0	150			53	
Interim	BD-5	11/22/94	2.5	78			38	
Interim	MW-SB3	11/10/94	2.0	190			50	
Interim	MW-SB3	11/10/94	4.5	310			53	
Interim	MW-SB4	11/22/94	2.0	79			35	
Interim	MW-SB4	11/22/94	5.0	10			15	
Interim	MW-SB4A	11/10/94	5.0	6.2			13	
Interim	MW-SB5	11/22/94	2.0	63			24	

TABLE 3
SUMMARY OF LEAD AND COPPER CONCENTRATIONS IN SOIL
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Sample Date	Depth (feet bgs)	Lead			Copper	
				Total (mg/kg)	WET (mg/L)	TCLP (mg/L)	Total (mg/kg)	WET (mg/L)
Interim	MW-SB5	11/22/94	3.0	320			150	
2nd Interim	PW1 36"	1/31/95	3.0	9.3				
2nd Interim	PW1 B5'	1/31/95	5.0	38				
2nd Interim	PW2 4.5-6B	1/30/95	4.5	6.4				
2nd Interim	PW2 12"	1/30/95	1.0	210				
2nd Interim	PW3 12"	1/30/95	1.0	81				
2nd Interim	PW3 5.6'	1/30/95	5.6	28				
2nd Interim	PW4 12"	1/30/95	1.0	43				
2nd Interim	PW4 42"	1/30/95	3.5	63				
3rd Interim	S-11	8/11/95	1.0	150			28	
3rd Interim	S-11	8/11/95	3.0	210			50	
3rd Interim	S-12	8/11/95	1.0	7.4			5.4	
3rd Interim	S-12	8/11/95	4.0	79			36	
3rd Interim	S-12	8/11/95	6.0	13			30	
CC Removal	C-1	11/12/96	0.5	9.36			22.8	
CC Removal	CS-1	11/27/96	5.0	10.9			19.7	
CC Removal	CS-2	11/27/96	5.0	19.3			24.4	
CC Removal	CS-3	11/27/96	5.0	26.2			27.4	

Notes: bgs = below ground surface.

<x = Metal not identified above laboratory reporting limit of x.

xx/yy = Results of two separate analyses of same sample.

See Figure 12 for sample locations.

TABLE 4
SUMMARY OF PETROLEUM AND OIL & GREASE CONCENTRATIONS IN SOIL
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Date Sampled	Sample Depth (feet bgs)	TPH as Kerosene	TPH as Diesel	TPH as Bunker C Lab. Std.	TPH as Bunker C Site Std.	TPH as Motor Oil	Nonpolar O&G	Total O&G
Preliminary	SB-8	9/6/90	0.5						<125	230
Preliminary	SB-8	9/6/90	2.5						350	1,200
Preliminary	SB-15	9/7/90	0.5						7,800	18,000
Preliminary	SB-15	9/7/90	1.0						4,200	7,900
Preliminary	SB-15	9/7/90	3.5						520	1,700
Phase III	BC-1	8/15/94	1.0			1,900	1,900			
Phase III	BC-2	8/15/94	2.5			1,300	1,300			
Phase III	BC-3	8/15/94	1.0			1,100	1,100			
Phase III	BC-4	8/15/94	1.75			3,000	3,000			
Phase III	BC-5	8/15/94	2.5			2,000	2,000			
Phase III	BC-6	8/15/94	2.5			1,200	1,200			
Phase III	BC-7	8/15/94	0.5			1,000	1,100			
Phase III	BC-8	8/15/94	2.5			240	240			
Phase III	BC-9	8/15/94	3.0			<25	<25			
Phase III	BC-10	8/15/94	0.0			<25	<25			
Phase III	BC-11	8/15/94	2.0			200	200			
Phase III	BC-12	8/15/94	0.0			<25	<25			
Phase III	BC-13	8/15/94	0.5			2,000	2,300			
Phase III	BC-14	8/15/94	2.5			130	150			
Phase III	BC-15	8/15/94	3.5			750	670			
Phase III	BC-16	8/15/94	2.5			2,600	2,600			
Phase III	BC-17	8/15/94	2.5			<25	<25			
Phase III	BC-18	8/15/94	3.5			<25	<25			
Phase III	BC-19	8/15/94	3.5			240	240			
Interim	BD-1	11/10/94	2.0		2	210	230			
Interim	BD-1	11/10/94	6.0		6	370	410			
Interim	BD-1A	11/10/94	2.0		<1	<30	<30			
Interim	BD-1A	11/10/94	4.0		2	280	250			
Interim	BD-2	11/10/94	2.0		40	1,600	1,800			
Interim	BD-2	11/10/94	4.0		<20	2,300	2,500			
Interim	BD-2A	11/10/94	2.0		<1	110	100			
Interim	BD-2A	11/10/94	4.5		<20	12,000	11,000			
Interim	BD-3	11/22/94	2.5		70	1,700	1,500			
Interim	BD-3	11/22/94	5.0		480	2,000	1,800			
Interim	BD-4	11/10/94	0.0		<10	1,600	1,900			
Interim	BD-5	11/22/94	2.5		350	7,800	7,100			
Interim	MW-SB3	11/10/94	2.0		66	4,000	4,500			
Interim	MW-SB3	11/10/94	4.5		11	300	340			

TABLE 4
SUMMARY OF PETROLEUM AND OIL & GREASE CONCENTRATIONS IN SOIL
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Date Sampled	Sample Depth (feet bgs)	TPH as Kerosene	TPH as Diesel	TPH as Bunker C Lab. Std.	TPH as Bunker C Site Std.	TPH as Motor Oil	Nonpolar O&G	Total O&G
Interim	MW-SB4	11/22/94	2.0		2	160	140			
Interim	MW-SB4	11/22/94	5.0		21	460	410			
Interim	MW-SB4A	11/10/94	5.0		11,000	49,000	55,000			
Interim	MW-SB5	11/22/94	2.0		30	1,200	1,100			
Interim	MW-SB5	11/22/94	3.0		820	16,000	15,000			
Interim	MW-SB5grab	11/22/94			8	140	150			
2nd Interim	PW-1 18"	1/31/95	1.5		30[1]					
2nd Interim	PW-1 24"	1/31/95	2.0		410[1]					
2nd Interim	PW-2 6"	1/30/95	0.5		1,000[1]					
2nd Interim	PW-2 @ 4.5-6'	1/30/95	4.5		620[1]					
2nd Interim	PW-3 @ 6"	1/30/95	0.5		<50[1]					
2nd Interim	PW-3 @ 5'	1/30/95	5.0		<50[1]					
2nd Interim	PW-4 @ .6	1/30/95	0.5		<50[1]					
2nd Interim	PW-4 @36"	1/30/95	3.0		<50[1]					
2nd Interim	TP-1	3/6/95	3.0	NR	28	340		200		
2nd Interim	TP-2	3/6/95	3.0	<1	<1	<25		<25		
2nd Interim	TP-2	3/6/95	5.5	<1	14	190		120		
2nd Interim	TP-3	3/6/95	3.0	NR	92	400		190		
2nd Interim	TP-4	3/6/95	3.0	<1	<1	<25		<25		
3rd Interim	S-1	8/11/95	2.0		<1	<25		<25		
3rd Interim	S-1	8/11/95	3.0		11	170		NR		
3rd Interim	S-2	8/11/95	2.0		85	2,700		NR		
3rd Interim	S-2	8/11/95	3.0		40	360		NR		
3rd Interim	S-3	8/11/95	2.0		150	NR		220		
3rd Interim	S-3	8/11/95	3.0		560	NR		630		
3rd Interim	S-4	8/11/95	2.0		1.5	<25		<25		
3rd Interim	S-4	8/11/95	3.0		1,400	NR		<625		
3rd Interim	S-5	8/11/95	2.0		7.9	83		NR		
3rd Interim	S-5	8/11/95	3.0		<1	<25		<25		
3rd Interim	S-6	8/11/95	2.0		67	NR		250		
3rd Interim	S-6	8/11/95	3.0		580	NR		1,700		
3rd Interim	S-7	8/11/95	2.0		1,700	30,000		NR		
3rd Interim	S-7	8/11/95	3.0		110	770		NR		
3rd Interim	S-8	8/11/95	2.0		22	450		NR		
3rd Interim	S-8	8/11/95	3.0		11	99		NR		
3rd Interim	S-9	8/11/95	2.0		<1	32		<25		
3rd Interim	S-9	8/11/95	3.0		24	90		NR		
3rd Interim	S-11	8/11/95	2.0		18	850		NR		

TABLE 4
SUMMARY OF PETROLEUM AND OIL & GREASE CONCENTRATIONS IN SOIL
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Date Sampled	Sample Depth (feet bgs)	TPH as Kerosene	TPH as Diesel	TPH as Bunker C Lab. Std.	TPH as Bunker C Site Std.	TPH as Motor Oil	Nonpolar O&G	Total O&G
3rd Interim	S-11	8/11/95	3.0		130	20,000		NR		
3rd Interim	S-12	8/11/95	2.0		6.1	950		NR		
3rd Interim	S-12	8/11/95	3.0		73	490		NR		
10/95 Data Rpt	S-13	10/4/95	4.5		3,000	NR		2,500		
10/95 Data Rpt	S-13	10/4/95	6.5		1,800	NR		1,400		
10/95 Data Rpt	S-14	10/4/95	5.0		NR	420		NR		
10/95 Data Rpt	S-14	10/4/95	7.0		NR	530		NR		
10/95 Data Rpt	S-15	10/4/95	6.5		1,900	NR		1,300		
10/95 Data Rpt	S-15	10/4/95	8.5		2,600	NR		1,000		
10/95 Data Rpt	S-16A	10/4/95	4.0		2,600	NR		<250		
10/95 Data Rpt	S-16A	10/4/95	6.0		6,300	NR		2,000		
10/95 Data Rpt	S-16B	10/4/95	4.5		NR	57,000		NR		
10/95 Data Rpt	S-16B	10/4/95	7.0		4,700	NR		4,700		
CC Removal	C-1	11/12/96	0.5		<5	<10		<10		
CC Removal	CS-1[2]	11/27/96	5.0		19	<10		44		
CC Removal	CS-2[2]	11/27/96	5.0		10	<10		43		
CC Removal	CS-3[2]	11/27/96	5.0		22	<10		30		

Notes: bgs = below ground surface.

