CROWLEY MARINE SERVICES, INC.

March 22, 1996

Mr. Barney Chan
Alameda County Health Care Service Agency
Department of Environmental Health
1131 Harbor Bay Parkway, #260
Alameda, California 94502-6577

Reference: **Preliminary Investigation and Evaluation Report for the former Pacific Dry Dock and Repair Company Yard II Facility, Oakland, California**

Dear Mr. Chan:

Enclosed for your review is the Preliminary Investigation and Evaluation Report (PIER) for the above referenced property at 321 Embarcadero, in Oakland. After your review of the PIER I would welcome the opportunity to meet with you to discuss the PIER and additional work which may be required.

Please contact me at (206) 443-8042 with any questions or comments that you may have regarding this matter.

Sincerely,

Stephen Wilson
Manager, Environmental Compliance

Enclosure

cc: PDDII Correspondence w/o enclosure
PDDII Reports w/enclosure
Dan Schoenholtz w/enclosure
Beth Hamilton w/o enclosure
Paul Graff w/o enclosure

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Versar INC.

PRELIMINARY INVESTIGATION AND EVALUATION REPORT FORMER PACIFIC DRY DOCK AND REPAIR COMPANY YARD II FACILITY OAKLAND, CALIFORNIA

Prepared for:

CROWLEY MARINE SERVICES, INC.
2401 Fourth Avenue
P.O. Box 2287
Seattle, Washington 98111

Prepared by:

VERSAR, INC.
7844 Madison Avenue, Suite 167
Fair Oaks, California 95628

Versar Project No. 2463-108

March 20, 1996

EXECUTIVE SUMMARY

On behalf of Crowley Marine Services, Inc. (Crowley), Versar, Inc. (Versar), has conducted an environmental investigation at the site known as the former Pacific Dry Dock and Repair Company Yard II, at 321 Embarcadero, Oakland, California (Site). This report summarizes the soil and groundwater data collected at the Site from December 1989 through January 1996.

The following activities have been conducted as part of the investigation:

- Soil samples have been collected from 67 locations, using hand-auger, hydraulic punch, and hollow-stem auger drilling methods. The samples were collected from six areas of interest and analyzed for a variety of chemical constituents, including total oil and grease, total petroleum hydrocarbons as gasoline and diesel, benzene, toluene, ethylbenzene, xylenes, chlorinated hydrocarbons, semi-volatile hydrocarbons, and selected metals.

- Grab groundwater samples were collected from 12 temporary groundwater sampling points and one boring. Also, seven groundwater monitoring wells have been installed at the Site and four quarterly sampling events have been conducted. The groundwater samples have been analyzed for the same constituents as the soil samples.

The soil sampling results indicate heavy, nonvolatile petroleum hydrocarbons (e.g., total oil and grease, total petroleum hydrocarbons as diesel) in soil from near the surface to approximately 16 feet below grade (below groundwater) in the areas of interest. Some lighter hydrocarbons (e.g., total petroleum hydrocarbons as gasoline, benzene, chlorobenzene) are present in the northeastern portion of the Site.

Groundwater is approximately two to five feet below grade. Groundwater sampling results indicate a plume in the northeastern portion of the Site, containing similar constituents as those found in the soil.

The limited extent and magnitude of impacted groundwater relative to soil implies effective natural attenuation mechanisms (e.g., biodegradation, volatilization, soil adsorption).

Prepared by:

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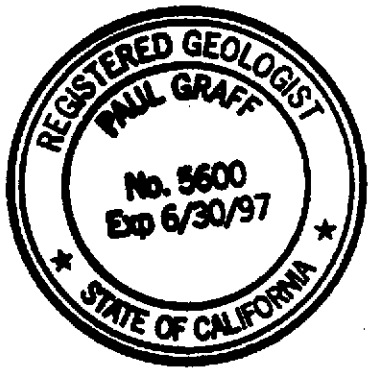
Senior Geologist
California Registered Geologist No. 5600



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1.0 INTRODUCTION

Crowley Marine Services, Inc. (Crowley), retained Versar, Inc. (Versar), to conduct an environmental investigation at the former Pacific Dry Dock and Repair Company Yard II Facility (Site) located at 321 Embarcadero in Oakland, California (Figure 1). This report presents results of the investigations conducted from 1989 through 1996.

1.1 Site Description

The Site occupies approximately 1.5 acres of shoreline property between the Embarcadero and the Oakland Inner Harbor. The property is bounded by Oakland Inner Harbor on the south and west, the Embarcadero on the north, and industrial property on the east (Figure 2).

1.2 Site Geology and Hydrogeology

The Site is located in the Coast Ranges geomorphic province between the Hayward Fault (to the east) and the San Andreas Fault (to the west). The underlying bedrock consists of Mesozoic volcanic and metavolcanic rocks similar to those found throughout the Coast Ranges. Overlying the bedrock are Quaternary marine and nonmarine alluvial sediments consisting of clays and silts.

The Site is nearly level at an elevation between five and eight feet above mean sea level (National Geodetic Vertical Datum of 1929). Versar has characterized the shallow soils as gravel, sand, silt, and clay fill material extending from the surface to the bay muds. The depth of the bay muds is between 15 feet and 20 feet below ground surface (bgs). The bay muds consist of silty clays, clays with shell fragments, and thin water-saturated layers of sands or gravels.

Groundwater has been reported beneath the Site at depths ranging from approximately two to five feet bgs. Because of the Site's proximity to the waterfront, groundwater depth and movement are expected to be tidally influenced. However, the typical groundwater gradient is approximately 0.015 to the northwest.

1.3 Site History

In approximately 1942, the United States Navy leased from the City of Oakland the property at 321 Embarcadero, which then consisted largely of unfilled bay lands, and an adjoining parcel which housed a dry dock and marine railway. Soon thereafter, the Navy undertook a massive project whereby the bay lands were filled, and a pier and several buildings were constructed on the filled area. The Navy used the facility until 1951 for military purposes related to maintenance and repair. From 1951 to 1963, the facility was subleased by the Navy to Martinolich Ship Repair Co., and in 1963 Mr. Thomas Crowley purchased the Martinolich company, which then leased the property directly from the City. Since that time, the facilities at 321 Embarcadero have been operated by Crowley Marine Services or a corporate predecessor. The property has been used for industrial purposes since 1942, primarily as a ship repair and maintenance facility.

1.4 Site Environmental Activities

This section summarizes the soil and groundwater sampling activities conducted at the Site. All analytical and groundwater level data are shown in the attached tables and figures. Additional information for each sampling event can be found in the referenced documents.

In December 1989, Versar performed a limited subsurface investigation to assess the impact of historical activities on site soils. The focus of the investigation was on areas where aboveground (AST) and underground storage tanks (UST) were located and sand-blasting activities had occurred. The investigation included hand-augering 11 boreholes (PDDII-1 through PDDII-11) to approximately two to five feet bgs, and collecting 20 soil samples and several spent sand-blasting material samples.

Selected soil samples were analyzed for concentrations of total recoverable petroleum hydrocarbons (TRPH); benzene, toluene, ethylbenzene, and total xylenes (BTEX); semi-volatile hydrocarbons; chlorinated hydrocarbons; and selected metals. The investigation results were presented in the *Site Assessment of Pacific Dry Dock Yards I and II Report*, dated October 2, 1990; and in the *Site Investigation Work Plan, Pacific Dry Dock and Repair Yard II*, dated June 13, 1991. Subsequent investigation activities were conducted according to the work plan, which was approved by the Alameda County Health Care Services Agency (County) in August 1992, and subsequent addenda.

In May 1994, Versar performed an additional subsurface investigation at the Site. The investigation included collecting 30 soil samples and one water sample from 18 boreholes (BH1 through BH18). The purpose of the investigation was to further delineate the impacted soils identified in the December 1989 investigation and to assess groundwater conditions. The soil samples were analyzed for total oil and grease (TOG), total petroleum hydrocarbons as diesel (TPH-D) and gasoline (TPH-G), BTEX, semivolatile hydrocarbons, chlorinated hydrocarbons, and selected metals. The grab groundwater sample was analyzed for TPH-G, BTEX and chlorinated hydrocarbons. The findings of this investigation were presented in the *Soil and Groundwater Investigation Report*, dated July 14, 1995.

In July 1994, Versar supervised the drilling of three boreholes and the installation of three, four-inch-diameter groundwater monitoring wells at the Site (MW1 through MW3). The wells were developed and sampled according to EPA protocols, and the samples analyzed for TPH-D, TPH-G, and volatile organic compounds by EPA Method 8240 (including BTEX and chlorinated hydrocarbons). The results were reported in the *Well Installation and Monitoring Report*, dated June 14, 1995.

In September 1994, Versar supervised the removal of a 500-gallon UST from the location shown in Figure 2. Soil samples collected from the excavation following removal of the UST were analyzed for TPH-G, BTEX, and total lead. The results were reported in the *Underground Storage Tank Removal Report*, dated February 14, 1995. Site closure regarding the former UST was received from the Alameda County Health Care Services Agency in a letter dated March 2, 1995.

In April 1995, Versar performed an additional subsurface soils investigation at the site. During the investigation, 33 soil samples were collected from 28 locations (CH1, CH1A, etc. through CH14). Selected samples were analyzed for TPH-D, TPH-G, BTEX, chlorinated hydrocarbons, and metals. The purpose of this investigation was to delineate the extent of petroleum hydrocarbon- and metals-impacted vadose soils identified during the December 1989 and May 1994 investigations. The findings of the April 1995 investigation were presented in the *Soil and Groundwater Investigation Report*, dated July 14, 1995.

In July 1995, Versar collected filtered groundwater samples from 10 temporary groundwater sampling points installed across the Site (TGSP1 through TGSP11; no samples were collected from TGSP5). The points were installed by placing slotted casing into borings advanced using a hydraulic punch rig. The samples were analyzed for TPH-D, TPH-G, BTEX, chlorinated hydrocarbons, and selected metals.

As a result of the July 1995 groundwater investigation, four additional groundwater monitoring wells were installed and sampled in September 1995. Soil and groundwater sampling results from this work are presented in the *Monitoring Well Installation and Third Round Groundwater Monitoring Report*, dated December 1, 1995.

2.0 INVESTIGATION AREAS

Based on initial soil sampling results and information regarding past activities at the facility, the Site has been divided into six areas of investigation, as shown in Figure 2:

Area 1. This area was identified during the December 1989 investigation (by PDDII-1 soil samples) as containing TRPH, lead, and mercury concentrations above estimated background concentrations in some soil samples.

Area 2. This area was identified during the December 1989 investigation (by PDDII-3 soil samples) as containing TRPH, tetrachloroethene, and semivolatile hydrocarbons in soil.

Area 3. An aboveground 500-gallon diesel tank was operated in this area.

Area 4. TRPH concentrations were identified in soil in this area in the December 1989 investigation (by sample PDDII-5).

Area 5. This area was identified by aerial photographs as containing potentially disturbed regions.

Area 6. This area contains aboveground diesel fuel storage tanks.

3.0 SOIL INVESTIGATION RESULTS

Soil sampling analytical results are summarized in Tables 1 through 6. Soil sampling locations are shown on Figure 3. Figures 5 through 9 and 11 show analytical results of compounds of interest detected in the soil samples from each area.

3.1 Area 1

Area 1 soil sampling locations and results (of detected analytes only) are shown on Figure 5. TRPH and TOG concentrations were indicated at depths ranging from 0.5 to 9.0 feet bgs. TPH-D, TPH-G, and xylenes were reported in two soil samples. No benzene, toluene, ethylbenzene, semi-volatile hydrocarbons, or chlorinated hydrocarbons were reported in Area 1 soil samples. Metals detected above estimated background concentrations in this area included lead, mercury, and copper.

3.2 Area 2

Area 2 soil sampling locations and results (of detected analytes only) are shown on Figure 6. TRPH and TOG concentrations were indicated at depths ranging from 0.5 to 9.0 feet bgs. No TPH-D, TPH-G, or BTEX were reported in soil samples from Area 2. The semivolatile hydrocarbon bis (3-ethylhexyl) phthalate was reported in one soil sample. Tetrachloroethene was also detected in one soil sample. No other semivolatile or chlorinated hydrocarbons were reported in soil samples from Area 2. Metals were not detected above estimated background concentrations in this area.

3.3 Area 3

Area 3 soil sampling locations and results (of detected analytes only) are shown on Figure 7. TOG concentrations were indicated at depths ranging from 3.0 to 9.0 feet bgs. TPH-D was detected in one soil sample. No TPH-G, BTEX, chlorinated hydrocarbons or semivolatile hydrocarbons were reported in soil samples from Area 3. Metals were not detected above estimated background concentrations in this area.

