CROWLEY MARITIME CORPORATION

May 26, 1992

Mr. Barney Chan
Hazardous Materials Division
Department of Environmental Health
Alameda County Health Care Services Agency
80 Swan Way
Oakland, California 94621

RE: Pacific Dry Dock & Repair Yard 1, Western Section

Dear Mr. Chan:

As you know, Crowley Maritime Corporation has been investigating subsurface contamination at the above referenced facility. Attached for your review is a Preliminary Investigation and Evaluation Report (PIER) for the western section of this facility for your review. We feel that we have sufficiently investigated this portion of the site to completely identify the magnitude and extent of contamination. We are presently evaluating cleanup alternatives for the petroleum contamination discovered during our investigation. A work plan outlining our proposed remedial actions will be submitted for your review in the near future.

We would appreciate any comments your have on this report and the entire project. If any questions arise concerning this matter, feel free to contact me at (206) 443-7882.

Sincerely,

George A. Brooks

George A. Brooks, General Manager
Crowley Environmental Services

Enclosure

cc: C. Nalen
H. Bowles
L. Kleinecke, Versar

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Versar INC. SACRAMENTO

PRELIMINARY INVESTIGATION AND EVALUATION REPORT (PIER)
PACIFIC DRY DOCK AND REPAIR YARD I
WESTERN SECTION
OAKLAND, CALIFORNIA

Prepared for:

Crowley Maritime Corporation
2401 Fourth Avenue
P.O. Box 2287
Seattle, Washington 98111

Prepared by:

Versar Inc. - Sacramento
5330 Primrose Drive, Suite 228
Fair Oaks, California 95628-3520

Versar Project No. 7703.26

May 6, 1992

Versar INC. SACRAMENTO

PROJECT SUMMARY

This Preliminary Investigation and Evaluation Report (PIER) was prepared by Versar Inc. of Sacramento, California for Crowley Maritime Corporation. Mr. Lawrence Kleinecke, Geohydrologist/ Chemist, and Ms. Yvonne Lembi, Geologist, prepared this PIER. Mr. R. Stephen Wilson, Senior Geologist, reviewed this PIER. This work was performed under the supervision of Mr. Wilson and Mr. James R. Frantes, R.G., Regional Manager.

This PIER documents the subsurface investigation conducted at the western section of the Pacific Dry Dock and Repair Yard I located at 1441 Embarcadero in Oakland, California. The activities performed as part of the investigation include the coring of 48 boreholes at the site, collection and analysis of 11 ground-water and 70 soil samples, interpretation of the laboratory analytical results, and preparation of the PIER. From the investigation, Versar Inc. has drawn the following conclusions:

- The primary areas of concern are soils and ground water containing gasoline, diesel, benzene, toluene, ethylbenzene, and xylenes identified in the areas of the underground storage tank excavation and the office building.

- Local areas of minor contamination have been identified at the site. The contamination in any one of the areas does not appear to be sufficient to identify the source for the primary areas of concern.

- Minor oil and grease contamination was identified in several locations in the fill material underlying the site. The source of the contamination is unclear.

Prepared By:

Lawrence Kleinecke
Geohydrologist/Chemist

Reviewed By:

R. Stephen Wilson
Senior Geologist

Approved for Release:

REGISTERED GEOLOGIST James R. Frantes STATE OF CALIFORNIA

James R. Frantes, R.G. No. 4534
Pacific Regional Manager

DISCLAIMER

The purpose of this Preliminary Investigation and Evaluation Report (PIER) is only to inform the client of the environmental conditions as they currently exist at the subject site. Versar Inc. (Versar) does not assume responsibility for the discovery and elimination of hazards that could possibly cause accidents, injuries, or damage. Compliance with submitted recommendations and/or suggestions in no way assures elimination of hazards or the fulfillment of a client's obligation under any local, or federal laws or any modifications or changes thereto. In many cases, federal, or local codes require the prompt reporting to relevant authorities if a release occurs. It is the responsibility of the client to comply with requirements to notify authorities of any conditions that are in violation of the current legal standards.

Factual information regarding operations, conditions, and test data was obtained, in part, from the client and has been assumed by Versar to be correct and complete. Since the facts stated in this PIER are subject to professional interpretation, they could result in differing conclusions. In addition, the findings and conclusions contained in this PIER are based on various quantitative and qualitative factors as they existed on or near the date of the investigation.

Versar has prepared this PIER at the request of its client. Versar is responsible for the accuracy of the PIER's contents, subject to what is stated elsewhere in this Disclaimer, but recommends the PIER be used only for the purposes intended by the client and Versar when the PIER was prepared. Versar makes no warranty and assumes no liability with respect to the use of information contained in this PIER. The PIER may be unsuitable for other uses, and Versar assumes no liability for such uses. No changes to its form or content may be made without Versar's express written approval.

This PIER reflects conditions, operations, and practices as observed during the investigation. Changes or modifications to procedures and/or facilities made after the site visit are not included.

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This PIER reflects conditions, operations, and practices as observed during the investigation. Changes or modifications to procedures and/or facilities made after the site visit are not included.

1.0 INTRODUCTION

Versar Inc. (Versar) has been retained by Crowley Maritime Corporation to conduct a Preliminary Investigation and Evaluation of the western section of the Pacific Dry Dock and Repair Yard I (PDD I) facility. The PDD I facility is located at 1441 Embarcadero in Oakland, California. This Preliminary Investigation and Evaluation Report (PIER) includes the results of the investigation of the western section of PDD I (hereinafter referred to as the Site) as outlined in Versar's Site Investigation Work Plan (Versar, 1991). The investigation of the remainder of PDD I will be addressed separately.

1.1 Site History

Since 1935, the Site has been used as a boat repair and dry dock facility. Prior to 1953, PDD I was the only developed site along the local shoreline. Since 1953, the land use in the surrounding areas has been primarily light industrial or commercial office space.

The Site is currently operating on a limited basis. However, the practice of repairing and refurbishing sea-going vessels has generated various regulated and non-regulated wastes. Activities at the Site also utilized many products which are regulated materials. These products and waste materials include: waste sand blasting materials, oil-based paints, solvents, acids, caustics, waste oils, hydrocarbon-contaminated water, and motor fuels.

During December 1989 and January 1990, Versar conducted a site assessment of PDD I (Versar 1990). The findings of the site assessment identified petroleum hydrocarbons, volatile and semi-volatile organic compounds, metals, and non-metals (arsenic, cyanide and sulfides) in the soil and sediments at the Site. Also, a 400-gallon, unleaded gasoline underground storage tank (UST), which was not in use and not intended to be used in the

future, was identified near the northwest corner of the Site. A regulatory review did not identify any ongoing or historical investigations or problems at the Site.

During September 1991, the 400-gallon unleaded gasoline UST was removed from the Site under the supervision of Versar (Versar, 1991). Soil and ground-water samples were collected following the UST removal and found to contain petroleum hydrocarbons, benzene, toluene, ethylbenzene, xylenes, and organic lead. It should be noted that the contamination was identified primarily in the ground-water sample.

1.2 Investigation Objectives

This investigation represents the initial Preliminary Investigation and Evaluation of the Site. The Preliminary Investigation is intended to determine if the previously identified contamination is restricted to soils only, or if ground-water has been affected (RWQCB, 1991). Because contamination has been identified at various locations, the field investigation will be conducted in two phases. This PIER documents the results of the initial phase, which was conducted in two stages. The second phase of the investigation will further define the soil and ground-water contamination, and determine the source, if possible, of the contamination.

The objectives of the field investigation are:

- To determine if soil contamination is present in the subsurface soils at selected locations.
- To determine if ground-water contamination is present at locations other than the previously removed UST location.
- To obtain accurate contaminant concentrations through laboratory analysis of soil and ground-water samples.

The PIER will provide information necessary for assessment of the problem area and subsequent remedial proposals.

2.0 SITE DESCRIPTION

This section presents a description of the Site with respect to its physical location, layout, geology and soils, and hydrology. Beneficial uses of the ground water beneath the site are also discussed.

2.1 Site Location

The Site is located at 1441 Embarcadero in Oakland, California, in the central portion of the north bank of Brooklyn Basin. Brooklyn Basin, an estuary of Oakland Inner Harbor, is bounded by Government Island to the south and the City of Oakland to the north. Oakland Inner Harbor extends in an easterly direction from San Francisco Bay to San Leandro Bay. East and west of the Site are light industrial businesses and commercial offices. North of the Site are the Embarcadero, the Nimitz Freeway, Southern Pacific and Western Pacific Railways and a Bay Area Rapid Transit railway. Figures 1 and 2 show the site location and site layout, respectively.

2.2 Site Layout

The western portion of the Site, which is paved with asphalt, occupies approximately 58,240 square feet and supports several structures. The buildings include an office building; two machine shops, one of which has an associated canopy-covered area; an unused storage building; and a cinderblock drum-storage shed. Other surface structures noted during this investigation include a large generator, which adjoins one of the machine shops; an unused, above-ground waste-oil storage tank located adjacent to the other machine shop; and four unused above-ground storage tanks located south of the storage building. The 400-gallon gasoline UST was formerly located immediately south of the drum storage shed.

A sheet metal bulkhead abutts the southern edge of the Site, separating the Site from Brooklyn Basin. A chain-link fence separates the Site from the Embarcadero.

2.3 Site Geology and Soils

The Site is located in the Coast Ranges geomorphic province. The Site is situated between the Hayward Fault (on the east) and the San Andreas Fault (on the west) and is tectonically active. The underlying bedrock consists of Mesozoic volcanic and metavolcanic rocks 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 of between five and ten feet above lower low water (National Geodetic Vertical Datum of 1929). Data collected from sampling activities has indicated the soils beneath the Site consist of sand, silt, and clay, with wood and brick fragments. These soils appear to be fill material, and extend from the surface to bay muds, which begin between eight and 12 feet bgs. The bay muds consist of tan-grey silty clay with shell fragments and thin layers of sands or gravels. Versar's borehole logs which describe the subsurface stratigraphy are included as Appendix A. Figures 3 through 11 include soil and ground-water sampling locations, subsurface cross-sections, cross-section lines-of-reference, and graphic representation of standard symbols for soil types.

Stratographic units identified beneath the Site include a layer of sand and gravel which extends from the asphalt surface to a typical depth of between two and four feet. The sand and gravel layer occurs over 90 percent of the Site. In the central portion of the Site, between boreholes BH7, BH9, and BH24, the sand and gravel layer extends to the bay muds. A metal bulkhead extends along the east and south boundaries of the Site. Gravels extend from the surface to the bay muds adjacent to the bulkhead.

A clay unit is found beneath the sand and gravel layer in the northern portion of the Site near the offices. The clay unit occurs between seven and nine feet bgs and extends between boreholes BH4, BH6, and south to BH7. The remainder of the Site consists of minor discontinuous units of sands, gravels, silts, and clays which extend to the bay muds.

2.4 Site Hydrology

Ground water was identified during Versar's investigation (Versar, 1992) between four feet bgs in gravels found under the south side of the Site (near the edge of Brooklyn Basin), and eight feet bgs beneath the north side of the Site (near the Embarcadero) in minor sand or gravel layers. The depth to ground water varies greatly at the Site due to the extreme variation in the local soil composition. In general, the ground water is slightly elevated (one to two feet) along the south edge of the Site. The elevated water level may occur as a result of tidal influences, which is typical of bayside hydrology, or may be due to mounding of ground water against the shoring at the southern boundary of the site. The ground water appears to follow interconnected pockets of sand, gravels, and artificial subsurface conduits such as buried piping or utility lines. Both ground-water flow and depth are subject to tidal influences.

2.5 Beneficial Uses of Water

The ground water identified in the shallow soils beneath the Site occurs primarily as a result of seawater intrusion. Based on the proximity to the salt water estuary, the ground water is believed to be highly saline and unfit for consumption. There is therefore no apparent beneficial use for the shallow ground water beneath the Site.

3.0 SITE INVESTIGATION METHODS AND PROCEDURES

The following sections summarize the methods and procedures followed during Versar's preliminary investigation. Standard methods and procedures are more fully described in Versar's Site Investigation Work Plan (1991). Deviations from the standard methods and procedures are described in the following sections.

3.1 Soil Sampling and Analysis

As part of Versar's investigation, soil samples were collected from 48 locations during two sampling events at the western section of the PDD I Site. The soil samples were collected by Powercore Soil Sampling, Inc. (Powercore) using hydraulically operated machinery to drive and retrieve soil samplers. Versar representatives Ms. Yvonne Lembi, Geologist, and Mr. Stephen Wilson, Senior Geologist, supervised the field activities conducted during the first sampling event, which took place on October 25, 1991. Versar representatives Ms. Lembi and Mr. Lawrence Kleinecke, Geohydrologist/Chemist, supervised the second sampling event, which took place between January 6 and January 8, 1992. Versar's Site Investigation Work Plan (1991) proposed the first sampling event. The second event was conducted to supplement the information obtained in the first event.

Soil samples were collected by attaching a decontaminated, two-inch outside diameter, split-spoon sampler lined with brass tubes to a steel drilling rod and driving it two feet into the soil. The sampler was then retrieved and the four six-inch brass tubes removed for inspection. Either a center or bottom tube was selected for possible laboratory analysis. The ends of the selected tube were covered with Teflon™ film and fitted with plastic end caps. The tube was then appropriately labeled, sealed in a plastic bag, and placed on ice in an insulated cooler.

A portion of each of the soil samples was monitored for volatile organic compounds (VOCs) by headspace analysis. The field analysis was conducted using a photonization detector (PID) (either a Photovac TIP II or a Thermoenvironmental Instruments Model 580B) using the following procedures:

- A background reading was obtained from the ambient air in the area, and the subsequent readings corrected to reflect a zero background reading.
- A full brass liner of soil (if available) was emptied into a one-gallon Ziploc™ bag and sealed, allowing some ambient air to be included. The bag was then agitated and placed in the sun to allow volatilization of VOCs.
- The Ziploc™ bag was opened a minimum amount and the PID probe inserted.
- The air within the bag was monitored with the PID and the maximum reading recorded in parts per million (ppm).

It should be noted that the results of field headspace analysis are only a qualitative indication of the presence of organic compounds and cannot be used in place of laboratory analyses. The results of field headspace analysis are included in the borehole logs in Appendix A.

Boreholes BH1 through BH14 were cored and sampled in the first sampling event (October 1991). The remaining boreholes, BH15 through BH48, were completed during the second event (January 1992).

As shown in Figure 3, boreholes BH1, BH2, and BH3 were positioned triangularly around a compressor located near the east entrance to the yard, just north of the plate shop. The asphalt surface surrounding the compressor was heavily stained. After cutting through the asphalt, each of the boreholes was cored to a depth of ten feet bgs. Ground water was identified at 7.5 feet bgs in borehole BH2. Ground water was not identified in either of the other boreholes. The soil sample collected from seven

feet bgs in borehole BH3 exhibited a moderate hydrocarbon odor and an oily sheen.

Boreholes BH4, BH5, BH6, and BH7 were positioned around the office building in the north-central portion of the Site. Each of the boreholes was cored to a depth of ten feet bgs. The soil samples collected from six feet bgs in borehole BH4 and from four, six, and eight feet bgs in borehole BH6 exhibited moderate hydrocarbon odors. Ground water was not identified in boreholes BH4, BH6 or BH7. Ground water was identified at 3.2 feet bgs in borehole BH5. The water exhibited a multicolored sheen and was found in a void extending from approximately four feet bgs to eight feet bgs. Gravels, wood fragments, and an unidentified white fibrous material were encountered in the void.

Boreholes BH8 and BH9 were positioned adjacent to an above-ground waste oil storage tank located in the south-central portion of the Site. The waste-oil tank has a three-foot tall containment area beneath it and was empty at the time of the investigation. Ground water was identified at seven feet bgs in borehole BH8, and at four feet bgs in borehole BH9. A hydrocarbon odor and sheen was identified in the soil sample collected from five feet bgs in borehole BH9. Each of the boreholes was cored to a depth of eight feet bgs.

Boreholes BH10, BH11, and BH12 were drilled triangularly around the underground storage tank excavation near the northwest corner of the Site. Petroleum hydrocarbon contaminated ground water has been previously identified in the excavation. Boreholes BH10 and BH11 were cored to a depth of 12 feet bgs. Borehole BH12 was cored to 10 feet bgs. Ground water was identified at eight feet bgs in borehole BH10, and ten feet bgs in borehole BH11. Soil samples from each of the boreholes exhibited strong hydrocarbon odors. Soil samples from borehole BH12 also exhibited an oily sheen.

Boreholes BH13 and BH14 were located east and north of the above-ground storage tank area in the southwest corner of the Site. Borehole BH13 was drilled to a depth of nine feet bgs. An oily sheen was identified in the sample collected from nine feet bgs in borehole BH13. Borehole BH14 was drilled to a depth of 13 feet bgs. Moderate hydrocarbon odors were identified in the soil samples collected at four and six feet bgs in borehole BH14. Ground water was identified at six feet bgs in borehole BH13, and at 11 feet bgs in borehole BH14.

Boreholes BH15 through BH25 were positioned in the south-central portion of the Site. Boreholes BH15 through BH21, and BH23, were cored to a depth of three feet bgs. The soil sample from three feet bgs in BH19 had a slight hydrocarbon odor. Boreholes BH22, BH24 and BH25 were each cored to 12 feet bgs. Ground water was encountered between seven and eight feet bgs in the three boreholes. A strong grease odor and an oily appearance was noted in the soil sample taken at 12 feet bgs from BH22.

Boreholes BH26 through BH31 and BH46 through BH48 were cored in the north-central portion of the Site, in and around the building currently housing offices. Boreholes BH26, BH46 and BH47 were cored to a depth of nine feet bgs, and BH48 was cored to three feet bgs. The remaining boreholes in this group, BH27 through BH31, were completed at a depth of nine feet bgs. Ground water was encountered at approximately eight feet bgs in boreholes BH26 and BH31 and at one foot bgs in BH48. Hydrocarbon odors were detected in the eight to ten foot bgs samples from boreholes BH28, BH29, BH31, and BH47; and in the two foot bgs sample from BH26. The soil samples taken from four to ten feet bgs in BH30 also had a distinct hydrocarbon odor. The soil sample from three feet bgs in BH48 had a slight to moderately strong grease-like odor.

Boreholes BH35 through BH39 were located in the northwest portion of the Site, near the excavation created by the removal of the UST. All of the boreholes in this group were cored to a depth of ten feet bgs, with the exception of BH38, which was completed at four feet bgs due to the presence of a concrete pad or block encountered at that depth. A similar obstruction was encountered during the coring of borehole BH37; the hydraulic sampling apparatus was moved approximately four feet to the southeast of the first location and the borehole was re-cored. Ground water was encountered in BH35 at three feet bgs and then at seven feet bgs; and in BH37 at seven feet bgs. A slight grease-like odor was noted in soil samples collected from one to six feet bgs in BH35. The six foot bgs sample from BH39 had a slight sewage-like odor.

Boreholes BH40 through BH45, which were also positioned in the northwest portion of the Site, are along the perimeter of a planned warehouse. All of the boreholes in this group were cored to a depth of three feet bgs; ground water was not encountered within this group. The soil sample from three feet bgs in BH40 had a slight hydrocarbon odor. The soil samples from BH43 did not have a noticeable odor.

Boreholes BH32 through BH34 were positioned in the southwest portion of the Site, near the above-ground storage tanks. Borehole BH32 was completed at four feet bgs; the nature of the large gravels encountered prevented the collection of soil samples and inhibited the coring process. The location was noted and the rig was moved to the next coring location. Ground water was encountered at four feet bgs in boreholes BH33 and BH34, both of which had total depths of 10 feet. The two-foot bgs and 10-foot bgs samples from both BH33 and BH34 had slight to strong odors.

A total of 48 soil samples collected during the first sampling event were transported following EPA protocols, via Federal Express courier, using Versar's chain-of-custody documents, to Trace Analysis Laboratory, Inc. (Trace). A total of 22 soil samples were submitted to Trace during the second sampling event. The samples were received by a Trace courier under chain-of-custody documentation. A description of the analyses performed and the analytical results are included in Section 4.0 Laboratory Analytical Results.

3.2 Ground-Water Sampling and Analysis

A total of 11 ground-water samples were collected during Versar's investigation of the PDD I Site. Ten of the samples were collected from borings which exhibited significant amounts of ground water, four during the first sampling event and six during the second. The eleventh sample was collected from the UST excavation. Figure 9 shows the ground-water sampling locations.

The following procedure was used to collect ground-water samples from the borings:

- Immediately following the completion of soil coring operations, a decontaminated dedicated 1.5 inch inside diameter well screen was placed in the borehole and allowed to fill with ground water.
- After the well screen has filled sufficiently with ground water, approximately 10 casing volumes of water were removed using either a peristaltic pump or a decontaminated Teflon™ bailer, and placed in DOT-approved 55-gallon drums for disposal.
- The casing was then allowed to refill and a ground-water sample was collected using a decontaminated Teflon™ bailer.

Following sample collection, the casing was removed and the borehole backfilled with neat cement.

Ground-water samples were collected from boreholes BH2, BH5, BH9, BH14, BH24, BH28, BH31, BH33, BH37, and BH39. Following collection, each sample was appropriately labeled and placed on ice in an ice chest. The samples were delivered to Trace by a Trace or Federal Express courier, following EPA protocols, using Versar's chain-of-custody document.

On November 1, 1990, Ms. Lembi returned to PDD I after the first sampling event and collected a sample of the ground water in the UST excavation. The following procedure was used to collected the ground-water sample from the UST excavation:

- Approximately 165 gallons of water was removed from the excavation using a peristaltic pump and placed in DOT-approved 55 gallon drums for disposal.
- The excavation was allowed to refill for approximately one hour and a ground-water sample collected using a decontaminated Teflon™ bailer.

Following collection, the sample was appropriately labeled and placed on ice in an ice chest. The sample was delivered to Trace by Ms. Lembi following EPA protocols, and using Versar's chain-of-custody document. A complete description of the analyses performed and analytical results is presented in Section 4.0 Laboratory Analytical Results.

4.0 LABORATORY ANALYTICAL RESULTS

A total of 70 soil samples and 11 water samples (custody log numbers 1457, 1468, 1479, and 1640) were submitted to Trace. The following sections briefly describe the results of laboratory analysis. Copies of the laboratory analytical results are included as Appendix B. Tables 1 and 2 summarize the laboratory analytical results for soils. Tables 3 and 4 summarize the laboratory analytical results for water. Figures 12, 13, 14 and 15 show the laboratory analytical results for soils. Figure 16 shows the laboratory analytical results for ground water.

4.1 Soil Sample Results

A total of 70 soil samples were submitted to Trace. The laboratory analytical methods used and the number of soil samples analyzed by each method are as follows:

- Total petroleum hydrocarbons as gasoline (TPH-G) by the California Department of Health Services (DHS)/LUFT Field Manual method - 28 samples.
- Total petroleum hydrocarbons as diesel (TPH-D) by the DHS/LUFT Field Manual Method - 31 samples.
- Oil and grease (O&G) by U.S. Environmental Protection Agency (EPA) Method 5520EF - 25 samples.
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8020 - 28 samples.
- Halogenated volatile organics by EPA Method 8010 - four samples.
- Semivolatile organics by EPA Method 8270 - eight samples.
- Metals (cadmium, chromium, lead, nickel, and zinc) using EPA Methods 7130, 7190, 7420, 7520, and 7950, respectively - three samples.

The laboratory analytical results did not identify any halogenated volatile organics or semivolatile organics in concentrations at or above the methods' reporting limits. Metal

concentrations identified are all well below Total Threshold Limit Concentration (TTLC) values.

Of the soil samples collected from the compressor area (boreholes BH1 through BH3), one sample (BH2-8) was analyzed for TPH-G, three (BH2-4, BH2-8, and BH3-8) for TPH-D, one (BH3-2) for O&G, and one (BH2-8) for BTEX. The analytical results identified 23 milligrams per kilogram (mg/kg) of TPH-D in sample BH3-8 and 120 mg/kg of O&G in sample BH3-2. Analyte concentrations were below reporting limits in the remaining samples.

Of the soil samples collected from the existing office building area (boreholes BH4 through BH7, BH26 through BH31, and BH46 through BH48), 11 samples were analyzed for TPH-G, 11 for TPH-D, ten for O&G, and 11 for BTEX. The analytical results identified between 1.8 mg/kg and 47 mg/kg of TPH-G in samples BH4-6, BH28-9.0, BH30-4.0, BH31-1.5, BH47-8.5, and BH48-3.0. TPH-D concentrations between 3.1 mg/kg and 2,800 mg/kg were identified in samples BH4-6, BH5-4, BH26-6.0, BH27-3.0, BH28-9.0, BH30-4.0, BH31-1.5, BH47-8.5, and BH48-3.0. Soil samples BH4-6, BH7-4, BH7-6, BH26-6.0, and BH48-3.0 contained between 80 mg/kg and 850 mg/kg of O&G. BTEX concentrations up to 1.0 mg/kg were identified in samples BH4-6, BH26-6.0, BH27-3.0, BH28-9.0, BH30-4.0, BH31-1.5, BH47-8.5, and BH48-3.0.

Of the soil samples collected from around the waste-oil storage tank and in the south-central portion of the Site, four were analyzed for TPH-G, four for TPH-D, four for O&G, and four for BTEX. The laboratory analytical results identified 32 mg/kg of TPH-G and 1,200 mg/kg of TPH-D in sample BH17-1.0, between 63 mg/kg and 370 mg/kg of O&G in samples BH9-4, BH22-12, and BH25-4.0, and up to 0.2108 mg/kg of total BTEX in samples BH9-4 and BH19-2.5.

Of the soil samples collected from around the former UST location, seven were analyzed for TPH-G, seven for TPH-D, four

for O&G, and seven for BTEX. Concentrations between 0.78 mg/kg and 970 mg/kg of TPH-G were identified in samples BH10-4, BH12-4, BH35-6.0, and BH38-4.0. TPH-D concentrations between 9.8 mg/kg and 1,800 mg/kg were identified in samples BH10-4, BH12-4, and BH35-6. Samples BH10-4, BH10-8, and BH12-4 contained concentrations of O&G between 90 mg/kg and 2,500 mg/kg. Total BTEX concentrations between 0.075 mg/kg and 58.1 mg/kg were identified in samples BH10-4, BH12-4, BH25-6.0, BH38-4.0, and BH39-6.0.

Of the soil samples collected from around the above-ground storage tanks in the southwest portion of the Site, three were analyzed for TPH-G, four for TPH-D, two for oil and grease, and three for BTEX. Samples BH13-9 and BH34-2.0 contained between 6.3 mg/kg and 52 mg/kg of TPH-G. Samples BH13-9, BH33-2.0, and BH34-2.0 contained between 9.4 mg/kg and 2,100 mg/kg of TPH-D. 1,800 mg/kg of oil and grease was identified in sample BH13-9, and total BTEX concentrations up to 13 mg/kg were identified in samples BH13-9, BH33-2.0, and BH34-2.0.

4.2 Water Sample Results

A total of 11 water samples were submitted to Trace for analysis. The laboratory analytical methods used and the number of water samples analyzed by each method are as follows:

- TPH-G by the DHS/LUFT Field Manual method - ten samples.
- TPH-D by the DHS/LUFT Field Manual method - ten samples.
- O&G by EPA Method 5520DF - six samples.
- BTEX by EPA Method 8020 - ten samples.
- Chlorinated volatile organics by EPA Method 8010 - two samples.
- Semivolatile organics by EPA Method 8270 - three samples.

- Metals (cadmium, chromium, lead, nickel, and zinc) by EPA Methods 7130, 7190, 7420, 7520, and 7950, respectively - three samples. (These samples were filtered of sediments by the laboratory prior to analysis.)

Concentrations of chlorinated volatile organics and semivolatile organics at or above the methods' reporting limits were not identified in any of the water samples.

The ground-water samples from boreholes BH5 and BH14 and from the UST excavation (sample PIT #2) contained TPH-D above the method's minimum detection limit of 0.050 milligrams per liter (mg/l). The detected concentrations range from 0.250 mg/l (sample BH14) to 3.0 mg/l (sample PIT #2). TPH-G was detected in the ground-water samples from boreholes BH5 and BH28, at 0.250 mg/l and 0.058 mg/l, respectively. BTEX compounds were detected in the ground-water samples from BH2, BH5, BH9, BH28, BH31, BH37, and BH39, in concentrations ranging from 0.00051 mg/l (toluene in BH2) to 0.021 mg/l (toluene in BH28). O&G was detected in the ground-water samples from boreholes BH5 and BH9 and from the UST excavation. The concentrations detected range from 7.3 mg/l (sample BH9) to 18 mg/l (sample BH5).

Chromium, lead, and nickel were detected in ground-water sample BH5 in concentrations above drinking water maximum contaminant levels (MCLs). Lead was also detected in the ground-water samples from BH9 and the UST excavation (sample PIT #2) in concentrations above MCLs. It should be noted that drinking water MCL values are used here for reference purposes only; the ground water beneath the Site is believed unsuitable for consumption due to its saline nature.

5.0 SUMMARY AND CONCLUSIONS

The following sections provide a brief summary of the results of Versar's preliminary investigation of the Site and Versar's conclusions drawn from the investigation.