NR = Not reported due to overlap of hydrocarbon ranges.

<x = Compound(s) not identified above laboratory reporting limit of x.

TPH = Total petroleum hydrocarbons.

O&G = Oil and grease.

See Figure 13 for sample locations.

[1] Quantification based on an extended range spanning both diesel and motor oil retention times.

[2] Silica gel cleanup performed on sample.

TABLE 5
SUMMARY OF SEMI-VOLATILE ORGANIC COMPOUNDS CONCENTRATIONS IN SOIL
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Date Sampled	Sample Depth (feet bgs)	Semi-Volatile Organic Compounds	
Interim	BD-1	11/10/94	2.0	Cresote by EPA Method 8270	ND
Interim	BD-1	11/10/94	6.0	Cresote by EPA Method 8270	ND
2nd Interim	PW-1	1/31/95	3.0	SVOCs by EPA Method 8270	ND

Notes: bgs = below ground surface.

SVOCs = Semi-volatile Organic Compounds.

All samples were analyzed using EPA Method 8270.

See Figure 14 for sample locations.

TABLE 6
SUMMARY OF VOLATILE ORGANIC COMPOUNDS CONCENTRATIONS IN SOIL
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Date Sampled	Sample Depth (feet bgs)	Volatile Organic Compounds	
Preliminary	SB-1	9/6/90	3.5	Acetone[1]	0.014
Preliminary	SB-2	9/6/90	5.0	Acetone[1]	0.012
				Carbon Disulfide	0.0051
Preliminary	SB-3	9/6/90	3.5	VOCs by 8240	ND
Preliminary	SB-4	9/6/90	3.5	Acetone[1]	0.029
				Toluene	0.009
				Xylenes	0.012
Preliminary	SB-5	9/6/90	3.5	Acetone[1]	0.079
				2-Butanone	0.022
Preliminary	SB-6	9/6/90	2.0	Carbon Disulfide[1]	0.014
				Xylenes	0.025
Preliminary	SB-8	9/6/90	2.5	Acetone[1]	0.1
				2-Butanone	0.023
				1,2-dichloropropane	0.0076
Preliminary	SB-9	9/6/90	3.5	Acetone[1]	0.03
Preliminary	SB-10	9/6/90	3.0	VOCs by 8240	ND
Preliminary	SB-11	9/7/90	3.0	Acetone[1]	0.18
				Carbon Disulfide	0.011
				2-Butanone	0.045
Preliminary	SB-12	9/7/90	2.5	Acetone[1]	0.027
Preliminary	SB-13	9/7/90	2.5	VOCs by 8240	ND
Preliminary	SB-14	9/7/90	3.0	VOCs by 8240	ND
Preliminary	SB-15	9/7/90	3.5	Acetone[1]	0.033
Interim	BD-4	11/10/94	0	VOCs by 8240	ND
Interim	MW-SB5grab	11/22/94	5.0	Ethylbenzene[1]	0.15
				Xylenes	0.34

Notes: bgs = below ground surface

VOCs = Volatile Organic Compounds.

All samples were analyzed using EPA Method 8240.

See Figure 14 for sample locations.

[1] Only the VOC compounds identified above the reporting limits are listed.

TABLE 7
SUMMARY OF POLYCHLORINATED BIPHENYL CONCENTRATIONS IN SOIL
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Date Sampled	Sample Depth (feet bgs)	Polychlorinated Biphenyls	
2nd Interim	T-1	3/6/95	3.0	PCBs	<0.02
2nd Interim	T-1	3/6/95	5.5	PCBs	<0.02
2nd Interim	T-2	3/6/95	3.0	Aroclor 1254[1]	0.15
				Aroclor 1260	0.065
2nd Interim	T-3	3/6/95	3.0	PCBs	<0.02
2nd Interim	T-4	3/6/95	3.0	PCBs	<0.02
3rd Interim	S-1	8/11/95	2.0	PCBs	<0.02
3rd Interim	S-1	8/11/95	3.0	PCBs	<0.02
3rd Interim	S-2	8/11/95	2.0	PCBs	<0.02
3rd Interim	S-2	8/11/95	3.0	PCBs	<0.02
3rd Interim	S-3	8/11/95	2.0	PCBs	<0.02
3rd Interim	S-3	8/11/95	3.0	PCBs	<0.02
3rd Interim	S-4	8/11/95	2.0	PCBs	<0.02
3rd Interim	S-4	8/11/95	3.0	PCBs	<0.02
3rd Interim	S-5	8/11/95	2.0	Aroclor 1260[1]	0.062
3rd Interim	S-5	8/11/95	3.0	PCBs	<0.02
3rd Interim	S-6	8/11/95	2.0	Aroclor 1260[1]	0.021
3rd Interim	S-6	8/11/95	3.0	PCBs	<0.02
3rd Interim	S-7	8/11/95	2.0	PCBs	<0.02
3rd Interim	S-7	8/11/95	3.0	PCBs	<0.02
3rd Interim	S-8	8/11/95	2.0	PCBs	<0.02
3rd Interim	S-8	8/11/95	3.0	PCBs	<0.02
3rd Interim	S-9	8/11/95	2.0	Aroclor 1260[1]	0.42
3rd Interim	S-9	8/11/95	3.0	PCBs	<0.02
3rd Interim	S-11	8/11/95	2.0	Aroclor 1254[1]	0.2
				Aroclor 1260	0.29
3rd Interim	S-11	8/11/95	3.0	PCBs	<0.02
3rd Interim	S-12	8/11/95	2.0	PCBs	<0.02
3rd Interim	S-12	8/11/95	3.0	PCBs	<0.02

Notes: bgs = below ground surface.

PCBs = polychlorinated biphenyls.

All samples were analyzed by EPA Method 8080.

See Figure 14 for sample locations.

[1] Only the PCBs identified above reporting limits are listed.

TABLE 8
SUMMARY OF METAL CONCENTRATIONS IN GROUNDWATER
Seabreeze Yacht Center Study Area, Oakland, California
(mg/L)

Report	Sample Date	Total As	Total Ba	Total Cd	Total Cr	Total Cu	Total Hg	Total Pb	Total Ni	Total Se	Total Ag	Total Zn	Total Fe
MW-SB1													
Phase II	4/17/91					0.0198/0.0144		<0.07/<0.07					
Phase II	7/9/91					<0.02/<0.02		<0.06/<0.06					
Phase III	1/10/94					<0.02/<0.02		<0.1/<0.1					
Phase III	1/26/94					0.037/0.026		0.012/0.0039					
Interim	11/28/94					0.014		<0.003					
MW-SB2													
Phase II	4/17/91					0.0481		<0.07					
Phase II	7/9/91					<0.02		<0.06					
Phase III	1/10/94					0.02		<0.1					
Phase III	1/26/94					0.014		0.0048					
Interim	11/28/94					0.054		<0.003					
Q-rpt	7/1/96					0.055/0.065		<0.003/<0.003					
Q-rpt	9/16/96	<0.005		<0.005	<0.007	<0.005/<0.005	<0.0002	<0.003/<0.003	<0.03		<0.007	<0.1	0.13
Q-rpt	12/11/96					0.00354		0.00855					
Q-rpt	3/14/97					<0.003		0.00314					
MW-SB3													
Interim	11/14/94					<0.01/0.01		<0.003/<0.003					
Q-rpt	7/1/96					<0.01		0.0036					
Q-rpt	9/16/96					<0.005		<0.003					
Q-rpt	12/11/96					<0.003		<0.003					
Q-rpt	3/14/97					0.00529		<0.003					
MW-SB4													
Interim	11/28/94					0.078		0.093					
Q-rpt	7/1/96					0.013		0.014					
Q-rpt	9/16/96					<0.005		<0.003					
Q-rpt	12/11/96					0.00674		0.00465					
Q-rpt	3/14/97					<0.003		0.00519					

TABLE 8
SUMMARY OF METAL CONCENTRATIONS IN GROUNDWATER
Seabreeze Yacht Center Study Area, Oakland, California
(mg/L)

Report	Sample Date	Total As	Total Ba	Total Cd	Total Cr	Total Cu	Total Hg	Total Pb	Total Ni	Total Se	Total Ag	Total Zn	Total Fe
MW-SB5													
Interim	11/28/94					0.019		<0.003					
Q-rpt	7/1/96					0.012		0.0031					
Q-rpt	9/16/96					<0.005		<0.003					
Q-rpt	12/11/96					<0.003/<0.003		0.00344/<0.003					
Q-rpt	3/14/97					0.00318/<0.003		<0.003/<0.003					
PW-1													
2nd Interim	2/2/95	0.019	0.018	<0.005	<0.01		<0.0002	0.006		<0.005	<0.01		
PW-2													
2nd Interim	2/2/95	0.014	0.1	<0.005	<0.01		<0.0002	0.0043		0.011	<0.01		
Q-rpt	7/1/96					<0.01		<0.003					
Q-rpt	9/16/96					<0.005		<0.003					
Q-rpt	12/11/96					<0.003		0.0101					
Q-rpt	3/14/97					<0.003		0.00401					
PW-3													
2nd Interim	2/2/95	0.015	0.084	<0.005	<0.01		<0.0002	<0.003		<0.005	<0.01		
PW-4													
2nd Interim	2/2/95	0.014	0.081	<0.005	<0.01		<0.0002	<0.003		<0.005	<0.01		

Notes: <x = Metal not identified above laboratory reporting limit of x.
xx/yy = Duplicate sample results.
All samples were filtered prior to analysis.
See Figure 15 for monitoring well locations.