3.4 Area 4

Area 4 soil sampling locations and results (of detected analytes only) are shown on Figure 8. TRPH concentrations were indicated at depths ranging from 0.5 to 5.0 feet bgs. No TPH-D, TPH-G, BTEX, chlorinated hydrocarbons, or semivolatile hydrocarbons were reported in soil samples from Area 4. Metals were not detected above estimated background concentrations in this area.

3.5 Area 5

Area 5 soil sampling locations and results (of detected analytes only) are shown on Figure 9. TOG and TPH as motor oil concentrations were indicated at depths ranging from 3.5 to 9.0 feet bgs. TPH-D, TPH-G, and BTEX were detected at depths ranging from 1.0 to 16.5 feet bgs. No semi-volatile hydrocarbons were reported in soil samples from Area 5. Chlorinated hydrocarbons reported in this area included chlorobenzene, dichlorobenzene, 1,2-, 1,3-, and 1,4-dichlorobenzene, and cis-and trans 1,2 dichloroethene. One soil sample contained trichloroethene. Metals were not detected above estimated background concentrations in this area.

3.6 Area 6

Area 6 soil sampling locations and results (of detected analytes only) are shown on Figure 11. TRPH and TOG concentrations were indicated at depths ranging from 0.5 to 9.0 feet bgs. TPH-D, TPH-G, ethylbenzene, and xylenes were detected at depths ranging from 2.0 to 6.0 feet bgs. No semi-volatile hydrocarbons or chlorinated hydrocarbons were reported in soil samples from Area 6. Metals were not detected above estimated background concentrations in this area.

4.0 GROUNDWATER INVESTIGATION RESULTS

Groundwater sampling analytical results are summarized in Tables 1 through 6. Groundwater sampling locations and results (of detected analytes only) are shown on Figures 4 through 8, 10 and 11. Well locations show only the most recent analytical results. All groundwater level data are shown in Table 7. Figure 12 is a groundwater elevation map from the most recent monitoring event.

4.1 Area 1

The two grab groundwater sampling locations in Area 1 are shown on Figure 5. The samples were analyzed for TPH-D, TPH-G, BTEX, and mercury. TPH-D was the only analyte detected, and only in one of the samples.

4.2 Area 2

There were three grab groundwater samples collected in or near Area 2, shown on Figure 6. Two of the samples were analyzed for TPH-D, TPH-G, BTEX, and chlorinated hydrocarbons. The other was analyzed only for lead. TPH-D was the only analyte detected.

4.3 Area 3

No groundwater samples were collected from Area 3.

4.4 Area 4

The only groundwater sampling location in Area 4 is monitoring well MW3, shown on Figure 8. Recent analytical results indicate no TOG, TPH-D, TPH-G, BTEX, MTBE, or chlorinated hydrocarbons are present in groundwater from this well. Copper and zinc were the only metals detected.

4.5 Area 5

Figure 11 shows the six grab groundwater sampling locations and five groundwater monitoring wells in Area 5. TPH-D, TPH-G, BTEX, and chlorinated hydrocarbons were reported in the grab groundwater samples. The most recent well sampling results indicated TOG, TPH-D, TPH-G, BTEX,

and chlorobenzene in groundwater samples from Area 5. Copper, mercury, and zinc were the only metals detected.

4.6 Area 6

The only groundwater sampling location in Area 6 is monitoring well MW1, shown on Figure 8. Recent analytical results indicated no TOG, TPH-D, TPH-G, toluene, xylenes, or MTBE in groundwater samples from this well. Chlorobenzene was the only chlorinated hydrocarbon detected. Copper, lead, and zinc were the only metals detected.

5.0 REFERENCES

Keiley, Enea, Piunti, & Hamilton. San Jose, California, July 31, 1995. *Status of Subsurface Investigation at Pacific Dry Dock Yard II, 321 Embarcadero, Oakland, California 94606.*

Versar, Inc., Fair Oaks, California. 1990, Site Assessment Report for the Pacific Dry Dock and Repair Yards I and II, Oakland, California.

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Versar, Inc., Fair Oaks, California. February 14, 1995. *Underground Storage Tank Removal Report, 321 Embarcadero, Oakland, California.*

Versar, Inc., Fair Oaks, California. May 10, 1995. *Groundwater Monitoring Well Installation and Monitoring Report-March 13, 1995, Former Pacific Dry Dock and Repair Company Yard II Facility, Oakland, California.*

Versar, Inc., Fair Oaks, California. June 14, 1995. Groundwater Monitoring Well Installation and Monitoring Report - March 13, 1995, Former Pacific Dry Dock and Repair Company Yard II Facility, Oakland, California.

Versar, Inc., Fair Oaks, California. July 14, 1995. Soil and Groundwater Investigation Report, Former Pacific Dry Dock and Repair Company Yard II Facility, Oakland, California.

Versar, Inc., Fair Oaks, California. September 1995. Addendum to Work Plan for Site Investigation, 321 Embarcadero, Oakland, California.

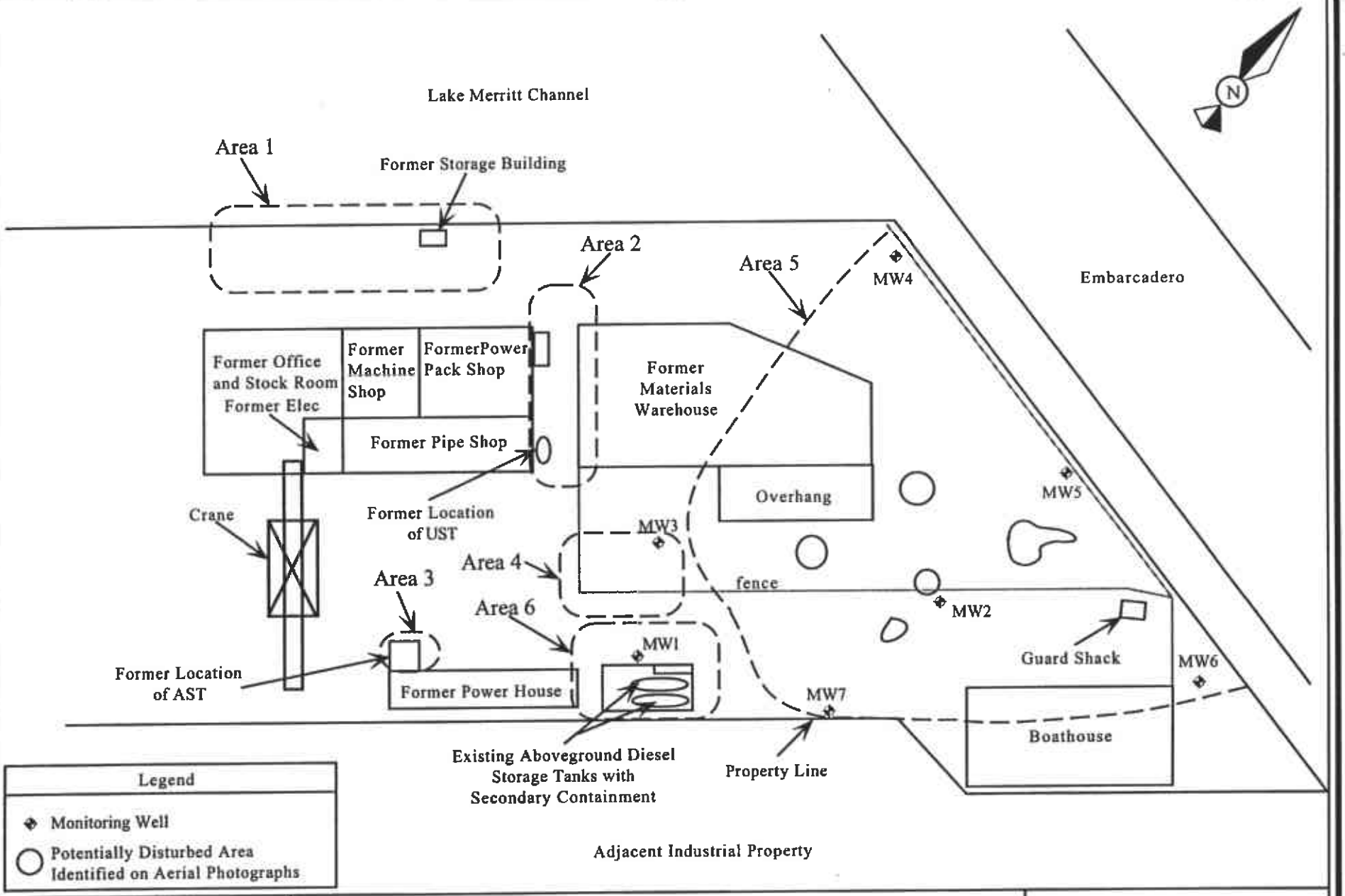
Versar, Inc., Fair Oaks, California, October 2, 1995. *Groundwater Sampling Report-June 21, 1995, Former Pacific Dry Dock and Repair Company Yard II Facility, Oakland, California*

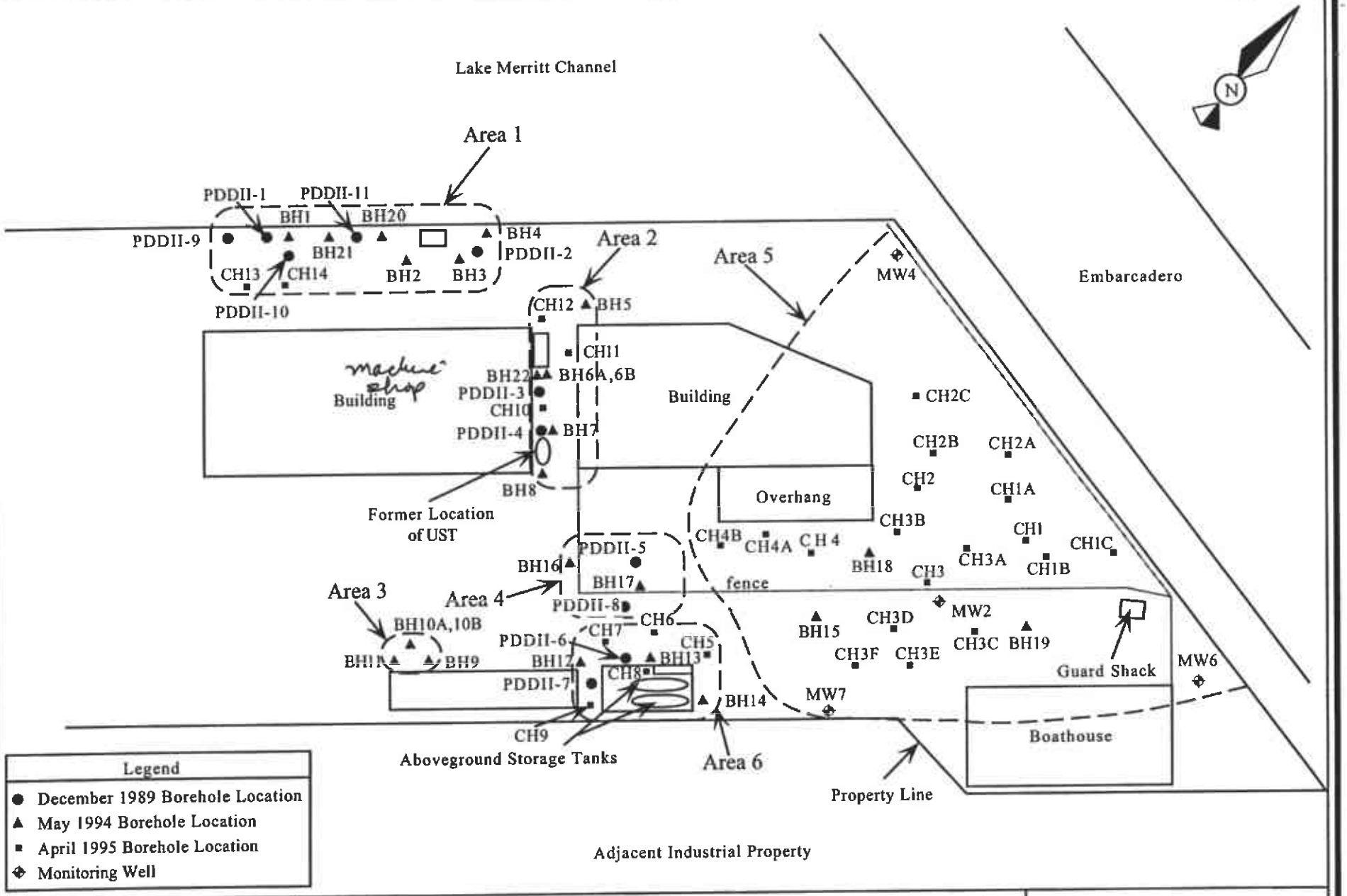
Versar, Inc., Fair Oaks, California, December 1, 1995. *Monitoring Well Installation and Third Round Groundwater Monitoring Report - October 2, 1995. Former Pacific Dry Dock and Repair Company Yard II Facility, Oakland, California.*