5.1 Summary

The results of Versar's field investigation identified fill material to a depth of 12 feet beneath the Site which varied widely in composition. This variation in composition from sands to silts and clays coincides with apparent changes in the occurrence of ground water beneath the Site. Therefore, soil corings produced widely varying amounts of ground water despite their proximity to each other.

Borehole BH5 was a notable anomaly at the Site. Coring of borehole five identified a water-filled void space in the subsurface extending from approximately four feet to eight feet bgs. Soil sample BH5-4 contained only TPH-D while the ground-water sample (BH5) contained TPH-G, TPH-D, O&G, benzene, ethylbenzene, xylenes, and concentrations of chromium, lead, and nickel in excess of drinking water MCLs.

O&G was identified in approximately half of the soil samples analyzed for O&G. While TPH-D and TPH-G were identified at various locations, concentrations in the soil did not exceed 2.8 mg/kg and 65.0 mg/kg, respectively. Concentrations of BTEX were identified in several of the limited number of soil samples for analyzed BTEX.

Preliminary ground-water sampling identified TPH-G, TPH-D, O&G, and BTEX in the UST excavation and south of the office building. To a lesser extent, TPH-D was identified north of the above-ground storage tank area. O&G was also identified near the storage tank located west of the machine shop. Trace

concentrations of toluene (0.00051 mg/l and 0.00056 mg/l) were identified near the generator and the storage tank.

5.2 Conclusions

Based on the data collected during the field investigation, it is Versar's opinion that the primary areas of concern are petroleum hydrocarbon contaminated soils and ground water near the UST excavation and the office building.

The TPH-G, TPH-D, O&G, and BTEX identified near the office building (boreholes BH4 and BH5) may have a common source. The location of the source is unknown but does not appear to be connected with recent operations at the Site.

The TPH-G, TPH-D, O&G, and BTEX identified in and near the UST excavation is not consistent with what would be expected to be found following an unleaded gasoline UST release. Samples collected from the surrounding soils contained higher concentrations of O&G and TPH-D than TPH-G. The source of this contamination is therefore unknown.

The TPH-G, TPH-D, O&G and xylenes identified near the above-ground storage tanks appear to be the result of surface spills. However, the higher concentrations of contaminants identified in the deeper soils may have resulted from historic sources or other activities.

Minor O&G contamination was identified in several locations in the fill material underlying the PDD I Site. The source of the O&G contamination is unknown.

6.0 REFERENCES

Tri-Regional Board Staff Recommendations for Preliminary Investigation and Evaluation of Underground Tank Site; Appendix - Reports, Central Valley Regional Water Quality Control Board. 1991.

Site Investigation Work Plan, Pacific Dry Dock and Repair Yard I, Western Section, Oakland, California. Versar Inc., Fair Oaks, California, 1991.

Summary of Tank Removal Activities, Pacific Dry Dock Yard I, 1441 Embarcadero, Oakland, California. Versar Inc., Fair Oaks, California, 1991.

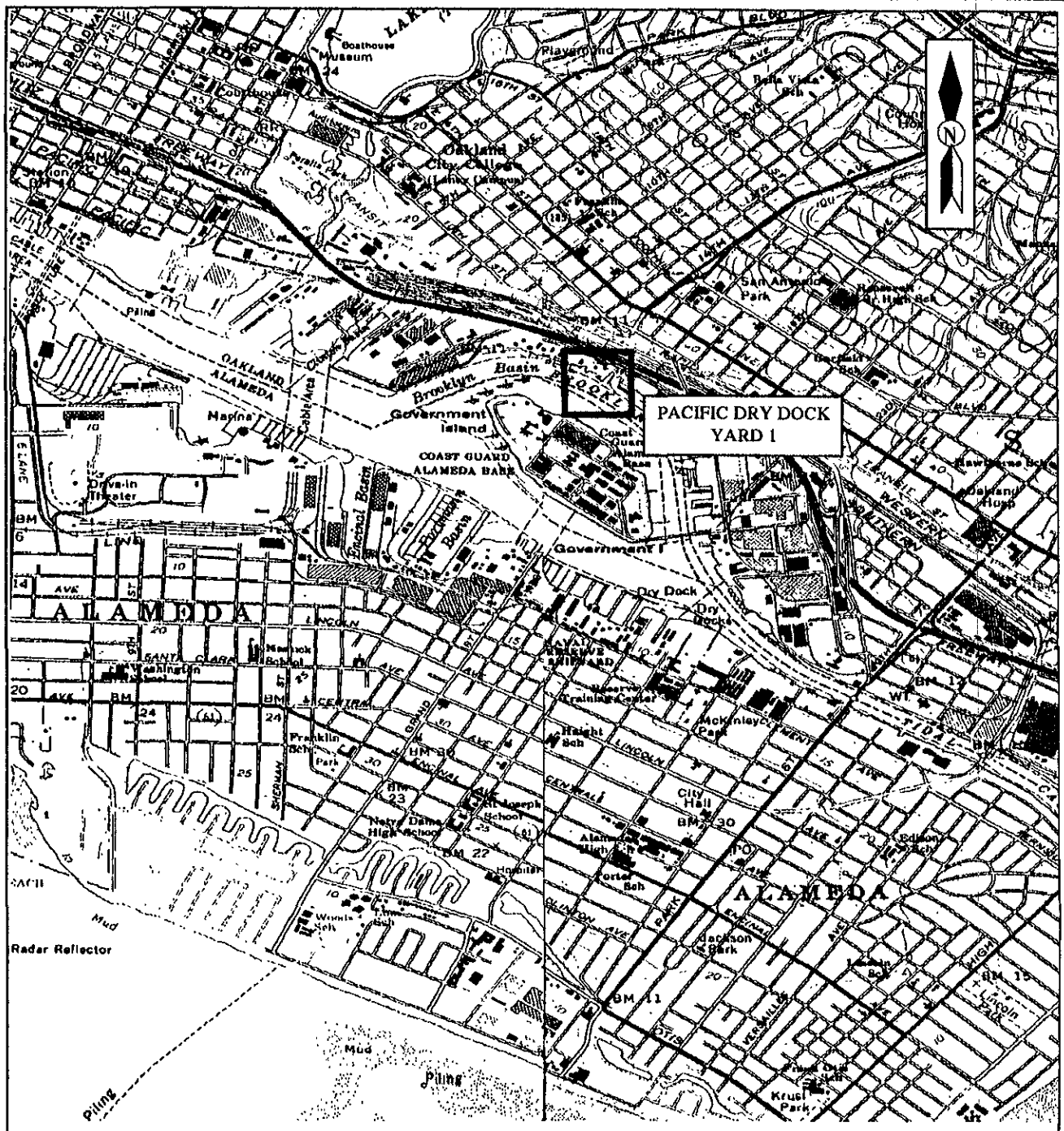
Site Assessment Report for the Pacific Dry Dock and Repair Yards 1 and 2, Oakland, California. Versar Inc., Fair Oaks, California, 1990.

7.0 APPENDIX

Appendices A and B comprises the Appendix of this report.

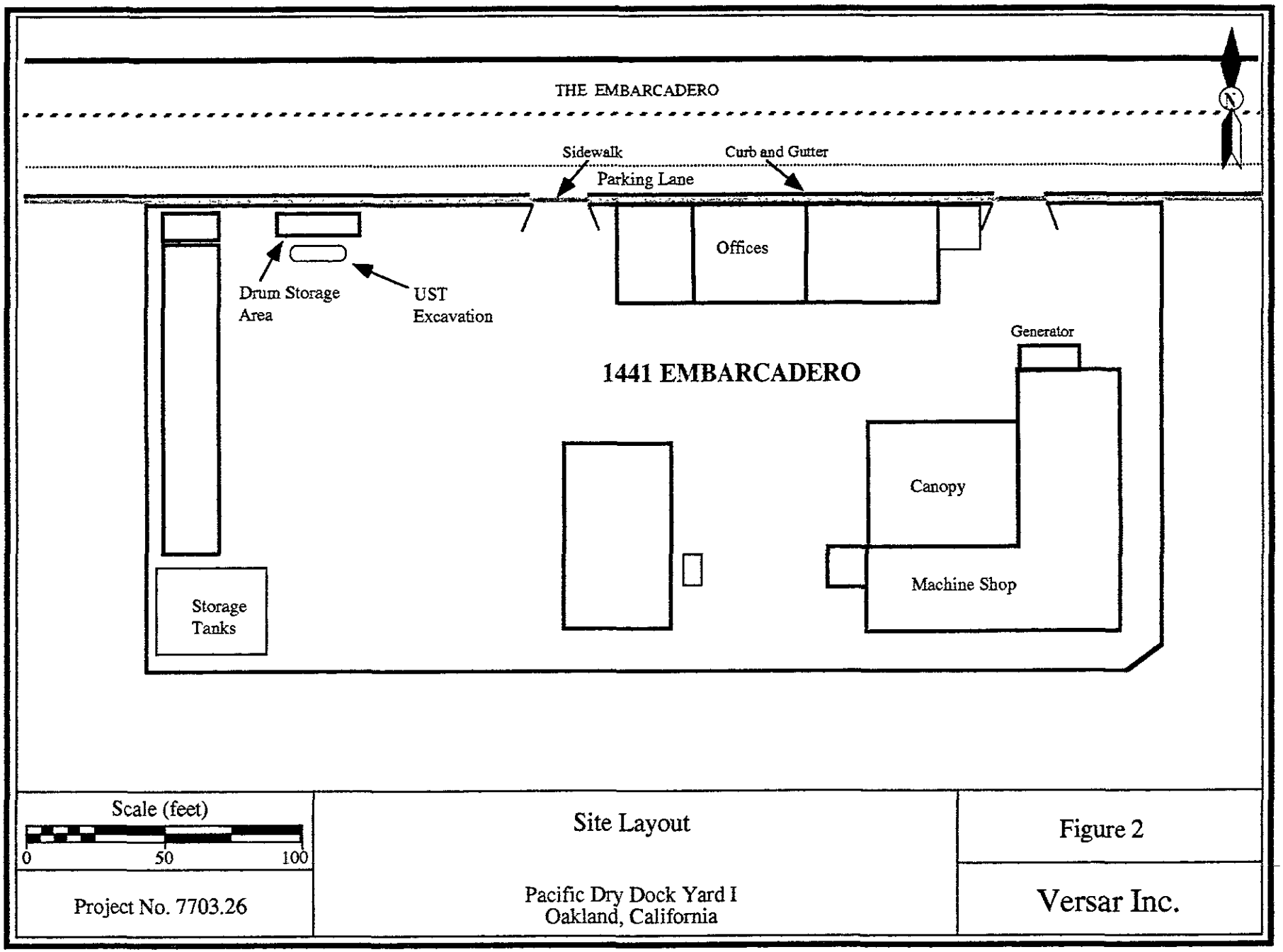
Appendix A. Borehole Logs

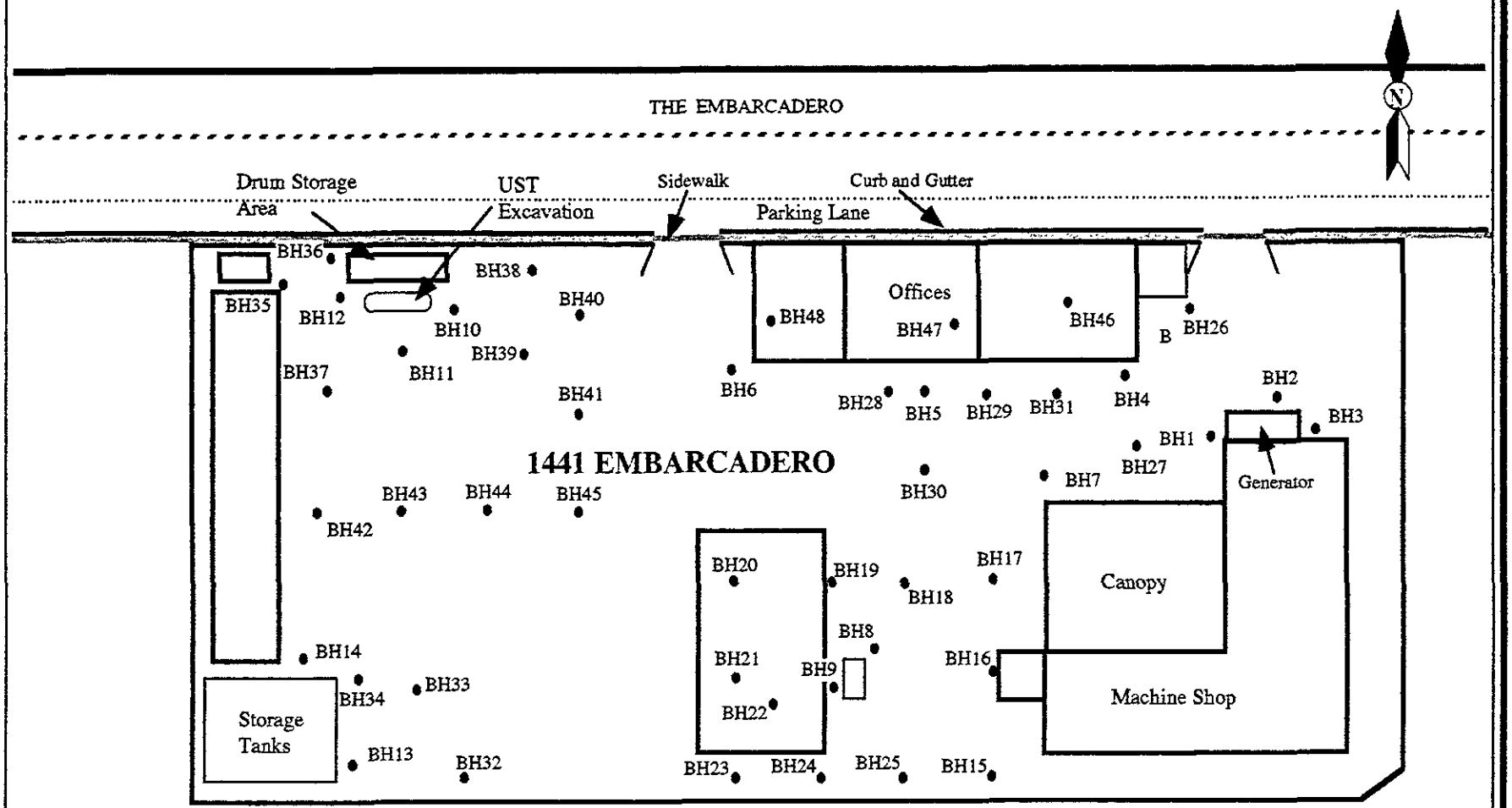
Appendix B. Laboratory Analytical Results



SOURCE: USGS TOPO 1959

Scale (miles) 0 0.25 0.50	Site Location	Figure 1
Project No. 7703.26	Pacific Dry Dock Yard I Oakland, California	Versar Inc.


THE EMBARCADERO
N
Sidewalk
Curb and Gutter
Parking Lane
Offices
Drum Storage Area
UST Excavation
Generator
1441 EMBARCADERO
Canopy
Machine Shop
Storage Tanks
Scale (feet)
0
50
100
Site Layout
Figure 2
Project No. 7703.26
Pacific Dry Dock Yard I
Oakland, California
Versar Inc.



Scale (feet)

0 50 100

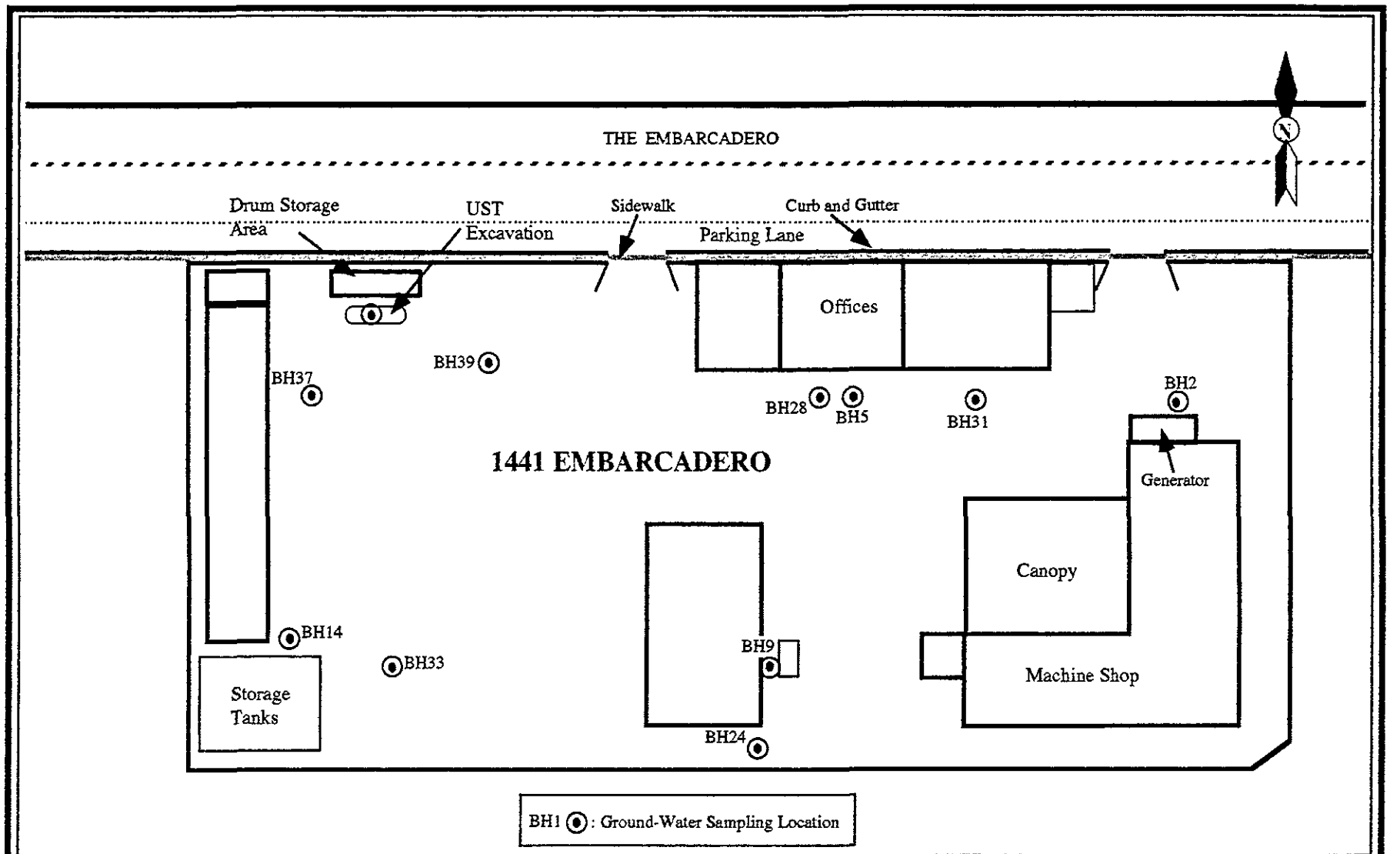
Project No. 7703.26

Preliminary Investigation Soil Sampling Locations

Pacific Dry Dock Yard I
Oakland, California

Figure 3

Versar Inc.



Scale (feet)

0 50 100

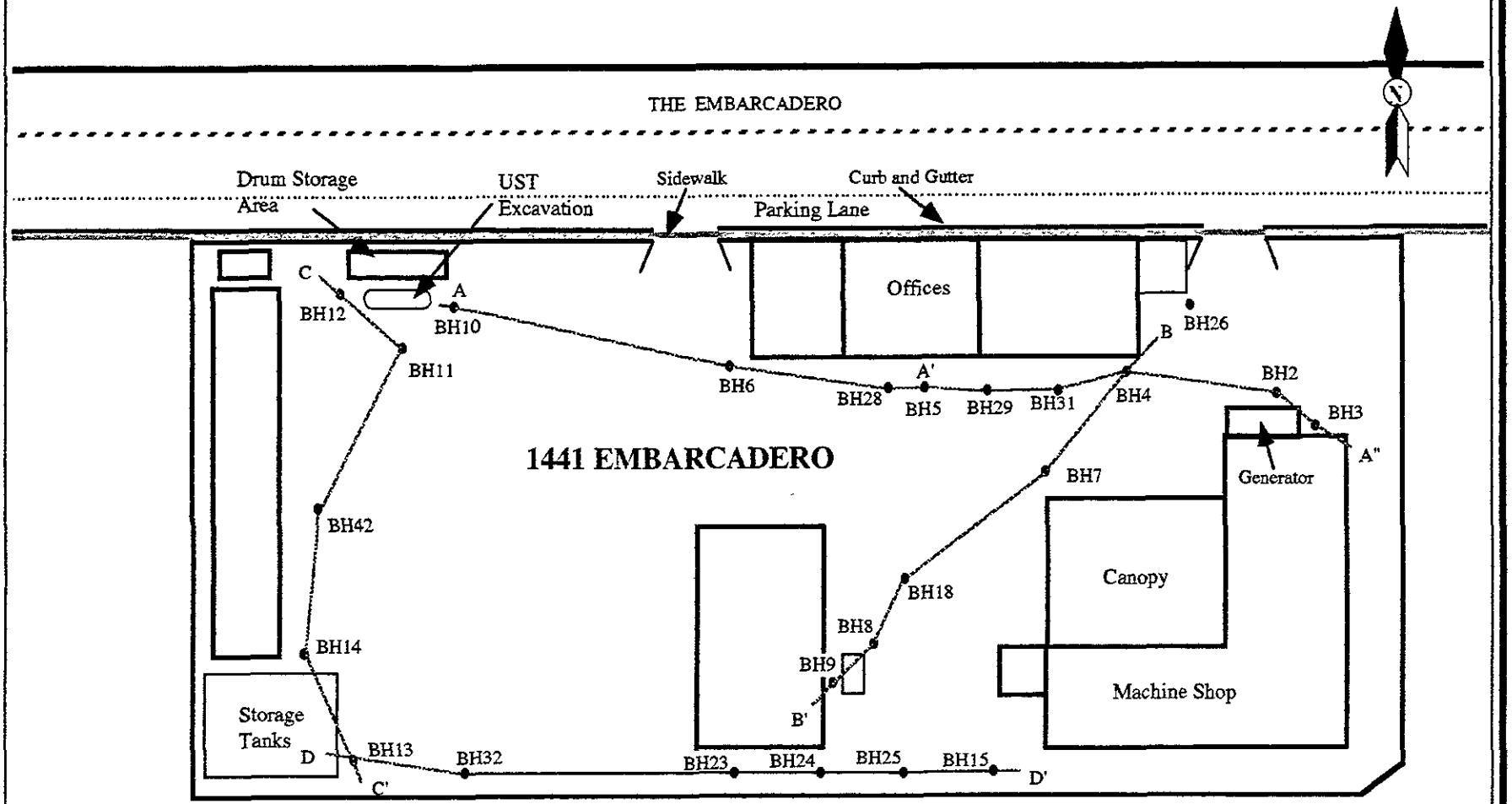
Preliminary Investigation Ground-Water Sampling Locations

Figure 4

Project No. 7703.26

Pacific Dry Dock Yard I
Oakland, California

Versar Inc.



Scale (feet) 0 50 100	Cross-Section Lines-of-Reference	Figure 5
Project No. 7703.26	Pacific Dry Dock Yard I Oakland, California	Versar Inc.

BASIC SYMBOLS


Sand (SW, SP)


Clay (CH)


Angular Gravel (GW, GP)


Silt (ML, MH)


Rounded Gravel (GW, GP)


Peat (Pt)

SYMBOLS FOR COMPOSITE SOILS


Sandy Clay (SC)


Sandy Silt (SM)


Gravelly Silt (GM)


Clayey Silt (ML)


Sandy Gravel (GW, GP)


Organic Sand (MH)


Organic Clay (OH)


Clayey Sand (SC)


Silty Sand (SM)


Gravelly Clay (GC)


Silty Clay (CL, OL)


Gravelly Sand (GW, GP)


Organic Silt (OH, OL)

OTHER DESCRIPTIVE SYMBOLS


Contains Shells


Boulders


Fill


Rock (unclassified)