As = Arsenic
Ba= Barium
Cd = Cadmium
Cr = Chromium
Cu = Copper
Hg = Mercury
Ni = Nickel
Pb = Lead
Se = Selenium
Ag = Silver
Zn = Zinc
Fe = Iron

TABLE 9
SUMMARY OF PETROLEUM CONCENTRATIONS IN GROUNDWATER
Seabreeze Yacht Center Study Area, Oakland, California
(mg/L)

Report	Date Sampled	TPH as Gasoline	TPH as Kerosene	TPH as Diesel	TPH as Bunker C Lab. Std.	TPH as Bunker C Site Std.	TPH as Motor Oil	Nonpolar O&G	Notes
MW-SB1									
Phase II	4/17/91							<5/<5	Also analyzed by EPA Method 8240 - all analytes were ND
Phase III	1/26/94							<5/<5	Also analyzed by EPA Method 8240 - acetone= 0.06 mg/L
Interim	11/28/94			1.3	4.8	4.8			Also analyzed by EPA Method 8240 - acetone= 0.043 mg/L
2nd Interim	3/3/95			1.8	4.8		1.4		
MW-SB2									
Phase II	4/17/91							<5	Also analyzed by EPA Method 8240 - all analytes were ND
Phase III	1/26/94							<5	Also analyzed by EPA Method 8240 - 2-butanone= 0.1 mg/L
Interim	11/28/94			12	30	30			Also analyzed by EPA Method 8240 - acetone= 0.033 mg/L
2nd Interim	3/6/95		NR/NR	16/18	28/33		4.9/<25		
Q-rpt	7/1/96			<0.05/0.17	<0.3/<0.3				Silica gel cleanup performed
Q-rpt	9/16/96			<0.05/0.17	<0.5/<0.5		<0.25/<0.25		Silica gel cleanup performed
Q-rpt	12/11/96			0.16	<0.5		<0.25		Silica gel cleanup performed
Q-rpt	3/14/97			0.061	<0.5		<0.25		Silica gel cleanup performed
Q-rpt	6/20/97			0.15					Silica gel cleanup performed
Q-rpt	1/28/98			<0.05					Silica gel cleanup performed
Q-rpt	1/6/99			<0.048					Silica gel cleanup performed
MW-SB3									
Interim	11/14/94					0.46/0.35			
Interim	12/7/94	<0.05/<0.05		1.4/1.1	3/2.5	3/2.3			Also analyzed for BTEX - all analytes were ND
2nd Interim	3/6/95		NR	2.3	5.8		1.5		
Q-rpt	7/1/96			<0.049	<0.3				Silica gel cleanup performed
Q-rpt	9/16/96			<0.05	<0.5		0.28		Silica gel cleanup performed
Q-rpt	12/11/96			0.19	<0.5		<0.25		Silica gel cleanup performed
Q-rpt	3/14/97			0.085	<0.5		<0.25		Silica gel cleanup performed
Q-rpt	6/20/97			0.15/0.11					Silica gel cleanup performed
Q-rpt	1/28/98			<0.05/<0.05					Silica gel cleanup performed
Q-rpt	1/6/99			<0.049/0.13					Silica gel cleanup performed

TABLE 9
SUMMARY OF PETROLEUM CONCENTRATIONS IN GROUNDWATER
Seabreeze Yacht Center Study Area, Oakland, California
(mg/L)

Report	Date Sampled	TPH as Gasoline	TPH as Kerosene	TPH as Diesel	TPH as Bunker C Lab. Std.	TPH as Bunker C Site Std.	TPH as Motor Oil	Nonpolar O&G	Notes
MW-SB4									
Interim	11/28/94			1.1	4.3	4.3			Also analyzed by EPA Method 8240 - acetone= 0.075 mg/L
2nd Interim	3/3/95			1.4	3		0.66		
Q-rpt	7/1/96			<0.049	<0.3				Silica gel cleanup performed
Q-rpt	9/16/96			<0.05	<0.5		<0.25		Silica gel cleanup performed
Q-rpt	12/11/96			0.12	<0.5		<0.25		Silica gel cleanup performed
Q-rpt	3/14/97			<0.05	<0.5		<0.25		Silica gel cleanup performed
Q-rpt	6/20/97			0.11					Silica gel cleanup performed
Q-rpt	1/28/98			<0.05					Silica gel cleanup performed
Q-rpt	1/6/99			<0.049					Silica gel cleanup performed
MW-SB5									
Interim	11/28/94			34	74	74			Also analyzed by EPA Method 8240 - acetone= 0.13 mg/L
2nd Interim	3/6/95		NR/NR	16/15	34/31		8.1/6.9		
Q-rpt	7/1/96			<0.049	<0.3				Silica gel cleanup performed
Q-rpt	9/16/96			0.14	<0.5		<0.25		Silica gel cleanup performed
Q-rpt	12/11/96			0.16/0.081	<0.5/<0.5		<0.25/<0.25		Silica gel cleanup performed
Q-rpt	3/14/97			0.29/0.22	<0.5<0.5		<0.25/<0.25		Silica gel cleanup performed
Q-rpt	6/20/97			0.27					Silica gel cleanup performed
Q-rpt	1/28/98			<0.05					Silica gel cleanup performed
Q-rpt	1/6/99			<0.05					Silica gel cleanup performed
PW-1									
2nd Interim	3/3/95			1.7	3.9		1		
PW-2									
2nd Interim	3/3/95		NR	1.7	4.4		1.1		
Q-rpt	7/1/96			<0.049	<0.3				Silica gel cleanup performed
Q-rpt	9/16/96			<0.05	<0.5		<0.25		Silica gel cleanup performed
Q-rpt	12/11/96			0.11	<0.5		<0.25		Silica gel cleanup performed
Q-rpt	3/14/97			<0.05	<0.5		<0.25		Silica gel cleanup performed
Q-rpt	6/20/97			<0.05					Silica gel cleanup performed

TABLE 9
SUMMARY OF PETROLEUM CONCENTRATIONS IN GROUNDWATER
Seabreeze Yacht Center Study Area, Oakland, California
(mg/L)

Report	Date Sampled	TPH as Gasoline	TPH as Kerosene	TPH as Diesel	TPH as Bunker C Lab. Std.	TPH as Bunker C Site Std.	TPH as Motor Oil	Nonpolar O&G	Notes
PW-3									
2nd Interim	3/3/95		NR	5.8	9.4		1.2		
PW-4									
2nd Interim	3/3/95			0.61	1.6		<1.3		

Notes: NR = Not reported due to overlap of hydrocarbon ranges.

<x = Compound(s) not identified above laboratory reporting limit of x.

xx/yy = Duplicate sample results.

TPH = Total petroleum hydrocarbons.

O&G = Oil and grease.

See Figure 15 for monitoring well locations.

TABLE 10
SUMMARY OF METAL CONCENTRATIONS IN SURFACE AND NEAR-SURFACE SAMPLES
Seabreeze Yacht Center Study Area, Oakland, California

Report	Sample Number	Sample Date	Depth (feet bgs)	Lead			Copper		Total As (mg/kg)	Total Ba (mg/kg)	Total Cd (mg/kg)	Total Cr (mg/kg)	Total Hg (mg/kg)	Total Ni (mg/kg)	Total Se (mg/kg)	Total Ag (mg/kg)	Total Sn (mg/kg)
				Total (mg/kg)	WET (mg/L)	TCLP (mg/L)	Total (mg/kg)	WET (mg/L)									
Preliminary	SB-1	9/6/90	0.5	40			31				<0.5	9.1		8.1			<5.0
Preliminary	SB-1	9/6/90	1	36			20				<0.5	14		25			<5.0
Preliminary	SB-2	9/6/90	0.5	<2.5			17				<0.5	<2.5		<2.5			<5.0
Preliminary	SB-2	9/6/90	1	<2.5			19				<0.5	<2.5		<2.5			<5.0
Preliminary	SB-3	9/6/90	0.5	<2.5			10				<0.5	<2.5		<2.5			<5.0
Preliminary	SB-3	9/6/90	1	3			12				<0.5	<2.5		<2.5			<5.0
Preliminary	SB-4	9/6/90	0.5	69	2.7		100				0.5	11		24			<5.0
Preliminary	SB-4	9/6/90	1	<2.5			21				<0.5	6.7		15			<5.0
Preliminary	SB-5	9/6/90	0.5	6.5			34				0.6	18		19			<5.0
Preliminary	SB-5	9/6/90	1	<2.5			26				<0.5	<2.5		<2.5			<5.0
Preliminary	SB-6	9/6/90	0.5	650	28		140				1.6	22		120			11
Preliminary	SB-7	9/6/90	1	67	0.34		37				<0.5	19		27			<5.0
Preliminary	SB-8	9/6/90	0.5	51	1.6		79				0.8	9.1		14			<5.0
Preliminary	SB-8	9/6/90	1	2.9			7.3				<0.5	20		20			<5.0
Preliminary	SB-9	9/6/90	0.5	200	19		18				<0.5	36		26			<5.0
Preliminary	SB-9	9/6/90	1	160	12		12				<0.5	9.2		15			<5.0
Preliminary	SB-10	9/6/90	0.5	12			130				<0.5	6.0		14			<5.0
Preliminary	SB-10	9/6/90	1	<2.5			79				<0.5	4		9.5			<5.0
Preliminary	SB-11	9/7/90	0.5	72	3.7		33				<0.5	21		38			<5.0
Preliminary	SB-11	9/7/90	1	22			18				<0.5	26		69			<5.0
Preliminary	SB-12	9/7/90	0.5	340	9.0		730	44			1.5	22		37			6.2
Preliminary	SB-12	9/7/90	1	17	0.72		20				0.5	5.4		7.4			<5.0
Preliminary	SB-13	9/7/90	0.5	31			10				<0.5	23		17			<5.0
Preliminary	SB-13	9/7/90	1	19			9.9				<0.5	13		18			<5.0
Preliminary	SB-14	9/7/90	0.5	61	6.6		47				0.7	23		35			<5.0
Preliminary	SB-14	9/7/90	1	55	1.4		81				<0.5	15		25			<5.0
Preliminary	SB-15	9/7/90	0.5	12			8.4				<0.5	12		25			<5.0
Preliminary	SB-15	9/7/90	1	39			9.8				<0.5	14		28			<5.0
Phase II	SB-6A	4/9/91	0.5	990	155												
Phase II	SB-6A	4/9/91	1	101	4.8												
Phase II	SB-6B	4/9/91	0.5	145	3.1												
Phase II	SB-6B	4/9/91	1	16.8	0.27												
Phase II	SB-6C	4/9/91	0.5	11.3	0.19												

TABLE 10
SUMMARY OF METAL CONCENTRATIONS IN SURFACE AND NEAR-SURFACE SAMPLES
Seabreeze Yacht Center Study Area, Oakland, California