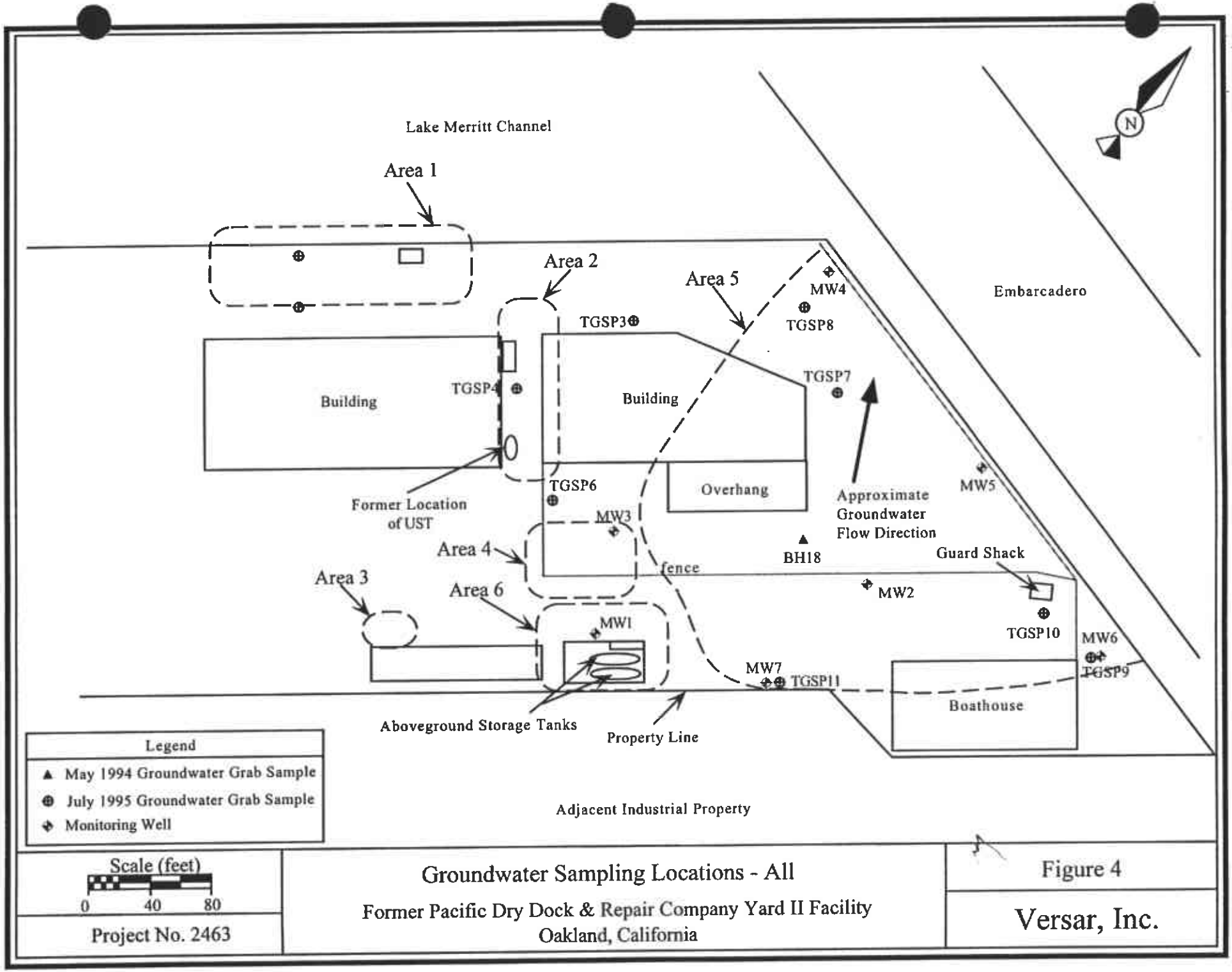
Versar, Inc., Fair Oaks, California, In Preparation, *Fourth Round Groundwater Monitoring Report - December 29, 1995. Former Pacific Dry Dock and Repair Company Yard II Facility, Oakland, California.*

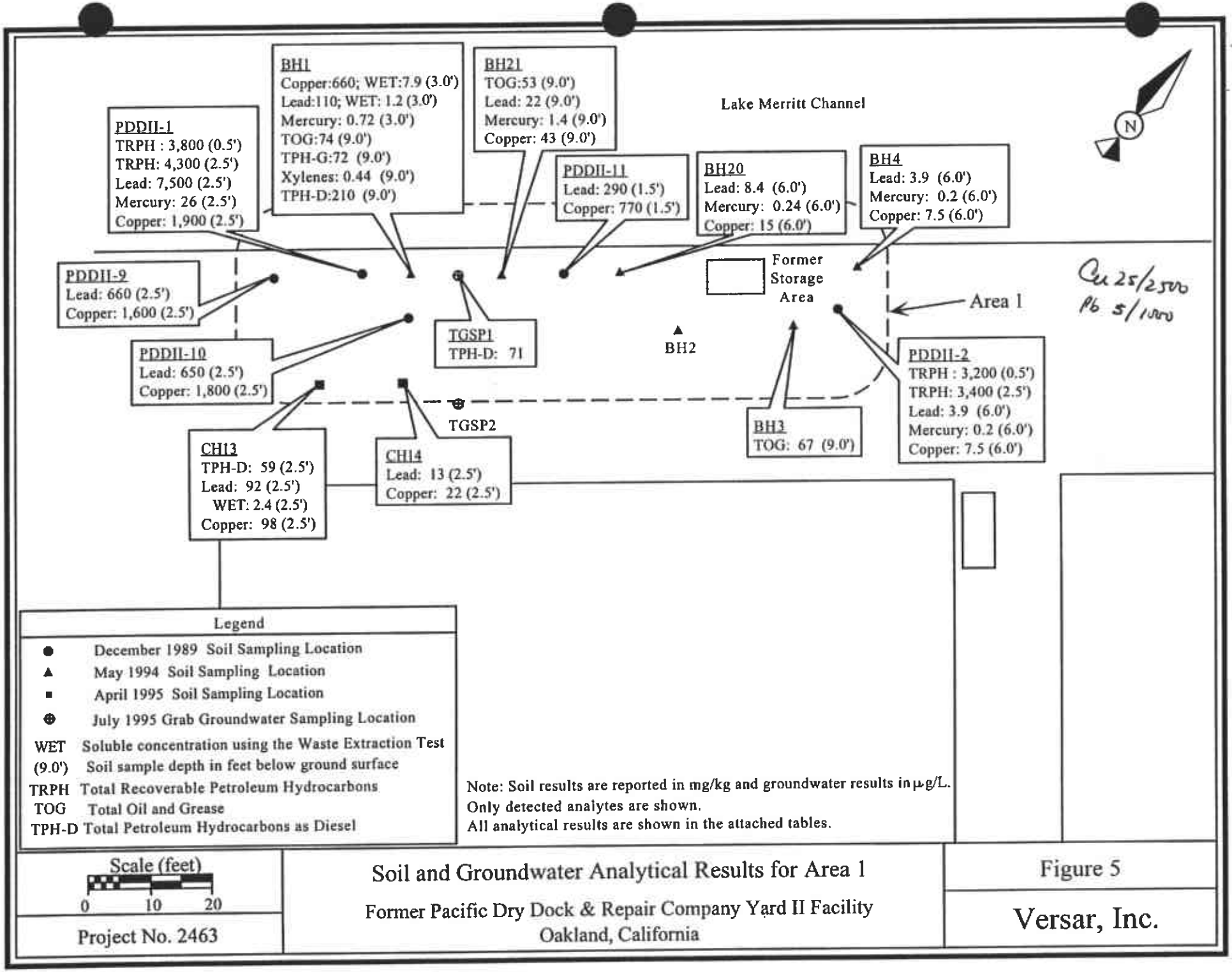
SOURCE: USGS TOPO 1959

Scale (miles) 0 0.25 0.50	Site Location	Figure 1
Project No. 2463	Former Pacific Dry Dock & Repair Company Yard II Facility Oakland, California	Versar, Inc.


Lake Merritt Channel
Area 1
Former Storage Building
Area 2
Area 5
MW4
Embarcadero
Former Office and Stock Room
Former Elec
Former Machine Shop
FormerPower Pack Shop
Former Pipe Shop
Former Materials Warehouse
Overhang
MW5
Crane
Former Location of UST
MW3
Area 4
Area 3
Area 6
fence
MW2
MW1
Guard Shack
MW6
Former Location of AST
Former Power House
MW7
Boathouse
Existing Aboveground Diesel Storage Tanks with Secondary Containment
Property Line
Adjacent Industrial Property
Legend
Monitoring Well
Potentially Disturbed Area Identified on Aerial Photographs
Scale (feet)
0
40
80
Project No. 2463
Site Layout
Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California
Figure 2
Versar, Inc.


Lake Merritt Channel
Area 1
PDDII-1
PDDII-11
BH1
BH20
PDDII-9
BH4
BH21
PDDII-2
CH13
CH14
BH2
BH3
PDDII-10
Area 2
Area 5
MW4
Embarcadero
CH12
BH5
CH11
machine shop
Building
BH22
BH6A,6B
PDDII-3
CH10
Building
CH2C
PDDII-4
BH7
CH2B
CH2A
CH2
CH1A
BH8
Overhang
Former Location of UST
CH3B
CH1
CH4B
CH4A
CH4
CH1C
PDDII-5
BH16
BH18
CH3
CH3A
CH1B
BH17
fence
Area 3
Area 4
PDDII-8
MW2
BH10A,10B
CH7
CH6
CH3D
BH15
PDDII-6
CH5
CH3C
BH19
BH11
BH9
BH12
BH13
CH3F
CH3E
Guard Shack
MW6
CH8
PDDII-7
BH14
MW7
CH9
Aboveground Storage Tanks
Area 6
Boathouse
Property Line
Adjacent Industrial Property
Legend
December 1989 Borehole Location
May 1994 Borehole Location
April 1995 Borehole Location
Monitoring Well
Scale (feet)
0
40
80
Project No. 2463
Soil Sampling Locations-All
Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California
Figure 3
Versar, Inc.


Lake Merritt Channel
Area 1
Area 2
Area 5
Area 4
Area 3
Area 6
Embarcadero
N
MW4
TGSP8
TGSP3
TGSP7
Building
TGSP4
Building
Overhang
TGSP6
MW3
MW5
Former Location of UST
Approximate Groundwater Flow Direction
BH18
Guard Shack
fence
MW2
MW1
TGSP10
MW6
TGSP9
MW7
TGSP11
Boathouse
Aboveground Storage Tanks
Property Line
Adjacent Industrial Property
Legend
May 1994 Groundwater Grab Sample
July 1995 Groundwater Grab Sample
Monitoring Well
Scale (feet)
0
40
80
Project No. 2463
Groundwater Sampling Locations - All
Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California
Figure 4
Versar, Inc.