Sandstone

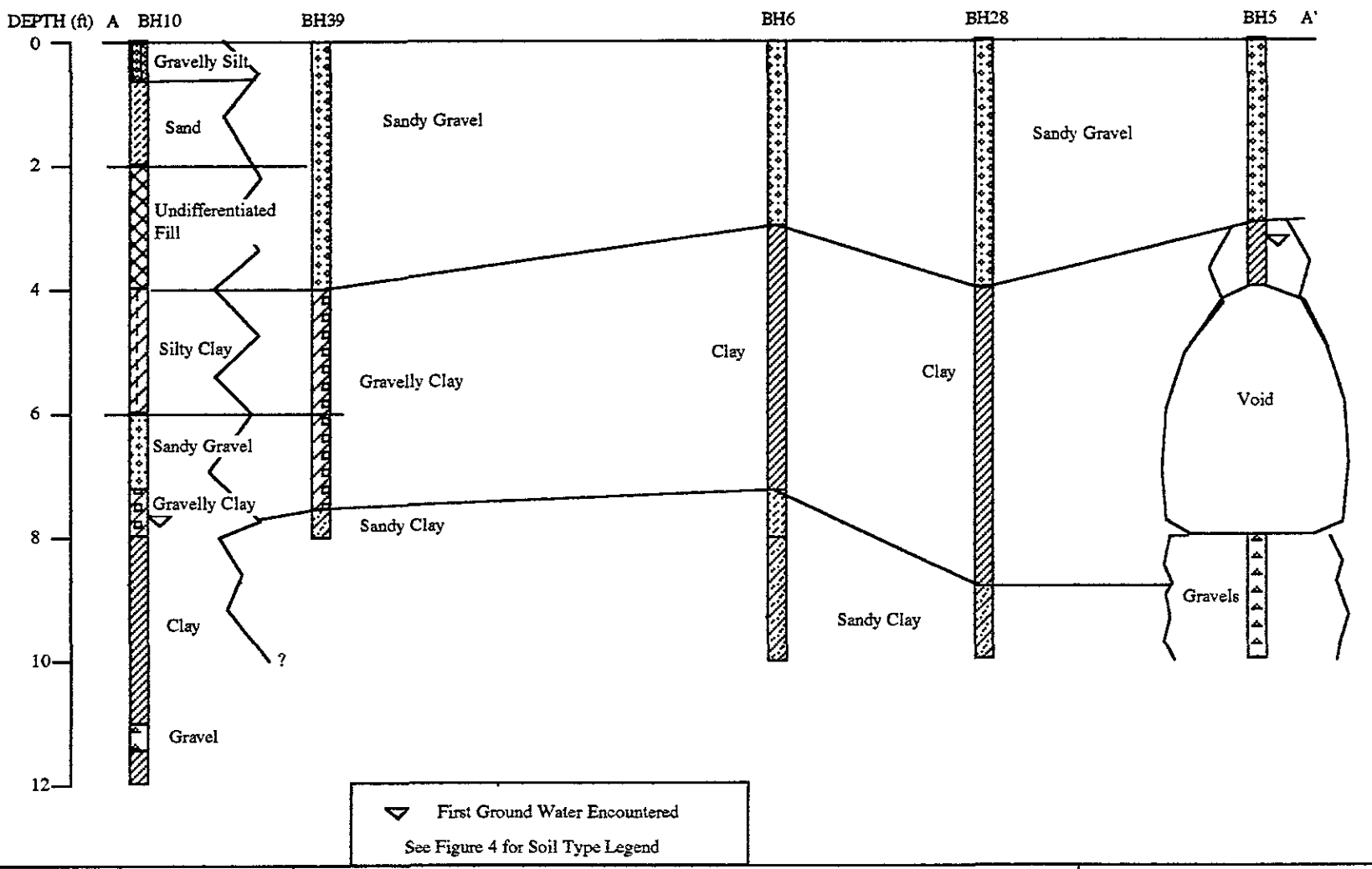

Shale


Chalk

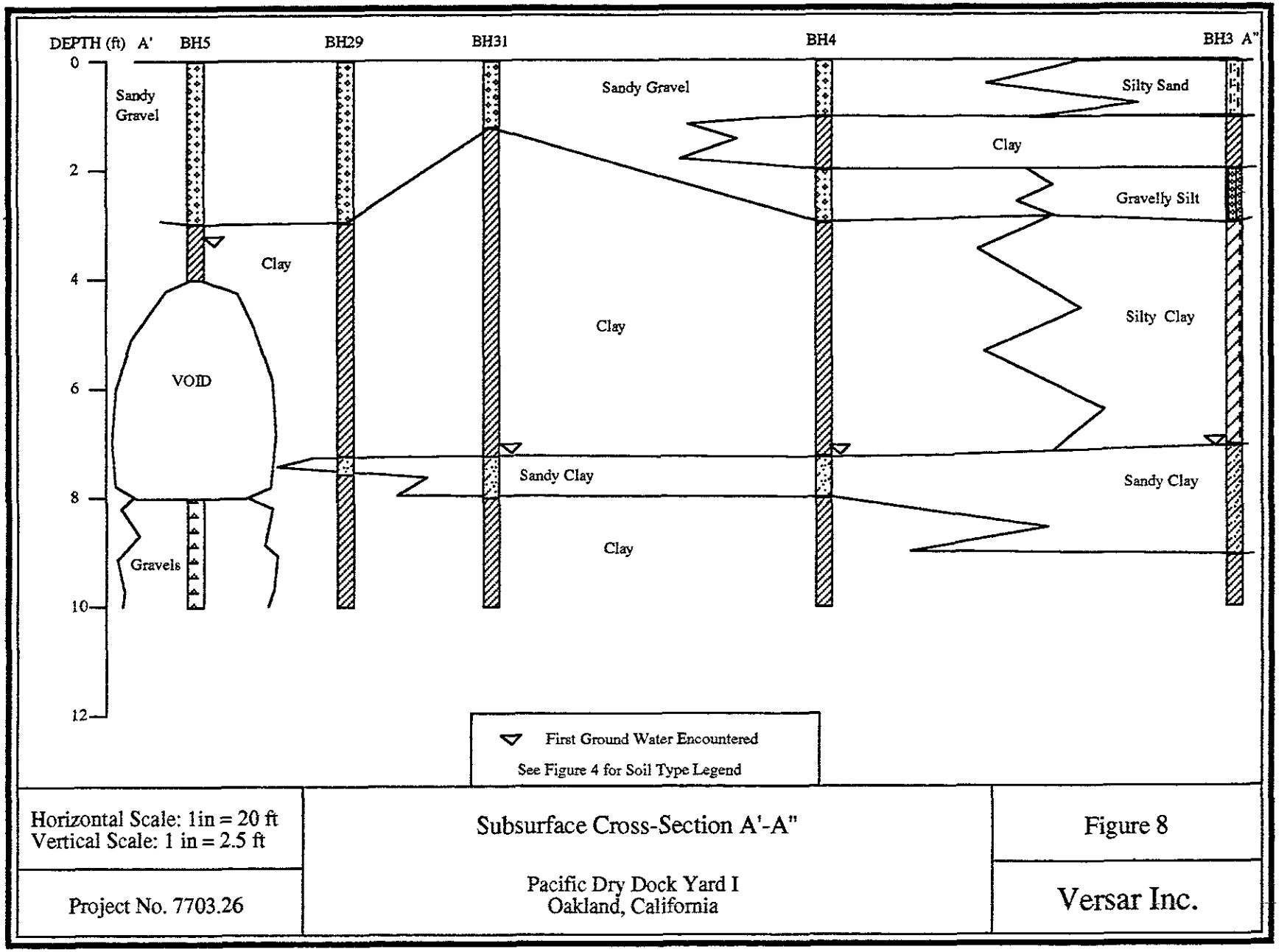

Limestone


Dolomite

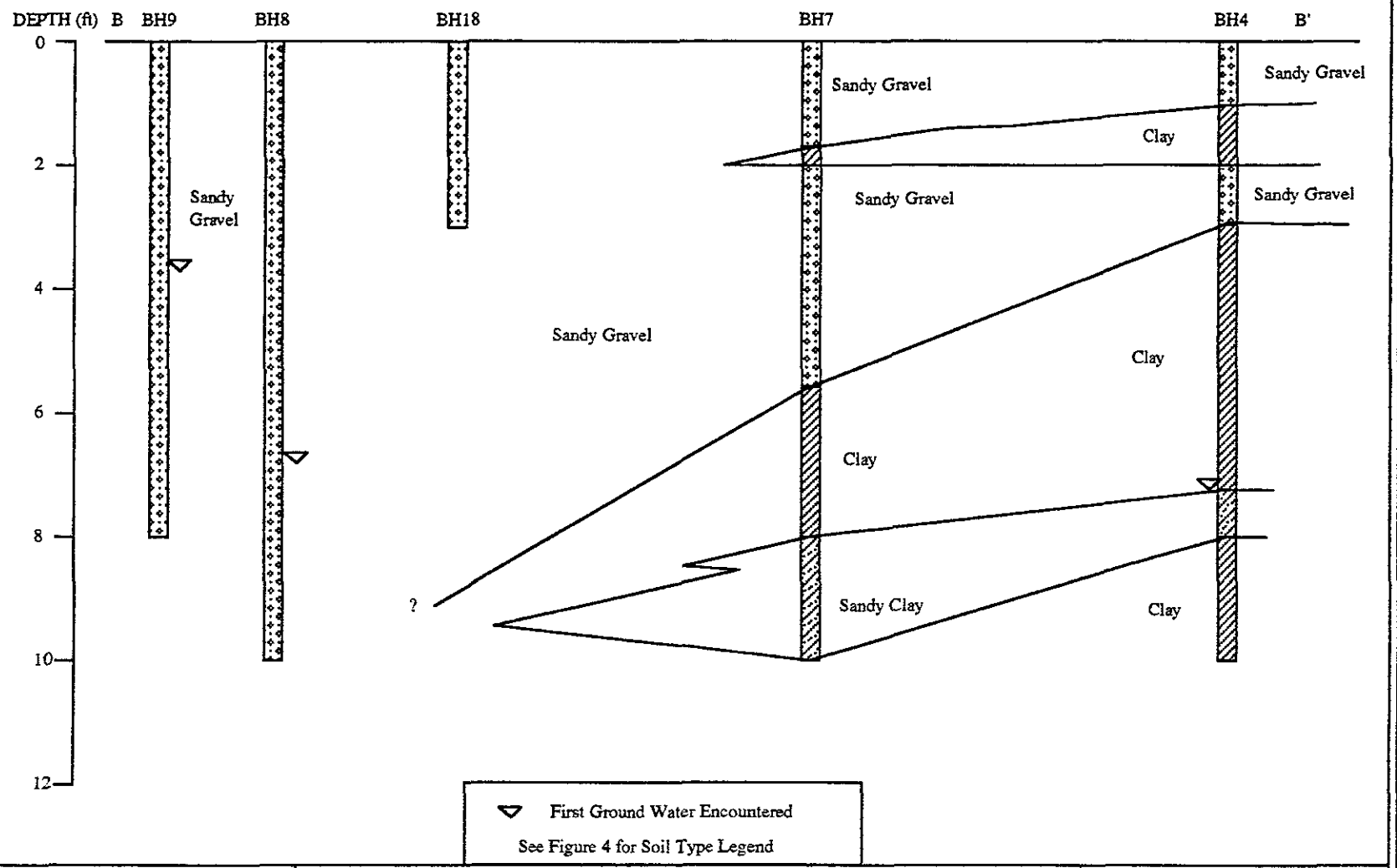
Normal Scale	Graphic Representation of Standard Symbols for Soil Types	Figure 6
Project No. 7703.26	Pacific Dry Dock Yard I Oakland, California	Versar Inc.



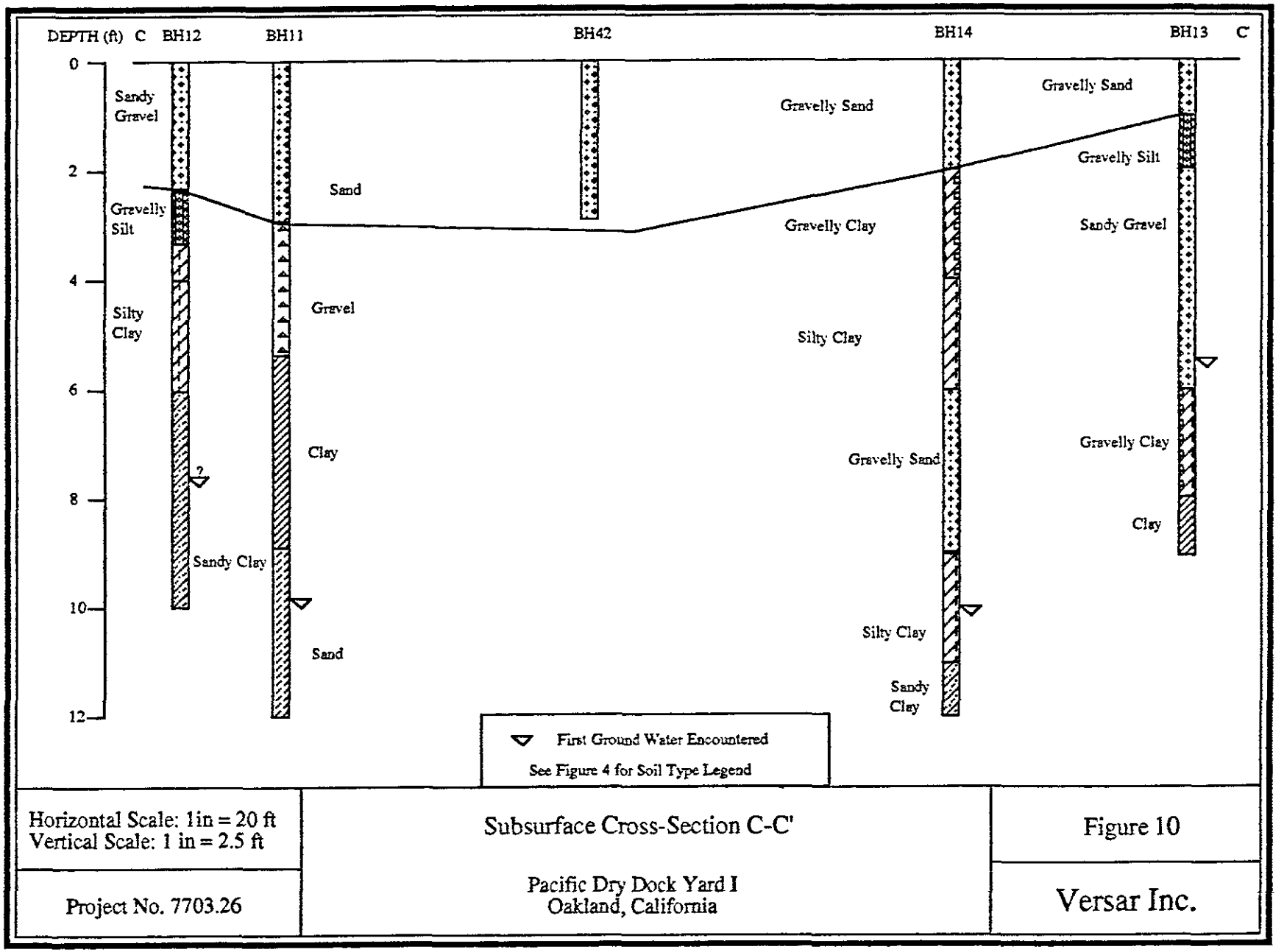
Horizontal Scale: 1in = 20 ft Vertical Scale: 1 in = 2.5 ft	Subsurface Cross-Section A-A'	Figure 7
Project No. 7703.26	Pacific Dry Dock Yard I Oakland, California	Versar Inc.



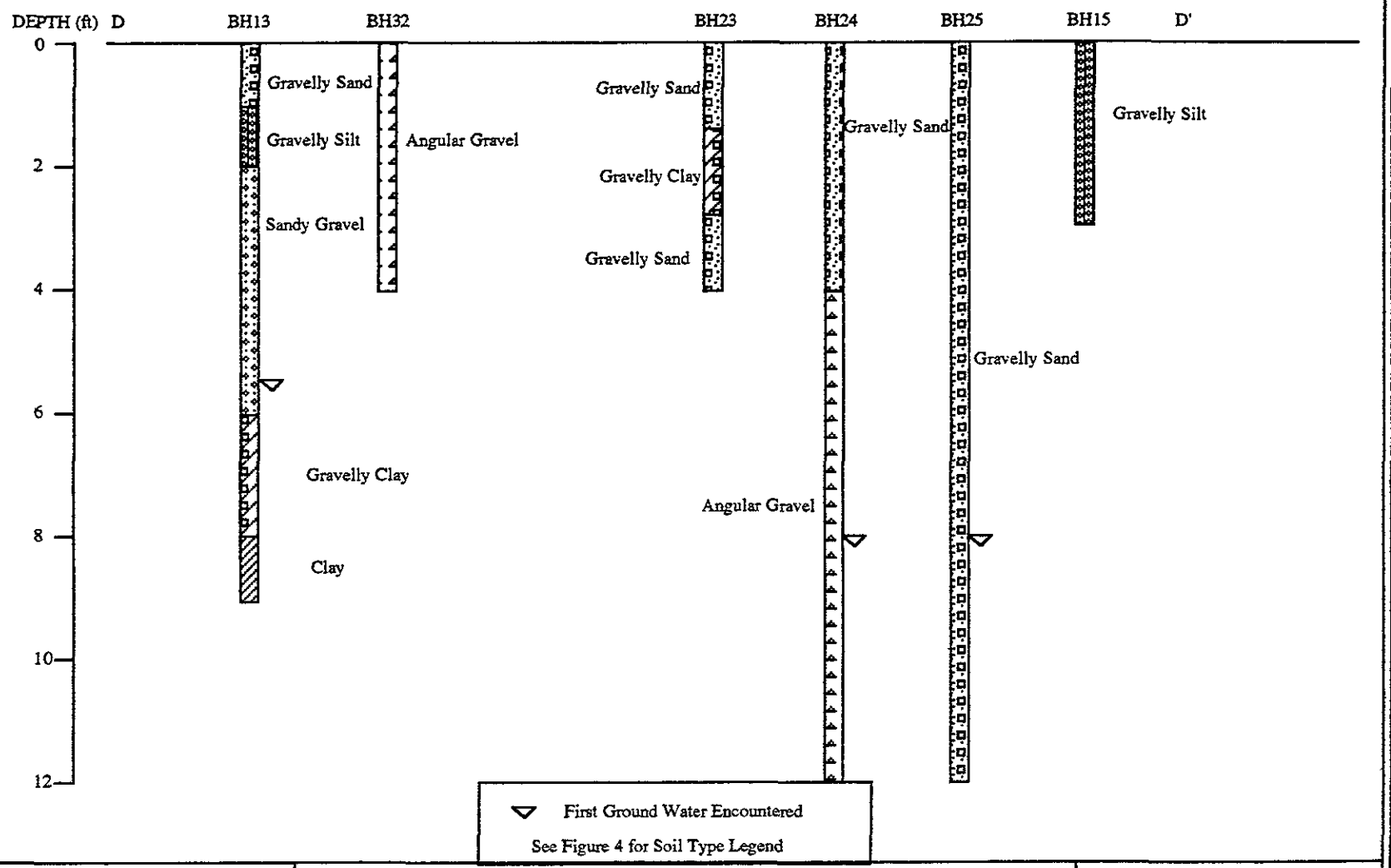
Horizontal Scale: 1in = 20 ft Vertical Scale: 1 in = 2.5 ft	Subsurface Cross-Section A'-A"	Figure 8
Project No. 7703.26	Pacific Dry Dock Yard I Oakland, California	Versar Inc.



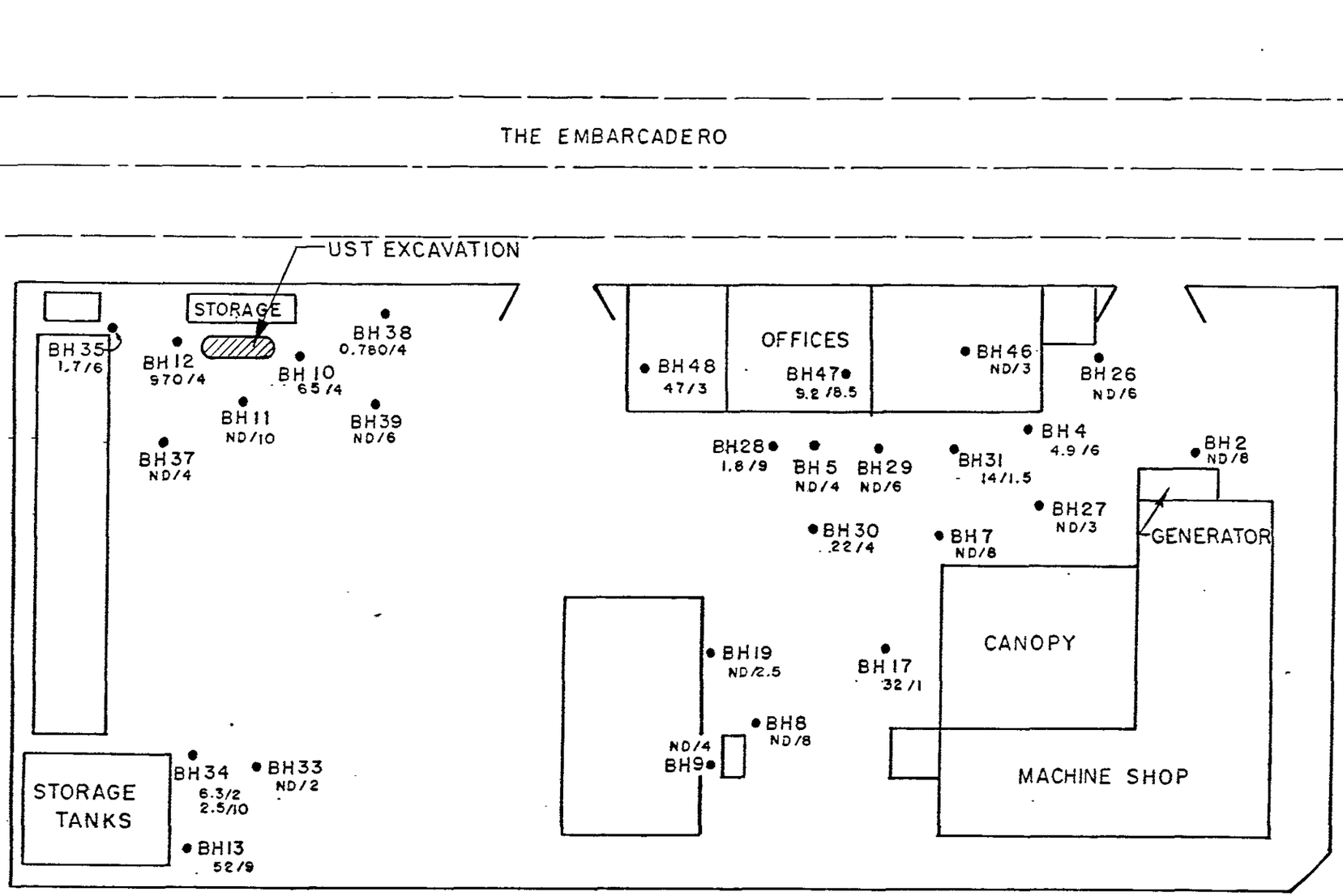
Horizontal Scale: 1in = 20 ft Vertical Scale: 1 in = 2.5 ft	Subsurface Cross-Section B-B'	Figure 9
Project No. 7703.26	Pacific Dry Dock Yard I Oakland, California	Versar Inc.



Horizontal Scale: 1in = 20 ft Vertical Scale: 1 in = 2.5 ft	Subsurface Cross-Section C-C'	Figure 10
Project No. 7703.26	Pacific Dry Dock Yard I Oakland, California	Versar Inc.



Horizontal Scale: 1in = 40 ft Vertical Scale: 1 in = 2.5 ft	Subsurface Cross-Section D-D'	Figure 11
Project No. 7703.26	Pacific Dry Dock Yard I Oakland, California	Versar Inc.



LEGEND:

14/1.5 = Milligrams per Kilogram/Depth in Feet.

ND = Not Detected

Samples Collected : October 25,1991 and January 6, 7, and 8, 1992

REVISIONS				
ITEM	DATE	DESCRIPTION	BY	APPR.

Versar, INC.
ENVIRONMENTAL RISK MANAGEMENT
5330 PRIMROSE DRIVE, STE. 228
FAIR OAKS, CALIFORNIA, 95628
TELEPHONE: (916)962-1612

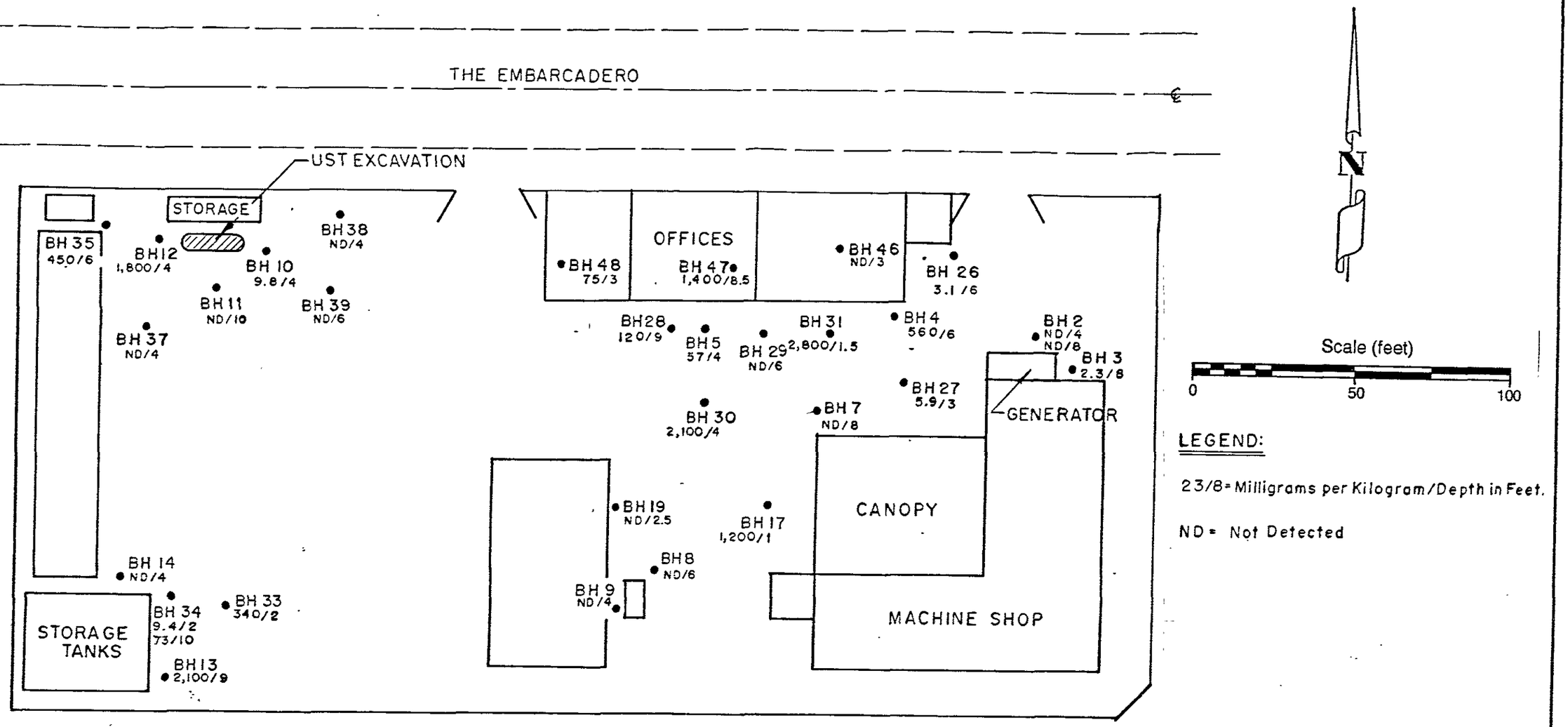
DRAWN BY: B HAMILTON
SCALE: AS SHOWN
CHECKED/APPROVED:
DATE: FEB 1992

PACIFIC DRY DOCK YARD 1
OAKLAND, CALIFORNIA

TITLE:
Total Petroleum Hydrocarbons (as gasoline) In Soils

JOB NO. 7703.26

FIGURE 12



LEGEND:

23/8 = Milligrams per Kilogram/Depth in Feet.

ND = Not Detected

Samples Collected : October 25,1991 and January 6, 7, and 8, 1992

REVISIONS				
ITEM	DATE	DESCRIPTION	BY	APPR.

Versar, INC.
ENVIRONMENTAL RISK MANAGEMENT

5330 PRIMROSE DRIVE, STE. 228
FAIR OAKS, CALIFORNIA, 95628
TELEPHONE: (916)962-1612

DRAWN BY: B HAMILTON

SCALE: AS SHOWN

CHECKED/APPROVED:

DATE: FEB. 1992

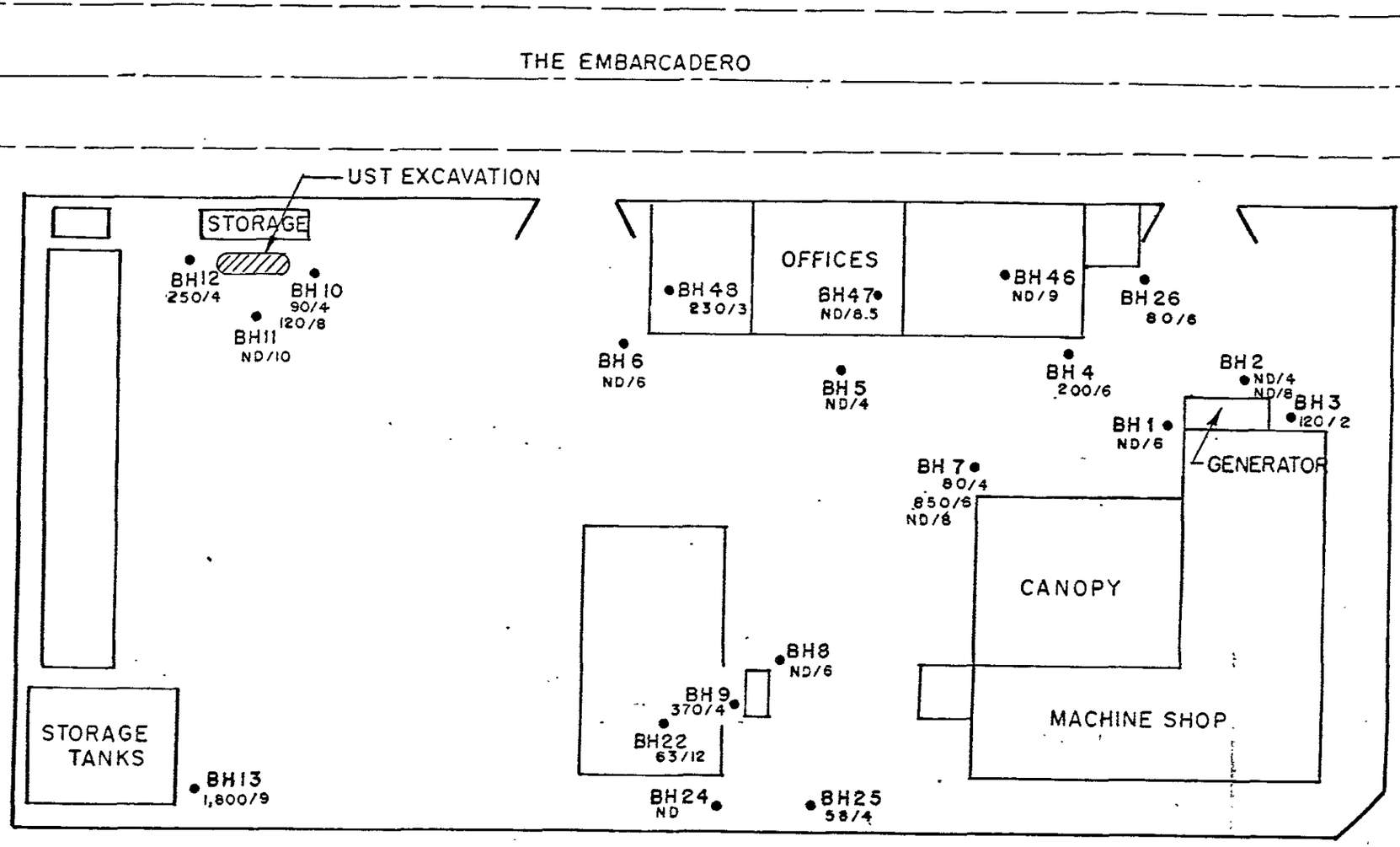
PACIFIC DRY DOCK YARD 1
Oakland, California

TITLE:

Total Petroleum Hydrocarbons (as diesel) In Soils

JOB NO. 7703.26

FIGURE 13



N

Scale (feet)

0 50 100

LEGEND:

80/4 = Milligrams per Kilogram/Depth in Feet.

ND = Not Detected

Samples Collected : October 25,1991 and January 6, 7, and 8, 1992

REVISIONS				
ITEM	DATE	DESCRIPTION	BY	APPR.