Report	Sample Number	Sample Date	Depth (feet bgs)	Lead			Copper		Total As (mg/kg)	Total Ba (mg/kg)	Total Cd (mg/kg)	Total Cr (mg/kg)	Total Hg (mg/kg)	Total Ni (mg/kg)	Total Se (mg/kg)	Total Ag (mg/kg)	Total Sn (mg/kg)
				Total (mg/kg)	WET (mg/L)	TCLP (mg/L)	Total (mg/kg)	WET (mg/L)									
Phase II	SB-6C	4/9/91	1	3.5	0.14												
Phase II	SB-6D	4/9/91	0.5	8.5	0.16												
Phase II	SB-6D	4/9/91	1	7.9	0.25												
Phase II	SB-6E	4/9/91	0.5	7.8	0.29												
Phase II	SB-6E	4/9/91	1	142	2.8												
Phase II	SB-6F	4/9/91	0.5	9.3	0.16												
Phase II	SB-6F	4/9/91	1	8.4	<0.06												
Phase II	SB-6G	4/9/91	0.5	<3.0	0.10												
Phase II	SB-6G	4/9/91	1	67.3	<0.06												
Phase II	SB-6H	4/9/91	0.5	50.5	1.5												
Phase II	SB-6H	4/9/91	1	102	7.3												
Phase II	SB-9A	4/9/91	0.5	<3.0	0.06												
Phase II	SB-9A	4/9/91	1	<3.0	<0.06												
Phase II	SB-9B	4/9/91	0.5	60.8	5.6												
Phase II	SB-9B	4/9/91	1	34.8	1.4												
Phase II	SB-9C	4/9/91	0.5	483	28.3												
Phase II	SB-9C	4/9/91	1	45.3	3												
Phase II	SB-9D	4/9/91	0.5	119	2.3												
Phase II	SB-9D	4/9/91	1	82.4	8.6												
Phase II	SB-9E	4/9/91	0.5	138	8.6												
Phase II	SB-9E	4/9/91	1	125	2.9												
Phase II	SB-9F	4/9/91	0.5	152	9.1												
Phase II	SB-9F	4/9/91	1	509	61.6												
Phase II	SB-9G	4/9/91	0.5	217	38.8												
Phase II	SB-9G	4/9/91	1	53.7	11.7												
Phase II	SB-9H	4/9/91	1	382	11.1												
Phase II	SB-12A	4/9/91	0.5	413	39.8		1,780	21.2									
Phase II	SB-12A	4/9/91	1	490	8.3		40	9.2									
Phase II	SB-12B	4/9/91	0.5	116	0.26		368	7.6									
Phase II	SB-12B	4/9/91	1	70.5	3.9		87	4.6									
Phase II	SB-12C	4/9/91	0.5	86.8	2.9		237	11.9									
Phase II	SB-12C	4/9/91	1	97	5.7		55	1.7									
Phase II	SB-12D	4/9/91	0.5	82.2	3.3		418	11.0									

TABLE 10
SUMMARY OF METAL CONCENTRATIONS IN SURFACE AND NEAR-SURFACE SAMPLES
Seabreeze Yacht Center Study Area, Oakland, California

Report	Sample Number	Sample Date	Depth (feet bgs)	Lead			Copper		Total As (mg/kg)	Total Ba (mg/kg)	Total Cd (mg/kg)	Total Cr (mg/kg)	Total Hg (mg/kg)	Total Ni (mg/kg)	Total Se (mg/kg)	Total Ag (mg/kg)	Total Sn (mg/kg)
				Total (mg/kg)	WET (mg/L)	TCLP (mg/L)	Total (mg/kg)	WET (mg/L)									
Phase II	SB-12D	4/9/91	1	68.5	2.5		51	1.2									
Phase II	SB-12E	4/9/91	0.5	128	7.7		2,280	61.4									
Phase II	SB-12E	4/9/91	1	51.7	2.7		210	5									
Phase II	SB-12F	4/9/91	0.5	115	2.6		95	2.0									
Phase II	SB-12F	4/9/91	1	17.9	2.5		23	1.9									
Phase II	SB-12G	4/9/91	0.5	68.6	2.0		164	4.9									
Phase II	SB-12G	4/9/91	1	28.1	2.4		33	2.5									
Phase II	SB-14A	4/8/91	0.5	52	3.1												
Phase II	SB-14A	4/8/91	1	73	4												
Phase II	SB-14B	4/8/91	0.5	6.4	0.09												
Phase II	SB-14B	4/8/91	1	51	2.8												
Phase II	SB-14C	4/8/91	0.5	105	3.6												
Phase II	SB-14C	4/8/91	1	91	5.3												
Phase II	SB-14D	4/8/91	0.5	90	2.9												
Phase II	SB-14D	4/8/91	1	52	1.7												
Phase II	SB-14E	4/8/91	0.5	38.1	0.74												
Phase II	SB-14E	4/8/91	1	91.3	3.5												
Phase II	SB-14F	4/8/91	0.5	36.5	3.2												
Phase II	SB-14F	4/8/91	1	70.1	3.8												
Phase II	SB-14G	4/9/91	0.5	126	1.8												
Phase II	SB-14G	4/9/91	1	79.8	3.7												
Phase III	SB-6H	1/7/94	1.5	<4.9													
Phase III	SB-6I	1/7/94	0.5	80	5.4												
Phase III	SB-6I	1/7/94	1	45													
Phase III	SB-6J	1/7/94	0.5	24													
Phase III	SB-6K	1/7/94	0.5	180/3,700	--/340	10											
Phase III	SB-6L	1/7/94	1	49													
Phase III	SB-9	1/7/94	1.5	26													
Phase III	SB-9D	1/7/94	1.5	120	11	0.22											
Phase III	SB-9F	1/7/94	1.5	75	4.7												
Phase III	SB-9G	1/7/94	1.5	34													
Phase III	SB-9H	1/7/94	1.5	270	5.5												

TABLE 10
SUMMARY OF METAL CONCENTRATIONS IN SURFACE AND NEAR-SURFACE SAMPLES
Seabreeze Yacht Center Study Area, Oakland, California

Report	Sample Number	Sample Date	Depth (feet bgs)	Lead			Copper		Total As (mg/kg)	Total Ba (mg/kg)	Total Cd (mg/kg)	Total Cr (mg/kg)	Total Hg (mg/kg)	Total Ni (mg/kg)	Total Se (mg/kg)	Total Ag (mg/kg)	Total Sn (mg/kg)
				Total (mg/kg)	WET (mg/L)	TCLP (mg/L)	Total (mg/kg)	WET (mg/L)									
Phase III	SB-9I	1/7/94	0.5	310	15	0.48											
Phase III	SB-9J	1/7/94	0.5	110	3.1												
Phase III	SB-9J	1/7/94	1	84	2.7												
Phase III	SB-9K	1/7/94	0.5	240	7												
Phase III	SB-9K	1/7/94	1	93	6.8												
Phase III	SB-9K	1/7/94	1.5		4.1												
Phase III	SB-9L	1/7/94	1	<4.9													
Phase III	SB-9M	1/7/94	0.5	87	5.4												
Phase III	SB-9M	1/7/94	1	74/93	--/3												
Phase III	SB-9N	1/7/94	1	180	2.8												
Phase III	SB-9O	1/7/94	0.5	<5													
Phase III	SB-9O	1/7/94	1	<5													
Phase III	SB-9O	1/7/94	1.5	58	2												
Phase III	SB-12A	1/7/94	1.5	140	5.1		350	27									
Phase III	SB-12C	1/7/94	1.5	340	26	0.5	360	30									
Phase III	SB-12H	1/7/94	0.5	150	5.9		190										
Phase III	SB-12H	1/7/94	1	300	8		3,500										
Phase III	SB-12H	1/7/94	1.5		4.2		23										
Phase III	SB-12I	1/7/94	0.5	230	7.5		100										
Phase III	SB-12I	1/7/94	1	200	8		150										
Phase III	SB-12I	1/7/94	1.5		3.4												
Phase III	SB-12J	1/7/94	0.5	48			86										
Phase III	SB-12J	1/7/94	1	63	3.4		240										
Phase III	SB-12K	1/7/94	1	19			170										
Phase III	SB-12L	1/10/94	0.5	220	8.6		240										
Phase III	SB-12L	1/10/94	1	75	7.4		120										
Phase III	SB-12L	1/10/94	1.5	140	1.2		39										
Phase III	SB-14C	1/7/94	1.5	65	3.5												
Phase III	SB-14H	1/7/94	1	120	3												

TABLE 10
SUMMARY OF METAL CONCENTRATIONS IN SURFACE AND NEAR-SURFACE SAMPLES
Seabreeze Yacht Center Study Area, Oakland, California

Report	Sample Number	Sample Date	Depth (feet bgs)	Lead			Copper		Total As (mg/kg)	Total Ba (mg/kg)	Total Cd (mg/kg)	Total Cr (mg/kg)	Total Hg (mg/kg)	Total Ni (mg/kg)	Total Se (mg/kg)	Total Ag (mg/kg)	Total Sn (mg/kg)
				Total (mg/kg)	WET (mg/L)	TCLP (mg/L)	Total (mg/kg)	WET (mg/L)									
Phase III	SB-14I	1/7/94	1	230	3.1												
Interim	BD-4[1]	11/10/94	0	150			53		11	360	0.77	31	0.29	39	<2.5	<0.99	
2nd Interim	PW2 12"	1/30/95	1	210					4.9	190	0.53	140	0.22		<2.5	<0.50	
2nd Interim	PW3 12"	1/30/95	1	81					5.7	140	0.58	35	<0.091		<2.5	<0.50	
2nd Interim	PW4 12"	1/30/95	1	43					5.5	86	0.4	31	<0.10		<2.5	<0.50	
3rd Interim	S-11	8/11/95	1	150			28										
3rd Interim	S-12	8/11/95	1	7.4			5.4										

Notes: bgs = below ground surface

<x = Metal not identified above laboratory reporting limit of x.

xx/yy = Results of two separate analyses of the same sample.