Project No. 2463

Soil and Groundwater Analytical Results for Area 1

Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California

Figure 5

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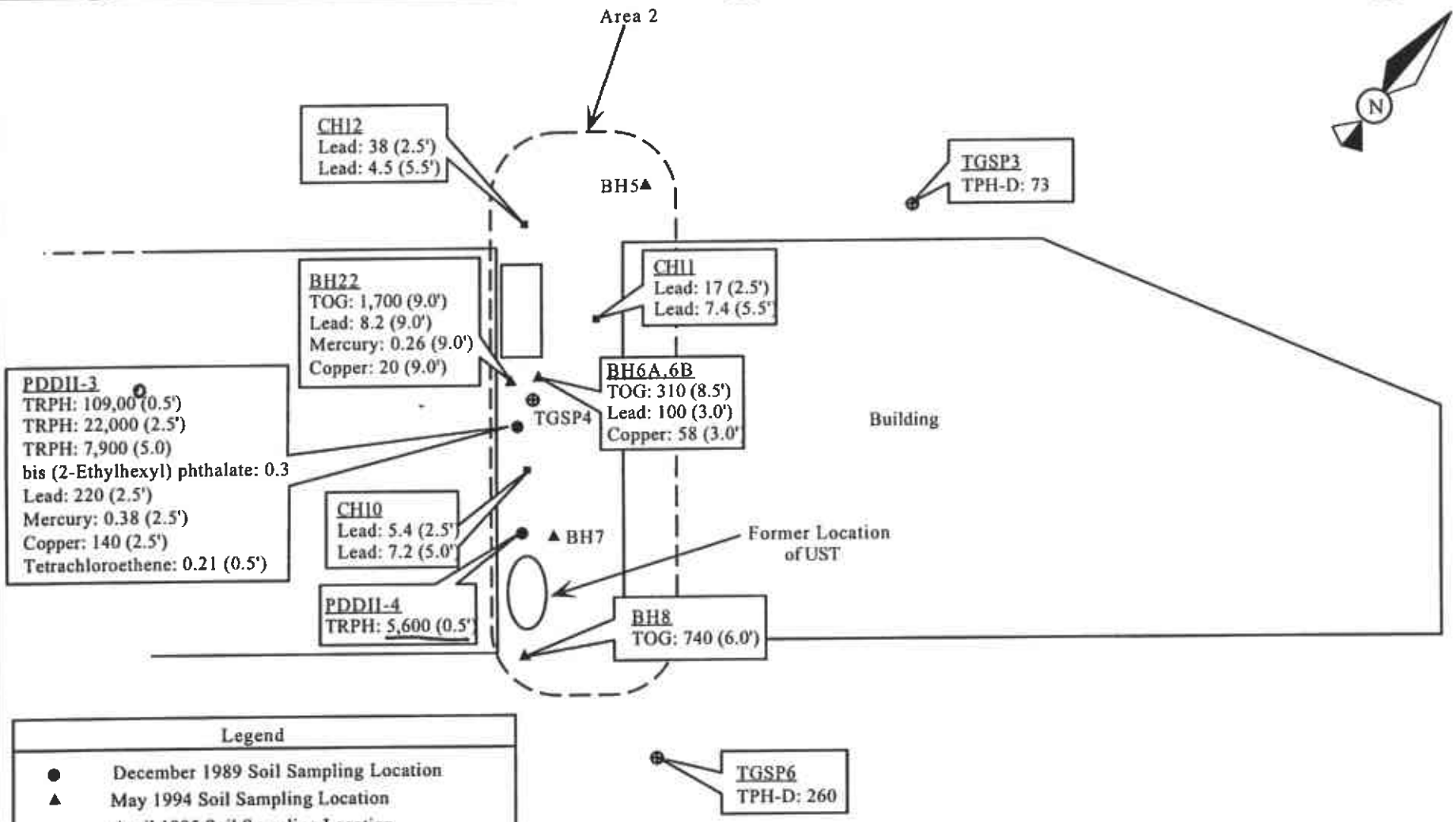


Legend	
●	December 1989 Soil Sampling Location
▲	May 1994 Soil Sampling Location
■	April 1995 Soil Sampling Location
⊕	July 1995 Grab Groundwater Sampling Location
TRPH	Total Recoverable Petroleum Hydrocarbons
(9.0')	Soil sample depth in feet below ground surface
TOG	Total Oil and Grease
TPH-D	Total Petroleum Hydrocarbons as Diesel

Note: Soil results are reported in mg/kg and groundwater results in µg/L.
Only detected analytes are shown.
All analytical results are shown in the attached tables.

Scale (feet)
0 10 20

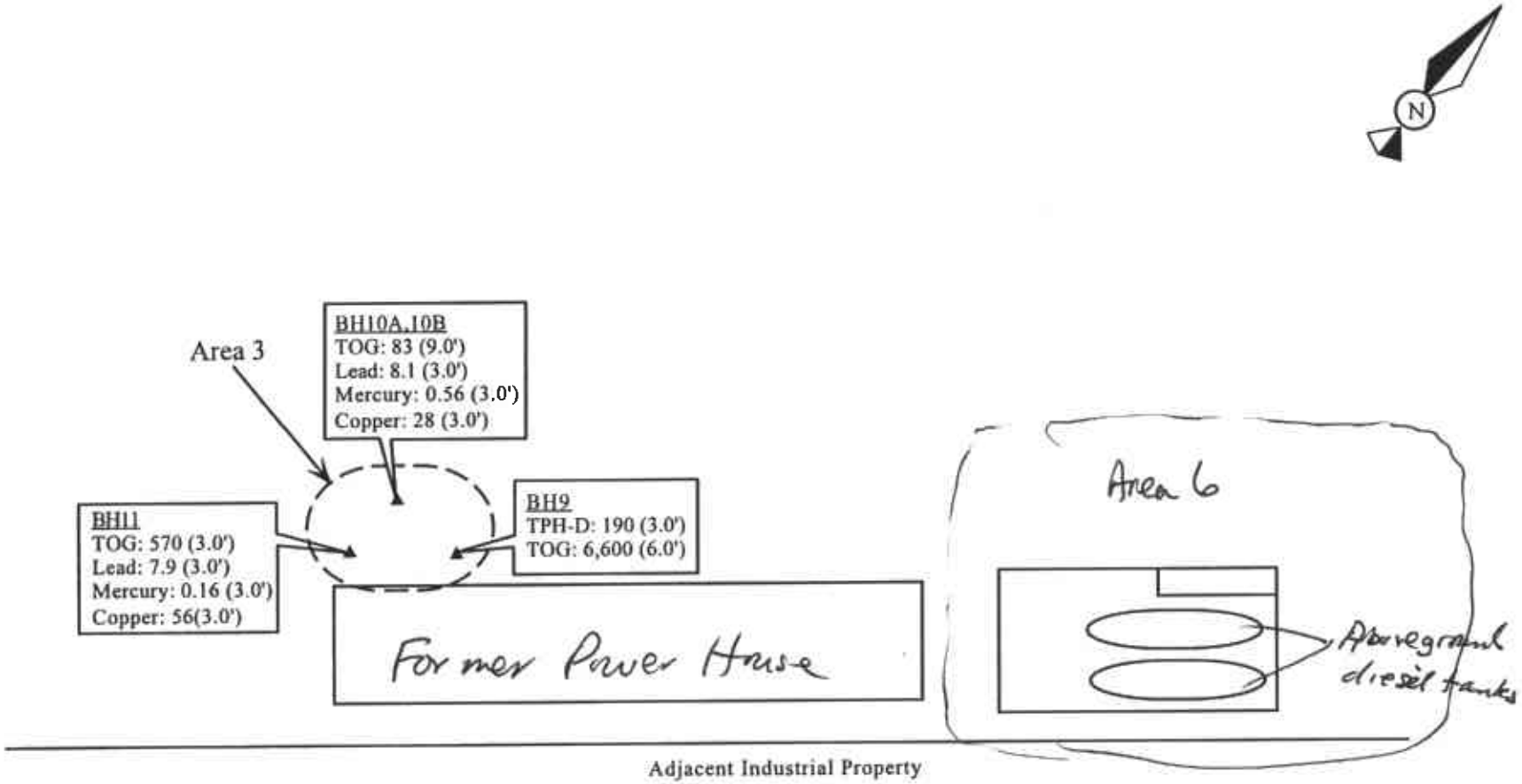
Project No. 2463

Soil and Groundwater Analytical Results for Area 2

Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California

Figure 6

Versar, Inc.



Legend	
▲	May 1994 Soil Sampling Location
TPH-D	Total Petroleum Hydrocarbons as Diesel
TOG	Total Oil and Grease
(9.0')	Sample Depth in feet below ground surface

Note: All results are reported in mg/kg.
Only detected analytes are shown.
All analytical results are shown in the attached tables.

Scale (feet)
0 10 20

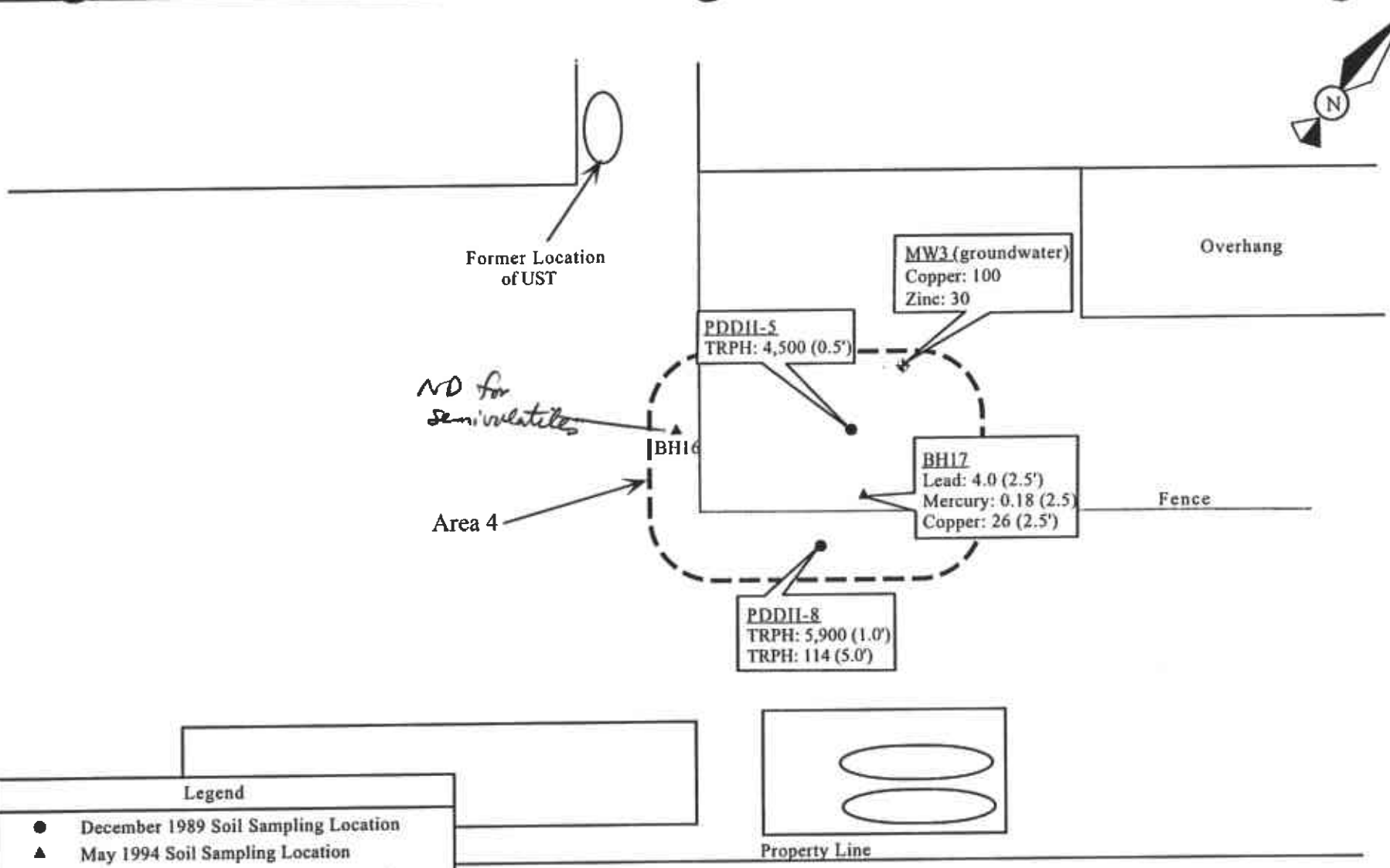
Project No. 2463

Soil Analytical Results for Area 3

Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California

Figure 7

Versar, Inc.



Legend

- ● December 1989 Soil Sampling Location
- ▲ May 1994 Soil Sampling Location
- ◆ Groundwater Monitoring Well (Groundwater analytical results from December 1995)

TRPH Total Recoverable Petroleum Hydrocarbons
(9.0') Soil sample depth in feet below ground surface

Note: Soil results are reported in mg/kg and groundwater results in µg/L.
Only detected analytes are shown.
All analytical results are shown in the attached tables.

Scale (feet)
0 10 20

Project No. 2463

Soil and Groundwater Analytical Results for Area 4

Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California

Figure 8

Versar, Inc.