VERSAR, INC.
ENVIRONMENTAL RISK MANAGEMENT

5330 PRIMROSE DRIVE, STE. 228
FAIR OAKS, CALIFORNIA, 95628
TELEPHONE: (916)962-1612

DRAWN BY: B. HAMILTON

SCALE: AS SHOWN

CHECKED/APPROVED:

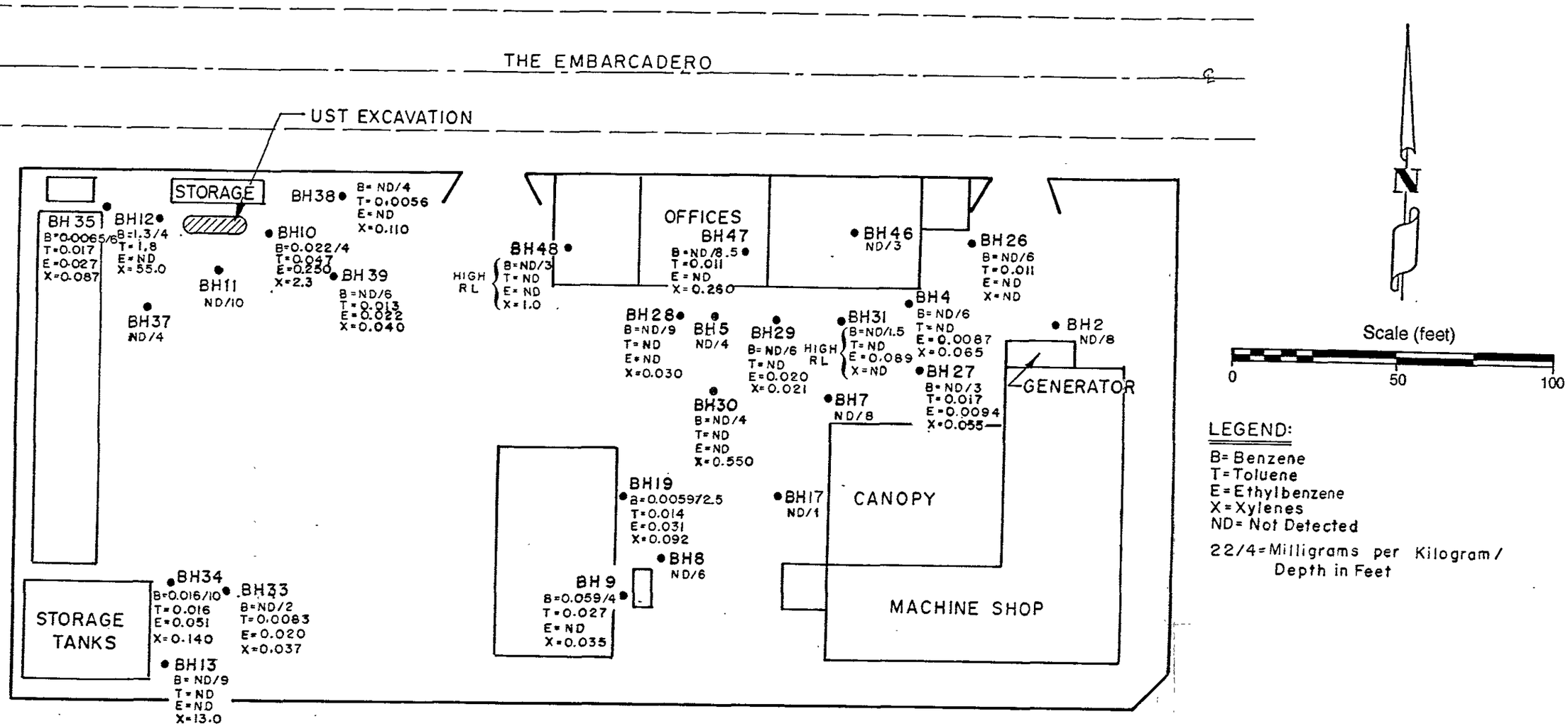
DATE: FEB. 1991

PACIFIC DRY DOCK YARD 1
Oakland, California

TITLE:
Total Petroleum Hydrocarbons (as oil&grease) In Soils

JOB NO. 7703.26

FIGURE 14



LEGEND:

B= Benzene
T= Toluene
E= Ethylbenzene
X= Xylenes
ND= Not Detected

22/4= Milligrams per Kilogram / Depth in Feet

Samples Collected : October 25,1991 and January 6, 7, and 8, 1992

REVISIONS

ITEM	DATE	DESCRIPTION	BY	APPR.

Versar, INC.
ENVIRONMENTAL RISK MANAGEMENT

5330 PRIMROSE DRIVE, STE. 228
FAIR OAKS, CALIFORNIA, 95628
TELEPHONE: (916)962-1612

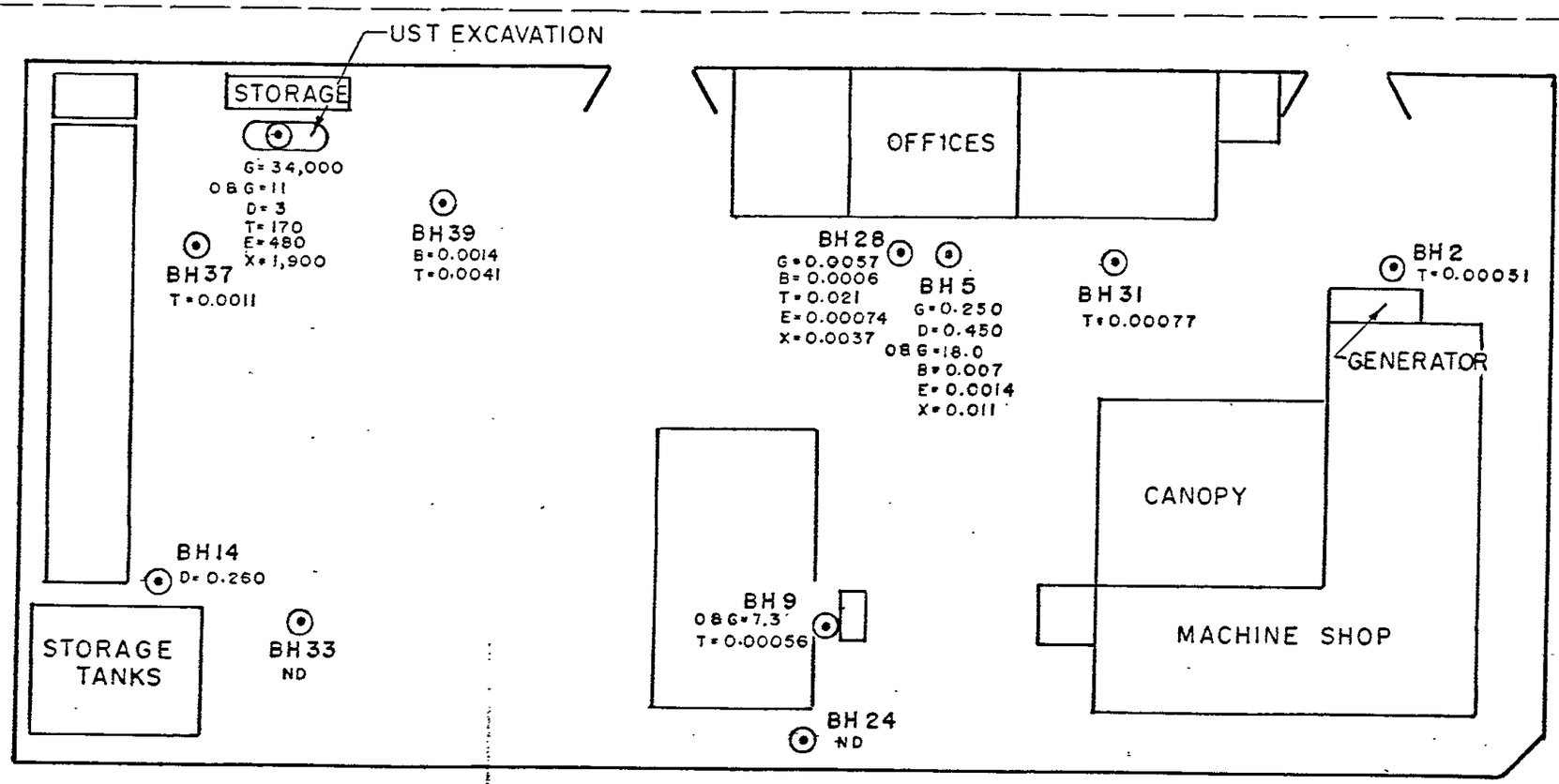
DRAWN BY: B HAMILTON
SCALE: AS SHOWN
CHECKED/APPROVED:
DATE: FEB. 1992

PACIFIC DRY DOCK YARD 1
Oakland, California

TITLE:
Volatile Organic Compounds In Soils

JOB NO. 7703.26

FIGURE 15



LEGEND:

BH1 ⊙ = Ground-Water Sampling Location
G = TPH-G
D = TPH-D
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes
O&G = Oil and Grease
All results expressed in Milligrams per Liter.
ND = Not Detected

Samples Collected : October 25, and 28, 1991 and January 8, 1992

REVISIONS				
ITEM	DATE	DESCRIPTION	BY	APPR.

Versar, INC.
ENVIRONMENTAL RISK MANAGEMENT
5330 PRIMROSE DRIVE, STE. 228
FAIR OAKS, CALIFORNIA, 95628
TELEPHONE: (916)962-1612

DRAWN BY: B. HAMILTON
SCALE: AS SHOWN
CHECKED/APPROVED:
DATE: FEB. 1992

PACIFIC DRY DOCK YARD 1
Oakland, California

TITLE:
Composite Analytical Results For Ground Water

JOB NO. 7703.26

FIGURE 16

Table 1

(Page 1 of 4)

Laboratory Analytical Results for Soils
(Organics)

Pacific Dry Dock and Repair Yard I
Oakland, California

Sample Number	Sample Depth (feet)	Sample Collection Date	Total Petroleum Hydrocarbons DHS Method, LUFT Field Manual		O&G Hydrocarbons EPA Method 5520EF	Volatile Organics EPA Method 8020			
			Gasoline[1] (mg/kg)	Diesel[2] (mg/kg)	Oil and Grease[3] (mg/kg)	Benzene[4] (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
BH1-3.5	3.0-3.5	10/25/91	NA[5]	NA	ND[6]	NA	NA	NA	NA
BH2-4	3.5-4.0	10/25/91	NA	ND	ND	NA	NA	NA	NA
BH2-8	7.5-8.0	10/25/91	ND	ND	ND	ND	ND	ND	ND
BH3-2	1.5-2.0	10/25/91	NA	NA	120	NA	NA	NA	NA
BH3-8	7.0-7.5	10/25/91	NA	23	NA	NA	NA	NA	NA
BH4-6	5.5-6.0	10/25/91	4.9	560	200	ND	ND	0.0087	0.065
BH5-4	3.5-4.0	10/25/91	ND	57	ND	ND	ND	ND	ND
BH6-6	5.5-6.0	10/25/91	NA	NA	ND	NA	NA	NA	NA
BH7-4	3.5-4.0	10/25/91	NA	NA	80	NA	NA	NA	NA
BH7-6	5.5-6.0	10/25/91	NA	NA	850	NA	NA	NA	NA
BH7-8	7.5-8.0	10/25/91	ND	ND	ND	ND	ND	ND	ND

[1] Reporting limit for gasoline is 0.5 mg/kg.

[2] Reporting limit for diesel is 1.00 mg/kg.

[3] Reporting limit for oil and grease is 50 mg/kg.

[4] Reporting limits for volatile organics are, unless otherwise noted,: benzene, 0.005 mg/kg; toluene 0.005 mg/kg; ethylbenzene 0.005 mg/kg; xylenes 0.015 mg/kg.

[5] Not Analyzed.

[6] Not detected at or above the reporting limit.

Table 1

(Page 2 of 4)

Laboratory Analytical Results for Soils
(Organics)

Pacific Dry Dock and Repair Yard I
Oakland, California

Sample Number	Sample Depth (feet)	Sample Collection Date	Total Petroleum Hydrocarbons DHS Method, LUFT Field Manual		O&G Hydrocarbons EPA Method 5520EF	Volatile Organics EPA Method 8020			
			Gasoline[1] (mg/kg)	Diesel[2] (mg/kg)	Oil and Grease[3] (mg/kg)	Benzene[4] (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
BH8-6	5.5-6.0	10/25/91	ND	ND	ND	ND	ND	ND	ND
BH9-4	3.5-4.0	10/25/91	ND	ND	370	0.0059	0.027	ND	0.035
BH10-4	3.5-4.0	10/25/91	65	9.8	90	0.022	0.047	0.52	2.3
BH10-8	7.5-8.0	10/25/91	NA	NA	120	NA	NA	NA	NA
BH11-10	9.5-10.0	10/25/91	ND	ND	ND	ND	ND	ND	ND
BH12-4	3.5-4.0	10/25/91	970	1,800	2,500	1.3	1.8	<0.20	55
BH13-9	8.5-9.0	10/25/91	52	2,100	1,800	<0.037	<0.030	<0.033	13
BH14-4	3.5-4.0	10/25/91	NA	ND	ND	NA	NA	NA	NA
BH17-1.0	0.5-1.0	1/6/92	32	1,200	NA	<0.076	<0.080	<0.084	<0.020
BH19-2.5	2.0-2.5	1/6/92	ND	ND	NA	0.0059	0.014	0.031	0.092

[1] Reporting limit for gasoline is 0.50 mg/kg.

[2] Reporting limit for diesel is 1.0 mg/kg.

[3] Reporting limit for oil and grease is 50 mg/kg.

[4] Reporting limits for volatile organics are, unless otherwise noted,: benzene, 0.005 mg/kg; toluene 0.005 mg/kg; ethylbenzene 0.005 mg/kg; xylenes 0.015 mg/kg.

[5] Not Analyzed.

[6] Not detected at or above the reporting limit.

Table 1

(Page 3 of 4)

Laboratory Analytical Results for Soils
(Organics)

Pacific Dry Dock and Repair Yard I
Oakland, California

Sample Number	Sample Depth (feet)	Sample Collection Date	Total Petroleum Hydrocarbons DHS Method, LUFT Field Manual		O&G Hydrocarbons EPA Method 5520EF	Volatile Organics EPA Method 8020			
			Gasoline[1] (mg/kg)	Diesel[2] (mg/kg)	Oil and Grease[3] (mg/kg)	Benzene[4] (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
BH22-12.0	11.5-12.0	1/6/92	NA	NA	63	NA	NA	NA	NA
BH24-12.0	11.5-12.0	1/6/92	NA	NA	ND	NA	NA	NA	NA
BH25-4.0	3.5-4.0	1/6/92	NA	NA	58	NA	NA	NA	NA
BH26-6.0	5.5-6.0	1/6/92	ND	3.1	80	ND	0.011	<0.005	0.021
BH27-3.0	2.5-3.0	1/6/92	ND	5.9	NA	ND	0.017	0.0094	0.055
BH28-9.0	8.5-9.0	1/7/92	1.8	120	NA	ND	ND	<0.005	0.030
BH29-6.0	5.5-6.0	1/7/92	ND	ND	NA	ND	ND	0.020	0.021
BH30-4.0	3.5-4.0	1/7/92	22	2,100	NA	<0.006	ND	<0.0079	0.550
BH31-1.5	1.0-1.5	1/7/92	14	2,800	NA	<0.076	<0.080	0.089	<0.28
BH33-2.0	1.5-2.0	1/7/92	ND	340	NA	ND	0.0083	0.020	0.037
BH34-2.0	1.5-2.0	1/7/92	6.3	9.4	NA	0.017	0.011	ND	0.260

[1] Reporting limit for gasoline is 0.5 mg/kg.

[2] Reporting limit for diesel is 1.0 mg/kg.

[3] Reporting limit for oil and grease is 50 mg/kg.

[4] Reporting limits for volatile organics are, unless otherwise noted,: benzene, 0.005 mg/kg; toluene 0.005 mg/kg; ethylbenzene 0.005 mg/kg; xylenes 0.015 mg/kg.

[5] Not Analyzed.

[6] Not detected at or above the reporting limit.

Table 1

(Page 4 of 4)

Laboratory Analytical Results for Soils
(Organics)

Pacific Dry Dock and Repair Yard I
Oakland, California

Sample Number	Sample Depth (feet)	Sample Collection Date	Total Petroleum Hydrocarbons DHS Method, LUFT Field Manual		O&G Hydrocarbons EPA Method 5520EF	Volatile Organics EPA Method 8020			
			Gasoline[1] (mg/kg)	Diesel[2] (mg/kg)	Oil and Grease[3] (mg/kg)	Benzene[4] (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)
BH34-10.0	9.5-10.0	1/7/92	2.5	73	NA	0.016	0.016	0.051	0.140
BH35-6.0	5.5-6.0	1/7/92	1.7	450	NA	0.0065	0.017	0.027	0.087
BH37-4.0	3.5-4.0	1/7/92	ND	ND	NA	ND	ND	ND	ND
BH38-4.0	3.5-4.0	1/7/92	0.780	ND	NA	ND	0.0056	ND	0.110
BH39-6.0	5.5-6.0	1/8/92	ND	ND	NA	ND	0.013	0.022	0.040
BH46-3.0	2.5-3.0	1/8/92	ND	ND	NA	ND	ND	ND	ND
BH46-9.0	8.5-9.0	1/8/92	NA	NA	ND	NA	NA	NA	NA
BH47-8.5	8.0-8.5	1/8/92	9.2	1,400	ND	ND	0.011	ND	0.260
BH48-3.0	2.5-3.0	1/8/92	47	75	230	<0.076	<0.080	<0.084	1

[1] Reporting limit for gasoline is 0.5 mg/kg.

[2] Reporting limit for diesel is 1 mg/kg.

[3] Reporting limit for oil and grease is 50 mg/kg.

[4] Reporting limits for volatile organics are, unless otherwise noted,: benzene, 0.005 mg/kg; toluene 0.005 mg/kg; ethylbenzene 0.005 mg/kg; xylenes 0.015 µg/kg.

[5] Not Analyzed.

[6] Not detected at or above the reporting limit.

Table 2

Laboratory Analytical Results for Soils
(Metals)

Pacific Dry Dock and Repair Yard I
Oakland, California

Sample Number	Sample Collection Date	Sample Depth (feet)	EPA Method 7130 Cadmium[1] (mg/kg)	EPA Method 7190 Chromium[2] (mg/kg)	EPA Method 7420 Lead[3] (mg/kg)	EPA Method 7520 Nickel[4] (mg/kg)	EPA Method 7950 Zinc[5] (mg/kg)
BH9-4	10/25/91	3.5-4.0	0.38	15	14	24	140
BH11-10	10/25/91	9.5-10.0	ND[6]	39	5.8	56	36
BH13-9	10/25/91	8.5-9.0	ND	36	8.6	42	250
TTLC[7]			100	2,500	1,000	2,000	5,000

[1] Reporting limit for cadmium is 0.250 mg/kg.

[2] Reporting limit for chromium is 1.2 mg/kg.

[3] Reporting limit for lead is 2.5 mg/kg.

[4] Reporting limit for nickel is 7.5 mg/kg.

[5] Reporting limit for zinc is 1.200 mg/kg.

[6] Not detected at or above the reporting limit.

[7] Total threshold limit concentration values.

Table 3

Laboratory Analytical Results for Water
(Organics)

Pacific Dry Dock and Repair Yard I
Oakland, California

Sample Number	Sample Collection Date	Total Petroleum Hydrocarbons DHS Method, LUFT Field Manual			O&G Hydrocarbons EPA Method 5520DF	Volatile Organics EPA Method 8020			
		Gasoline[1] (mg/L)	Diesel[2] (mg/L)	Motor Oil[3] (mg/L)	Oil and Grease[4] (mg/L)	Benzene[5] (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)
BH2	10/25/91	ND[6]	ND	NA	NA[7]	ND	0.00051	ND	ND
BH5	10/25/91	0.25	0.45	NA	18	0.007	ND	0.0014	0.011
BH9	10/25/91	ND	ND	NA	7.3	ND	0.00056	ND	ND
BH14	10/25/91	ND	0.26	NA	NA	ND	ND	ND	ND
PIT #2	11/1/91	NA	3	NA	11	NA	NA	NA	NA
BH24	1/8/92	ND	ND	ND	NA	NA	ND	ND	ND
BH28	1/8/92	0.58	NA	NA	NA	0.0006	0.021	0.00074	0.0037
BH31	1/8/92	ND	ND	ND	NA	ND	0.00077	ND	ND
BH33	1/8/92	ND	ND	ND	NA	ND	ND	ND	ND
BH37	1/8/92	ND	ND	NA	NA	ND	0.0011	ND	ND
BH39	1/8/92	ND	ND	NA	NA	0.0014	0.0041	ND	ND

[1] Reporting limit for gasoline is 0.05 mg/L.

[2] Reporting limit for diesel is 0.05 mg/L.

[3] Reporting limit for motor oil is 0.5 mg/L.

[4] Reporting limit for oil and grease is 1 mg/L.

[5] Reporting limits for volatile organics are: benzene, 0.0005 mg/L; toluene 0.0005 mg/L; ethylbenzene 0.0005 mg/L; xylenes 0.0015 mg/L.

[6] Not detected at or above the reporting limit.

[7] Not Analyzed.

Table 4

Laboratory Analytical Results for Water
(Metals)

Pacific Dry Dock and Repair Yard I
Oakland, California

Sample Number	Sample Collection Date	EPA Method 7130	EPA Method 7190	EPA Method 7420	EPA Method 7520	EPA Method 7950
		Cadmium[1] (mg/L)	Chromium[2] (mg/L)	Lead[3] (mg/L)	Nickel[4] (mg/L)	Zinc[5] (mg/L)
BH5	10/25/91	ND[6]	0.56	1.1	1.2	2.8
BH9	10/25/91	ND	ND	0.16	ND	0.08
PIT #2	11/1/91	ND	ND	0.13	ND	0.28
US EPA MCL[7]		0.005	0.10	0.050	0.10[8]	5.0[9]
Calif MCL[10]		0.010	0.050	0.050	NA	NA

[1] Reporting limit for cadmium is 0.010 mg/L.

[2] Reporting limit for chromium is 0.050 mg/L.

[3] Reporting limit for lead is 0.10 mg/L.

[4] Reporting limit for nickel is 0.30 mg/L.

[5] Reporting limit for zinc is 0.050 mg/L.

[6] Not detected at or above the reporting limit.

[7] US EPA Maximum Contaminant Level for drinking water.

[8] Proposed MCL

[9] Secondary MCL

[10] California Maximum Contamiant Level for drinking water.

Versar INC. SACRAMENTO

APPENDIX A

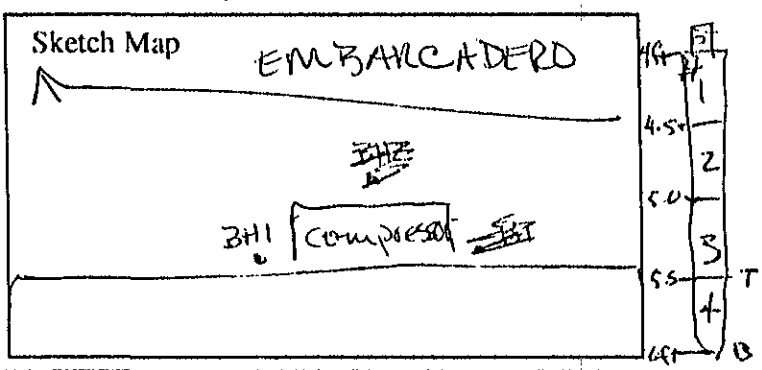
Borehole Logs

DRILLING LOG

Job Number 7703.26

Project PDD Yard I - West
Location Richmond
Borehole Number BH1
Date Drilled 10/25/91
Contractor Powerdrive
Drilling Method Hydraulic Punch
Driller Michael Nosewicz
Hole Diameter 2"
Log By Yvonne Lemos
Total Depth 10'

Sketch Map



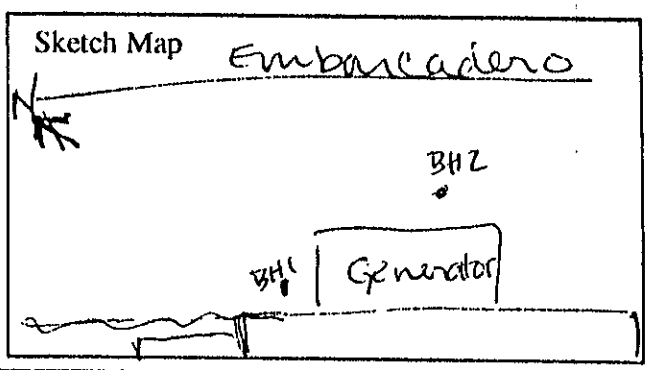
Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0-2	24/20	NA		NA	Asphalt - 1" thin Fill sand/gravel 6 in - orange sandy silt bottom w/ green color 18 in black clay
2-4	24/13	BH1-3.5			wood in bottom of 2 tallop tube black/grey clay w/ green spots Sample at 3.5 [HS-4] BH1-3.5 Headspace 11.3
4-6	24/7	BH1-6			Black gravelly sand at 3.5 grey beach sand w/ shell frags at bot 6 Headspace 3.0 BH1-6
6-8	24/24	BH1-8			sand changes to sandy clay at 6.5 tan/grey clay Bottom tan bay mud-clay moist/moder no water in hole BH-8
8-10	24/21	BH1-9.5			AA - increase in sand content BH-9.5
					End of Hole

DRILLING LOG

Job Number 7703.26

Project Crowley PODI - WPSF
Location Oakland
Borehole Number BH2
Date Drilled 10/25/91
Contractor Pitcher Core
Drilling Method Hydraulic Punch
Driller Michael N. / AL
Hole Diameter 2"
Log By V Lemon
Total Depth 10 FT

Sketch Map



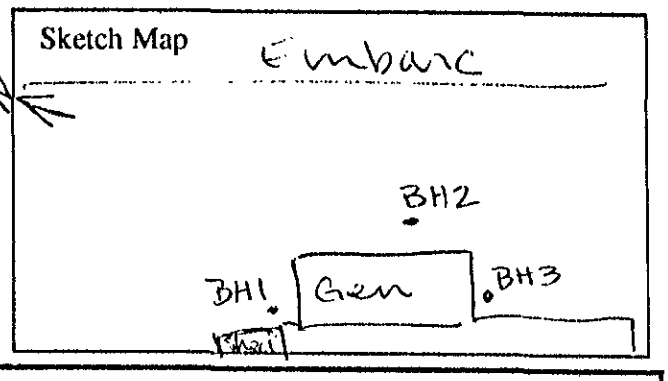
Depth (ft)	Advanced/ Recovered	Sample # Blow counts per six inches	Water Table	Head Space Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
					gravel under asphalt
0-2	24/18	None		NA	Brownish orange sandy silt, sand increasing toward bottom small lenses of greenish sand at 1Bin brick frags at bottom
2-4	24/22	BH2-4		(1') 3.5 21	Gravel & brick frags at top to 2'4" Black stiff dry clay at 2'4" to 4" - some brick frags in tube #3 No Odor
4-6	24/21	BH2-6		(5.5) 15	AA - some greenish coloring in tube #4 tube #3 had loose dry sand & gravel (fill?) - 1" No odor
6-8	24/22	BH2-8	▽	(7.5) 22	AA, slightly more moist 7.5' change to grey clay, wet, very sandy no odor Bottom - grey/tan sandy clay - Shell fragsts
8-10	24	BH2-8.5	3 4/1	9.5) 12	Sandy grey clay - WET - water Interfingers w/ tan clay w/ depth no odor lenses of sand in tan clay - larger toward bottom
					Bottom of hole left screen in hole

DRILLING LOG

Job Number 7203.26

Project Crowley PDDI - West
Location Oakland
Borehole Number BH3
Date Drilled 10/25/91
Contractor Rowe Drilling
Drilling Method Hydraulic Ponsn
Driller M. Nowicz
Hole Diameter 2"
Log By V. Lembi
Total Depth 10'

Sketch Map



Depth (ft)	Advanced/ Recovered	Sample # Blow Counts per Six Inches	Water Table	Headspace (ppm) Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0-2	24/24	BH3-2		/	orange brown silty sand 15 - brick frags Black stiff dry clay
2-4	24/24	BH3-4		3.5 / 1	dry gravel at top silty w/ depth silty dry clay - black at bottom
4-6	24/7	BH3-6		D / 2	Clay silty brown/black clay sand in top of sampler (? fill)
6-8	24/18	BH3-8 BH3-7.5		D3 / 7.0	silty clay sand, loose black/brn sandy clay w/ oily sheen, moderate odor wood frags in #4 - black sandy clay green sticky sandy clay in shoe
8-10	24/24	BH3-10		91 / 3	clamp black/grey sandy clay - moist at 9'11 sandy w/ depth, shell frags, lighter color tan/grey sticky mud/clay [BAY MUD] TD bottom of hole

D = direct PID from Sample

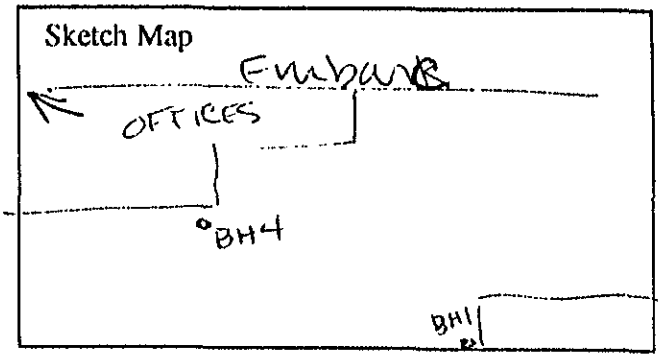
pp
1
2
3
4

DRILLING LOG

Job Number 7703.26

Project PRD I - West
Location Oakland
Borehole Number BH 4
Date Drilled 10/25/91
Contractor Tosco Corp
Drilling Method hydraulic punch
Driller N Norwicz
Hole Diameter 2"
Log By Yvonne Levnhi
Total Depth 10 ft