WET = Waste Extraction Test

TCLP = Toxicity Characteristic Leaching Procedure

Pb = lead, Cu = copper, As = arsenic, Ba = barium, Cd = cadmium, Hg = mercury, Ni = nickel, Se = selenium, Ag = silver, Sn = tin

See Figure 16 for sample locations.

[1] This sample was analyzed for all of the Title 22 metals. Concentrations of metals not listed in table in mg/kg are as follows: Be = 0.63, Co = 8.2, Hg = 0.29, Mo = <2.0, Sb = <5.9, Tl= <2.5, V = 40, and Zn =300.

TABLE 11
SUMMARY OF PETROLEUM CONCENTRATIONS IN SURFACE AND NEAR-SURFACE SAMPLES
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Date Sampled	Sample Depth (feet bgs)	TPH as Diesel	TPH as Bunker C Lab. Std.	TPH as Bunker C Site Std.	Nonpolar O&G	Total O&G
Preliminary	SB-8	9/6/90	0.5				<125	230
Preliminary	SB-15	9/7/90	0.5				7,800	18,000
Preliminary	SB-15	9/7/90	1.0				4,200	7,900
Phase III	BC-1	8/15/94	1.0		1,900	1,900		
Phase III	BC-3	8/15/94	1.0		1,100	1,100		
Phase III	BC-4	8/15/94	1.75		3,000	3,000		
Phase III	BC-7	8/15/94	0.5		1,000	1,100		
Phase III	BC-10	8/15/94	0		<25	<25		
Phase III	BC-12	8/15/94	0.0		<25	<25		
Phase III	BC-13	8/15/94	0.5		2,000	2,300		
Interim	BD-4[1]	11/10/94	0	<10	1,600	1,900		
2nd Interim	PW-1 18"	1/31/95	1.5	30[2]				
2nd Interim	PW-2 6"	1/30/95	0.5	1,000[2]				
2nd Interim	PW-3 @ 6"	1/30/95	0.5	<50[2]				
2nd Interim	PW-4 @ 6"	1/30/95	0.5	<50[2]				

Notes: bgs = below ground surface.

<x = Compound(s) not identified above laboratory reporting limit of x.

TPH = Total petroleum hydrocarbons.

O&G = Oil and grease.

See Figure 16 for sample locations.

[1] Sample also analyzed for volatile organic compounds by EPA Method 8240. None of the compounds were identified above laboratory reporting limits.

[2] Quantification based on extended range spanning both diesel and motor oil retention times.

TABLE 12
SUMMARY OF METAL CONCENTRATIONS IN SEDIMENT
Seabreeze Yacht Center Study Area, Oakland
(mg/kg)

Report	Sample Number	Sample Date	Depth (feet bgs)	Total As	Total Ba	Total Cd	Total Cr	Total Cu	Total Hg	Total Pb	Total Ni	Total Se	Total Ag	Total V
2nd Interim	Shore-1-Surface	1/18/95	0	<2	45	<2	26		<2	8	28	<2	<2	39
2nd Interim	Shore-1-3'	1/18/95	3	6	7	<2	22		<2	55	22	<2	<2	23
2nd Interim	Shore-2-Surface	1/18/95	0	3	56	<2	59		<2	230	14	<2	<2	5
2nd Interim	Shore-2-3'	1/18/95	3	5	79	<2	29		<2	34	43	<2	<2	33
2nd Interim	Shore-2d-Surface	1/18/95	0	3	100	<2	110		<2	600	13	<2	<2	6
2nd Interim	Shore-2d-3'	1/18/95	3	5	38	<2	33		<2	20	52	<2	<2	28
2nd Interim	Shore-3-Surface	1/19/95	0	9	27	<2	12		<2	240	13	<2	<2	110
2nd Interim	Shore-3-2.5	1/19/95	2.5	6/5	15/14	<2/<2	27/26		<2/<2	11/11	46/44	<2/<2	<2/<2	26/25
2nd Interim	Shore-4-Surface	1/18/95	0	9	64	<2	15		<2	420	24	<2	<2	30
2nd Interim	Shore-4-3'	1/18/95	3	10	34	<2	18		<2	270	47	3	<2	26
2nd Interim	Shore-5-Surface	1/19/95	0	6	31	<2	17		<2	300	27	<3	<2	21
2nd Interim	Shore-5-3.0	1/19/95	3	9	54	<2	18		<2	600	30	<2	<2	27
2nd Interim	Shore-6-Surface	1/19/95	0	5	34	<2	11		<2	100	13	<2	<2	38
2nd Interim	Shore-6-2.0	1/19/95	2	9	30	<2	15		<2	110	26	<2	<2	25
CC Removal	C-2	1/12/96						15.3		5.83				
CC Removal	C-3	1/12/96						16.1		6.62				
CC Removal	C-4	1/12/96						14.7		5.72				
CC Removal	C-5	1/12/96						14.6		6.5				
CC Removal	C-6	1/14/96						14.1		7.45				
CC Removal	C-7	1/12/96						14.5		5.59				

Notes: bgs = below ground surface.

<x = Metal not identified above laboratory reporting limit of x.

xx/yy = Results of two separate analyses of the same sample.

As = arsenic, Ba = barium, Cd = cadmium, Cr = chromium, Cu = copper, Hg = mercury, Ni = nickel, Se = selenium, Ag = silver, and V = vanadium.

See Figure 17 for sample locations.

TABLE 13
SUMMARY OF PETROLEUM CONCENTRATIONS IN SEDIMENT
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Date Sampled	Sample Depth (feet bgs)	TPH as Diesel	TPH as Bunker C Lab. Std.	TPH as Bunker C Site Std.	TRPH
2nd Interim	Shore-1-Surface	1/18/95	0				<10
2nd Interim	Shore-1-3'	1/18/95	3				15
2nd Interim	Shore-2-Surface	1/18/95	0				44
2nd Interim	Shore-2-3'	1/18/95	3				<10
2nd Interim	Shore-2d-Surface	1/18/95	0				59
2nd Interim	Shore-2d-3'	1/18/95	3				360
2nd Interim	Shore-3-Surface	1/19/95	0				160
2nd Interim	Shore-3-2.5	1/19/95	2.5				18
2nd Interim	Shore-4-Surface	1/18/95	0				370
2nd Interim	Shore-4-3'	1/18/95	3				24
2nd Interim	Shore-5-Surface	1/19/95	0				28
2nd Interim	Shore-5-3.0	1/19/95	3				140
2nd Interim	Shore-6-Surface	1/19/95	0				58
2nd Interim	Shore-6-2.0	1/19/95	2				33
CCRemoval	C-2[1]	11/12/96	0.5	33	<10	<10	
CCRemoval	C-3[1]	11/12/96	0.5	<5	<10	<10	
CCRemoval	C-4	11/12/96	0.5	<5	<10	<10	
CCRemoval	C-5	11/12/96	0.5	<5	<10	<10	
CCRemoval	C-6[1]	11/14/96	0.5	<5	<10	<10	
CCRemoval	C-7	11/12/96	0.5	<5	<10	<10	

Notes: bgs = below ground surface.

<x = Compound(s) not identified above laboratory reporting limit of x.

TPH = Total petroleum hydrocarbons.

TRPH = Total recoverable petroleum hydrocarbons.

See Figure 17 for sample locations.

[1] Silica Gel Cleanup was performed on the sample prior to analysis.

TABLE 14
SUMMARY OF SEMI-VOLATILE ORGANIC COMPOUNDS AND POLYCHLORINATED BIPHENYL CONCENTRATIONS IN SEDIMENT
Seabreeze Yacht Center Study Area, Oakland, California
(mg/kg)

Report	Sample Number	Date Sampled	Sample Depth (feet bgs)	Semi-Volatile Organic Compounds		Polychlorinated Biphenyls	
2nd Interim	Shore-2d-Surface	1/18/95	0	Di-n-butylphthalate	1	Aroclor 1260[1]	2.9
				Pyrene	0.039		
				Butylbenzylphthalate	0.067		
				Bis(2-ethylhexyl)phthalate	20		
				Di-n-octylphthalate	0.16		
2nd Interim	Shore-2-3'	1/18/95	3	Di-n-butylphthalate	0.053	NA	
				Bis(2-ethylhexyl)phthalate	0.2		
				Benzo(b)fluoranthene	0.037		
				Benzo(k)fluoranthene	0.038		
2nd Interim	Shore-2x	3/6/95	1.5	NA		Aroclor 1260	4.7
2nd Interim	Shore-4-3'	1/18/95	3	Acenaphthylene	0.03	NA	
				Acenaphthene	0.025		
				Fluorene	0.061		
				Phenanthrene	0.67		
				Anthracene	0.25		
				Di-n-butylphthalate	0.11		
				Fluoranthene	1		
				Pyrene	0.99		
				Butylbenzylphthalate	0.14		
				Benzo(a)anthracene	0.36		
				Chrysene	0.69		
				Bis(2-ethylhexyl)phthalate	0.17		
				Benzo(a)pyrene	0.47		
				Benzo(b)fluoranthene	0.63		
				Benzo(k)fluoranthene	0.37		
				Indeno(1,2,3-cd)pyrene	0.27		
				Dibenz(a,h)anthracene	0.16		
				Benzo(g,h,I)perylene	0.31		

Notes: bgs = below ground surface.

NA = not analyzed.

See Figure 17 for sample locations.

[1] Only Arochlor 1260 was targeted for analysis in this sample .

TABLE 15

Results of Aquatic Toxicity Tests for Petroleum Hydrocarbons[1, 2]
Seabreeze Yacht Center Study Area, Oakland, California

Exposure Medium Sample Site Test Species/Endpoint	EC25[3]/IC25[4]/LC25[5]	
	Diesel	Diesel/Bunker C
Soil Elutriate Test[6]		
Hunters Point:[7]		
Sea urchin development	5,878(1); 12,627 (2)	
Bivalve larval development	5,762 (1)	
Groundwater Test		
Point Molate:[8]		
Bivalve larval development	>4,760[9] (1)	>1,330[9] (1)
Mysid survival/growth/fecundity	748/1,258/540 (1)	1,091/>1,900[10]/646 (1)
Hunters Point:[11]		
Mysid growth[12]	315 (1); 1,521 (2)	
WAF Test[13]		
Treasure Island:		
Sea urchin fertilization	1,717[9]	
Bivalve larval development	7,400[9]	

Notes: Numbers shown in parentheses represent the number of samples tested.