Area 5

MW4
TPH-D: 1,600 (5.5')
TPH-G: 58 (5.5')
Chlorobenzene: 0.22 (5.5')
1,4-Dichlorobenzene: 0.067 (5.5')
Lead: 30 (5.0')
Copper: 150 (5.0')
Zinc: 180 (5.0')

CH2C
TPH-D: 44 (2.5')
Benzene: 0.011 (2.5')
TPH-D: 8.3 (4.5')

CH2B
TPH-D: 55 (1.5')
Ethylbenzene: 0.0053 (2.5')

CH2
TPH-D: 18 (1.0')
TPH-G: 4.5 (1.0')
Xylenes: 0.019 (1.0')
Trichloroethene: 0.023 (1.0')

CH2A
TPH-D: 8.7 (2.5')
TPH-G: 16 (2.5')
Benzene: 2.1 (2.5')
Xylenes: 0.660 (2.5')
Chlorobenzene: 0.063 (2.5)

CH1A
TPH-D: 240 (2.0')
TPH-G: 5.4 (2.0')
Benzene: 0.048 (2.0')
Toluene: 0.0069 (2.0')
Xylenes: 0.140 (2.0')
Chlorobenzene: 0.22 (2.0')

CH3B
TPH-D: 240 (2.5')
TPH-G: 1.8 (2.5')
Benzene: 0.150 (2.5')
Toluene: 0.017 (2.5')
Ethylbenzene: 0.012 (2.5')
Xylenes: 0.096 (2.5')
Chlorobenzene: 0.89 (2.5')
cis-and trans 1,2 Dichloroethene: 0.031 (2.5')

CH1
TPH-D: 1,300 (4.0')
TPH-G: 73 (4.0')
Benzene: 0.580 (4.0')
Toluene: 0.088 (4.0')
Xylenes: 1.5 (4.0')
Chlorobenzene: 0.54 (4.0')
1,4-Dichlorobenzene: 0.19 (4.0')

CH4A
TPH-D: 26 (2.5')

CH4
TPH-D: 1.6 (3.0')

CH1C
Ethylbenzene: 0.0068 (2.0')
Xylenes: 0.018 (2.0')
TPH-D: 910 (4.5')
TPH-G: 23 (4.5')
Benzene: 0.1 (4.5')
Xylenes: 0.300 (4.5')
Chlorobenzene: 0.48 (4.5')
1,4-Dichlorobenzene: 0.41 (4.5')

MW2
TPH-D: 2,700 (16.5')
TPH-G: 500 (16.5')
Toluene: 1.0 (16.5')
Ethylbenzene: 8.3 (16.5')
Xylenes: 7.4 (16.5')
Chlorobenzene: 9.0 (16.5')
1,4-Dichlorobenzene: 5.4 (16.5')
1,2-Dichlorobenzene: 4.2 (16.5')

CH4B

CH3A
TPH-D: 26 (1.5')

BH18
Chlorobenzene: 0.610 (8.0')
TOG: 65 (8.0')

CH3
Ethylbenzene: 0.0092 (4.0')
Xylenes: 0.022 (4.0')

CH1B
TPH-D: 1.4 (3.0')
Chlorobenzene: 0.034(3.0')

BH15
TPH-D: 180 (9.0')
TPH-G: 31 (9.0')
TOG: 260 (9.0')

MW6
TPH-D: 280 (3.5')
TPH-G: 0.7 (3.5')
TPH-MO: 360 (3.5')
Lead: 39 (3.5')
Mercury: 1.3 (3.5')
Copper: 200 (3.5')
Zinc: 140 (3.5)
Copper: 32 (6.0')
Zinc: 69 (6.0')
Lead: 5.8 (15.5')
Copper: 360 (15.5')
Zinc: 87 (15.5')

BH19
Mercury: 0.12 (6.0')
Copper: 26 (6.0')
Chlorobenzene: 1.7 (6.0')
1,2-Dichlorobenzene: 1.5 (6.0')
1,3-Dichlorobenzene: 0.15 (6.0')
1,4-Dichlorobenzene: 0.610 (6.0')
TOG: 230 (9.0')

CH3D
TPH-D: 940 (2.0')
TPH-G: 9.6 (2.0')
Benzene: 0.810 (2.0')
Xylenes: 3.6 (2.0')
Chlorobenzene: 2.3 (2.0')
1,4-Dichlorobenzene: 1.2 (2.0')
1,2-Dichlorobenzene: 0.068 (2.0')

MW7
TPH-D: 1.6 (15.5')
TPH-G: 0.61 (15.5')
Lead: 5.9 (15.5')
Copper: 32 (15.5')
Zinc: 40 (15.5)

CH3E

CH3F
TPH-G: 0.8 (4.0')
Chlorobenzene: 0.027 (4.0')

CH3C
TPH-G: 0.88 (2.0')
Benzene: 0.0054 (2.0')
Xylenes: 0.070 (2.0')
Chlorobenzene: 0.079 (2.0')

N

Legend

- December 1989 Soil Sampling Location
- May 1994 Soil Sampling Location
- April 1995 Soil Sampling Location
- Monitoring Well
- TPH-D Total Petroleum Hydrocarbons as Diesel
- TPH-G Total Petroleum Hydrocarbons as Gasoline
- TOG Total Oil and Grease
- (9.0') Sample Depth in feet below ground surface

Note: All results are reported in mg/kg.
Only detected analytes are shown.
All analytical results are shown in the attached tables.

Scale (feet)
0 10 20

Project No. 2463

Soil Analytical Results for Area 5
Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California

Figure 9

Versar, Inc.

PRG chlorobenzene ≈ 35 ppb water

TGSP8
TPH-D: 870
TPH-G: 1,900
Benzene: 58
Toluene: 3.0
Ethylbenzene: 2.6
Xylenes: 400
Chlorobenzene: 310
1,4-Dichlorobenzene: 13

MW4
TOG: 9,500
TPH-D: 800
TPH-G: 960
Benzene: 35
Toluene: 5.5
Ethylbenzene: 13
Chlorobenzene: 210
Copper: 55
Zinc: 68

Area 5

TGSP7
TPH-D: 770
TPH-G: 1,700
Benzene: 22
Xylenes: 310
1,4-Dichlorobenzene: 8.1

MW5
TOG: 40,000
TPH-D: 650
TPH-G: 860
Benzene: 8.5
Toluene: 0.85
Ethylbenzene: 0.77
Chlorobenzene: 240
Copper: 100
Zinc: 68

BH18
TPH-G: 2,600
Chlorobenzene: 2,200

MW2
TPH-D: 2,600
TPH-G: 1,600
Benzene: 36
Ethylbenzene: 14
Chlorobenzene: 370
Copper: 55
Zinc: 38

TGSP10
TPH-D: 580
TPH-G: 2,200
Benzene: 47
Ethylbenzene: 5.2

TGSP9
TPH-D: 250
TPH-G: 480
Benzene: 2.1
Toluene: 0.91
Ethylbenzene: 2.2
Xylenes: 3.6

MW6
TOG: 7,300
Copper: 95
Mercury: 0.53
Zinc: 110

MW7
TPH-D: 130
Copper: 60
Zinc: 80

TGSP11
TPH-D: 480

TGSP9

Legend	
▲	May 1994 Grab Groundwater Sampling Location
⊕	July 1995 Grab Groundwater Sample
⊕	Monitoring Well (Groundwater analytical results from December 1995)
TPH-D	Total Petroleum Hydrocarbons as Diesel
TPH-G	Total Petroleum Hydrocarbons as Gasoline
TOG	Total Oil and Grease

Note: Groundwater results are reported in µg/L.
Only detected analytes are shown.
All analytical results are shown in the attached tables.

Scale (feet)
0 10 20

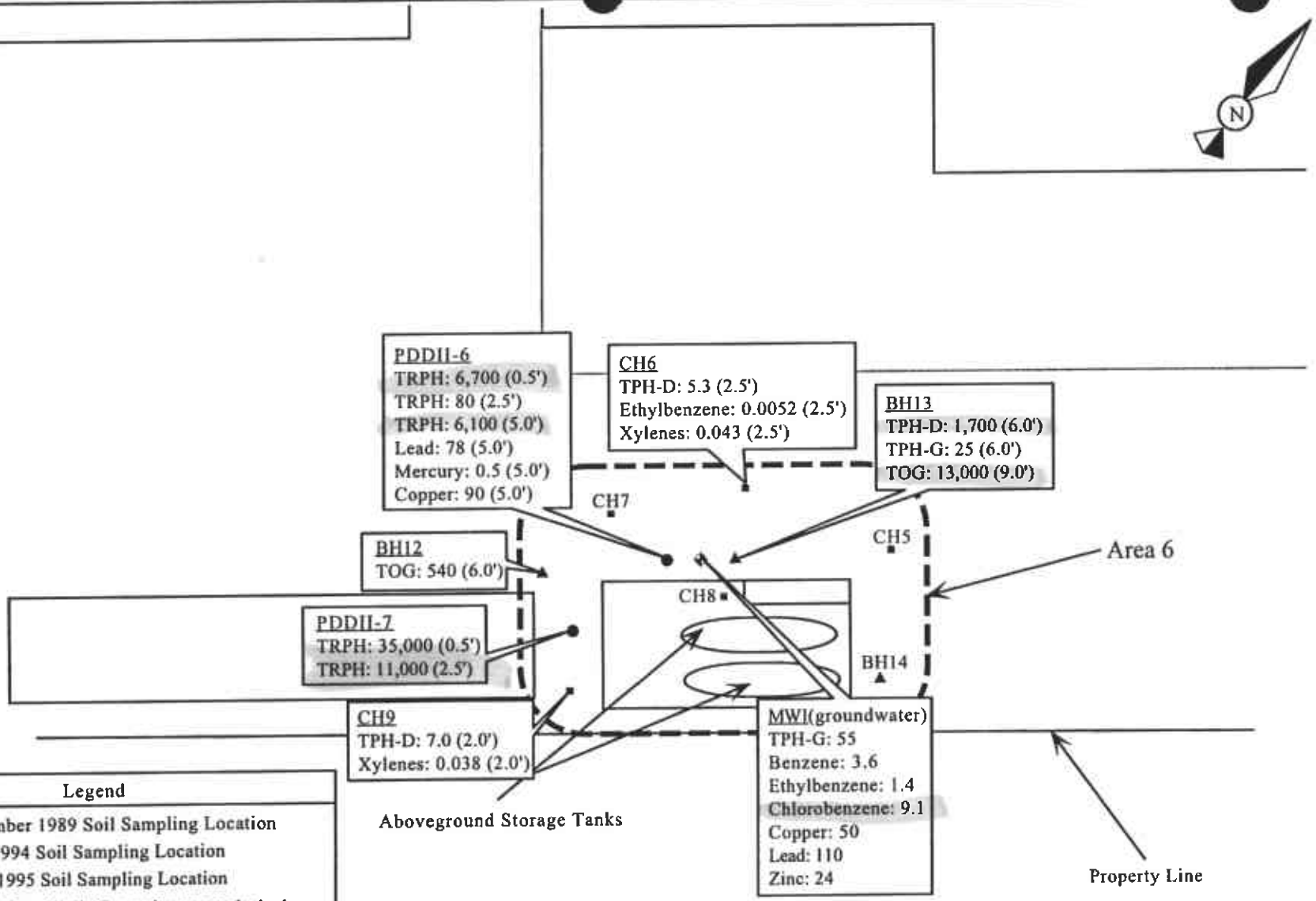
Project No. 2463

Groundwater Analytical Results for Area 5

Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California

Figure 10

Versar, Inc.



Legend

- ● December 1989 Soil Sampling Location
- ▲ May 1994 Soil Sampling Location
- ■ April 1995 Soil Sampling Location
- ◆ Monitoring Well (Groundwater analytical results from December 1995)

TRPH Total Recoverable Petroleum Hydrocarbons
(9.0') Soil sample depth in feet below ground surface

Note: Soil results are reported in mg/kg and groundwater results in µg/L.
Only detected analytes are shown.
All analytical results are shown in the attached tables.