Sketch Map



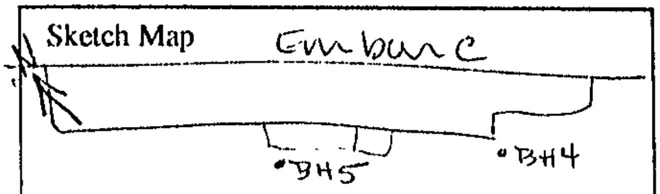
Depth (ft)	Advanced/ Recovered	Sample # Blow Counts per 6 inches	Water Table	Head Space Field Readings	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0-2	24/18	NS		0 3	gravel fill to 1 ft 3" brown/orange gravelly sand blackish green stiff dry clay to bottom
2-4	24/14	BH4-4		(35) 2	sandy gravel to 3 ft more moist, more clay sticky Most dusk gray/black clay at bottom
4-6	24/8	BH4-6		D.2	black sticky clay, moderate odor
6-8	24/18	BH4-8		(2.5) 3	AA to 7'3", then, Grey clay w sand lenses & clayey sand, grey, vy moist no odor
8-10	24/14	BH NS			darker moist clay very stiff dry clay sand - dry
					Bottom of hole

DRILLING LOG

Job Number 7703.20

Project FPDD I - West
Location Oakland
Borehole Number BH5
Date Drilled 10/25
Contractor Down Cote
Drilling Method Hydraulic Punch
Driller M.N.
Hole Diameter 2"
Log By Y. Lemda
Total Depth 10 ft
Start 11:05 END

Sketch Map



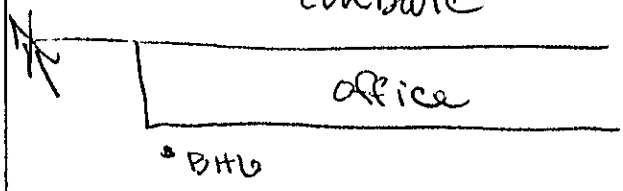
Depth (ft)	Advanced/ Recovered	Blow Counts Sample ID	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0-2	24/12				gravel fill white hard ¼ inch layer silty sand fill - orange brown
2-4	24/15	BH5-4	▼	(3.5) 23	Same AA - more pebbles drk grey clay
4-6	Ø	NS			water w/ sheen, multicolored garbage - some sort of packing material - white fibers, wood frags, gravel strong odor - sampler fell through void to 8 ft
8-10					end of hole - 10 ft
					left screen in hole for H_2O sample
					static water level: 3.2 ft from surface

DRILLING LOG

Job Number 7703.2e

Project PPDF West
Location Oakland
Borehole Number BH6
Date Drilled 10/25/11
Contractor Powercore
Drilling Method Hydraulic Punch
Driller M. Neoquist
Hole Diameter 2"
Log By M. Lemmi
Total Depth 10'

Sketch Map



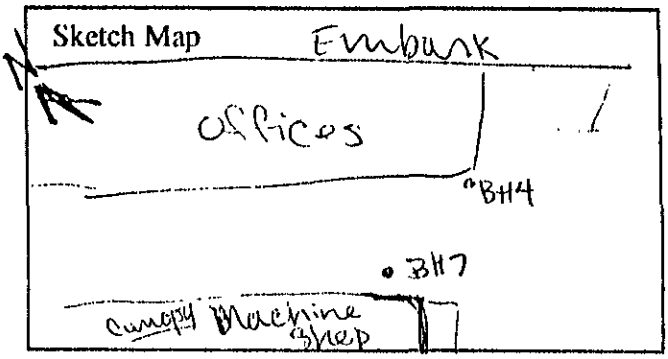
Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0-2	24/22				Fill orange sand & gravel green at bottom (4 in). w/ moderate odor
2-4	24/6	BH6-4			A-A to 4' stiff hard black clay, dry
4-6	24/12	BH6-6			AA to 4.5 dark clay, dry, some gravel mod. odor
6-8	24/24	BH6-8			AA to 7 ft - grey clay w/ shell frags moderate odor grey sand at bottom
8-10	24	BH6-10			sandy clay, dry
					End of hole

DRILLING LOG

Job Number 7703.26

Project PDD Yard I - West
Location Oakland
Borehole Number BH7
Date Drilled 10/25/94
Contractor Downer
Drilling Method Hydraulic Punch
Driller M. Nusewicz
Hole Diameter 2"
Log By Y. Lesnoj
Total Depth 10 ft

Sketch Map



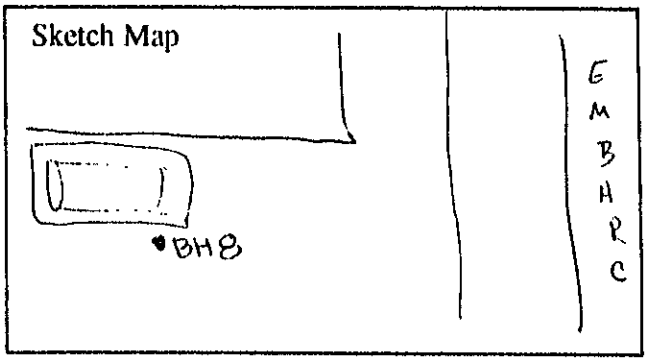
Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Head Space/ Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0-2	24/20	NS			~~Orange silty sand~~ rock frags w/ tan appearance of tan? greenish sands, concrete frags NO odor dry stiff black clay at bottom
2-4	24/12	BH7-4			brown sand & gravel fill brown clayey material @ 3.5 ft NO odor Bottom - fill material brick frags, clay, sand, gravel
4-6	24/12	BH7-6			fill material: sandy to dry black slightly clamp clay NO odor at bottom
6-8	24/24	BH7-8			~~rock frags, tr of~~ organic band w/wood frags 3 ft grey clay w/ shell frags, damp ~~sandy in lt~~ become Sweet: grey Sandy Clay
8-10	24/24	B7-10			AA, increasingly gritty, dry NO odor tan toward center of sampler grey at bottom
					End of Hole

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BHB
Date Drilled 10/25/91
Contractor Penetrator
Drilling Method Hydraulic Punch
Driller Michael Noskwicz
Hole Diameter 2"
Log By M. Semko
Total Depth 8'

Sketch Map



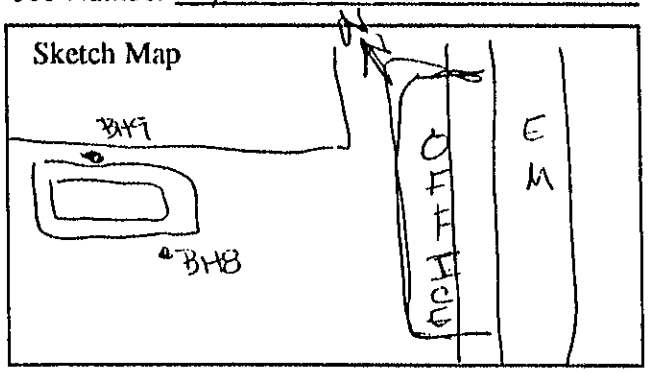
Depth (ft)	Advanced/ Recovered	Sample ID (Sample Collected per Six Inches)	Water Table	Headspace Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0-2	24/18				Fill - Dry orange sand at ~~2ft~~ 1.5 ft
2-4	24/0				Dry Fill - rock in shoe, so not a representative sample
4-6	24/	BHB 6			Fill - orange gravelly sand
6-8		BHB-8	▽ 7.0		AA - wet
					Bottom of hole

DRILLING LOG

Job Number 7703.26

Project PPD Yard I - West
Location Oakland
Borehole Number BH9
Date Drilled 10/25/91
Contractor Powerscreen
Drilling Method Hydraulic Punch
Driller Michael
Hole Diameter 2"
Log By Yvonne Lambi
Total Depth 8'

Sketch Map



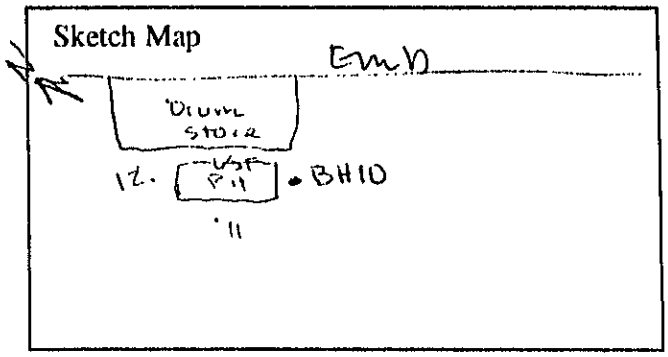
Depth (ft)	Advanced/ Recovered	Sample ID Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0 2	24/10	NS			Fill - gravel & orange sand
2- 4	24/6	BH9-4	▼		moist sandy fill - orange NO odor
4- 6	24/6	BH9-6			wet AA - some odor, unknown type sheen on inside of sampler
6- 8	24/18	BH9-8			AA
					final of Hole — screen to sample label

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH10
Date Drilled 10/25/91
Contractor Pinnacle
Drilling Method Hydraulic Punch
Driller M. Wisniewski
Hole Diameter 2"
Log By
Total Depth 12'

Sketch Map



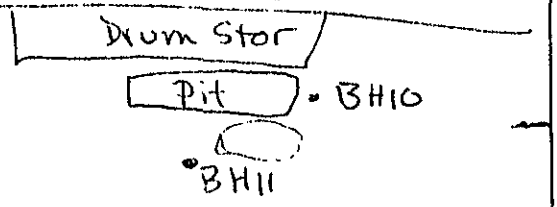
Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0-2	14/22				Fill - top 6 in black gravelly silt then green sand. Strong odor
2-4	24/14	BH10-4		35	black asphalt fill then grey clay in tube #3 tube #4 gravel fill material strong odor
4-6	24/14	BH10-6		35	Fill then black stiff clay w/silt, brick frags
6-8	24/14	BH10-8	▼		black sandy gravel becomes at 7.25 ft green gravelly & clay, strong odor very bottom sandy & wet
8-10	24/24	BH10-10			green grey clay - no sand strong odor
10/12					NA Gravel lens at 11 ft then clay becomes more sticky w/ streaks of black
					End of Hole

DRILLING LOG

Job Number 5703.26

Project PDDI - West
Location Oakland
Borehole Number BH11
Date Drilled 10/25/11
Contractor Powerscore
Drilling Method Hydraulic Punch
Driller M. Nosewicz
Hole Diameter 2"
Log By CK
Total Depth 12ft

Sketch Map EMB



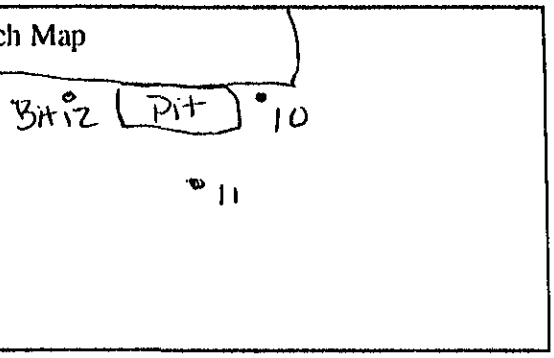
Depth (ft)	Advanced/ Recovered	Sample ID / Blow Counts per 6 inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0-2	24/20	NS			fill - orange brown sandy gravel to green silty sand, more clay & damp w/depth hit something hard at 2ft strong odor
2-4	24/	BH11-4			gravelly sand fill w/ green clay w/ depth large-gravel layer mod odor
4-6	24/	BH11-6			gravelly fill AA mod odor green clay w/ wood frags
6-8	24/18	BH11-8			gravelly sand, green clay w/ shell frags sand lens at bottom NO odor
8-10 *	24/24	BH11-10	▼		grey green clay to 9ft grey gravelly sand at bottom - very damp
10-12	24/24	NS			wet med gran sand ~~not~~ grades to gravel at 11ft then back to finer WET no odor
					END of hole screen in for water sample

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH 12
Date Drilled 10/25/11
Contractor Powerscore
Drilling Method Hydraulic Punch
Driller M. Norkiewicz
Hole Diameter 2"
Log By KF
Total Depth 10 ft

Sketch Map



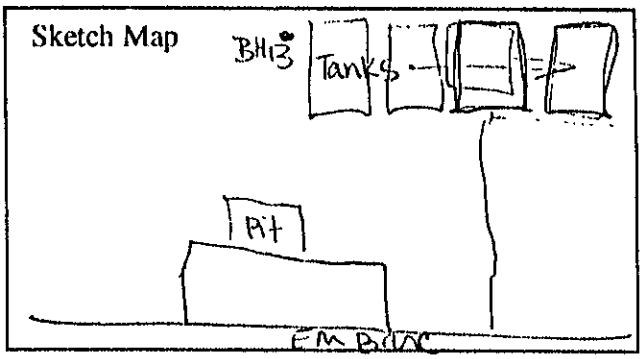
Depth (ft)	Advanced/ Recovered	Sample	Water Table	HS: Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0-2	24/18	NS			dark gravelly sand fill (4") green sand/silt/gravel fill w/ strong odor more clay at bottom
2-4	24/18	BH12-4			dark gravelly fill w/ 1" green clay then orange silt-gravel dark brown/black silty clay at bottom dry
4-6	24/15	BH12-6			AA more gravel - strong odor, oily appearance Brick frags wood frags at bottom
6-8	24/18	BH12-8			7ft black oily sandy clay w/ strong odor wet? gravelly layer bottom dry
8-10	24/22				AA w/ greater clay content toward 9ft green grey [at 9ft bright oily sheen]
					End of hole

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH13
Date Drilled 10/25/91
Contractor Powerscore
Drilling Method Hydraulic Punch
Driller M. Nadewicz
Hole Diameter 2"
Log By VN
Total Depth 9 ft

Sketch Map



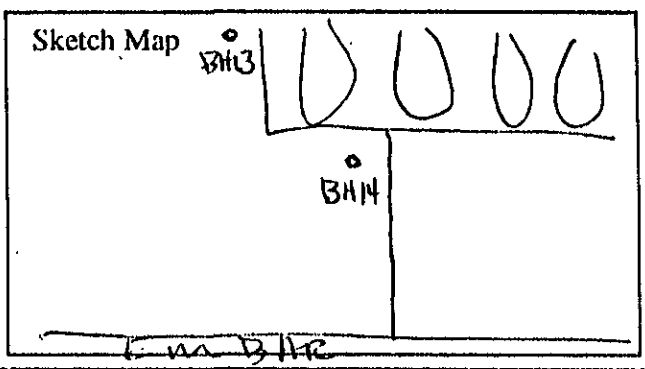
Depth (ft)	Advanced/ Recovered	SVE Flow Cards per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0-2	24/12	NS			brown orange gravelly sand fill greenish gravel/silt below that - fill also slight odor
2-4	24/3	NS			large rock stuck in bottom tube - no sample
4-6	24/2	NS	▽	(6)	brown/orange sand and gravel - No sample / wet in shoe
6-8	24/6	BH13-8	▽		orange brown clay gravel more clay toward bottom
8-9	24/6	BH13-9			refusal at 9 ft - sheen on water sample looked oily - black/grey sticky clay w/ some sand
					end of hole Unable to take water sample

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH-14
Date Drilled 10/25/91
Contractor Powerscore
Drilling Method Hydraulic Punch
Driller M. Noscuicz
Hole Diameter 2"
Log By [illegible]
Total Depth 13ft

Sketch Map



Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
0-2	24/18	NS			top 3" dark greenish fill remainder brown/orange gravelly/sandy fill mod odor
2-4	24/18	BH14-4			black gravelly clay fill at bottom mod odor
4-6	24/10	BH14-6			black silty clay, hard mod odor
6-8	24/3	NS			brown fine sand & gravel w black gravelly sand fill
8-10	24/18	BH14-11	▽		black clay dry, stiff
11-13	24/24	1			Grey dry gritty clay ~~at bottom~~ sticky tan/grey clay no odor black sandy clay - grades into sandy grey clay, shell frags toward bottom, also sand increases
					End of hole stuck screen down hole

DRILLING LOG

Job Number 7703.26

Project Crowley
Location PDOT
Borehole Number KH15
Date Drilled 1-6-92
Contractor Powercore
Drilling Method Power coring
Driller Mike / Allen
Hole Diameter 2.5"
Log By L. Kleinecke
Total Depth 5.0 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
[illegible]					Asphalt surface
1.5					Blk stained silty gvl becoming ang/Brn at 0.5' ang gvls to 1/2" damp No odor OVM 1.7ppm
5					AA [illegible] 50% gvl 50% silt OVM 1.8ppm

DRILLING LOG

Job Number 7703.26

Project County Y
Location @ POST 3
Borehole Number BH16
Date Drilled 1-6-92
Contractor Penncore
Drilling Method Power Auger
Driller Mike Allen
Hole Diameter 4.5 in
Log By L. Ickenroth
Total Depth 3.0 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
					Asphalt
					angular gvls ¼ to ½"
1.5			Y		org brn sclty gvl W/ blk layering damp
					OVM 1.9 ppm
3.0					AA 50/50 wet
					becoming sclty sand at 2.0 LT brn No odor
					OVM 2.3 ppm

DRILLING LOG

Job Number 1703.26

Project [illegible]
Location PVDT 4
Borehole Number RH17
Date Drilled 1-6-92
Contractor [illegible]
Drilling Method [illegible]
Driller Mike Allen
Hole Diameter 2.5 in
Log By L. Klemecki
Total Depth 3.0 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
1.5					org-brn multi silty sand w gvls to 1" damp-dry slight odor took middle tube OVM 4.4 ppm
3.0					AA No odor damp-dry OVM 6.1 ppm

DRILLING LOG

Job Number 7203.26

Project Crowley
Location Port
Borehole Number BH18
Date Drilled 1-6-92
Contractor Powercore
Drilling Method Coring
Driller Mike Allen
Hole Diameter 2.5 in
Log By L. Klemecke
Total Depth 3.0 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
					blk gvls beneath asphalt
1.5					med brn silty sand w gvls to 1/4" damp no odor OVM 3.0 ppm
3.0					AA w blk, org, yel mottling gvls to 3/4" damp no odor OVM 0.5 ppm

DRILLING LOG

Job Number 7703.26

Project Crowley
Location Pond
Borehole Number SB19
Date Drilled 1-6-92
Contractor [illegible]
Drilling Method coring
Driller [illegible] Allen
Hole Diameter 2.5"
Log By [illegible]
Total Depth 3.0 FT

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
1.5					Org-brn silty sand w gvls to 1/4" damp becoming Gsn-grey clay at 1.5 No odor OVM 0.7ppm
3.0					Gsn grey sandy clay w sand lens at 2-2.5" Took ctr tube moist slight odor OVM 0.7ppm

DRILLING LOG

Job Number 7203.26

Project Crowley
Location PDBL
Borehole Number RH20
Date Drilled 1-6-92
Contractor Powercore
Drilling Method Coring
Driller [illegible] Allen
Hole Diameter 2.5 in
Log By [illegible]
Total Depth 3.0 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
1.5					brn-org silty sand w/ gvls to 1/4" [illegible] no odor OVM 1.3 ppm
3.0					AA becoming med brn clay damp no odor wood frags slight 2° porosity OVM 1.5 ppm

DRILLING LOG

Job Number 7703.26

Project Crowley
Location Pond
Borehole Number BH 21
Date Drilled 1-6-92
Contractor Parratt-Wolff
Drilling Method Coring
Driller [illegible]
Hole Diameter [illegible]
Log By B. Kleinecke
Total Depth 5.0 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
1.5					Org-brn silty gvl mottled damp gvls to 1" No odor OVM 2.5 ppm
5.0					lt org brn sandy silt dry no odor OVM 2.0 ppm

DRILLING LOG

Job Number 7703.26

Project 7703.26 PDDI - West
Location ~~PDDI~~ - Oakland
Borehole Number SB22
Date Drilled 1/6/97
Contractor Bonnecore
Drilling Method Hydraulic Punch
Driller M. Nocewicz
Hole Diameter 2"
Log By Y Lemoi
Total Depth 12 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
					Asphalt surface
2ft	24/15				silt, sand, clay, gravel dry to damp no odor sand increases at bottom (1.5ft) OVM 1.8ppm
4ft	24/8				top 2 in gravel, angular then silty/clayey sand no odor damp OVM 1.7ppm
6ft	24/8				silty/clayey sand w/ gravel damp no odor OVM 1.8ppm
8	24/12		▽		Silty sandy gravel, wet, no odor OVM 2.0ppm
10	24/4				AA no odor, wet - No Sample OVM 2.9 ppm
12	24/0				no sample retrieved - rock in shoe - rock coated in slick grey mud (bay muds)
	24/18				~~Refusal~~ retry - AA top 12 in, then green/grey mottled slick clay w/ strong oil & grease odor - dark layer at top of bottom tube - product? OVM 7.0 ppm

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH23
Date Drilled 1-16-92
Contractor Powercore
Drilling Method Hydraulic Punch
Driller M. Nocewicz
Hole Diameter 2"
Log By V. Lembi
Total Depth 3 Ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
1.5	18/10				Asphalt surface Black gravel & sand - to 2" OVM 3.5 ppm Orange sand-gravel-clay damp no odor
3.0	18/10				increasing clay at bottom AA, increasing sand toward bottom OVM 1.3 ppm no odor
					End of hole

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH24
Date Drilled 1-6-98
Contractor PowerCare
Drilling Method Hydraulic Punch
Driller M. Notzewicz
Hole Diameter 2"
Log By YLemm
Total Depth 12 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/18				Asphalt surface Backsand & gravel turns to orange sand, silt & gravel (angular) damp OVM 0.8 no odor
4	24/8				AA, greater sand content no odor OVM 0.7 ppm damp-wet
6	24/6				AA, gravels ~~increase~~ angular - 1cm-5cm encountered
8	24/0		▽		AA, gravels prevent sample recovery
10	24/4				AA, no sample, no odor wet Headspace: OVM 3.5 ppm
12	24/0				AA, sample, no odor wet
					End of hole

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH25
Date Drilled 1-6-92
Contractor Powercore
Drilling Method Hydraulic punch
Driller M. Noszwicz
Hole Diameter 2"
Log By Y. Lamb
Total Depth 12 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/20				Asphalt surface Brown silt w/ gravel no odor dry orange coarse sand & gravel med grn sand & gravels to bottom
4	24/18				dry silt & gravel no odor bottom tube sand & gravel OVM 2.5 ppm
6	24/6				sand & angular gravel no odor
8	24/6		▽		AA - wet no odor OVM 1.1 ppm
10	24/8				AA - wet no odor OVM 1.1 PPM
12	24/12				AA - wet no odor layer of med. grading to coarse sand, 3" OVM 1.1 ppm
					Bottom.

DRILLING LOG

Job Number 7703.2e

Project RDDI - West
Location Oakland
Borehole Number BH2e
Date Drilled 1-6-92
Contractor Pomercore
Drilling Method Hydraulic Punch
Driller M. Nolewicz
Hole Diameter 2"
Log By Y. Lembi
Total Depth 9.5'

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2ft	24/18				Asphalt surface silt w/ clay & gravel, slight odor, dry-damp OVM 1.4 ppm
4	24/18				Clay w/ silt & gravel - damp loose brown silt & gravel no odor, dry no sample OVM 3.7 ppm
6	24/6				loose silt & gravel - slight odor bottom sample tube had mottled slick gray clay w/ gravels - no odor
9	24/19		▽		AA shell frags fine grey sand/silt, loose, wet sample - slick grey clay · Bay Muds, turns buff, dry
					End of hole

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH23
Date Drilled 1-6-92 / 1-7-92
Contractor Power Core
Drilling Method Hydraulic Punch
Driller M. Nocawicz
Hole Diameter 2"
Log By Yvonne Lembi
Total Depth 10'

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
15 2	24/9				Asphalt surface brown-orange silt & sandy w/ gravel, no odor dry OVM 1.2 ppm
3 4	24/14				AA, becoming clayey gravel at bottom OVM 2.3 ppm
6	24/24				silty grey-green clay, no odor OVA 0.4 ppm
8	24/24				AA becoming lt gry sticky clay w/ light gry sand w/ shells - No odor OVA 1.4 ppm
10	24/24				AA - no odor OVA 0.2 ppm

DRILLING LOG

Job Number 7703.26

Project PDDT - West
Location Oakland
Borehole Number BH-2B
Date Drilled 1-7-92
Contractor Pinnacle
Drilling Method Hydraulic Punch
Driller M. Nocunich
Hole Diameter 2"
Log By Y. Lemon
Total Depth 10 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/20				Asphalt surface orange-brown silty sand w/ gravel becomes brown black w/ gravel, rounded no odor green silty sand w/ gravel damp OVM 1.2 ppm
4	24/1				orange & green silty sand w/ gravel No Sample no odor dry OVM 1.9 ppm
6	24/18				green - black silty clay w/ sand and gravel dry OVM 0.9 ppm
8	24/16				AA, w/ less gravel, very slight odor
10	24/22				AA, becomes dry buff clay w/ shell frags at 9 ft - Bay Mud? Strong gasoline odor at 8.5 - 9 ft - damp-dry dark coloring - product? OVM 21.5 ppm
					End of Hole

DRILLING LOG

Job Number 7703.21e

Project PDDI - West
Location Oakland
Borehole Number B11-29
Date Drilled 1-7-92
Contractor Pinnacle
Drilling Method Hydraulic Punch
Driller M. Nowicz
Hole Diameter 8"
Log By V. Lamb
Total Depth 10 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/20		X		Asphalt surface light brown-orange silt w/ gravel OVA 4.4 ppm sand with gravel dry orange med coarse sand at bottom no odor
4	24/18				AA, more gravel increase in clay, becomes hard dark dry silty clay, no odor OVM 4.6 ppm
6	24/7				AA, greater plasticity, no odor OVA 5.1 ppm
8	24/24				AA, becomes dark grey w/ plant frags strong odor at bottom, shiny black patches - free product? does OVA 4.9 ppm
10	24/18				AA, spots of sand dry OVA 1.9 ppm shell frags at bottom w/ slick black spots, strong odor
					End of hole

DRILLING LOG

Job Number 7703.26

Project PDDE - West
Location Oakland
Borehole Number BH30
Date Drilled 1-7-92
Contractor Powercore
Drilling Method Hydraulic Punch
Driller M Nocewicz
Hole Diameter 2"
Log By Yvonne Lembi
Total Depth 10 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/17		NE		Asphalt surf orange brown silty sand & green sand no odor dry OVA 2.8 ppm
4	24/18				AA top 4 in mix green & black mottled silty clay, strong odor OVA 82.2 ppm
6	24/12				AA, strong odor, plant frags, shiny black product OVA 71.3 ppm
8	24/18				AA, ~~plant frags, shiny black liquid patches~~ strong odor
10	24/12				AA, strong odor OVA 9.8 ppm
					End of hole

DRILLING LOG

Job Number 7203.26

Project PDDI - West
Location Oakland
Borehole Number BH31
Date Drilled 1-7-92
Contractor Bowers Corp
Drilling Method Hydraulic Punch
Driller M. Wozniak
Hole Diameter 2"
Log By Y. Lomvai
Total Depth 10 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/20				Asphalt surf green & brown silty sand w/ gravel dry ~~no odor~~ ~~med-strong odor at 1ft~~ ~~turns to brown dry silty clay at 1.5ft no odor~~
4	24/14				AA, no odor, dry OVA 3.1 ppm
6	24/18				AA, no odor, dry OVA 3.4 ppm
8	24/20				AA, no odor, increased plasticity, plant roots w/ fine grey sand w/ silt, slight odor OVA 2.8 ppm
10	24/24		▽		grey mud-clay w/ lenses of grey fine sand with shell frags and pebbles no odor, wet OVA 3.3 ppm
					End of hole

Sample: 1.5ft OVA 17.1 ppm

DRILLING LOG

Job Number 7703-26

Project PDDT - West
Location Oakland
Borehole Number B132
Date Drilled 1-7-92
Contractor Powercore
Drilling Method Hydraulic Punch
Driller M. Norquist
Hole Diameter 2"
Log By V. Lembi
Total Depth 4 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
					Asphalt surface
					All gravels - no sample to 4 ft

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH33
Date Drilled 1-7-92
Contractor Powerscore
Drilling Method Hydraulic Punch
Driller M. Nogowicz
Hole Diameter 2"
Log By Yvonne Lembi
Total Depth 10 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/14				Asphalt surface Brown gravel & silt green silt and sand becoming orange silt & sand w/o gravel strong gasoline odor, dry OVA 3.4 ppm
4	24/6				Cobble in sampler - 1 Sand & silt w/ angular gravel - no odor, dry OVA 1.4 ppm
6	24/16		▽		AA, increase in sand, no odor, wet
8	24/6				AA, wet - No Sample OVA ∅
10	24/9				grey green fine silty sand & clay, slight odor OVA 0.8 ppm Wet
					End of hole

DRILLING LOG

Job Number 7703.26

Project PDPI - West
Location Oakland
Borehole Number BH34
Date Drilled 1-7-92
Contractor Power Core
Drilling Method Hydraulic Core
Driller M. Norwicz
Hole Diameter 2"
Log By Yvonne Lemkin
Total Depth 10 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/5				Asphalt Brown-orange silt & sand w/ angular gravel - dry green med. sand - moderate odor OVA 5.6 ppm
4	24/9				orange brown angular gravel w/ sand & silt dry OVA 2.5 ppm no odor
6	24/0		▽?		No sample
8	24/10				brown sand-silt w/ gravel - wet green black silty clay with, no odor chunks of orange compact silt sand (rock?) OVA Ø
10	24/7				silty clay w/ angular gravel and orange chunks (AA) strong odor at bottom, black shiny patches of liq. End of hole OVA 0.7 ppm

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH35
Date Drilled 1-7-92
Contractor Powercore
Drilling Method Hydraulic Punch
Driller M. Nocalwicz
Hole Diameter 2"
Log By Yvonne Lembi
Total Depth 10 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/8				asphalt surf angular serp. gravel w/sand slight odor dry OVA 8.1 ppm
4	24/16		▽		small gravel w/sand wet, no odor fine silty sand, black, slight odor OVA 4.8 ppm
6	24/16				AA, w/ some large angular gravel slight O&G odor, damp-wet OVA 7.1 ppm
8	24/16		▽		AA, becomes green grey fine sand, more fine with depth (sample 7.5 ft) OVA 4.6 ppm
10	24/24				AA becoming green grey clay at 9-9.5 ft OVA 3.9 ppm no odor wet-moist
					End of hole.