1 While petroleum hydrocarbons other than diesel or diesel/Bunker C were often evaluated in the studies (e.g., TPH as motor oil, gasoline, jet fuel), this table only includes TPH as diesel and diesel/Bunker C bioassay results. EC25/IC25/LC25 results are shown since these are the bioassay endpoints upon which screening levels for petroleum hydrocarbons are commonly based. Refer to the citation for other toxicity values.

2 Additional work completed by Anderson, et al. (1974) used water soluble fractions and oil-in-water dispersions from two crude oils, South Louisiana crude and Kuwait crude, and two refined oil products, No. 2 fuel oil and Bunker C residual oil, in bioassay tests performed on three crustacean and three fish species. In this study using marine aquatic species native to Texas, No. 2 fuel oil and Bunker C residual oil were considerably more toxic to the six test species than were those of the crude oils. With one exception (*M. almyra*), Bunker C was generally found to be slightly more toxic to the test organisms than No. 2 fuel oil, when compared on a part per million basis. Because none of the test species in the study matched species from bioassays for Bay Area sites, application of this data for species in the Bay Area is uncertain. However, *M. almyra* is within the same genus as *M. edulis*, which is used in Bay Area studies, and may be expected to have a similar response. The *M. almyra* results indicate that Bunker C was less toxic to the organisms tested than Diesel No. 2.

3 ECxx = effective concentration of test solution that would cause an effect on xx% of the organisms tested. EC is often used interchangeably with ICxx (U.S. EPA, 1995).

4 ICxx = effective concentration of test solution that would produce a xx% inhibition in the endpoint measured. ICxx is often used interchangeably with ECxx (U.S. EPA, 1995).

5 LCxx = lethal concentration at which xx% of test organisms die (U.S. EPA, 1995).

Table 15 - *continued*

[6] Soil elutriates (or eluates) were prepared for each soil sample by combining seawater with soil in a specified ratio, tumbling the mixture and allowing it to settle for a specified time period, decanting off the liquid phase after settling, and centrifuging the liquid. The supernatant liquid (the elutriate) was then decanted into appropriate containers for toxicity and analytical testing. Elutriates are used in toxicological evaluations to measure the effects of chemicals in the water column on ecological receptors.

[7] PRC, 1997a; AFA Construction, 1997.

[8] MEC, 1997; Seur, 1997.

[9] Original citation not reviewed; data obtained from L. Seur, U.S. Environmental Protection Agency, 1999.

[10] EC25 for mysid growth exceeded 100%.

[11] PRC, 1997a; AFA Construction, 1997.

[12] Only the EC25 for mysid growth was presented in the report; see Figures A-1 through A-3.

[13] Water accommodated fraction (WAF) is a petroleum product mixed with seawater from which test dilutions of the desired concentrations were prepared for use in bioassay testing.

APPENDIX A

ALAMEDA COUNTY LETTER

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION (LOP)
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

March 3, 1999
SLIC #236

Ms. Diane Heinze
Port of Oakland
530 Water Street, 2nd Floor
Oakland, CA 94607

Subject: **Request for Information to Assess Ecological Risk and Risk Manage Former Seabreeze Yacht Center 280 Sixth Avenue, Oakland CA 94606**

The following documents our February 23, 1999 meeting with Stephen Hill, of the Regional Water Quality Control Board, and Yane Nordhav, of Baseline Environmental. The purpose of the meeting was to follow up on my January 25, 1999 letter to you, which requested that the Port of Oakland assess ecological risks at the Former Seabreeze Yacht Center. Our meeting provided an opportunity to review existing soil and groundwater data at the site, discuss the need for additional work and discuss cleanup levels established by the RWQCB at other Bayside sites. We also discussed potential risk management options, which could be included in a Risk Management Plan (RMP) for the site.

Based on the discussion at the meeting, please submit the following information:

- Sediment data: Provide all existing sediment data including any data near the former concrete containment area and any other known source areas. Provide a map showing sample locations relative to the high tide line, if possible.
- Surficial soil data: Summarize in tabular form and on a map, all soil sampling data within the top one-two foot depth.
- Bunker C toxicity: Provide information on the toxicity to aquatic life and characteristics of Bunker C relative to diesel.
- Proposal to remediate and seal the cooling water intake/discharge tunnels which pose a potential threat to the estuary.

In addition, our office requests a concise historical site summary including maps and tabulated results indicating the location and concentration of all residual contamination at this site. Such information will be included in the Risk Management Plan.

Please submit this information to me and Derek Lee, of the RWQCB, **within six weeks of receipt of this letter or by April 15, 1999**. Based on this information, the County and RWQCB will assess whether additional field sampling may be required and whether site conditions warrant an ecological risk assessment.

Submittal of this information is required per Chapter 6.5, Article 8, Section 25187 (a) (1) of the Health and Safety Code and 13267 (b) of the Water Code.

If you have any questions, please contact me at 510-567-6765.

Sincerely,

Barney Chan

Barney Chan
Hazardous Materials Specialist

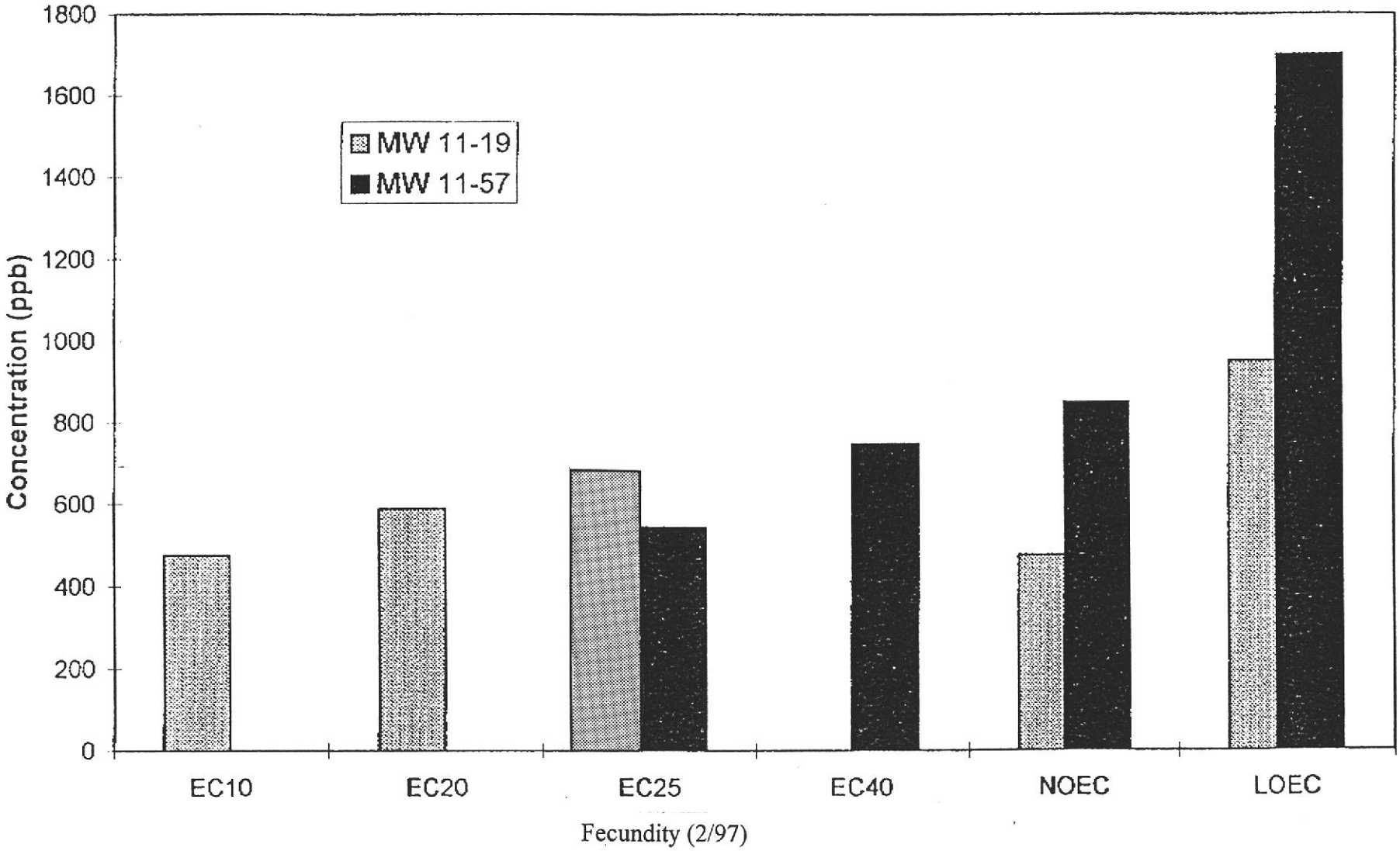
cc: ✓ Yane Nordhav, Baseline Environmental, 5900 Hollis St., Suite D, Emeryville, CA 94608
Derek Lee and Stephen Hill, RWQCB, 1515 Clay St., Ste. 1400, Oakland CA 94612
Michele Heffes, Port of Oakland, 530 Water St., Oakland CA 94607