Scale (feet)
0 10 20

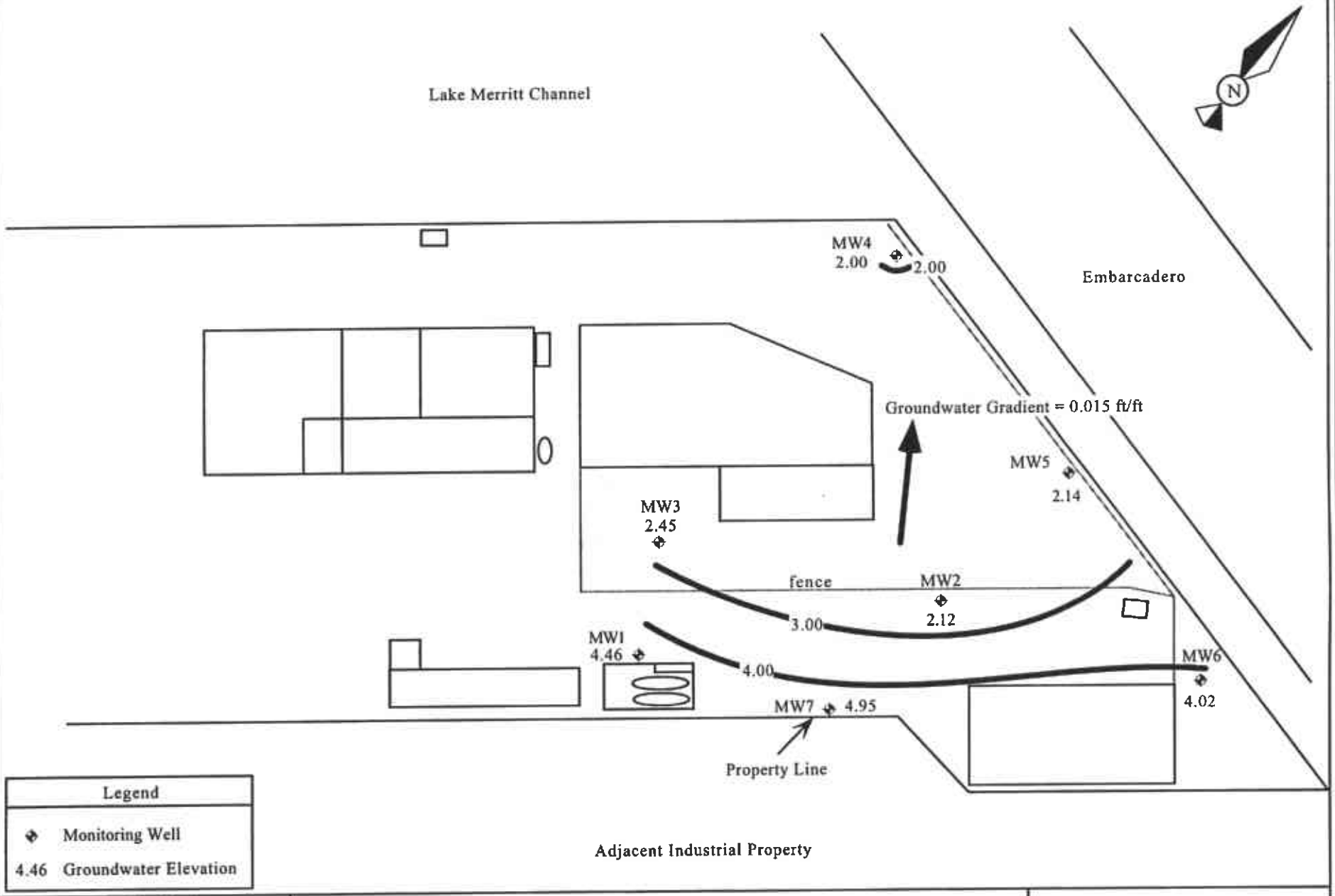
Project No. 2463

Soil and Groundwater Analytical Results for Area 6

Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California

Figure 11

Versar, Inc.



Project No. 2463

Groundwater Elevation Map, January 18, 1996

Former Pacific Dry Dock & Repair Company Yard II Facility
Oakland, California

Figure 12

Versar, Inc.

Table 1

Area 1

Former Pacific Dry Dock and Repair Company Yard II
321 Embarcadero
Oakland, California

Soil Sampling Results - TRPH, TOG, TPH-MO

Date and Boring No.	Depth (feet)	TRPH[1] (mg/kg)	TOG[2] (mg/kg)	TPH-MO[3] (mg/kg)
DECEMBER 1989				
PDDII-1	0.5	3,800	---[4]	---
PDDII-1	2.5	4,300	---	---
PDDII-2	0.5	3,200	---	---
PDDII-2	2.5	3,400	---	---
MAY 1994				
BH1	9.0	---	74	---
BH2	6.0	---	ND[5]	---
BH3	9.0	---	67	---
BH4	6.0	---	ND	---
BH20	6.0	---	ND	---
BH21	9.0	---	53	---

[1] TRPH = Total Recoverable Petroleum Hydrocarbons by EPA Method 418.1, Typical Reporting Limit 50 mg/kg
[2] TOG = Total Oil and Grease by SMWW Method 5520CF, Typical Reporting Limit 50 mg/kg;
[3] TPH-MO = Total Petroleum Hydrocarbons as Motor Oil by EPA Method 8015 Modified, Typical Reporting Limit 5 mg/kg
[4] --- = Not Analyzed
[5] ND = Not Detected Above Reporting Limit

Table 1

Area 1

Soil Sampling Results - TPH-D, TPH-G, BTEX

Boring No.	Depth (feet)	TPH-D[1] (mg/kg)	TPH-G[2] (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
MAY 1994							
BH1	9.0	210	72	ND[3]	ND	ND	0.44
APRIL 1995							
CH13	2.5	59	ND	ND	ND	ND	ND
CH14	2.5	ND	ND	ND	ND	ND	ND

Soil Sampling Results - Metals

Date and Boring No.	Depth (feet)	Lead (mg/kg)	Mercury (mg/kg)	Copper (mg/kg)	Other (mg/kg)		
DECEMBER 1989							
PDDII-1	2.5	7,500	26	1,900	Arsenic - 25	Total Chromium - 61	Selenium - ND
					Antimony - 5.2	Chromium VI - ND	Silver - ND
					Barium - 51	Cobalt - 5.8	Thallium - ND
					Beryllium - ND	Molybdenum - ND	Vanadium - 20
					Cadmium - ND	Nickel - 12	Zinc - 550
PDDII-9	2.5	660	---[4]	1,600		---	
PDDII-10	2.5	650	---	1,800		---	
PDDII-11	1.5	290	---	770		---	

[1] TPH-D = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015-modified
[2] TPH-G = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015-modified
[3] ND = Not Detected
[4] --- = Not Analyzed

Table 1

Area 1

Soil Sampling Results - Metals

Date and Boring No.	Depth (feet)	Lead (mg/kg)	Mercury (mg/kg)	Copper (mg/kg)	Other (mg/kg)		
MAY 1994							
BH1	3.0	110	0.72	660	7.9 Soluble (WET)[1] Copper 1.2 Soluble (WET) Lead Antimony - ND Arsenic - 14 Barium - ND Beryllium - ND Vanadium - 24	Cadmium - ND Chromium -12 Cobalt - ND Molybdenum - ND Zinc - 510	Nickel - ND Selenium - 0.3 Silver - ND Thallium - ND
BH4			6.0	3.9	0.2	7.5	---[2]
BH20			6.0	8.4	0.24	15	---
BH21			9.0	22	1.4	43	---
APRIL 1995							
CH13			2.5	92	---	98	2.4 Soluble (WET) Lead
CH14			2.5	13	---	22	---

[1] WET = Soluble Metal Analysis using California Waste Extraction Test
[2] --- = Not Analyzed

Table 1

Area 1

Grab Groundwater Sample Analytical Results

Date and Sample Location	TPH-D (µg/L)	TPH-G (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Chlorinated Hydrocarbons (µg/L)	Metals (µg/L)
JULY 1995								
TGSP1	71	ND[1]	ND	ND	ND	ND	---[2]	Mercury - ND
TGSP2	ND	ND	ND	ND	ND	ND	---	Mercury - ND

[1] ND = Not Detected
[2] --- = Not Analyzed

Table 2

Area 2

Former Pacific Dry Dock and Repair Company Yard II
321 Embarcadero
Oakland, California

Soil Sampling Results - TRPH, TOG, TPH-MO

Boring No.	Depth (feet)	TRPH[1] (mg/kg)	TOG[2] (mg/kg)	TPH-MO[3] (mg/kg)
DECEMBER 1989				
PDDII-3	0.5	109,000	---[4]	---
PDDII-3	2.5	22,000	---	---
PDDII-3	5.0	7,900	---	---
PDDII-4	0.5	5,600	---	---
MAY 1994				
BH5	6.0	---	ND[5]	---
BH6B	8.5	---	310	---
BH7	8.0	---	ND	---
BH8	6.0	---	740	---

[1] TRPH = Total Recoverable Petroleum Hydrocarbons by EPA Method 418.1, Typical Reporting Limit 50 mg/kg
[2] TOG = Total Oil and Grease by SMWW Method 5520CF, Typical Reporting Limit 50 mg/kg;
[3] TPH-MO = Total Petroleum Hydrocarbons as Motor Oil by EPA Method 8015 Modified, Typical Reporting Limit 5 mg/kg
[4] --- = Not Analyzed
[5] ND = Not Detected Above Reporting Limit

Table 2

Area 2

Soil Sampling Results - TPH-D, TPH-G, BTEX

Boring No.	Depth (feet)	TPH-D[1] (mg/kg)	TPH-G[2] (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
DECEMBER 1989							
PDDII-3	0.5	---[3]	---	ND[4]	ND	ND	ND
MAY 1994							
BH5	8.0	ND	ND	ND	ND	ND	ND
BH8	8.5	ND	ND	ND	ND	ND	ND

Soil Sampling Results - Semi Volatile Hydrocarbons

Boring No.	Depth (feet)	Semi-Volatile Hydrocarbons (mg/kg)[5]
DECEMBER 1989		
PDDII-3	5.0	0.3 bis (2-Ethylhexyl) phthalate
MAY 1994		
BH6B	8.5	all ND

[1] TPH-D = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015-modified
[2] TPH-G = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015-modified
[3] --- = Not Analyzed
[4] ND = Not Detected
[5] Analyzed by EPA Method 8270

Table 2

Area 2

Soil Sampling Results - Chlorinated Hydrocarbons[1]

Boring No.	Depth (feet)	Chlorobenzene (mg/kg)	1,4-Dichlorobenzene (mg/kg)	Trichloroethene (mg/kg)	Other (mg/kg)
DECEMBER 1989					
PDDII-3	0.5	ND[2]	ND	ND	0.21 Tetrachloroethene
MAY 1994					
BH22	9.0	ND	ND	ND	all ND

Soil Sampling Results - Metals

Boring No.	Depth (feet)	Lead (mg/kg)	Mercury (mg/kg)	Copper (mg/kg)	Other (mg/kg)		
DECEMBER 1989							
PDDII-3	2.5	220	0.38	140	Arsenic - 5.5	Total Chromium - 27	Selenium - ND
					Antimony - ND	Chromium VI - ND	Silver - ND
					Barium - 88	Cobalt - 9.5	Thallium - ND
					Beryllium - ND	Molybdenum - ND	Vanadium - ND
					Cadmium - 1.6	Nickel - 29	Zinc - 600
MAY 1994							
BH6A	3.0	100	ND	58	2.4 Soluble (WET) Copper		
BH22	9.0	8.2	0.26	20	Arsenic - 11	Chromium -10	Selenium - ND
					Antimony - ND	Silver - ND	Barium - 51
					Cobalt - ND	Thallium - ND	Beryllium - 0.15
					Molybdenum - ND	Vanadium - 33	Cadmium - ND
					Nickel - ND	Zinc - 63	

[1] Analyzed by either EPA Method 8010 or EPA Method 8240
ND = Not Detected

Table 2

Area 2

Soil Sampling Results - Metals

Boring No.	Depth (feet)	Lead (mg/kg)	Mercury (mg/kg)	Copper (mg/kg)	Other (mg/kg)
APRIL 1995					
CH10	2.5	5.4	---[1]	---	ND organic lead
CH10	5.0	7.2	---	---	ND organic lead
CH11	2.5	17	---	---	ND organic lead
CH11	5.5	7.4	---	---	ND organic lead
CH12	2.5	38	---	---	ND organic lead
CH12	5.5	4.5	---	---	ND organic lead

Grab Groundwater Sample Analytical Results

Sample Location	TPH-D (µg/L)	TPH-G (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Chlorinated Hydrocarbons (µg/L)	Metals (µg/L)
TGSP3	73	ND[2]	ND	ND	ND	ND	all ND	---
TGSP4	---	---	---	---	---	---	---	Lead - ND
TGSP6	260	ND	ND	ND	ND	ND	all ND	---

[1] --- = Not Analyzed/Applicable
[2] ND = Not Detected

Table 3

Area 3

Former Pacific Dry Dock and Repair Company Yard II
321 Embarcadero
Oakland, California

Soil Sampling Results - TRPH, TOG, TPH-MO

Boring No.	Depth (feet)	TRPH[1] (mg/kg)	TOG[2] (mg/kg)	TPH-MO[3] (mg/kg)
BH9	6.0	---[4]	6,600	---
BH10B	9.0	---	83	---
BH11	3.0	---	570	---

Soil Sampling Results - TPH-D, TPH-G, BTEX

Boring No.	Depth (feet)	TPH-D[5] (mg/kg)	TPH-G[6] (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
BH9	3.0	190	ND[7]	ND	ND	ND	ND

[1] TRPH = Total Recoverable Petroleum Hydrocarbons by EPA Method 418.1, Typical Reporting Limit 50 mg/kg
[2] TOG = Total Oil and Grease by SMWW Method 5520CF, Typical Reporting Limit 50 mg/kg;
[3] TPH-MO = Total Petroleum Hydrocarbons as Motor Oil by EPA Method 8015 Modified, Typical Reporting Limit 5 mg/kg
[4] --- = Not Analyzed
[5] TPH-D = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015-modified
[6] TPH-G = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015-modified
[7] ND = Not Detected

Table 3

Area 3

Soil Sampling Results - Semi Volatile Hydrocarbons

Boring No.	Depth (feet)	Semi-Volatile Hydrocarbons (mg/kg)[1]
MAY 1994		
BH11	6.0	all ND[2]