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH36
Date Drilled 1-7-92
Contractor Power Core
Drilling Method Hydraulic Punch
Driller M. Nosewicz
Hole Diameter 2"
Log By V. Lemmon
Total Depth 10 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/12				asphalt brown-orange gravel, silt, sand OVA 86.6 ppm green sand & gravel dry, no odor
4	24/12				brown/or gravel & sand black fine sand w/shells, no odor, dry OVA 26.9 ppm
6	24/18				black-grey-green clay w/silt, some gravel moderate odor at 5.5 ft, dry OVA 11.5 ppm
8	24/12				black-grey-green clay, dry to hydrophilic no odor (no sample for lab) OVA 1.7 ppm
10	24/22				AA (no sample for lab) OVA 0.8 ppm
					End of hole

DRILLING LOG

Job Number 7703.26

Project PDDT - West
Location Oakland
Borehole Number BH37
Date Drilled 1-7-92
Contractor Powerscore
Drilling Method Hydraulic Punch
Driller M. Nocewicz
Hole Diameter 2"
Log By V. Lepori
Total Depth 10 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/14				Asphalt sand-silt w/ brown orange angular gravel no odor OVA 2.7 ppm
4	24/12				AA. then green-grey silty clay w/gravel brown gravel w/ clay no odor OVA 5.2 ppm
6	24/16				~~green grey~~ AA green grey fine sand with shell frags no odor OVA 2.0 ppm
8	24/22		▽ 7'		AA, then beds muds at 7 ft - beige to green grey clay, no odor, interfingering fine sand, damp to wet Sample at 8 ft OVA 2.0 ppm
10	24/8				AA, no odor - no lab sample wet OVA 0.6 ppm
					End of hole
					[First location hit obstruction at 4ft, [moved to continue]

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH-8
Date Drilled 1-7-92
Contractor Powerscope
Drilling Method Hydraulic Punch
Driller M. Nagiwicz
Hole Diameter 2"
Log By Y. Lembi
Total Depth 4 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/12				Asphalt brown orange ~~silt~~ gravel w/ sand & ~~gravel~~ silt No odor, dry OVA Ø
4	24/10				AA w/ green sand, slight odor, dry Hit concrete(?) obstruction OVA 6.6 ppm
					End of hole

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH89
Date Drilled 1-8-92
Contractor Powercore
Drilling Method hydraulic punch
Driller M. Nobawicz
Hole Diameter 2"
Log By V. Lemon
Total Depth 10 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
2	24/12				Asphalt brown-orange gravel & silt/sand no odor green in places dry OVM 1.8 ppm
4	24/15				AA. no odor greater clay content at bottom, green-black OVM 2.0 ppm
6	24/6				AA, slight sewage-like odor, dry-damp OVM 2.2 ppm
8	24/24				AA, becoming dry silty green black clay at 6.5 ft no odor Then fine gray-green sand/clay at bottom OVM 0.9 ppm
10	24/0				No Sample Recovery End of hole

DRILLING LOG

Job Number 7703.26

Project DDD&T - West
Location Oakland
Borehole Number BH40
Date Drilled 1-8-92
Contractor Powercore
Drilling Method Hydraulic Ponch
Driller M. Nocwicz
Hole Diameter 2"
Log By Yvonne Lemba
Total Depth 3.0 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
1.5	18				Asphalt large angular brown/orange gravel no odor w/green silt/clay OVM 2.9 ppm
3.0	18				AA, more green silt clay, sl odor OVM 18.1 ppm
					End of Hole (No lab samples)

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number Bit 41
Date Drilled 1-8-92
Contractor Powerscore
Drilling Method hydraulic Ponch
Driller M. Kriewitz
Hole Diameter 2"
Log By Yvonne Lemaire
Total Depth 30 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
1.5	18				asphalt+ brown orange gravel & sand, no odor OVM 3.7 ppm greater, compact sand toward bottom, dry
3.0	18				AA, some green sand, no odor OVM 1.8 ppm
					End of hole (no lab samples)

DRILLING LOG

Job Number 7203.26

Project PDTI - West
Location Oakland
Borehole Number BH 42
Date Drilled 1-8-92
Contractor Powerscore
Drilling Method Hydraulic Punch
Driller M. Nocewicz
Hole Diameter 2"
Log By Yvonne Lembi
Total Depth 3.0 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
1.5	18/12				Asphalt surf brown orange gravel and sand w/silt no odor dry OVM 1.7 ppm
3.0	18/12				AA, green sand/silt/clay around gravel, dry no odor OVM 1.1 ppm

DRILLING LOG

Job Number 7703.26

Project PDDT - West
Location Oakland
Borehole Number B143
Date Drilled 1-8-92
Contractor Parratt-Wolff
Drilling Method Hydraulic Punch
Driller M. Noelewicz
Hole Diameter 2"
Log By Y. Lembi
Total Depth 3 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
1.5	18/12				Asphalt surf brown orange gravel w/ sand & silt green sand & silt, no odor, dry OVM 1.2 ppm
3	18/12				AA, no odor, dry OVM 74.3 ppm
					End of hole no lab samples

DRILLING LOG

Job Number 7703.26

Project PODI - West
Location Oakland
Borehole Number BH44
Date Drilled 1-8-92
Contractor Powercore
Drilling Method hydraulic Punch
Driller M. Nocewicz
Hole Diameter 2"
Log By Y. Lembo
Total Depth 3 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
1.5	18/18				Asphalt surf brown black gravel, slight odor - org? OVM 3.7 green sand w/ gravel, no odor, dry OVM 1.4
3	18/14				AA orange brown gravel intermixed no odor dry OVM 2.0 ppm
					End of hole (no lab samples)

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH45
Date Drilled 1-8-92
Contractor Powerserve
Drilling Method hydraulic ponch
Driller M. Nieciwicz
Hole Diameter 2"
Log By Y. Lemoi
Total Depth 3.0 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
1.5	1B/				Asphalt surf brown orange gravel & silt/sand no odor green sand/silt OVM 1.2 ppm any
3.0	1B/				AA no odor any OVM 3.2 ppm
					End of Hole (no lab samples)

DRILLING LOG

Job Number 7703.10

Project PDDI - West
Location Oakland
Borehole Number BH46
Date Drilled 1-8-92
Contractor Powerscore
Drilling Method hydraulic Punch
Driller M. Nocewicz
Hole Diameter 2"
Log By V Lembi
Total Depth 9.0 ft

Sketch Map

Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
					Asphalt surface in building
					Cobbles to 1 ft
					dry silt
1					Compact gravel, silt, clay mix dry
	24/14				becoming more clay rich at bottom no odor
3'					OVM 3.0 ppm
					AA, damp, no odor
6'	24/18				OVM 1.8 ppm
					AA, turning to buff & grey clay, no odor
9	24/17				and fine grey sand
					OVM 1.6 ppm
					End of hole

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH47
Date Drilled 1-8-92
Contractor Powercore
Drilling Method hydraulic Punch
Driller M. Nodewicz
Hole Diameter 2"
Log By V. Lembi
Total Depth 9.0ft

Sketch Map

office in building

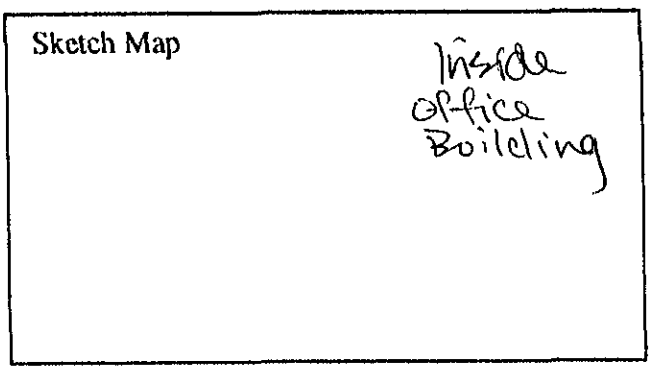
Depth (ft)	Advanced/ Recovered	Blow Counts per Six Inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
					cobbles to 1ft (asphalt 6in ft) hand augured
1'	24/12				dark brown hard, dry clay w/ brick frags no odor OVM 0.9 ppm
3'	24/16				AA, damp, more plastic toward bottom no odor OVM Ø
6'	24/18				clay, grey and buff with shell frags & some gravel, plastic, damp, becoming more firm with depth - slight odor (sample at 8.5) OVM 3.2 ppm
9'					End of hole

DRILLING LOG

Job Number 7703.26

Project PDDI - West
Location Oakland
Borehole Number BH48
Date Drilled 1-8-92
Contractor Powerscore
Drilling Method hydraulic punch
Driller M. Nadlewicz
Hole Diameter 2"
Log By Y. Lambi
Total Depth 3.0 ft

Sketch Map



Depth (ft)	Advanced/ Recovered	Blow Counts per Six inches	Water Table	Well Construction	Sample Description (Soil or Rock Type, Color, Grain Size, Sorting, Roundness, Plasticity, Moisture Content, Trace Materials, Odor, Staining, Trace Gas Readings)
			▽		Asphalt 8cm Large angular brown/orange gravel w/sand wet, no odor ovm 1.9 ppm
1.5	10/8				
					Large angular grey gravel, slight to moderate O&G odor, wet [Lab sample collected]
3.0	18/16				
					End of hole ovm 4.1 ppm

Versar INC. SACRAMENTO

APPENDIX B

Laboratory Analytical Results

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545
Telephone (510) 783-6960
Facsimile (510) 783-1512

TAL

November 27, 1991

Mr. Stephen Wilson
Versar, Inc.
5330 Primrose Drive, Suite 228
Fair Oaks, California 95628

Dear Mr. Wilson:

Trace Analysis Laboratory received forty eight soil samples and three water samples on October 25, 1991, one water sample on October 30, 1991 and one water sample on November 1, 1991 for your Project No. 7703.26, PDDI-West (our custody log numbers 1457, 1468 and 1479 respectively).

These samples were analyzed according to your chains of custody. Our analytical report, the completed chain of custody forms, and our analytical methodologies are enclosed for your review.

Trace Analysis Laboratory is certified under the California Environmental Laboratory Accreditation Program. Our certification number is 1199.

If you should have any questions or require additional information, please call me.

Sincerely yours,

Jennifer Pekol
Project Specialist

Enclosures

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8. • Hayward, California 94545
Telephone (510) 783-6960
Facsimile (510) 783-1512

TAL

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 11/04/91
DATE ANALYZED: 11/12/91
DATE REPORTED: 11/18/91

CUSTOMER: Versar, Inc.

REQUESTER: Stephen Wilson

PROJECT: No. 7703.26, PDDI - West

Sample Type: Soil

Method and Constituent:	Units	BH2-4 Concentration	BH2-4 Reporting Limit	BH2-8 Concentration	BH2-8 Reporting Limit	BH3-8 Concentration	BH3-8 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/kg	ND	1,000	ND	1,000	23,000	1,000

Method and Constituent:	Units	BH4-6 Concentration	BH4-6 Reporting Limit	BH5-4 Concentration	BH5-4 Reporting Limit	BH7-8 Concentration	BH7-8 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/kg	560,000	1,000	57,000	1,000	ND	1,000

Method and Constituent:	Units	BH8-6 Concentration	BH8-6 Reporting Limit	BH9-4 Concentration	BH9-4 Reporting Limit	BH10-4 Concentration	BH10-4 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/kg	ND	1,000	ND	1,000	9,800	1,000

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 11/04/91
DATE ANALYZED: 11/12/91
DATE REPORTED: 11/18/91
PAGE: Two

Sample Type: Soil

Method and Constituent:	Units	BH11-10 Concentration	BH11-10 Reporting Limit	BH12-4 Concentration	BH12-4 Reporting Limit	BH13-9 Concentration	BH13-9 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/kg	ND	1,000	1,800,000	2,900	2,100,000	2,900

Method and Constituent:	Units	BH14-4 Concentration	BH14-4 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:					
Total Petroleum Hydrocarbons as Diesel	ug/kg	ND	1,000	ND	1,000

QC Summary:

% Recovery: 81
% RPD: 22

Concentrations reported as ND were not detected at or above the reporting limit.

TAL Trace Analysis Laboratory, Inc.

LOG NUMBER: 1457, 1468 and 1479
DATE SAMPLED: 10/25/91 and 11/01/91
DATE RECEIVED: 10/25/91, 10/30/91 and 11/01/91
DATE EXTRACTED: 11/07/91 and 11/15/91
DATE ANALYZED: 11/14/91 and 11/22/91
DATE REPORTED: 11/18/91 and 11/27/91
PAGE: Three

Sample Type: Water

Method and Constituent:	Units	BH2 Concentration	BH2 Reporting Limit	BH5 Concentration	BH5 Reporting Limit	BH9 Concentration	BH9 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/l	ND	50	450	50	ND	50

Method and Constituent:	Units	BH14 Concentration	BH14 Reporting Limit	Pit #2 Concentration	Pit #2 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/l	260	50	3,000	50	ND	50

QC Summary:

% Recovery: 116 and 79
% RPD: 1.8 and 2.3

Concentrations reported as ND were not detected at or above the reporting limit.

TAL Trace Analysis Laboratory, Inc.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 11/07/91
DATE ANALYZED: 11/07/91, 11/08/91 and 11/09/91
DATE REPORTED: 11/18/91
PAGE: Four

Sample Type: Soil

Method and Constituent:	Units	BH2-8 Concentration	BH2-8 Reporting Limit	BH4-6 Concentration	BH4-6 Reporting Limit	BH5-4 Concentration	BH5-4 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/kg	ND	500	4,900	500	ND	500
EPA Method 8020 for:							
Benzene	ug/kg	ND	5.0	ND	5.0	ND	5.0
Toluene	ug/kg	ND	5.0	ND	5.0	ND	5.0
Ethylbenzene	ug/kg	ND	5.0	8.7	5.0	ND	5.0
Xylenes	ug/kg	ND	15	65	15	ND	15

Method and Constituent:	Units	BH7-8 Concentration	BH7-8 Reporting Limit	BH8-6 Concentration	BH8-6 Reporting Limit	BH9-4 Concentration	BH9-4 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/kg	ND	500	ND	500	ND	500
EPA Method 8020 for:							
Benzene	ug/kg	ND	5.0	ND	5.0	5.9	5.2
Toluene	ug/kg	ND	5.0	ND	5.0	27	5.0
Ethylbenzene	ug/kg	ND	5.0	ND	5.0	ND	5.0
Xylenes	ug/kg	ND	15	ND	15	35	15

Concentrations reported as ND were not detected at or above the reporting limit.

Sample BH9-4 was analyzed 1 day beyond the 14-day holding time for this analysis.

Trace Analysis Laboratory, Inc.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 11/07/91
DATE ANALYZED: 11/07/91, 11/08/91 and 11/09/91
DATE REPORTED: 11/18/91
PAGE: Five

Sample Type: Soil

Method and Constituent:	Units	BH10-4 Concentration	BH10-4 Reporting Limit	BH11-10 Concentration	BH11-10 Reporting Limit	BH12-4 Concentration	BH12-4 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/kg	65,000	500	ND	500	970,000	600
EPA Method 8020 for:							
Benzene	ug/kg	22	5.0	ND	5.0	1,300	210
Toluene	ug/kg	47	5.0	ND	5.0	1,800	160
Ethylbenzene	ug/kg	520	5.0	ND	5.0	ND	200
Xylenes	ug/kg	2,300	15	ND	15	55,000	400

Method and Constituent:	Units	BH13-9 Concentration	BH13-9 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:					
Total Petroleum Hydrocarbons as Gasoline	ug/kg	52,000	500	ND	500
EPA Method 8020 for:					
Benzene	ug/kg	ND	37	ND	5.0
Toluene	ug/kg	ND	30	ND	5.0
Ethylbenzene	ug/kg	ND	33	ND	5.0
Xylenes	ug/kg	13,000	74	ND	15

QC Summary:

% Recovery: 88 and 85
% RPD: 27 and 7.1

Concentrations reported as ND were not detected at or above the reporting limit.

Sample BH12-4 was analyzed 1 day beyond the 14-day holding time for this analysis.

Trace Analysis Laboratory, Inc.

LOG NUMBER: 1457 and 1468
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91 and 10/30/91
DATE ANALYZED: 11/02/91 and 11/03/91
DATE REPORTED: 11/18/91
PAGE: Six

Sample Type: Water

Method and Constituent:	Units	BH2 Concentration	BH2 Reporting Limit	BH5 Concentration	BH5 Reporting Limit	BH9 Concentration	BH9 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/l	ND	50	250	50	ND	50
EPA Method 8020 for:							
Benzene	ug/l	ND	0.50	7.0	0.50	ND	0.50
Toluene	ug/l	0.51	0.50	ND	0.50	0.56	0.50
Ethylbenzene	ug/l	ND	0.50	1.4	0.50	ND	0.50
Xylenes	ug/l	ND	1.5	11	1.5	ND	1.5

Method and Constituent:	Units	BH14 Concentration	BH14 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:					
Total Petroleum Hydrocarbons as Gasoline	ug/l	ND	50	ND	50
EPA Method 8020 for:					
Benzene	ug/l	ND	0.50	ND	0.50
Toluene	ug/l	ND	0.50	ND	0.50
Ethylbenzene	ug/l	ND	0.50	ND	0.50
Xylenes	ug/l	ND	1.5	ND	1.5

QC Summary:

% Recovery: 73
% RPD: 0.0

Concentrations reported as ND were not detected at or above the reporting limit.

TAL Trace Analysis Laboratory, Inc.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 11/05/91 and 11/14/91
DATE ANALYZED: 11/11/91 and 11/15/91
DATE REPORTED: 11/18/91
PAGE: Seven

Sample Type: Soil

Method and Constituent:	Units	BH1-3.5 Concentration	BH1-3.5 Reporting Limit	BH2-4 Concentration	BH2-4 Reporting Limit	BH2-8 Concentration	BH2-8 Reporting Limit
Standard Method 5520EF Hydrocarbons:							
Oil and Grease	ug/kg	ND	50,000	ND	50,000	ND	50,000

Method and Constituent:	Units	BH3-2 Concentration	BH3-2 Reporting Limit	BH4-6 Concentration	BH4-6 Reporting Limit	BH5-4 Concentration	BH5-4 Reporting Limit
Standard Method 5520EF Hydrocarbons:							
Oil and Grease	ug/kg	120,000	50,000	200,000	50,000	ND	50,000

Method and Constituent:	Units	BH6-6 Concentration	BH6-6 Reporting Limit	BH7-4 Concentration	BH7-4 Reporting Limit	BH7-6 Concentration	BH7-6 Reporting Limit
Standard Method 5520EF Hydrocarbons:							
Oil and Grease	ug/kg	ND	50,000	80,000	50,000	850,000	50,000

Method and Constituent:	Units	BH7-8 Concentration	BH7-8 Reporting Limit	BH8-6 Concentration	BH8-6 Reporting Limit	BH9-4 Concentration	BH9-4 Reporting Limit
Standard Method 5520EF Hydrocarbons:							
Oil and Grease	ug/kg	ND	50,000	ND	50,000	370,000	50,000

Concentrations reported as ND were not detected at or above the reporting limit.

TAL Trace Analysis Laboratory, Inc.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 11/05/91 and 11/14/91
DATE ANALYZED: 11/11/91 and 11/15/91
DATE REPORTED: 11/18/91
PAGE: Eight

Sample Type: Soil

Method and Constituent:	Units	BH10-4 Concentration	BH10-4 Reporting Limit	BH10-8 Concentration	BH10-8 Reporting Limit	BH11-10 Concentration	BH11-10 Reporting Limit
Standard Method 5520EF Hydrocarbons:							
Oil and Grease	ug/kg	90,000	50,000	120,000	50,000	ND	50,000

Method and Constituent:	Units	BH12-4 Concentration	BH12-4 Reporting Limit	BH13-9 Concentration	BH13-9 Reporting Limit	BH14-4 Concentration	BH14-4 Reporting Limit
Standard Method 5520EF Hydrocarbons:							
Oil and Grease	ug/kg	2,500,000	50,000	1,800,000	50,000	ND	50,000

Method and Constituent:	Units	Method Blank Concentration	Method Blank Reporting Limit
Standard Method 5520EF Hydrocarbons:			
Oil and Grease	ug/kg	ND	50,000

QC Summary:

% Recovery: 88 and 91
% RPD: 6.4 and 29

Concentrations reported as ND were not detected at or above the reporting limit.

Trace Analysis Laboratory, Inc.

LOG NUMBER: 1457 and 1479
DATE SAMPLED: 10/25/91 and 11/01/91
DATE RECEIVED: 10/25/91 and 11/01/91
DATE EXTRACTED: 11/14/91
DATE ANALYZED: 11/15/91
DATE REPORTED: 11/18/91 and 11/27/91
PAGE: Nine

Sample Type: Water

Method and Constituent:	Units	BH5 Concentration	BH5 Reporting Limit	BH9 Concentration	BH9 Reporting Limit	Pit #2 Concentration	Pit #2 Reporting Limit
Standard Method 5520DF Hydrocarbons:							
Oil and Grease	ug/l	18,000	1,000	7,300	1,000	11,000	1,000

Method and Constituent:	Units	Method Blank Concentration	Method Blank Reporting Limit
Standard Method 5520DF Hydrocarbons:			
Oil and Grease	ug/l	ND	1,000

QC Summary:

% Recovery: 116
% RPD: 4.3

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/29/91
DATE ANALYZED: 10/30/91
DATE REPORTED: 11/18/91
PAGE: Ten

Sample Type: Soil

Method and Constituent	Units	BH9-4 Concentration	BH9-4 Reporting Limit	BH10-4 Concentration	BH10-4 Reporting Limit	BH11-10 Concentration	BH11-10 Reporting Limit
EPA Method 8010:							
Benzyl Chloride	ug/kg	ND	6.6	ND	6.6	ND	6.6
Bis (2-Chloroethoxy) Methane	ug/kg	ND	6.6	ND	6.6	ND	6.6
Bis (2-Chloroisopropyl) Ether	ug/kg	ND	6.6	ND	6.6	ND	6.6
Bromobenzene	ug/kg	ND	6.6	ND	6.6	ND	6.6
Bromodichloromethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
Bromoform	ug/kg	ND	6.6	ND	6.6	ND	6.6
Bromomethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
Carbon Tetrachloride	ug/kg	ND	6.6	ND	6.6	ND	6.6
Chloracetaldehyde	ug/kg	ND	6.6	ND	6.6	ND	6.6
Chloral	ug/kg	ND	6.6	ND	6.6	ND	6.6
Chlorobenzene	ug/kg	ND	6.6	ND	6.6	ND	6.6
Chloroethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
Chloroform	ug/kg	ND	6.6	ND	6.6	ND	6.6
1-Chlorohexane	ug/kg	ND	6.6	ND	6.6	ND	6.6
2-Chloroethyl Vinyl Ether	ug/kg	ND	6.6	ND	6.6	ND	6.6

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/29/91
DATE ANALYZED: 10/30/91
DATE REPORTED: 11/18/91
PAGE: Eleven

Sample Type: Soil

Method and Constituent	Units	BH9-4 Concentration	BH9-4 Reporting Limit	BH10-4 Concentration	BH10-4 Reporting Limit	BH11-10 Concentration	BH11-10 Reporting Limit
EPA Method 8010 (Continued):							
Chloromethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
Chloromethyl Methyl Ether	ug/kg	ND	6.6	ND	6.6	ND	6.6
Chlorotoluene	ug/kg	ND	6.6	ND	6.6	ND	6.6
Dibromochloromethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
Dibromomethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
1,2-Dichlorobenzene	ug/kg	ND	6.6	ND	6.6	ND	6.6
1,3-Dichlorobenzene	ug/kg	ND	6.6	ND	6.6	ND	6.6
1,4-Dichlorobenzene	ug/kg	ND	6.6	ND	6.6	ND	6.6
Dichlorodifluoromethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
1,1-Dichloroethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
1,2-Dichloroethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
1,1-Dichloroethylene	ug/kg	ND	6.6	ND	6.6	ND	6.6
Trans-1,2-Dichloro-ethylene	ug/kg	ND	6.6	ND	6.6	ND	6.6
Dichloromethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
1,2-Dichloropropane	ug/kg	ND	6.6	ND	6.6	ND	6.6
1,3-Dichloropropylene	ug/kg	ND	6.6	ND	6.6	ND	6.6
1,1,2,2-Tetrachloro-ethane	ug/kg	ND	6.6	ND	6.6	ND	6.6

Concentrations reported as ND were not detected at or above the reporting limit.