POOSeabreeze

APPENDIX B

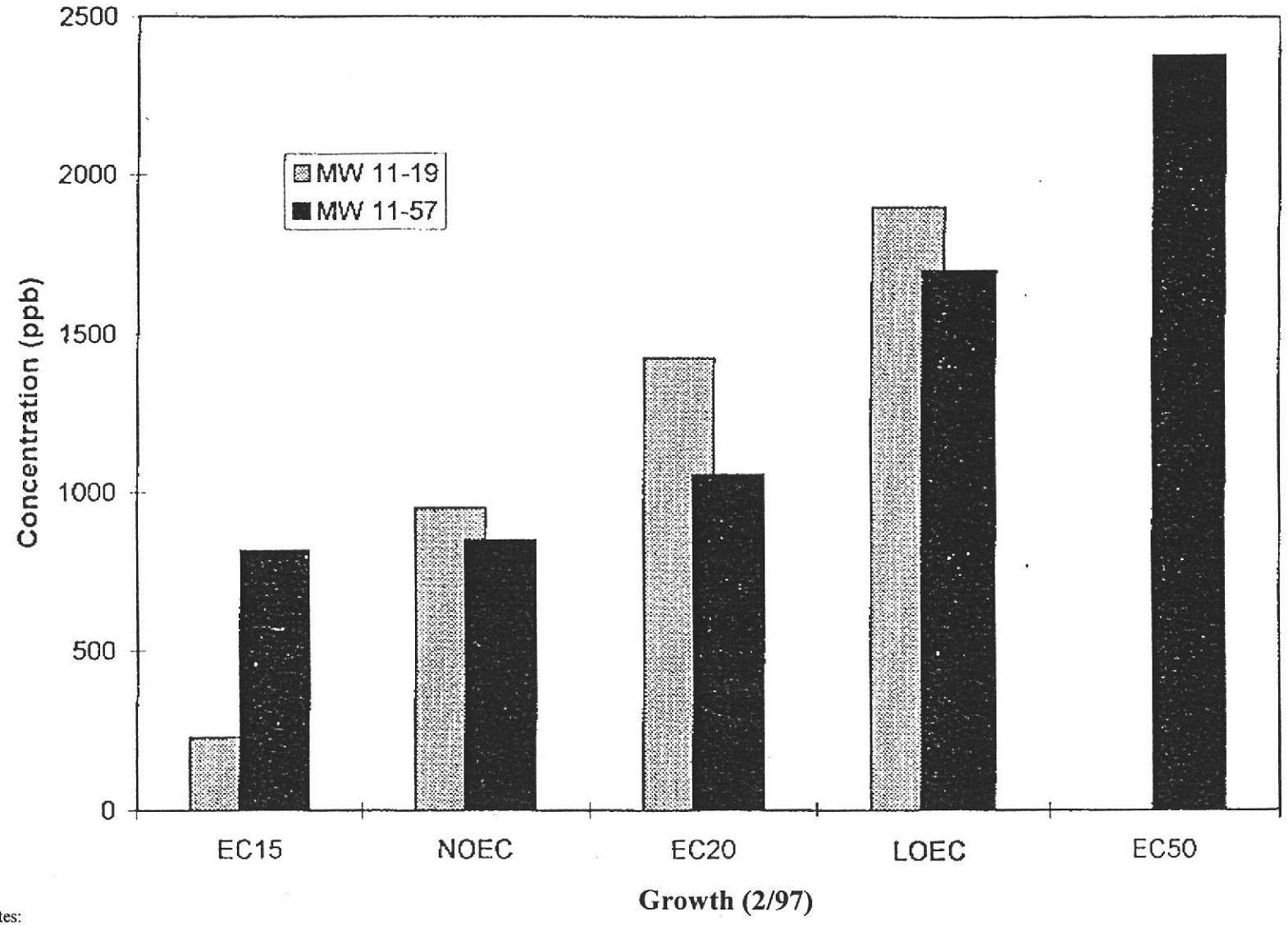
MARINE AQUATIC BIOASSAY DATA

Figure B-1: Toxicity of Diesel and Diesel/Bunker C to Fecundity of Mysid Shrimp (Pt. Molate)



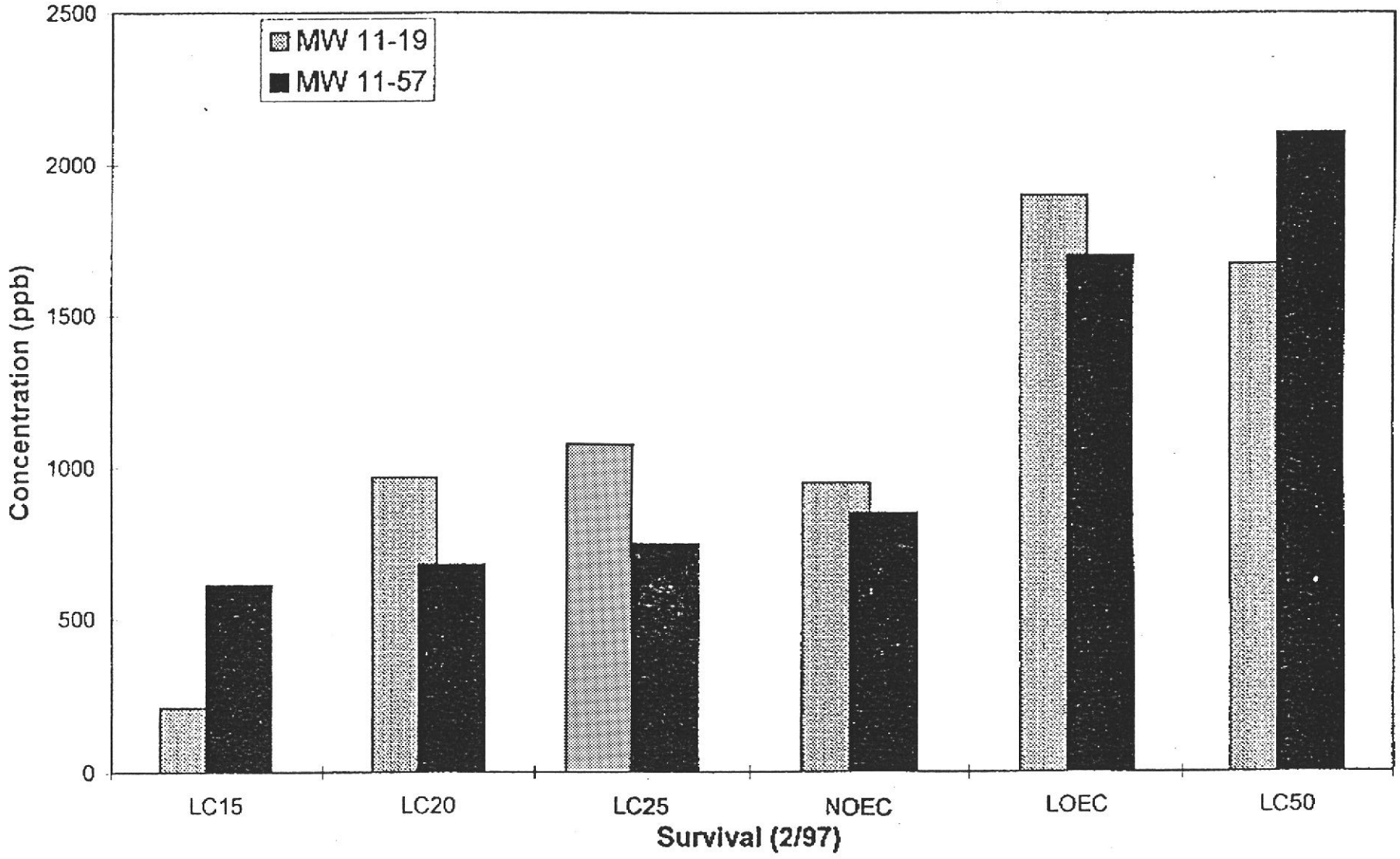
Notes:
Source: Mims, 1997.
Groundwater sample MW-19 contained 1,900 ug/L TPH as diesel, and 800 ug/L TPH as Bunker C.
Groundwater sample MW-57 contained 6,800 ug/L TPH as diesel.
ECxx = effective concentration of test solution that would cause an effect on xx% of the organisms tested.
NOEC = no observed effects concentration.
LOEC = lowest observed effects concentration.

Figure B-2 : Toxicity of Diesel and Diesel/Bunker C to the Growth of Mysid Shrimp (Pt. Molate)



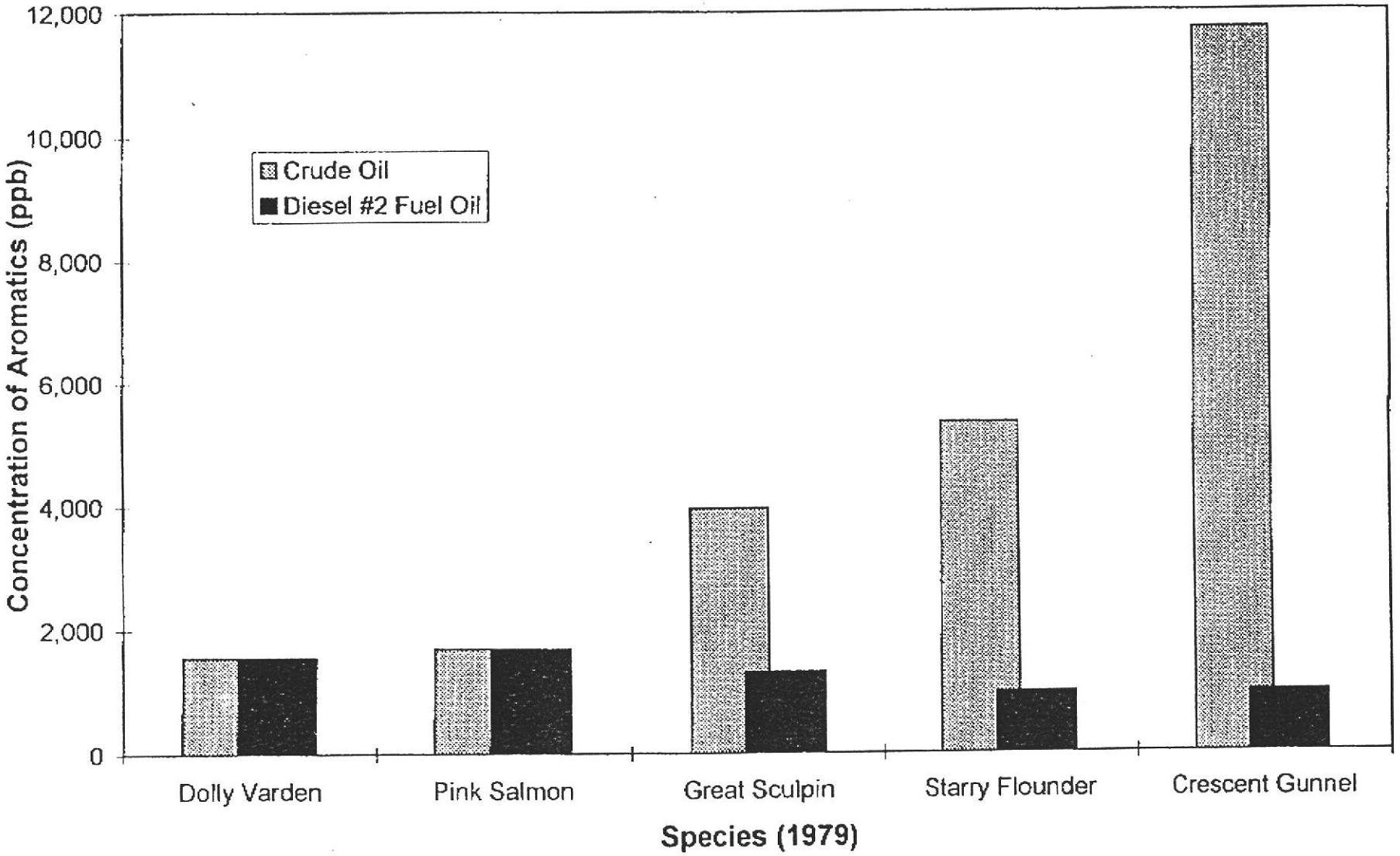
Notes:
Source: Mims, 1997.
Groundwater sample MW-19 contained 1,900 ug/L TPH as diesel, and 800 ug/L TPH as Bunker C.
Groundwater sample MW-57 contained 6,800 ug/L TPH as diesel.
EC25 results were 1,258 and >1,900 ppb for MW 11-57 and MW11-19, respectively.
ECxx = effective concentration of test solution that would cause an effect on xx% of the organisms tested.
NOEC = no observed effects concentration.
LOEC = lowest observed effects concentration.