Soil Sampling Results - Metals

Boring No.	Depth (feet)	Lead (mg/kg)	Mercury (mg/kg)	Copper (mg/kg)	Other (mg/kg)		
MAY 1994							
BH10A	3.0	8.1	0.56	28	---[3]		
BH11	3.0	7.9	0.16	56	Arsenic - 11	Total Chromium - ND	Selenium - ND
					Antimony - ND	Chromium VI - 1.2	Silver - ND
					Barium - ND	Cobalt - ND	Thallium - ND
					Beryllium - ND	Molybdenum - ND	Vanadium - 44
					Cadmium - ND	Nickel - ND	Zinc - 80

[1]Analyzed by EPA Method 8270
[2]ND = Not Detected
[3]---=Not Analyzed

Table 4

Area 4

Former Pacific Dry Dock and Repair Company Yard II
321 Embarcadero
Oakland, California

Soil Sampling Results - TRPH, TOG, TPH-MO

Boring No.	Depth (feet)	TRPH[1] (mg/kg)	TOG[2] (mg/kg)	TPH-MO[3] (mg/kg)
DECEMBER 1989				
PDDII-5	0.5	4,500	---[4]	---
PDDII-8	1.0	5,900	---	---
PDDII-8	5.0	114	---	---
BH16	9.0	---	ND[5]	---
BH17	6.0	---	ND	---

Soil Sampling Results - Semi Volatile Hydrocarbons

Boring No.	Depth (feet)	Semi-Volatile Hydrocarbons (mg/kg)[6]
MAY 1994		
BH16	9.0	all ND

[1] TRPH = Total Recoverable Petroleum Hydrocarbons by EPA Method 418.1, Typical Reporting Limit 50 mg/kg
[2] TOG = Total Oil and Grease by SMWW Method 5520CF, Typical Reporting Limit 50 mg/kg;
[3] TPH-MO = Total Petroleum Hydrocarbons as Motor Oil by EPA Method 8015 Modified, Typical Reporting Limit 5 mg/kg
[4] --- = Not Analyzed
[5] ND = Not Detected Above Reporting Limit
[6] Analyzed by EPA Method 8270

Table 4

Area 4

Soil Sampling Results - Metals

Boring No.	Depth (feet)	Lead (mg/kg)	Mercury (mg/kg)	Copper (mg/kg)	Other (mg/kg)
BH17	2.5	4.0	0.18	26	Arsenic - 15; Antimony - ND; Cobalt - ND; Molybdenum - ND; Nickel - ND; Chromium - 3.8; Silver - 0.89; Thallium - ND; Vanadium - 24; Zinc - 40; Selenium - 0.44; Barium - 69; Beryllium - 0.12; Cadmium - ND

Grab Groundwater Sample Analytical Results

Sample Location	TPH-D (µg/L)	TPH-G (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Chlorinated Hydrocarbons (µg/L)	Metals (µg/L)
JULY 1995								
TGSP6	260	ND[1]	ND	ND	ND	ND	all ND	---[2]

Monitoring Well Groundwater Sampling Results - Petroleum Hydrocarbons

Groundwater Monitoring Well Date	TOG[3]	TPH-MO[4]	TPH-D[5] (µg/L)	TPH-G[6] (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	MTBE (µg/L)
MW3									
3/13/95	---	---	ND	ND	ND	ND	ND	ND	---
6/21/95	---	---	140	ND	ND	ND	ND	ND	---
9/29/95	---	ND	ND	ND	ND	ND	ND	ND	ND
12/29/95	ND	---	ND	ND	ND	ND	ND	ND	ND

[1] ND = Not Detected
[2] --- = Not Analyzed
[3] TOG = Total Oil and Grease by SMWW Method 5520CF
[4] TPH-MO = Total Petroleum Hydrocarbons as Motor Oil by EPA Method 8015 Modified
[5] TPH-D = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015-modified
[6] TPH-G = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015-modified

Table 4

Area 4

Monitoring Well Groundwater Sampling Results - Chlorinated Hydrocarbons[1]

Groundwater Monitoring Well Date	Chlorobenzene	Chloroform	cis and trans-1,2-Dichloroethene
MW3			
3/13/95	0.51	ND[2]	ND
6/21/95	ND	ND	ND
9/29/95	ND	ND	ND
12/29/95	ND	ND	ND

Monitoring Well Groundwater Sampling Results - Metals

Groundwater Monitoring Well Date	Copper	Lead	Mercury	Zinc
MW3				
3/13/95	---[3]	---	---	---
6/21/95	---	---	---	---
9/29/95	ND	ND	ND	60
12/29/95	100	ND	ND	30

[1] Analyzed by EPA Method 8010 or EPA Method 8240
[2] ND = Not Detected
[3] --- = Not Analyzed

Table 5

Area 5

Former Pacific Dry Dock and Repair Company Yard II
321 Embarcadero
Oakland, California

Soil Sampling Results - TRPH, TOG, TPH-MO

Boring No.	Depth (feet)	TRPH[1] (mg/kg)	TOG[2] (mg/kg)	TPH-MO[3] (mg/kg)
BH15	9.0	---[4]	260	---
BH18	8.0	---	65	---
BH19	9.0	---	230	---
SEPTEMBER 1995				
MW4	5.5	---	---	ND[5]
MW6	3.5	---	---	360
MW6	6.0	---	---	ND
MW6	15.5	---	---	ND
MW7	15.5	---	---	ND

[1] TRPH = Total Recoverable Petroleum Hydrocarbons by EPA Method 418.1, Typical Reporting Limit 50 mg/kg
[2] TOG = Total Oil and Grease by SMWW Method 5520CF, Typical Reporting Limit 50 mg/kg;
[3] TPH-MO = Total Petroleum Hydrocarbons as Motor Oil by EPA Method 8015 Modified, Typical Reporting Limit 5 mg/kg
[4] --- = Not Analyzed
[5] ND = Not Detected Above Reporting Limit

Table 5

Area 5

Soil Sampling Results - TPH-D, TPH-G, BTEX

Boring No.	Depth (feet)	TPH-D[1] (mg/kg)	TPH-G[2] (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
MAY 1994							
BH15	6.0	---[3]	ND[4]	ND	ND	ND	ND
BH15	9.0	180	31	ND	ND	ND	ND
APRIL 1995							
CH1	4.0	1,300	73	0.580	0.088	ND	1.5
CH1A	2.0	240	5.4	0.048	0.0069	ND	0.140
CH1B	3.0	1.4	ND	ND	ND	ND	ND
CH1C	2.0	ND	ND	ND	ND	0.0068	0.018
CH1C	4.5	910	23	0.1	ND	ND	0.300
CH2	1.0	18	4.5	ND	ND	ND	0.019
CH2A	2.5	8.7	16	2.1	ND	ND	0.660
CH2B	1.5	55	ND	ND	ND	0.0053	ND
CH2C	2.5	44	ND	0.011	ND	ND	ND
CH2C	4.5	8.3	ND	ND	ND	ND	ND
CH3	4.0	ND	ND	ND	ND	0.0092	0.022
CH3A	1.5	26	ND	ND	ND	ND	ND
CH3B	2.5	240	1.8	0.150	0.017	0.012	0.096
CH3C	2.0	ND	0.88	0.0054	ND	ND	0.070
CH3D	2.0	940	9.6	0.810	ND	ND	3.6
CH3E	1.5	ND	ND	ND	ND	ND	ND
CH3E	4.0	ND	ND	ND	ND	ND	ND
CH3F	4.0	ND	0.8	ND	ND	ND	ND

[1]TPH-D = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015-modified
[2]TPH-G = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015-modified
[3]--- = Not Analyzed
[4]ND = Not Detected

Table 5

Area 5

Soil Sampling Results - TPH-D, TPH-G, BTEX

Boring No.	Depth (feet)	TPH-D[1] (mg/kg)	TPH-G[2] (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
APRIL 1995							
CH4	3.0	1.6	ND[4]	ND	ND	ND	ND
CH4A	2.5	26	ND	ND	ND	ND	ND
CH4A	4.5	---[3]	ND	ND	ND	ND	ND
JULY 1994							
MW2	16.5	2,700	500	ND	1.0	8.3	7.4
SEPTEMBER 1995							
MW4	5.5	1,600	58	ND	ND	ND	ND
MW6	3.5	280	0.7	ND	ND	ND	ND
MW6	6.0	ND	ND	ND	ND	ND	ND
MW6	15.5	ND	ND	ND	ND	ND	ND
MW7	15.5	1.6	0.61	ND	ND	ND	ND

[1]TPH-D = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015-modified
[2]TPH-G = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015-modified
[3]--- = Not Analyzed
[4]ND = Not Detected

Table 5

Area 5

Soil Sampling Results - Semi Volatile Hydrocarbons

Boring No.	Depth (feet)	Semi-Volatile Hydrocarbons[1] (mg/kg)
MAY 1994		
BH15	6.0	all ND[2]

Soil Sampling Results - Chlorinated Hydrocarbons[3]

Boring No.	Depth (feet)	Chlorobenzene (mg/kg)	1,4-Dichlorobenzene (mg/kg)	Trichloroethene (mg/kg)	Other (mg/kg)
MAY 1994					
BH18	8.0	0.610	ND	ND	all ND
BH19	6.0	1.7	0.610	ND	1.5 1,2-Dichlorobenzene 0.15 1,3-Dichlorobenzene
APRIL 1995					
CH1	4.0	0.54	0.19	ND	all ND
CH1A	2.0	0.22	ND	ND	all ND
CH1B	3.0	0.034	ND	ND	all ND
CH1C	2.0	ND	ND	ND	all ND
CH1C	4.5	0.48	0.41	ND	all ND

[1]Analyzed by EPA Method 8270
[2]ND = Not Detected
[3]Analyzed by either EPA Method 8010 or EPA Method 8240

Table 5

Area 5

Soil Sampling Results - Chlorinated Hydrocarbons[1]

Boring No.	Depth (feet)	Chlorobenzene (mg/kg)	1,4-Dichlorobenzene (mg/kg)	Trichloroethene (mg/kg)	Other (mg/kg)
APRIL 1995					
CH2	1.0	ND[2]	ND	0.023	all ND
CH2A	2.5	0.063	ND	ND	all ND
CH2B	1.5	ND	ND	ND	all ND
CH2C	2.5	ND	ND	ND	all ND
CH2C	4.5	ND	ND	ND	all ND
CH3	4.0	ND	ND	ND	ND
CH3A	1.5	ND	ND	ND	ND
CH3B	2.5	0.89	ND	ND	0.031 cis- and trans 1,2 Dichloroethene
CH3C	2.0	0.079	ND	ND	ND
CH3D	2.0	2.3	1.2	ND	0.068 1,2-Dichlorobenzene
CH4	3.0	ND	ND	ND	ND
CH4A	2.5	ND	ND	ND	ND
CH4A	4.5	ND	ND	ND	ND

[1]Analyzed by either EPA Method 8010 or EPA Method 8240
[2]ND = Not Detected

Table 5

Area 5

Soil Sampling Results - Chlorinated Hydrocarbons[1]

Boring No.	Depth (feet)	Chlorobenzene (mg/kg)	1,4-Dichlorobenzene (mg/kg)	Trichloroethene (mg/kg)	Other (mg/kg)
APRIL 1995					
CH3E	1.5	ND[2]	ND	ND	ND
CH3E	4.0	ND	ND	ND	ND
CH3F	1.5	ND	ND	ND	ND
CH3F	4.0	0.027	ND	ND	ND
JULY 1994					
MW2	16.5	9.0	5.4	ND	4.2 1,2-Dichlorobenzene
SEPTEMBER 1995					
MW4	5.5	0.22	0.067	ND	all ND
MW6	3.5	ND	ND	ND	ND
MW6	6.0	ND	ND	ND	ND
MW6	15.5	ND	ND	ND	ND
MW7	15.5	ND	ND	ND	ND

[1]Analyzed by either EPA Method 8010 or EPA Method 8240
[2]ND = Not Detected

Table 5

Area 5

Soil Sampling Results - Metals

Boring No.	Depth (feet)	Lead (mg/kg)	Mercury (mg/kg)	Copper (mg/kg)	Other (mg/kg)
MAY 1994					
BH19	6.0	ND[1]	0.12	26	Arsenic - 9.5, Antimony - ND, Cobalt -14, Molybdenum - ND, Nickel - 14, Chromium - 16, Silver - ND, Thallium - ND, Vanadium - 60, Zinc - 67, Selenium - ND, Barium - 440, Beryllium - 0.48, Cadmium - ND
SEPTEMBER 1995					
MW4	5.0	30	ND	150	Zinc -180
MW6	3.5	39	1.3	200	Zinc - 140
MW6	6.0	ND	ND	32	Zinc - 69
MW6	15.5	5.8	ND	360	Zinc - 87
MW7	15.5	5.9	ND	32	Zinc - 40