TAL Trace Analysis Laboratory, Inc.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/29/91
DATE ANALYZED: 10/30/91
DATE REPORTED: 11/18/91
PAGE: Twelve

Sample Type: Soil

Method and Constituent	Units	BH9-4 Concentration	BH9-4 Reporting Limit	BH10-4 Concentration	BH10-4 Reporting Limit	BH11-10 Concentration	BH11-10 Reporting Limit
EPA Method 8010 (Continued):							
1,1,1,2-Tetrachloroethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
Tetrachloroethylene	ug/kg	ND	6.6	ND	6.6	ND	6.6
1,1,1-Trichloroethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
1,1,2-Trichloroethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
Trichloroethylene	ug/kg	ND	6.6	ND	6.6	ND	6.6
Trichlorofluoromethane	ug/kg	ND	6.6	ND	6.6	ND	6.6
Trichloropropane	ug/kg	ND	6.6	ND	6.6	ND	6.6
Vinyl Chloride	ug/kg	ND	6.6	ND	6.6	ND	6.6

QC Summary:

% Recovery: 106
% RPD: 5.9

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/29/91
DATE ANALYZED: 10/30/91
DATE REPORTED: 11/18/91
PAGE: Thirteen

Sample Type: Soil

Method and Constituent	Units	BH13-9 Concentration	BH13-9 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
EPA Method 8010:					
Benzyl Chloride	ug/kg	ND	6.6	ND	6.6
Bis (2-Chloroethoxy) Methane	ug/kg	ND	6.6	ND	6.6
Bis (2-Chloroisopropyl) Ether	ug/kg	ND	6.6	ND	6.6
Bromobenzene	ug/kg	ND	6.6	ND	6.6
Bromodichloromethane	ug/kg	ND	6.6	ND	6.6
Bromoform	ug/kg	ND	6.6	ND	6.6
Bromomethane	ug/kg	ND	6.6	ND	6.6
Carbon Tetrachloride	ug/kg	ND	6.6	ND	6.6
Chloracetaldehyde	ug/kg	ND	6.6	ND	6.6
Chloral	ug/kg	ND	6.6	ND	6.6
Chlorobenzene	ug/kg	ND	6.6	ND	6.6
Chloroethane	ug/kg	ND	6.6	ND	6.6
Chloroform	ug/kg	ND	6.6	ND	6.6
1-Chlorohexane	ug/kg	ND	6.6	ND	6.6
2-Chloroethyl Vinyl Ether	ug/kg	ND	6.6	ND	6.6

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/29/91
DATE ANALYZED: 10/30/91
DATE REPORTED: 11/18/91
PAGE: Fourteen

Sample Type: Soil

Method and Constituent	Units	BH13-9 Concentration	BH13-9 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
EPA Method 8010 (Continued):					
Chloromethane	ug/kg	ND	6.6	ND	6.6
Chloromethyl Methyl Ether	ug/kg	ND	6.6	ND	6.6
Chlorotoluene	ug/kg	ND	6.6	ND	6.6
Dibromochloromethane	ug/kg	ND	6.6	ND	6.6
Dibromomethane	ug/kg	ND	6.6	ND	6.6
1,2-Dichlorobenzene	ug/kg	ND	6.6	ND	6.6
1,3-Dichlorobenzene	ug/kg	ND	6.6	ND	6.6
1,4-Dichlorobenzene	ug/kg	ND	6.6	ND	6.6
Dichlorodifluoromethane	ug/kg	ND	6.6	ND	6.6
1,1-Dichloroethane	ug/kg	ND	6.6	ND	6.6
1,2-Dichloroethane	ug/kg	ND	6.6	ND	6.6
1,1-Dichloroethylene	ug/kg	ND	6.6	ND	6.6
Trans-1,2-Dichloro-ethylene	ug/kg	ND	6.6	ND	6.6
Dichloromethane	ug/kg	ND	6.6	ND	6.6
1,2-Dichloropropane	ug/kg	ND	6.6	ND	6.6
1,3-Dichloropropylene	ug/kg	ND	6.6	ND	6.6
1,1,2,2-Tetrachloro-ethane	ug/kg	ND	6.6	ND	6.6

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/29/91
DATE ANALYZED: 10/30/91
DATE REPORTED: 11/18/91
PAGE: Fifteen

Sample Type: Soil

Method and Constituent	Units	BH13-9 Concentration	BH13-9 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
EPA Method 8010 (Continued):					
1,1,1,2-Tetrachloroethane	ug/kg	ND	6.6	ND	6.6
Tetrachloroethylene	ug/kg	ND	6.6	ND	6.6
1,1,1-Trichloroethane	ug/kg	ND	6.6	ND	6.6
1,1,2-Trichloroethane	ug/kg	ND	6.6	ND	6.6
Trichloroethylene	ug/kg	ND	6.6	ND	6.6
Trichlorofluoromethane	ug/kg	ND	6.6	ND	6.6
Trichloropropane	ug/kg	ND	6.6	ND	6.6
Vinyl Chloride	ug/kg	ND	6.6	ND	6.6

QC Summary:

% Recovery: 106
% RPD: 5.9

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE ANALYZED: 10/31/91
DATE REPORTED: 11/18/91
PAGE: Sixteen

Sample Type: Water

Method and Constituent	Units	BH5 Concentration	BH5 Reporting Limit	BH9 Concentration	BH9 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
EPA Method 8010:							
Benzyl Chloride	ug/l	ND	0.89	ND	0.89	ND	0.89
Bis (2-Chloroethoxy) Methane	ug/l	ND	0.89	ND	0.89	ND	0.89
Bis (2-Chloroisopropyl) Ether	ug/l	ND	0.89	ND	0.89	ND	0.89
Bromobenzene	ug/l	ND	0.89	ND	0.89	ND	0.89
Bromodichloromethane	ug/l	ND	0.89	ND	0.89	ND	0.89
Bromoform	ug/l	ND	0.89	ND	0.89	ND	0.89
Bromomethane	ug/l	ND	0.89	ND	0.89	ND	0.89
Carbon Tetrachloride	ug/l	ND	0.89	ND	0.89	ND	0.89
Chloracetaldehyde	ug/l	ND	0.89	ND	0.89	ND	0.89
Chloral	ug/l	ND	0.89	ND	0.89	ND	0.89
Chlorobenzene	ug/l	ND	0.89	ND	0.89	ND	0.89
Chloroethane	ug/l	ND	0.89	ND	0.89	ND	0.89
Chloroform	ug/l	ND	0.89	ND	0.89	ND	0.89
1-Chlorohexane	ug/l	ND	0.89	ND	0.89	ND	0.89
2-Chloroethyl Vinyl Ether	ug/l	ND	0.89	ND	0.89	ND	0.89

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE ANALYZED: 10/31/91
DATE REPORTED: 11/18/91
PAGE: Seventeen

Sample Type: Water

Method and Constituent	Units	BH5 Concentration	BH5 Reporting Limit	BH9 Concentration	BH9 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
EPA Method 8010 (Continued):							
Chloromethane	ug/l	ND	0.89	ND	0.89	ND	0.89
Chloromethyl Methyl Ether	ug/l	ND	0.89	ND	0.89	ND	0.89
Chlorotoluene	ug/l	ND	0.89	ND	0.89	ND	0.89
Dibromochloromethane	ug/l	ND	0.89	ND	0.89	ND	0.89
Dibromomethane	ug/l	ND	0.89	ND	0.89	ND	0.89
1,2-Dichlorobenzene	ug/l	ND	0.89	ND	0.89	ND	0.89
1,3-Dichlorobenzene	ug/l	ND	0.89	ND	0.89	ND	0.89
1,4-Dichlorobenzene	ug/l	ND	0.89	ND	0.89	ND	0.89
Dichlorodifluoromethane	ug/l	ND	0.89	ND	0.89	ND	0.89
1,1-Dichloroethane	ug/l	ND	0.89	ND	0.89	ND	0.89
1,2-Dichloroethane	ug/l	ND	0.89	ND	0.89	ND	0.89
1,1-Dichloroethylene	ug/l	ND	0.89	ND	0.89	ND	0.89
Trans-1,2-Dichloro-ethylene	ug/l	ND	0.89	ND	0.89	ND	0.89
Dichloromethane	ug/l	ND	1.2	ND	1.2	ND	1.2
1,2-Dichloropropane	ug/l	ND	0.89	ND	0.89	ND	0.89
1,3-Dichloropropylene	ug/l	ND	0.89	ND	0.89	ND	0.89
1,1,2,2-Tetrachloro-ethane	ug/l	ND	0.89	ND	0.89	ND	0.89

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE ANALYZED: 10/31/91
DATE REPORTED: 11/18/91
PAGE: Eighteen

Sample Type: Water

Method and Constituent	Units	BH5 Concentration	BH5 Reporting Limit	BH9 Concentration	BH9 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
EPA Method 8010 (Continued):							
1,1,1,2-Tetrachloroethane	ug/l	ND	0.89	ND	0.89	ND	0.89
Tetrachloroethylene	ug/l	ND	0.89	ND	0.89	ND	0.89
1,1,1-Trichloroethane	ug/l	ND	0.89	ND	0.89	ND	0.89
1,1,2-Trichloroethane	ug/l	ND	0.89	ND	0.89	ND	0.89
Trichloroethylene	ug/l	ND	0.89	ND	0.89	ND	0.89
Trichlorofluoromethane	ug/l	ND	0.89	ND	0.89	ND	0.89
Trichloropropane	ug/l	ND	0.89	ND	0.89	ND	0.89
Vinyl Chloride	ug/l	ND	0.89	ND	0.89	ND	0.89

QC Summary:

% Recovery: 106
% RPD: 10

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/31/91
DATE ANALYZED: 11/07/91
DATE REPORTED: 11/18/91
PAGE: Nineteen

Sample Type: Soil

Method and Constituent:	Units	BH1-6 Concentration	BH1-6 Reporting Limit	BH2-8 Concentration	BH2-8 Reporting Limit	BH3-8 Concentration	BH3-8 Reporting Limit
EPA Method 8270:							
N-Nitrosodimethylamine	ug/kg	ND	8,300	ND	330	ND	330
Phenol	ug/kg	ND	8,300	ND	330	ND	330
Bis (-2-Chloroethyl) ether	ug/kg	ND	8,300	ND	330	ND	330
2-Chlorophenol	ug/kg	ND	8,300	ND	330	ND	330
1,3-Dichlorobenzene	ug/kg	ND	8,300	ND	330	ND	330
1,4-Dichlorobenzene	ug/kg	ND	8,300	ND	330	ND	330
1,2-Dichlorobenzene	ug/kg	ND	8,300	ND	330	ND	330
N-Nitroso-Di-N-Propylamine	ug/kg	ND	8,300	ND	330	ND	330
Hexachloroethane	ug/kg	ND	8,300	ND	330	ND	330
Nitrobenzene	ug/kg	ND	8,300	ND	330	ND	330
Isophorone	ug/kg	ND	8,300	ND	330	ND	330
2-Nitrophenol	ug/kg	ND	8,300	ND	330	ND	330
2,4-Dimethylphenol	ug/kg	ND	8,300	ND	330	ND	330
Bis(-2-Chloroethoxy) Methane	ug/kg	ND	8,300	ND	330	ND	330
2,4-Dichlorophenol	ug/kg	ND	8,300	ND	330	ND	330
1,2,4-Trichlorobenzene	ug/kg	ND	8,300	ND	330	ND	330
Naphthalene	ug/kg	ND	8,300	ND	330	ND	330
Hexachlorobutadiene	ug/kg	ND	8,300	ND	330	ND	330
4-Chloro-3-Methyl-phenol	ug/kg	ND	8,300	ND	330	ND	330

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/31/91
DATE ANALYZED: 11/07/91
DATE REPORTED: 11/18/91
PAGE: Twenty

Sample Type: Soil

Method and Constituent	Units	BH1-6 Concentration	BH1-6 Reporting Limit	BH2-8 Concentration	BH2-8 Reporting Limit	BH3-8 Concentration	BH3-8 Reporting Limit
EPA Method 8270 (Continued):							
Hexachlorocyclo-pentadiene	ug/kg	ND	8,300	ND	330	ND	330
2,4,6-Trichlorophenol	ug/kg	ND	8,300	ND	330	ND	330
2-Chloronaphthalene	ug/kg	ND	8,300	ND	330	ND	330
Dimethyl Phthalate	ug/kg	ND	8,300	ND	330	ND	330
Acenaphthylene	ug/kg	ND	8,300	ND	330	ND	330
Acenaphthene	ug/kg	ND	8,300	ND	330	ND	330
2,4-Dinitrophenol	ug/kg	ND	8,300	ND	330	ND	330
4-Nitrophenol	ug/kg	ND	8,300	ND	330	ND	330
2,4-Dinitrotoluene	ug/kg	ND	8,300	ND	330	ND	330
2,6-Dinitrotoluene	ug/kg	ND	8,300	ND	330	ND	330
Diethylphthalate	ug/kg	ND	8,300	ND	330	ND	330
4-Chlorophenylphenyl Ether	ug/kg	ND	8,300	ND	330	ND	330
Fluorene	ug/kg	ND	8,300	ND	330	ND	330
N-Nitrosodiphenylamine	ug/kg	ND	8,300	ND	330	ND	330
4-Bromophenylphenyl Ether	ug/kg	ND	8,300	ND	330	ND	330
Hexachlorobenzene	ug/kg	ND	8,300	ND	330	ND	330
Pentachlorophenol	ug/kg	ND	8,300	ND	330	ND	330
Phenanthrene	ug/kg	ND	8,300	ND	330	ND	330
Anthracene	ug/kg	ND	8,300	ND	330	ND	330
Di-N-Butylphthalate	ug/kg	ND	8,300	ND	330	ND	330
Fluoranthene	ug/kg	ND	8,300	ND	330	ND	330

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/31/91
DATE ANALYZED: 11/07/91
DATE REPORTED: 11/18/91
PAGE: Twenty One

Sample Type: Soil

Method and Constituent:	Units	BH1-6 Concentration	BH1-6 Reporting Limit	BH2-8 Concentration	BH2-8 Reporting Limit	BH3-8 Concentration	BH3-8 Reporting Limit
EPA Method 8270 (Continued):							
Benzidine	ug/kg	ND	8,300	ND	330	ND	330
Pyrene	ug/kg	ND	8,300	ND	330	ND	330
Butylbenzylphthalate	ug/kg	ND	8,300	ND	330	ND	330
3,3'-Dichlorobenzidine	ug/kg	ND	8,300	ND	330	ND	330
Benzo(a)Anthracene	ug/kg	ND	8,300	ND	330	ND	330
Bis(2-Ethylhexyl) Phthalate	ug/kg	ND	8,300	ND	330	ND	330
Chrysene	ug/kg	ND	8,300	ND	330	ND	330
Di-N-Octyl Phthalate	ug/kg	ND	8,300	ND	330	ND	330
Benzo(b)Fluoranthene	ug/kg	ND	8,300	ND	330	ND	330
Benzo(k)Fluoranthene	ug/kg	ND	8,300	ND	330	ND	330
Benzo(a)Pyrene	ug/kg	ND	8,300	ND	330	ND	330
Indeno(1,2,3-cd)Pyrene	ug/kg	ND	8,300	ND	330	ND	330
Dibenzo(a,h)Anthracene	ug/kg	ND	8,300	ND	330	ND	330
Benzo(g,h,i)Perylene	ug/kg	ND	8,300	ND	330	ND	330
Surrogate % Recovery:							
Pentafluorophenol		81		77		85	
4-Fluoroaniline		111		110		95	
Decafluorobiphenyl		90		90		83	

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/31/91
DATE ANALYZED: 11/07/91
DATE REPORTED: 11/18/91
PAGE: Twenty Two

Sample Type: Soil

Method and Constituent:	Units	BH5-4 Concentration	BH5-4 Reporting Limit	BH9-4 Concentration	BH9-4 Reporting Limit	BH10-4 Concentration	BH10-4 Reporting Limit
EPA Method 8270:							
N-Nitrosodimethylamine	ug/kg	ND	330	ND	330	ND	330
Phenol	ug/kg	ND	330	ND	330	ND	330
Bis (-2-Chloroethyl) ether	ug/kg	ND	330	ND	330	ND	330
2-Chlorophenol	ug/kg	ND	330	ND	330	ND	330
1,3-Dichlorobenzene	ug/kg	ND	330	ND	330	ND	330
1,4-Dichlorobenzene	ug/kg	ND	330	ND	330	ND	330
1,2-Dichlorobenzene	ug/kg	ND	330	ND	330	ND	330
N-Nitroso-Di-N-Propylamine	ug/kg	ND	330	ND	330	ND	330
Hexachloroethane	ug/kg	ND	330	ND	330	ND	330
Nitrobenzene	ug/kg	ND	330	ND	330	ND	330
Isophorone	ug/kg	ND	330	ND	330	ND	330
2-Nitrophenol	ug/kg	ND	330	ND	330	ND	330
2,4-Dimethylphenol	ug/kg	ND	330	ND	330	ND	330
Bis(-2-Chloroethoxy) Methane	ug/kg	ND	330	ND	330	ND	330
2,4-Dichlorophenol	ug/kg	ND	330	ND	330	ND	330
1,2,4-Trichlorobenzene	ug/kg	ND	330	ND	330	ND	330
Naphthalene	ug/kg	ND	330	ND	330	ND	330
Hexachlorobutadiene	ug/kg	ND	330	ND	330	ND	330
4-Chloro-3-Methyl-phenol	ug/kg	ND	330	ND	330	ND	330

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/31/91
DATE ANALYZED: 11/07/91
DATE REPORTED: 11/18/91
PAGE: Twenty Three

Sample Type: Soil

Method and Constituent	Units	BH5-4 Concentration	BH5-4 Reporting Limit	BH9-4 Concentration	BH9-4 Reporting Limit	BH10-4 Concentration	BH10-4 Reporting Limit
EPA Method 8270 (Continued):							
Hexachlorocyclo-pentadiene	ug/kg	ND	330	ND	330	ND	330
2,4,6-Trichlorophenol	ug/kg	ND	330	ND	330	ND	330
2-Chloronaphthalene	ug/kg	ND	330	ND	330	ND	330
Dimethyl Phthalate	ug/kg	ND	330	ND	330	ND	330
Acenaphthylene	ug/kg	ND	330	ND	330	ND	330
Acenaphthene	ug/kg	ND	330	ND	330	ND	330
2,4-Dinitrophenol	ug/kg	ND	330	ND	330	ND	330
4-Nitrophenol	ug/kg	ND	330	ND	330	ND	330
2,4-Dinitrotoluene	ug/kg	ND	330	ND	330	ND	330
2,6-Dinitrotoluene	ug/kg	ND	330	ND	330	ND	330
Diethylphthalate	ug/kg	ND	330	ND	330	ND	330
4-Chlorophenylphenyl Ether	ug/kg	ND	330	ND	330	ND	330
Fluorene	ug/kg	ND	330	ND	330	ND	330
N-Nitrosodiphenylamine	ug/kg	ND	330	ND	330	ND	330
4-Bromophenylphenyl Ether	ug/kg	ND	330	ND	330	ND	330
Hexachlorobenzene	ug/kg	ND	330	ND	330	ND	330
Pentachlorophenol	ug/kg	ND	330	ND	330	ND	330
Phenanthrene	ug/kg	ND	330	ND	330	ND	330
Anthracene	ug/kg	ND	330	ND	330	ND	330
Di-N-Butylphthalate	ug/kg	ND	330	ND	330	ND	330
Fluoranthene	ug/kg	ND	330	ND	330	ND	330

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/31/91
DATE ANALYZED: 11/07/91
DATE REPORTED: 11/18/91
PAGE: Twenty Four

Sample Type: Soil

Method and Constituent:	Units	BH5-4 Concentration	BH5-4 Reporting Limit	BH9-4 Concentration	BH9-4 Reporting Limit	BH10-4 Concentration	BH10-4 Reporting Limit
EPA Method 8270 (Continued):							
Benzidine	ug/kg	ND	330	ND	330	ND	330
Pyrene	ug/kg	ND	330	ND	330	ND	330
Butylbenzylphthalate	ug/kg	ND	330	ND	330	ND	330
3,3'-Dichlorobenzidine	ug/kg	ND	330	ND	330	ND	330
Benzo(a)Anthracene	ug/kg	ND	330	ND	330	ND	330
Bis(2-Ethylhexyl) Phthalate	ug/kg	ND	330	ND	330	ND	330
Chrysene	ug/kg	ND	330	ND	330	ND	330
Di-N-Octyl Phthalate	ug/kg	ND	330	ND	330	ND	330
Benzo(b)Fluoranthene	ug/kg	ND	330	ND	330	ND	330
Benzo(k)Fluoranthene	ug/kg	ND	330	ND	330	ND	330
Benzo(a)Pyrene	ug/kg	ND	330	ND	330	ND	330
Indeno(1,2,3-cd)Pyrene	ug/kg	ND	330	ND	330	ND	330
Dibenzo(a,h)Anthracene	ug/kg	ND	330	ND	330	ND	330
Benzo(g,h,i)Perylene	ug/kg	ND	330	ND	330	ND	330
Surrogate % Recovery:							
Pentaflourophenol		90		78		79	
4-Fluoroaniline		133		122		117	
Decafluorobiphenyl		101		90		85	

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/31/91
DATE ANALYZED: 11/07/91
DATE REPORTED: 11/18/91
PAGE: Twenty Five

Sample Type: Soil

Method and Constituent:	Units	BH11-10 Concentration	BH11-10 Reporting Limit	BH13-9 Concentration	BH13-9 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
EPA Method 8270:							
N-Nitrosodimethylamine	ug/kg	ND	330	ND	660	ND	330
Phenol	ug/kg	ND	330	ND	660	ND	330
Bis (-2-Chloroethyl) ether	ug/kg	ND	330	ND	660	ND	330
2-Chlorophenol	ug/kg	ND	330	ND	660	ND	330
1,3-Dichlorobenzene	ug/kg	ND	330	ND	660	ND	330
1,4-Dichlorobenzene	ug/kg	ND	330	ND	660	ND	330
1,2-Dichlorobenzene	ug/kg	ND	330	ND	660	ND	330
N-Nitroso-Di-N-Propylamine	ug/kg	ND	330	ND	660	ND	330
Hexachloroethane	ug/kg	ND	330	ND	660	ND	330
Nitrobenzene	ug/kg	ND	330	ND	660	ND	330
Isophorone	ug/kg	ND	330	ND	660	ND	330
2-Nitrophenol	ug/kg	ND	330	ND	660	ND	330
2,4-Dimethylphenol	ug/kg	ND	330	ND	660	ND	330
Bis(-2-Chloroethoxy) Methane	ug/kg	ND	330	ND	660	ND	330
2,4-Dichlorophenol	ug/kg	ND	330	ND	660	ND	330
1,2,4-Trichlorobenzene	ug/kg	ND	330	ND	660	ND	330
Naphthalene	ug/kg	ND	330	ND	660	ND	330
Hexachlorobutadiene	ug/kg	ND	330	ND	660	ND	330
4-Chloro-3-Methyl-phenol	ug/kg	ND	330	ND	660	ND	330

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/31/91
DATE ANALYZED: 11/07/91
DATE REPORTED: 11/18/91
PAGE: Twenty Six

Sample Type: Soil

Method and Constituent	Units	BH11-10 Concentration	BH11-10 Reporting Limit	BH13-9 Concentration	BH13-9 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
EPA Method 8270 (Continued):							
Hexachlorocyclopentadiene	ug/kg	ND	330	ND	660	ND	330
2,4,6-Trichlorophenol	ug/kg	ND	330	ND	660	ND	330
2-Chloronaphthalene	ug/kg	ND	330	ND	660	ND	330
Dimethyl Phthalate	ug/kg	ND	330	ND	660	ND	330
Acenaphthylene	ug/kg	ND	330	ND	660	ND	330
Acenaphthene	ug/kg	ND	330	ND	660	ND	330
2,4-Dinitrophenol	ug/kg	ND	330	ND	660	ND	330
4-Nitrophenol	ug/kg	ND	330	ND	660	ND	330
2,4-Dinitrotoluene	ug/kg	ND	330	ND	660	ND	330
2,6-Dinitrotoluene	ug/kg	ND	330	ND	660	ND	330
Diethylphthalate	ug/kg	ND	330	ND	660	ND	330
4-Chlorophenylphenyl Ether	ug/kg	ND	330	ND	660	ND	330
Fluorene	ug/kg	ND	330	ND	660	ND	330
N-Nitrosodiphenylamine	ug/kg	ND	330	ND	660	ND	330
4-Bromophenylphenyl Ether	ug/kg	ND	330	ND	660	ND	330
Hexachlorobenzene	ug/kg	ND	330	ND	660	ND	330
Pentachlorophenol	ug/kg	ND	330	ND	660	ND	330
Phenanthrene	ug/kg	ND	330	ND	660	ND	330
Anthracene	ug/kg	ND	330	ND	660	ND	330
Di-N-Butylphthalate	ug/kg	ND	330	ND	660	ND	330
Fluoranthene	ug/kg	ND	330	ND	660	ND	330

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 10/31/91
DATE ANALYZED: 11/07/91
DATE REPORTED: 11/18/91
PAGE: Twenty Seven

Sample Type: Soil

Method and Constituent:	Units	BH11-10 Concentration	BH11-10 Reporting Limit	BH13-9 Concentration	BH13-9 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
EPA Method 8270 (Continued):							
Benzidine	ug/kg	ND	330	ND	660	ND	330
Pyrene	ug/kg	ND	330	ND	660	ND	330
Butylbenzylphthalate	ug/kg	ND	330	ND	660	ND	330
3,3'-Dichlorobenzidine	ug/kg	ND	330	ND	660	ND	330
Benzo(a)Anthracene	ug/kg	ND	330	ND	660	ND	330
Bis(2-Ethylhexyl) Phthalate	ug/kg	ND	330	ND	660	ND	330
Chrysene	ug/kg	ND	330	ND	660	ND	330
Di-N-Octyl Phthalate	ug/kg	ND	330	ND	660	ND	330
Benzo(b)Fluoranthene	ug/kg	ND	330	ND	660	ND	330
Benzo(k)Fluoranthene	ug/kg	ND	330	ND	660	ND	330
Benzo(a)Pyrene	ug/kg	ND	330	ND	660	ND	330
Indeno(1,2,3-cd)Pyrene	ug/kg	ND	330	ND	660	ND	330
Dibenzo(a,h)Anthracene	ug/kg	ND	330	ND	660	ND	330
Benzo(g,h,i)Perylene	ug/kg	ND	330	ND	660	ND	330
Surrogate % Recovery:							
Pentafluorophenol		84		80		71	
4-Fluoroaniline		106		110		108	
Decafluorobiphenyl		90		96		86	

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457 and 1479
DATE SAMPLED: 10/25/91 and 11/01/91
DATE RECEIVED: 10/25/91 and 11/01/91
DATE EXTRACTED: 10/30/91 and 11/07/91
DATE ANALYZED: 11/02/91, 11/03/91 and 11/23/91
DATE REPORTED: 11/18/91 and 11/27/91
PAGE: Twenty Eight

Sample Type: Water

Method and Constituent:	Units	BH5 Concentration	BH5 Reporting Limit	BH9 Concentration	BH9 Reporting Limit	Pit #2 Concentration	Pit #2 Reporting Limit
EPA Method 8270:							
N-Nitrosodimethylamine	ug/l	ND	10	ND	10	ND	10
Phenol	ug/l	ND	10	ND	10	ND	10
Bis (-2-Chloroethyl) ether	ug/l	ND	10	ND	10	ND	10
2-Chlorophenol	ug/l	ND	10	ND	10	ND	10
1,3-Dichlorobenzene	ug/l	ND	10	ND	10	ND	10
1,4-Dichlorobenzene	ug/l	ND	10	ND	10	ND	10
1,2-Dichlorobenzene	ug/l	ND	10	ND	10	ND	10
N-Nitroso-Di-N-Propylamine	ug/l	ND	10	ND	10	ND	10
Hexachloroethane	ug/l	ND	10	ND	10	ND	10
Nitrobenzene	ug/l	ND	10	ND	10	ND	10
Isophorone	ug/l	ND	10	ND	10	ND	10
2-Nitrophenol	ug/l	ND	10	ND	10	ND	10
2,4-Dimethylphenol	ug/l	ND	10	ND	10	ND	10
Bis(-2-Chloroethoxy) Methane	ug/l	ND	10	ND	10	ND	10
2,4-Dichlorophenol	ug/l	ND	10	ND	10	ND	10
1,2,4-Trichlorobenzene	ug/l	ND	10	ND	10	ND	10
Naphthalene	ug/l	ND	10	ND	10	ND	10
Hexachlorobutadiene	ug/l	ND	10	ND	10	ND	10
4-Chloro-3-Methyl-phenol	ug/l	ND	10	ND	10	ND	10

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457 and 1479
DATE SAMPLED: 10/25/91 and 11/01/91
DATE RECEIVED: 10/25/91 and 11/01/91
DATE EXTRACTED: 10/30/91 and 11/07/91
DATE ANALYZED: 11/02/91, 11/03/91 and 11/23/91
DATE REPORTED: 11/18/91 and 11/27/91
PAGE: Twenty Nine

Sample Type: Water

Method and Constituent	Units	BH5 Concentration	BH5 Reporting Limit	BH9 Concentration	BH9 Reporting Limit	Pit #2 Concentration	Pit #2 Reporting Limit
EPA Method 8270 (Continued):							
Hexachlorocyclopentadiene	ug/l	ND	10	ND	10	ND	10
2,4,6-Trichlorophenol	ug/l	ND	10	ND	10	ND	10
2-Chloronaphthalene	ug/l	ND	10	ND	10	ND	10
Dimethyl Phthalate	ug/l	ND	10	ND	10	ND	10
Acenaphthylene	ug/l	ND	10	ND	10	ND	10
Acenaphthene	ug/l	ND	10	ND	10	ND	10
2,4-Dinitrophenol	ug/l	ND	10	ND	10	ND	10
4-Nitrophenol	ug/l	ND	10	ND	10	ND	10
2,4-Dinitrotoluene	ug/l	ND	10	ND	10	ND	10
2,6-Dinitrotoluene	ug/l	ND	10	ND	10	ND	10
Diethylphthalate	ug/l	ND	10	ND	10	ND	10
4-Chlorophenylphenyl Ether	ug/l	ND	10	ND	10	ND	10
Fluorene	ug/l	ND	10	ND	10	ND	10
N-Nitrosodiphenylamine	ug/l	ND	10	ND	10	ND	10
4-Bromophenylphenyl Ether	ug/l	ND	10	ND	10	ND	10
Hexachlorobenzene	ug/l	ND	10	ND	10	ND	10
Pentachlorophenol	ug/l	ND	10	ND	10	ND	10
Phenanthrene	ug/l	ND	10	ND	10	ND	10
Anthracene	ug/l	ND	10	ND	10	ND	10
Di-N-Butylphthalate	ug/l	ND	10	ND	10	ND	10
Fluoranthene	ug/l	ND	10	ND	10	ND	10

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457 and 1479
DATE SAMPLED: 10/25/91 and 11/01/91
DATE RECEIVED: 10/25/91 and 11/01/91
DATE EXTRACTED: 10/30/91 and 11/07/91
DATE ANALYZED: 11/02/91, 11/03/91 and 11/23/91
DATE REPORTED: 11/18/91 and 11/27/91
PAGE: Thirty

Sample Type: Water

Method and Constituent:	Units	BH5 Concentration	BH5 Reporting Limit	BH9 Concentration	BH9 Reporting Limit	Pit #2 Concentration	Pit #2 Reporting Limit
EPA Method 8270 (Continued):							
Benzidine	ug/l	ND	10	ND	10	ND	10
Pyrene	ug/l	ND	10	ND	10	ND	10
Butylbenzylphthalate	ug/l	ND	10	ND	10	ND	10
3,3'-Dichlorobenzidine	ug/l	ND	10	ND	10	ND	10
Benzo(a)Anthracene	ug/l	ND	10	ND	10	ND	10
Bis(2-Ethylhexyl) Phthalate	ug/l	ND	10	ND	10	ND	10
Chrysene	ug/l	ND	10	ND	10	ND	10
Di-N-Octyl Phthalate	ug/l	ND	10	ND	10	ND	10
Benzo(b)Fluoranthene	ug/l	ND	10	ND	10	ND	10
Benzo(k)Fluoranthene	ug/l	ND	10	ND	10	ND	10
Benzo(a)Pyrene	ug/l	ND	10	ND	10	ND	10
Indeno(1,2,3-cd)Pyrene	ug/l	ND	10	ND	10	ND	10
Dibenzo(a,h)Anthracene	ug/l	ND	10	ND	10	ND	10
Benzo(g,h,i)Perylene	ug/l	ND	10	ND	10	ND	10
Surrogate % Recovery:							
Pentafluorophenol		147		111		93	
4-Fluoroaniline		53		97		84	
Decafluorobiphenol		89		76		89	