Figure B-3: Toxicity of Diesel and Diesel/Bunker C to Survival of Mysid Shrimp (Pt. Molate)



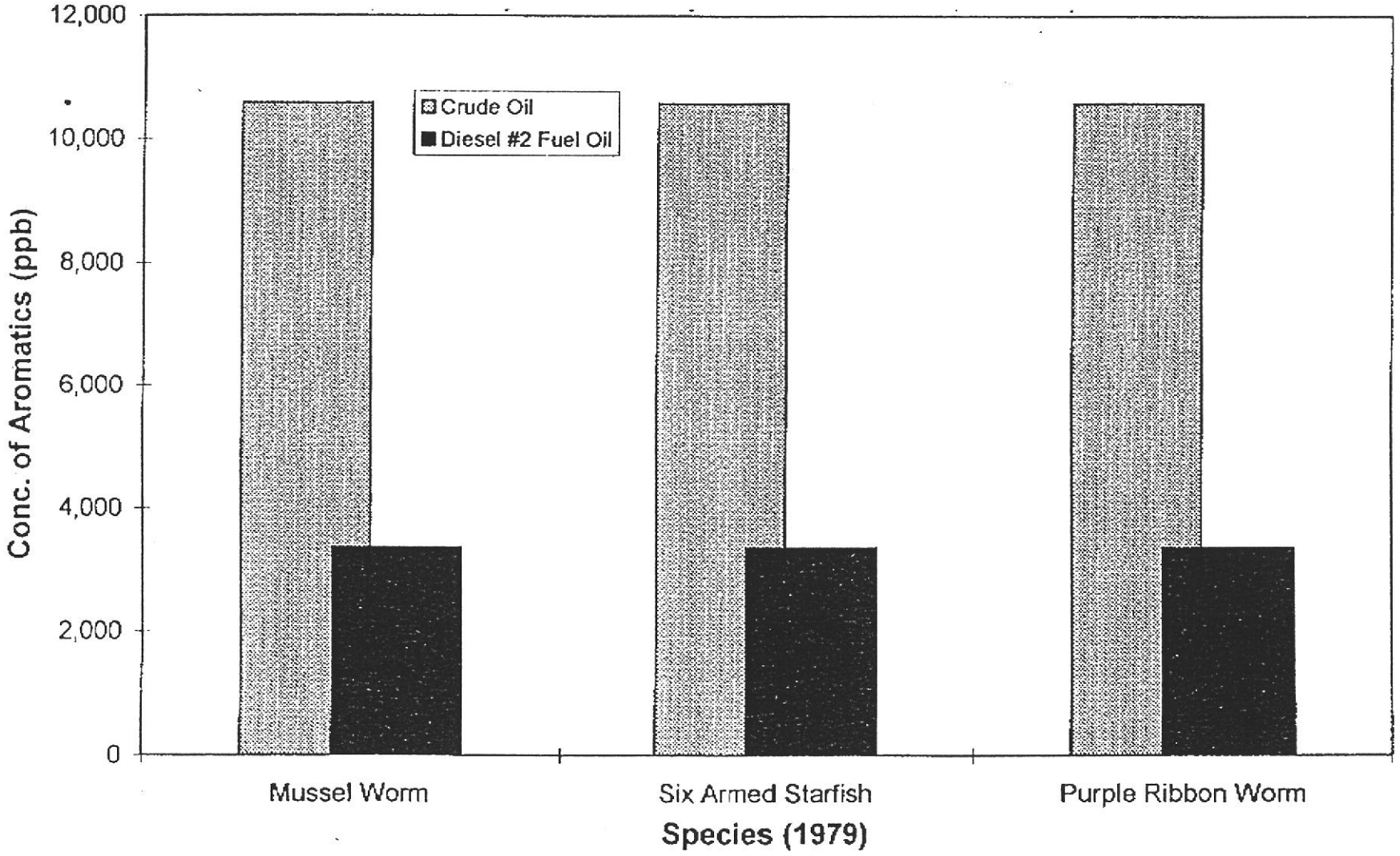
Source: Mims, 1997.
Groundwater sample MW-19 contained 1,900 ug/L TPH as diesel, and 800 ug/L TPH as Bunker C.
Groundwater sample MW-57 contained 6,800 ug/L TPH as diesel.
LCxx = lethal concentration at which xx% of test organisms die.
NOEC = no observed effects concentration.
LOEC = lowest observed effects concentration.

Figure B-4: Toxicity of Crude Oil vs. Diesel #2 Fuel Oil on Fish Species



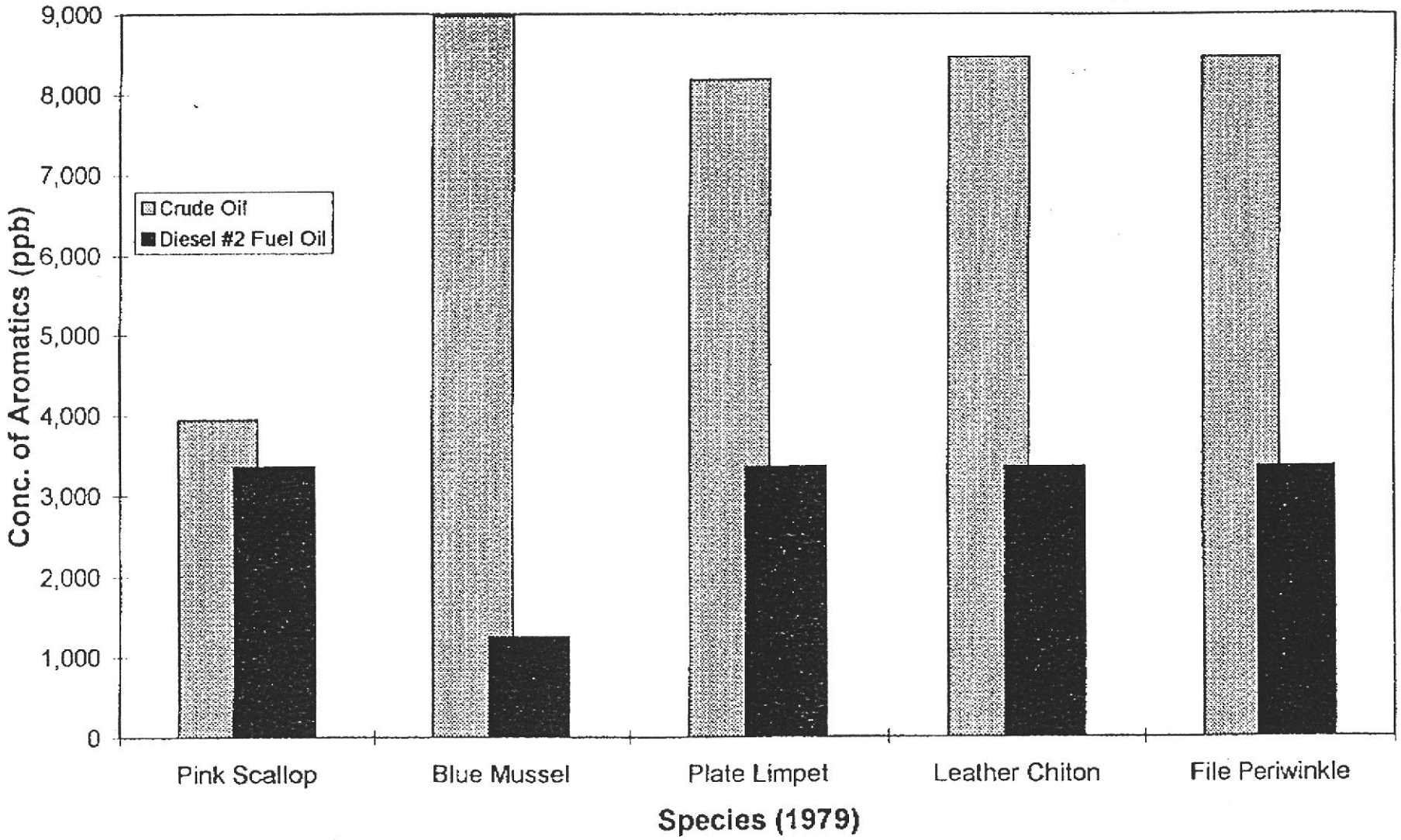
Notes:
Source: Mims, 1997, as cited from NOAA, 1979.

Figure B-5: Toxicity of Crude Oil vs. Diesel #2 Fuel Oil on Echinoderms, Annelids, and Nemerteans



Notes:
Source: Mims, 1997, as cited from NOAA, 1979.

Figure B-6: Toxicity of Crude Oil vs. Diesel #2 Fuel Oil on Mollusks



Notes:
Source: Mims, 1997, as cited from NOAA, 1979.