Grab Groundwater Sample Analytical Results

Sample Location	TPH-D[2] (µg/L)	TPH-G[3] (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Chlorinated[4] Hydrocarbons (µg/L)	Metals (µg/L)
MAY 1994								
BH18	---[5]	2,600	ND	ND	ND	ND	Chlorobenzene 2,200	---
JULY 1995								
TGSP7	770	1,700	22	ND[1]	ND	310	1,4 Dichloro-benzene - 8.1	---

[1] = Not Detected
[2] TPH-D = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015-modified
[3] TPH-G = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015-modified
[4] Analyzed by EPA Method 8010 or EPA Method 8240
[5] --- = Not Analyzed

Table 5

Area 5

Grab Groundwater Sample Analytical Results

Sample Location	TPH-D (µg/L)	TPH-G (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Chlorinated Hydrocarbons[1] (µg/L)	Metals (µg/L)
TGSP8	870	1,900	58	3.0	2.6	400	Chlorobenzene - 310 1,4-Dichlorobenzene-13	---
TGSP9	250	480	2.1	0.91	2.2	3.6	all ND	---
TGSP10	580	2,200	47	ND[2]	5.2	ND	all ND	---
T[redacted]P11	480	ND	ND	ND	ND	ND	all ND	---

Monitoring Well Groundwater Sampling Results - Petroleum Hydrocarbons

Groundwater Monitoring Well Date	TOG[3]	TPH-MO[4]	TPH-D[5] (µg/L)	TPH-G[6] (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	MTBE (µg/L)
MW2									
3/13/95	---[7]	---	2,500	1,600	77	ND	ND	850	---
6/21/95	---	---	3,300	2,300	65	0.74	1.3	810	---
9/29/95	---	ND	870	1,400	41	ND	ND	ND	ND
12/29/95	ND	---	2,600	1,600	36	ND	14	ND	ND

[1]Analyzed by EPA Method 8010 or EPA Method 8240
[2]ND = Not Detected
[3]TOG = Total Oil and Grease by SMWW Method 5520CF, Typical Reporting Limit 50 mg/kg;
[4]TPH-MO = Total Petroleum Hydrocarbons as Motor Oil by EPA Method 8015 Modified, Typical Reporting Limit 5 mg/kg
[5]TPH-D = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015-modified
[6]TPH-G = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015-modified
[7]--- = Not Analyzed

Table 5

Area 5

Monitoring Well Groundwater Sampling Results - Petroleum Hydrocarbons

Groundwater Monitoring Well Date	TOG[1]	TPH-MO[2]	TPH-D[3] (µg/L)	TPH-G[4] (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	MTBE (µg/L)
MW4									
10/2/95	---	880	1,900	1,400	33	ND	3.0	ND	ND
12/29/95	9,500	---	800	960	35	5.5	13	ND	ND
MW5									
10/2/95	---[5]	ND[6]	840	300	3.7	ND	ND	ND	ND
12/29/95	40,000	---	650	860	8.5	0.85	0.77	ND	ND
MW6									
10/2/95	---	ND	ND	ND	ND	ND	ND	ND	ND
12/29/95	7,300	---	ND	ND	ND	ND	ND	ND	ND
MW7									
10/2/95	---	ND	900	ND	ND	ND	ND	ND	ND
12/29/95	ND	---	130	ND	ND	ND	ND	ND	ND

[1]TOG = Total Oil and Grease by SMWW Method 5520CF, Typical Reporting Limit 50 mg/kg;
[2]TPH-MO = Total Petroleum Hydrocarbons as Motor Oil by EPA Method 8015 Modified, Typical Reporting Limit 5 mg/kg
[3]TPH-D = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015-modified
[4]TPH-G = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015-modified
[5]--- = Not Analyzed
[6]ND=Not Detected

Table 5

Area 5

Monitoring Well Groundwater Sampling Results - Chlorinated Hydrocarbons[1]

Groundwater Monitoring Well Date	Chlorobenzene	cis and trans-1,2-Dichloroethene
MW2		
3/13/95	790	ND[2]
6/21/95	290	1.6
9/29/95	940	ND
12/29/95	370	ND
MW4		
10/2/95	390	ND
12/29/95	210	ND
MW5		
10/2/95	35	ND
12/29/95	240	ND
MW6		
10/2/95	ND	ND
12/29/95	ND	ND
MW7		
10/2/95	ND	ND
12/29/95	ND	ND

[1]Analyzed by EPA Method 8010 or EPA Method 8240
[2]ND=Not Detected

Table 5

Area 5

Monitoring Well Groundwater Sampling Results - Metals

Groundwater Monitoring Well Date	Copper	Lead	Mercury	Zinc
MW2				
3/13/95	---[1]	---	---	---
6/21/95	---	---	---	---
9/29/95	ND	ND	ND	51
12/29/95	55	ND	ND	38
MW4				
10/2/95	20	210	0.6	440
12/29/95	55	ND	ND	68
MW5				
10/2/95	ND[2]	ND	0.91	240
12/29/95	100	ND	ND	68
MW6				
10/2/95	ND	ND	2.3	140
12/29/95	95	ND	0.53	110
MW7				
10/2/95	20	310	11	380
12/29/95	60	ND	ND	80

[1]--- = Not Analyzed
[2]ND=Not Detected

Table 6

Area 6

Former Pacific Dry Dock and Repair Company Yard II
321 Embarcadero
Oakland, California

Soil Sampling Results - TRPH, TOG, TPH-MO

Boring No.	Depth (feet)	TRPH[1] (mg/kg)	TOG[2] (mg/kg)	TPH-MO[3] (mg/kg)
DECEMBER 1989				
PDDII-6	0.5	6,700	---[4]	---
PDDII-6	2.5	80	---	---
PDDII-6	5.0	6,100	---	---
PDDII-7	0.5	35,000	---	---
PDDII-7	2.5	11,000	---	---
BH12	6.0	---	540	---
BH13	9.0	---	13,000	---
BH14	9.0	---	ND[5]	---

[1] TRPH = Total Recoverable Petroleum Hydrocarbons by EPA Method 418.1, Typical Reporting Limit 50 mg/kg
[2] TOG = Total Oil and Grease by SMWW Method 5520CF, Typical Reporting Limit 50 mg/kg;
[3] TPH-MO = Total Petroleum Hydrocarbons as Motor Oil by EPA Method 8015 Modified, Typical Reporting Limit 5 mg/kg
[4] --- = Not Analyzed
[5] ND = Not Detected Above Reporting Limit

Table 6

Area 6

Soil Sampling Results - TPH-D, TPH-G, BTEX

Boring No.	Depth (feet)	TPH-D[1] (mg/kg)	TPH-G[2] (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
MAY 1994							
BH13	6.0	1,700	25	ND[3]	ND	ND	ND
BH14	6.0	---[4]	ND	ND	ND	ND	ND
CH5	1.5	ND	ND	ND	ND	ND	ND
CH6	2.5	5.3	ND	ND	ND	0.0052	0.043
CH7	2.5	ND	ND	ND	ND	ND	ND
CH8	3.5	ND	ND	ND	ND	ND	ND
CH9	2.0	7.0	ND	ND	ND	ND	0.038

Soil Sampling Results - Semi Volatile Hydrocarbons

Boring No.	Depth (feet)	Semi-Volatile Hydrocarbons[5] (mg/kg)
MAY 1994		
BH14	6.0	all ND

[1] TPH-D = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015-modified
[2] TPH-G = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015-modified
[3] ND = Not Detected
[4] --- = Not Analyzed
[5] Analyzed by EPA Method 8270

Table 6

Area 6

Soil Sampling Results - Chlorinated Hydrocarbons[1]

Boring No.	Depth (feet)	Chlorobenzene (mg/kg)	1,4-Dichlorobenzene (mg/kg)	Trichloroethene (mg/kg)	Other (mg/kg)
MAY 1994					
BH13	6.0	ND[2]	ND	ND	all ND

Soil Sampling Results - Metals

Boring No.	Depth (feet)	Lead (mg/kg)	Mercury (mg/kg)	Copper (mg/kg)	Other (mg/kg)
DECEMBER 1989					
PDDII-6	5.0	78	0.5	90	Arsenic - 3.3; Antimony - ND; Barium - 32; Beryllium - ND; Cadmium - ND; Total Chromium - 37; Chromium VI - ND; Cobalt -11; Molybdenum - ND; Nickel - 31; Selenium - ND; Silver - ND; Thallium - ND; Vanadium - 52; Zinc - 360

Monitoring Well Groundwater Sampling Results - Petroleum Hydrocarbons

Groundwater Monitoring Well Date	TOG[3]	TPH-MO[4]	TPH-D[5] (µg/L)	TPH-G[6] (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	MTBE (µg/L)
MW1									
3/13/95	---[7]	---	220	ND	ND	ND	ND	ND	---
6/21/95	---	---	160	ND	ND	ND	1.0	5.3	---
9/29/95	---	ND	ND	ND	ND	ND	ND	ND	ND
12/29/95	ND	---	ND	55	3.6	ND	1.4	ND	ND

1 Analyzed by either EPA Method 8010 or EPA Method 8240
2 ND = Not Detected
3 TOG = Total Oil and Grease by SMWW Method 5520CF, Typical Reporting Limit 50 mg/kg;
4 TPH-MO = Total Petroleum Hydrocarbons as Motor Oil by EPA Method 8015 Modified, Typical Reporting Limit 5 mg/kg
5 TPH-D = Total Petroleum Hydrocarbons as Diesel by EPA Method 8015-modified
6 TPH-G = Total Petroleum Hydrocarbons as Gasoline by EPA Method 8015-modified
7 ---=Not Analyzed

Table 6

Area 6

Monitoring Well Groundwater Sampling Results - Chlorinated Hydrocarbons[1]

Groundwater Monitoring Well Date	Chlorobenzene	Chloroform	cis and trans-1,2-Dichloroethene
MW1			
3/13/95	4.6	ND	ND
6/21/95	ND[2]	0.73	ND
9/29/95	1.5	ND	ND
12/29/95	9.1	ND	ND

Monitoring Well Groundwater Sampling Results - Metals

Groundwater Monitoring Well Date	Copper	Lead	Mercury	Zinc
MW1				
3/13/95	---[3]	---	---	---
6/21/95	---	---	---	---
9/29/95	ND	ND	0.28	56
12/29/95	50	110	ND	24

[1] Analyzed by either EPA Method 8010 or EPA Method 8240
[2] ND = Not Detected
[3] ---=Not Analyzed

Table 7

Water Level Data

Former Pacific Dry Dock and Repair Company Yard II
321 Embarcadero
Oakland, California

Groundwater Monitoring Well Date	Reference Elevation (top of casing)[1,2]	Depth to Groundwater[1]	Groundwater Elevation[2]	Hydraulic Gradient and Direction
MW1 (Area 6)				
3/7/95	98.60	3.15	95.45	0.015 northwest
3/13/95		2.62	95.98	0.019 northwest
6/21/95		3.44	95.16	0.022 north/northwest
9/29/95	7.74	3.55	4.19	0.008 north/northwest
1/18/96		3.28	4.46	0.015 northwest
MW2 (Area 5)				
3/7/95	98.20	3.93	94.27	
3/13/95		3.23	94.97	
6/21/95		4.44	93.76	
9/29/95	7.35	4.90	2.45	
1/18/96		5.23	2.12	
MW3 (Area 4)				
3/7/95	98.36	4.12	94.24	
3/13/95		3.96	94.40	
6/21/95		4.63	93.73	
9/29/95	7.50	5.10	2.40	
1/18/96		4.05	2.45	

[1] Measurement and reference elevation taken from notch/mark on top north side of well casing.
[2] Elevation initially referenced to arbitrary site datum. Resurveyed to mean sea level datum in September 1995.

Table 7

Water Level Data

Former Pacific Dry Dock and Repair Company Yard II
321 Embarcadero
Oakland, California

Groundwater Monitoring Well Date	Reference Elevation (top of casing)[1,2]	Depth to Groundwater[1]	Groundwater Elevation[2]
MW4 (Area 5)			
9/29/95	5.65	4.78	0.87
1/18/96		3.65	2.00
MW5 (Area 5)			
9/29/95	5.89	4.25	1.64
1/18/96		3.75	2.14
MW6 (Area 5)			
9/29/95	7.65	4.82	2.83
1/18/96		3.63	4.02
MW7 (Area 5)			
9/29/95	6.80	3.65	3.15
1/18/96		1.85	4.95

[1] Measurement and reference elevation taken from notch/mark on top north side of well casing.
[2] Elevation initially referenced to arbitrary site datum. Resurveyed to mean sea level datum in September 1995.