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457 and 1479
DATE SAMPLED: 10/25/91 and 11/01/91
DATE RECEIVED: 10/25/91 and 11/01/91
DATE EXTRACTED: 10/30/91 and 11/07/91
DATE ANALYZED: 11/02/91, 11/03/91 and 11/23/91
DATE REPORTED: 11/18/91 and 11/27/91
PAGE: Thirty one

Sample Type: Water

Method and Constituent:	Units	Method Blank Concentration	Method Blank Reporting Limit
EPA Method 8270:			
N-Nitrosodimethylamine	ug/l	ND	10
Phenol	ug/l	ND	10
Bis (-2-Chloroethyl) ether	ug/l	ND	10
2-Chlorophenol	ug/l	ND	10
1,3-Dichlorobenzene	ug/l	ND	10
1,4-Dichlorobenzene	ug/l	ND	10
1,2-Dichlorobenzene	ug/l	ND	10
N-Nitroso-Di-N-Propylamine	ug/l	ND	10
Hexachloroethane	ug/l	ND	10
Nitrobenzene	ug/l	ND	10
Isophorone	ug/l	ND	10
2-Nitrophenol	ug/l	ND	10
2,4-Dimethylphenol	ug/l	ND	10
Bis(-2-Chloroethoxy) Methane	ug/l	ND	10
2,4-Dichlorophenol	ug/l	ND	10
1,2,4-Trichlorobenzene	ug/l	ND	10
Naphthalene	ug/l	ND	10
Hexachlorobutadiene	ug/l	ND	10
4-Chloro-3-Methyl-phenol	ug/l	ND	10

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457 and 1479
DATE SAMPLED: 10/25/91 and 11/01/91
DATE RECEIVED: 10/25/91 and 11/01/91
DATE EXTRACTED: 10/30/91 and 11/07/91
DATE ANALYZED: 11/02/91, 11/03/91 and 11/23/91
DATE REPORTED: 11/18/91 and 11/27/91
PAGE: Thirty Two

Sample Type: Water

Method and Constituent	Units	Method Blank Concentration	Method Blank Reporting Limit
EPA Method 8270 (Continued):			
Hexachlorocyclopentadiene	ug/l	ND	10
2,4,6-Trichlorophenol	ug/l	ND	10
2-Chloronaphthalene	ug/l	ND	10
Dimethyl Phthalate	ug/l	ND	10
Acenaphthylene	ug/l	ND	10
Acenaphthene	ug/l	ND	10
2,4-Dinitrophenol	ug/l	ND	10
4-Nitrophenol	ug/l	ND	10
2,4-Dinitrotoluene	ug/l	ND	10
2,6-Dinitrotoluene	ug/l	ND	10
Diethylphthalate	ug/l	ND	10
4-Chlorophenylphenyl Ether	ug/l	ND	10
Fluorene	ug/l	ND	10
N-Nitrosodiphenylamine	ug/l	ND	10
4-Bromophenylphenyl Ether	ug/l	ND	10
Hexachlorobenzene	ug/l	ND	10
Pentachlorophenol	ug/l	ND	10
Phenanthrene	ug/l	ND	10
Anthracene	ug/l	ND	10
Di-N-Butylphthalate	ug/l	ND	10
Fluoranthene	ug/l	ND	10

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457 and 1479
DATE SAMPLED: 10/25/91 and 11/01/91
DATE RECEIVED: 10/25/91 and 11/01/91
DATE EXTRACTED: 10/30/91 and 11/07/91
DATE ANALYZED: 11/02/91, 11/03/91 and 11/23/91
DATE REPORTED: 11/18/91 and 11/27/91
PAGE: Thirty Three

Sample Type: Water

Method and Constituent:	Units	Method Blank Concentration	Method Blank Reporting Limit
EPA Method 8270 (Continued):			
Benzidine	ug/l	ND	10
Pyrene	ug/l	ND	10
Butylbenzylphthalate	ug/l	ND	10
3,3'-Dichlorobenzidine	ug/l	ND	10
Benzo(a)Anthracene	ug/l	ND	10
Bis(2-Ethylhexyl) Phthalate	ug/l	ND	10
Chrysene	ug/l	ND	10
Di-N-Octyl Phthalate	ug/l	ND	10
Benzo(b)Fluoranthene	ug/l	ND	10
Benzo(k)Fluoranthene	ug/l	ND	10
Benzo(a)Pyrene	ug/l	ND	10
Indeno(1,2,3-cd)Pyrene	ug/l	ND	10
Dibenzo(a,h)Anthracene	ug/l	ND	10
Benzo(g,h,i)Perylene	ug/l	ND	10

Surrogate % Recovery:	
Pentafluorophenol	110
4-Fluoroaniline	94
Decafluorobiphenol	75

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 11/07/91
DATE ANALYZED: 11/12/91 and 11/08/91
DATE REPORTED: 11/18/91
PAGE: Thirty Four

Sample Type: Soil

Method and Constituent:	Units	BH9-4 Concentration	BH9-4 Reporting Limit	BH11-10 Concentration	BH11-10 Reporting Limit	BH13-9 Concentration	BH13-9 Reporting Limit
EPA Method 7130:							
Cadmium	ug/kg	380	250	ND	250	ND	250
EPA Method 7190:							
Chromium	ug/kg	15,000	1,200	39,000	1,200	36,000	1,200
EPA Method 7420:							
Lead	ug/kg	14,000	2,500	5,800	2,500	8,600	2,500
EPA Method 7520:							
Nickel	ug/kg	24,000	7,500	56,000	7,500	42,000	7,500
EPA Method 7950:							
Zinc	ug/kg	140,000	1,200	36,000	1,200	250,000	1,200

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457
DATE SAMPLED: 10/25/91
DATE RECEIVED: 10/25/91
DATE EXTRACTED: 11/07/91
DATE ANALYZED: 11/12/91 and 11/08/91
DATE REPORTED: 11/18/91
PAGE: Thirty Five

Sample Type: Soil

Method and Constituent:	Units	Method Blank Concentration	Method Blank Reporting Limit	QC Summary % Recovery	QC Summary % RPD
EPA Method 7130:					
Cadmium	ug/kg	ND	250	111	**
EPA Method 7190:					
Chromium	ug/kg	ND	1,200	106	0.0
EPA Method 7420:					
Lead	ug/kg	ND	2,500	97	8.7
EPA Method 7520:					
Nickel	ug/kg	ND	7,500	91	0.0
EPA Method 7950:					
Zinc	ug/kg	ND	1,200	113*	1.8

Concentrations reported as ND were not detected at or above the reporting limit.

* The Recovery is for the Laboratory Control Sample, due to interference in the spiked sample.
** The RPD is not reportable since the sample prepared in duplicate was not detectable.

LOG NUMBER: 1457 and 1479
DATE SAMPLED: 10/25/91 and 11/01/91
DATE RECEIVED: 10/25/91 and 11/01/91
DATE EXTRACTED: 11/01/91 and 11/18/91
DATE ANALYZED: 11/05/91, 11/06/91 and 11/19/91
DATE REPORTED: 11/18/91 and 11/27/91
PAGE: Thirty Six

Sample Type: Water

Method and Constituent:	Units	BH5 Concentration	BH5 Reporting Limit	BH9 Concentration	BH9 Reporting Limit	Pit #2 Concentration	Pit #2 Reporting Limit
EPA Method 7130:							
Cadmium	ug/l	ND	10	ND	10	ND	10
EPA Method 7190:							
Chromium	ug/l	560	50	ND	50	ND	50
EPA Method 7420:							
Lead	ug/l	1,100	100	160	100	130	100
EPA Method 7520:							
Nickel	ug/l	1,200	300	ND	300	ND	300
EPA Method 7950:							
Zinc	ug/l	2,800	50	80	50	280	50

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1457 and 1479
DATE SAMPLED: 10/25/91 and 11/01/91
DATE RECEIVED: 10/25/91 and 11/01/91
DATE EXTRACTED: 11/01/91 and 11/18/91
DATE ANALYZED: 11/05/91, 11/06/91 and 11/19/91
DATE REPORTED: 11/18/91 and 11/27/91
PAGE: Thirty Seven

Sample Type: Water

Method and Constituent:	Units	Method Blank Concentration	Method Blank Reporting Limit	QC Summary % Recovery	QC Summary % RPD
EPA Method 7130:					
Cadmium	ug/l	ND	10	103, 99	**, 4.5
EPA Method 7190:					
Chromium	ug/l	ND	50	102, 118	0.0, **
EPA Method 7420:					
Lead	ug/l	ND	100	77, 80	18, 3.3
EPA Method 7520:					
Nickel	ug/l	ND	300	96*, 99	**, **
EPA Method 7950:					
Zinc	ug/l	ND	50	76, 79	1.9, 0.8

Concentrations reported as ND were not detected at or above the reporting limit.

* The Recovery is for the Laboratory Control Sample, due to interference in the spiked sample.
** The RPD is not reportable since the sample prepared in duplicate was not detectable.

Louis W. DuPuis
Quality Assurance/Quality Control Manager

TOTAL PETROLEUM HYDROCARBONS AS DIESEL, KEROSENE, OR JET FUEL FOR SOIL

Method:

This method is based on the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California. This method uses an alternative column and flow rate as specified below.

Sample Preparation:

Approximately 50 grams of soil are extracted with 80 ml of solvent on a mechanical shaker for 4 hours. The extract is filtered and dried with anhydrous sodium sulfate. It is then concentrated using a Kuderna-Danish apparatus and brought to 10ml.

Sample Introduction:

The extracts are analyzed by direct injection into a gas chromatograph (GC).

Gas Chromatography Analysis:

The extractable hydrocarbons are separated on a 6-ft by 2 mm I.D. gas chromatography column packed with 10% SP-2100 on Supelcoport and then detected by a flame ionization detector (FID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	250° C
DETECTOR TEMPERATURE:	300° C
INITIAL TEMPERATURE:	40° C
Hold for 4 minutes	
PROGRAM RATE:	10° C/min.
FINAL TEMPERATURE:	265° C
Hold for 10 minutes	

Calculation:

Total Petroleum Hydrocarbons as Diesel is quantified by comparing the sum of the area of peaks from the sample, that elute in the same time range as the standard, to the sum of the area of peaks in the standard. The standard may be diesel, kerosene, jet fuel, or other compounds depending on the source of the sample.

2/20/91

TOTAL PETROLEUM HYDROCARBONS AS DIESEL, KEROSENE, OR JET FUEL FOR WATER

Method:

This method is based on the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative column and flow rate as specified below.

Sample Preparation:

EPA Method 3510 (separatory funnel liquid-liquid extraction) is used to prepare water samples. The sample is extracted with methylene chloride three times. The extracts are combined, then filtered and dried with anhydrous sodium sulfate. It is then concentrated using a Kuderna-Danish apparatus and brought to 10ml.

Sample Introduction:

The extracts are analyzed by direct injection into a gas chromatograph (GC).

Gas Chromatography Analysis:

The extractable hydrocarbons are separated on a 6-ft by 2 mm I.D. gas chromatography column packed with 10% SP-2100 on Supelcoport and then detected by a flame ionization detector (FID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	250° C
DETECTOR TEMPERATURE:	300° C
INITIAL TEMPERATURE:	40° C
Hold for 4 minutes	
PROGRAM RATE:	10° C/min.
FINAL TEMPERATURE:	265° C
Hold for 10 minutes	

Calculation:

Total Petroleum Hydrocarbons as Diesel is quantified by comparing the sum of the area of peaks from the sample, that elute in the same time range as the standard, to the sum of the area of peaks in the standard. The standard may be diesel, kerosene, jet fuel, or other compounds depending on the source of the sample.

1/2/90

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (TPH-G) FOR SOIL, BY PURGE AND TRAP

Method:

This method is based on the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative column, flow rate, and temperature program as specified below.

Sample Preparation:

Approximately 15 grams of the soil sample are added to 10 ml of methanol. The sample is extracted by agitation.

Sample Introduction:

Methanol extracts are introduced to the gas chromatograph (GC) by EPA Method 5030, Purge and Trap.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 5% SP-1200/1.75% Bentone-34 on Supelcoport. A flame ionization detector (FID) is used to detect total petroleum hydrocarbons as gasoline (TPH-G). The FID is preceded by a photoionization detector (PID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	240° C
DETECTOR TEMPERATURE:	270° C
INITIAL TEMPERATURE:	50° C
Hold for 2 minutes	
PROGRAM RATE:	6° C/min.
FINAL TEMPERATURE:	90° C
Hold for 17 minutes	

Calculation:

Total Petroleum Hydrocarbons as Gasoline is quantified by comparing the sum of the area of peaks from the sample to the sum of the area of peaks in the gasoline standard.

3/13/91

BENZENE, TOLUENE, XYLENES, AND ETHYLBENZENE (BTXE) FOR SOIL, BY PURGE AND TRAP

Method:

This method is EPA Method 8020 as referenced in the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative carrier gas as specified below.

Sample Preparation:

Approximately 15 grams of the soil sample are added to 10 ml of methanol. The sample is extracted by agitation.

Sample Introduction:

Methanol extracts are introduced to the gas chromatograph (GC) by EPA Method 5030, Purge and Trap.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 5% SP-1200/1.75% Bentone-34 on Supelcoport. A photoionization detector (PID) is used to detect BTXE. The PID is followed by a flame ionization detector (FID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	240° C
DETECTOR TEMPERATURE:	270° C
INITIAL TEMPERATURE:	50° C
Hold for 2 minutes	
PROGRAM RATE:	6° C/min.
FINAL TEMPERATURE:	90° C
Hold for 17 minutes	

Calculation:

BTXE are identified by comparing the retention times of the sample peaks to those of the standards. BTXE are quantified by comparing the area of the sample peaks to those of the standards. If BTX or E is present and Total petroleum Hydrocarbons as Gasoline (TPH-G) is not, the analysis is confirmed by using a second column or a gas chromatograph mass spectrometer (GC/MS).

3/13/91

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (TPH-G) FOR WATER, BY PURGE AND TRAP

Method:

This method is based on the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative column, flow rate, and temperature program as specified below.

Sample Preparation:

There is no sample preparation other than dilution.

Sample Introduction:

Water samples are introduced to the gas chromatograph (GC) by EPA Method 5030, Purge and Trap. Up to 5 ml of sample is purged by this method.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 5% SP-1200/1.75% Bentone-34 on Supelcoport. A flame ionization detector (FID) is used to detect total petroleum hydrocarbons as gasoline (TPH-G). The FID is preceded by a photoionization detector (PID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	240° C
DETECTOR TEMPERATURE:	270° C
INITIAL TEMPERATURE:	50° C
Hold for 2 minutes	
PROGRAM RATE:	6° C/min.
FINAL TEMPERATURE:	90° C
Hold for 17 minutes	

Calculation:

Total Petroleum Hydrocarbons as Gasoline is quantified by comparing the sum of the area of peaks from the sample, to the sum of the area of peaks in the gasoline standard.

1/2/90

BENZENE, TOLUENE, XYLENES, AND ETHYLBENZENE (BTXE) FOR WATER, BY PURGE AND TRAP

Method:

This method is EPA Method 8020 as referenced in the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative carrier gas as specified below.

Sample Preparation:

There is no sample preparation other than dilution.

Sample Introduction:

Water samples are introduced to the gas chromatograph (GC) by EPA Method 5030, Purge and Trap.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 5% SP-1200/1.75% Bentone-34 on Supelcoport. A photoionization detector (PID) is used to detect BTXE. The PID is followed by a flame ionization detector (FID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	240° C
DETECTOR TEMPERATURE:	270° C
INITIAL TEMPERATURE:	50° C
Hold for 2 minutes	
PROGRAM RATE:	6° C/min.
FINAL TEMPERATURE:	90° C
Hold for 17 minutes	

Calculation:

BTXE are identified by comparing the retention times of the sample peaks to those of the standards. BTXE are quantified by comparing the area of the sample peaks to those of the standards. If BTX or E is present and Total petroleum Hydrocarbons as Gasoline (TPH-G) is not, the analysis is confirmed by using a second column or a gas chromatograph mass spectrometer (GC/MS).

1/2/90

OIL AND GREASE, HYDROCARBONS

Method:

This is method 5520CF or 5520DF from Standard Methods for the Examination of Water and Wastewater, 17th edition.

Sample Preparation and Analysis

The sample is extracted with freon using a soxhlet extraction apparatus. The freon extract is collected. The extract is then dried with sodium sulfate and treated with silica gel. Non-petroleum oil and grease is removed by absorption onto the silca gel. The freon is evaporated leaving the oil and grease as a residue.

Calculation

The oil and grease is weighed and compared to the sample weight to obtain a final concentration of oil and grease.

11/9/90

HALOGENATED VOLATILE ORGANICS FOR SOIL

Method:

This is EPA Method 8010 from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846," 2nd edition, by the U.S. Environmental Protection Agency.

Sample Preparation:

Approximately 2 grams of the soil sample are added to 20 ml of polyethylene glycol (PEG) in a tube. The tube is sealed and the sample is extracted by agitation for 45 minutes.

Sample Introduction:

PEG extracts are introduced to the gas chromatograph (GC) by EPA Method 5030, purge and trap.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 1% SP-1000 on Carbopack-B. An electrolytic conductivity detector (ELCD or Hall) is used to detect the compounds.

Gas Chromatograph Conditions:

CARRIER GAS:	Helium
FLOW RATE:	40 ml/min.
INJECTOR TEMPERATURE:	225° C
DETECTOR TEMPERATURE:	250° C
INITIAL TEMPERATURE:	45° C
Hold for 3 minutes	
PROGRAM RATE:	8° C/min.
FINAL TEMPERATURE:	220° C
Hold for 15 minutes	

Calculation:

The compounds are identified by comparing the retention times of the sample peaks to those of the standards. The compounds are quantified by comparing the area of the sample peaks to those of the standards. If a compound included in Method 8010 is present, the analysis is confirmed by using a second column or a gas chromatograph mass spectrometer (GC/MS).

12/29/89

HALOGENATED VOLATILE ORGANICS FOR WATER

Method:

This is EPA Method 8010 from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846," 2nd edition, by the U.S. Environmental Protection Agency.

Sample Preparation:

There is no sample preparation other than dilution.

Sample Introduction:

Water samples are introduced to the gas chromatograph (GC) by EPA Method 5030, purge and trap. Up to 5 ml of sample is purged by this method.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 1% SP-1000 on Carbopack-B. An electrolytic conductivity detector (ELCD or Hall) is used to detect the compounds.

Gas Chromatograph Conditions:

CARRIER GAS:	Helium
FLOW RATE:	40 ml/min.
INJECTOR TEMPERATURE:	225° C
DETECTOR TEMPERATURE:	250° C
INITIAL TEMPERATURE:	45° C
Hold for 3 minutes	
PROGRAM RATE:	8° C/min.
FINAL TEMPERATURE:	220° C
Hold for 15 minutes	

Calculation:

The compounds are identified by comparing the retention times of the sample peaks to those of the standards. The compounds are quantified by comparing the area of the sample peaks to those of the standards. If a compound included in Method 8010 is present, the analysis is confirmed by using a second column or a gas chromatograph mass spectrometer (GC/MS).

12/29/89

EPA METHOD 8270, SEMIVOLATILE ORGANICS FOR SOIL

Method:

This is EPA Method 8270 from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846," 2nd edition, by the U.S. Environmental Protecton Agency.

Sample Preparation:

Sample preparation is by EPA Method 3550, solvent extraction with sonication. Methylene chloride is the solvent used. The extraction is followed by a concentration process using a Kuderna-Danish apparatus.

Sample Introduction:

Samples are introduced by direct injection.

Gas Chromatography Analysis:

The semivolatile organics are separated on a capillary gas chromatography column. A mass spectrometer is used to detect the compounds.

Calculation:

Compounds are identified by comparing ion spectra with the ion spectra of the 8270 compounds in our standards. The compounds are quantified by using the internal standard method of calibration.

EPA METHOD 8270, SEMIVOLATILE ORGANICS FOR WATER

Method:

This is EPA Method 8270 from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846," 2nd edition, by the U.S. Environmental Protecton Agency.

Sample Preparation:

Sample preparation is by EPA Method 3510, liquid-liquid extraction with a separatory funnel. Methylene chloride is the solvent used. The extraction is followed by a concentration process using a Kuderna-Danish apparatus.

Sample Introduction:

Samples are introduced by direct injection.

Gas Chromatography Analysis:

The semivolatile organics are separated on a capillary gas chromatography column. A mass spectrometer is used to detect the compounds.

Calculation:

Compounds are identified by comparing ion spectra with the ion spectra of the 8270 compounds in our standards. The compounds are quantified by using the internal standard method of calibration.

EPA METHOD 7130 - CADMIUM (Cd) BY FLAME

Method:

This method is from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846," 2nd Edition, by the U.S. Environmental Protection Agency.

Sample Preparation:

Water samples are prepared by EPA Method 3010, which is a digestion using acid and heat.

Soil samples are prepared by EPA Method 3050. The sample is dried, sifted, and digested with acid, hydrogen peroxide, and heat.

Atomic Absorption Conditions:

Lamp:	Cadmium
Wavelength:	228.8 nm
Heat Source:	Acetylene-Air flame

Atomic Absorption Analysis:

The sample is directly aspirated into the flame. The element entering the flame absorbs energy from the lamp. The atomic absorption unit will then display the concentration of the sample aspirated into the flame.

Calculation:

The concentration displayed is adjusted to account for the amount of sample used and the subsequent dilution of the sample.

1/2/90

EPA METHOD 7190 - CHROMIUM (Cr) BY FLAME

Method:

This method is from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846," 2nd Edition, by the U.S. Environmental Protection Agency.

Sample Preparation:

Water samples are prepared by EPA Method 3010, which is a digestion using acid and heat.

Soil samples are prepared by EPA Method 3050. The sample is dried, sifted, and digested with acid, hydrogen peroxide, and heat.

Atomic Absorption Conditions:

Lamp:	Chromium
Wavelength:	357.9 nm
Heat Source:	Nitrous Oxyde-Acetylene flame

Atomic Absorption Analysis:

The sample is directly aspirated into the flame. The element entering the flame absorbs energy from the lamp. The atomic absorption unit will then display the concentration of the sample aspirated into the flame.

Calculation:

The concentration displayed is adjusted to account for the amount of sample used and the subsequent dilution of the sample.

1/2/90

EPA METHOD 7420 - LEAD (Pb) BY FLAME

Method:

This method is from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846," 2nd Edition, by the U.S. Environmental Protection Agency.

Sample Preparation:

Water samples are prepared by EPA Method 3010, which is a digestion using acid and heat.

Soil samples are prepared by EPA Method 3050. The sample is dried, sifted, and digested with acid, hydrogen peroxide, and heat.

Atomic Absorption Conditions:

Lamp:	Lead
Wavelength:	283.3 nm
Heat Source:	Acetylene-Air flame

Atomic Absorption Analysis:

The sample is directly aspirated into the flame. The element entering the flame absorbs energy from the lamp. The atomic absorption unit then displays the concentration of the sample aspirated into the flame.

Calculation:

The concentration displayed is adjusted to account for the amount of sample used and the subsequent dilution of the sample.

1/2/90

EPA METHOD 7520 - NICKEL (Ni) BY FLAME

Method:

This method is from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846," 2nd Edition, by the U.S. Environmental Protection Agency.

Sample Preparation:

Water samples are prepared by EPA Method 3010, which is a digestion using acid and heat.

Soil samples are prepared by EPA Method 3050. The sample is dried, sifted, and digested with acid, hydrogen peroxide, and heat.

Atomic Absorption Conditions:

Lamp:	Nickel
Wavelength:	231.6 nm
Heat Source:	Acetylene-Air flame

Atomic Absorption Analysis:

The sample is directly aspirated into the flame. The element entering the flame absorbs energy from the lamp. The atomic absorption unit will then display the concentration of the sample aspirated into the flame.

Calculation:

The concentration displayed is adjusted to account for the amount of sample used and the subsequent dilution of the sample.

1/2/90

EPA METHOD 7950 - ZINC (Zn) BY FLAME

Method:

This method is from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846," 2nd Edition, by the U.S. Environmental Protection Agency.

Sample Preparation:

Water samples are prepared by EPA Method 3010, which is a digestion using acid and heat.

Soil samples are prepared by EPA Method 3050. The sample is dried, sifted, and digested with acid, hydrogen peroxide, and heat.

Atomic Absorption Conditions:

Lamp:	Zinc
Wavelength:	213.9 nm
Heat Source:	Acetylene-Air flame

Atomic Absorption Analysis:

The sample is directly aspirated into the flame. The element entering the flame absorbs energy from the lamp. The atomic absorption unit will then display the concentration of the sample aspirated into the flame.

Calculation:

The concentration displayed is adjusted to account for the amount of sample used and the subsequent dilution of the sample.

1/2/90

[illegible] IN[illegible]US[illegible] R[illegible]RD — PAGE 1 OF 3

PROJECT NO.	PROJECT NAME	INDUSTRIAL HYGIENE SAMPLE Y / N
7763.26	PDDI-West (SOILS)	

SAMPLERS: (Signature) Yvonne Lembi, R. Stephen Wilson — (Printed) YVONNE LEMBI, R. STEPHEN WILSON

PARAMETERS

REMARKS: log 1457

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	O&G TEF	TPH-D	TPH-CT	BTEX	8270	METALS	(Cd, Cr, Zn, Ni)	8010	REMARKS
BH1-3.5	10/25/91	8:10		X		1	X								
BH1-6	|	8:15		X		1					X				
BH1-8	|	8:20		X		1									Hold
BH1-9.5	|	8:30		X		1									Hold
BH2-4	|	9:00		X		1	X	X							
BH2-6	|	9:05		X		1									HOLD = per Yvonne 10/31/91 12:30
BH2-8	|	9:10		X		1	X	X	X	X	X				
BH2-9.5	|	9:15		X		1									Hold
BH3-2	|	9:35		X		1	X								
BH3-4	|	9:40		X		1									Hold
BH3-6	|	9:40		X		1									Hold
BH3-8	↓	9:45		X		1		X			X	—			

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R. Stephen Wilson	10/25 5:50				
(Printed)		(Printed)	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
		[signature]	10/25/91 5:53	HOLD ALL SAMPLES / Modified 10/29/91
(Printed)		(Printed) Mic Duncan		10/30/91 Yvonne Lembi said to analyze the water phase only

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

For water samples. CAL will filter through a glass wool filter. (not for volatiles though) [signature]

Versar INC. CHAIN OF CUSTODY RECORD Page 2 of 2

PROJECT NO.	PROJECT NAME	INDUSTRIAL HYGIENE SAMPLE	Y / (N)
7763.26	PDDI-West (SALS)		N (circled)

SAMPLERS: (Signature) Yvonne Lembi — (Printed) Yvonne Lembi

PARAMETERS

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	O4 CT EF	TPH-D	TPH-CT	BTEX	8270	METALS (Cd, Cr, Pb, Zn, Ni)		8010	REMARKS
BH3-10	10/25	9:50		X		1									Hold
BH4-4	↓	10:10		X		1									Hold
BH4-6		10:15		X		1	X	X	X	X					
BH4-8		10:20		X		1									Hold
BH5-4		11:20		X		1	X	X	X	X	X				
BH3-7.5		9:45		X		1									Hold
BH7-4		10:40		X		1	X								
BH7-8		10:45		X		1	X	X	X	X					
BH7-10		10:50		X		1									Hold
BH7-6		10:40		X		1	X								
BH5-6		12:10		X		1	X	X	X	X					
BH5-8	↓	12:15		X		1									Hold

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
(Printed)		(Printed)	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
Yvonne Lembi	10/25/91 5:55pm	[illegible]		HOLD ALL SAMPLES (Modified 10/29/91 YL)
(Printed) Yvonne Lembi		(Printed) M. Duncan		

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

ersar INC.

CHAIN OF CUSTODY RECORD

PROJECT NO. 7703.26

PROJECT NAME: PDDI - WEST (SOILS)

SAMPLERS (Signature): R Stephen Wilson

(Printed): R. STEPHEN WILSON

PARAMETERS

INDUSTRIAL HYGIENE SAMPLE (Y / N)

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	O4 CT FF	TPH - D	TPH - GT	BTEX	8220	METALS (Pb, Cr, Zn, Ni, Ag)	8010	REMARKS
BH9-4	10/25	12:35		X		1	X	X	X	X	X	X	X	
BH9-6		12:40		X		1								HOLD
BH9-8		12:45		X		1								HOLD
BH10-4		14:30		X		1	X	X	X	X	X		X	
BH10-6		14:35		X		1								HOLD
BH10-8		14:40		X		1	X							
BH10-10		14:45		X		1								HOLD
BH11-4		15:15		X		1								HOLD
BH11-6		15:20		X		1								HOLD
BH11-8		15:25		X		1								HOLD
BH11-10		15:30		X		1	X	X	X	X	X	X	X	
BH12-4	V	15:45		X		1	X	X	X	X				

Relinquished by: (Signature) K Stephen Wilson — Date / Time: 10/25 5:50

(Printed): R STEPHEN WILSON

Received by: (Signature)

(Printed)

Relinquished by: (Signature)

(Printed)

Date / Time

Received by: (Signature)

(Printed)

Relinquished by: (Signature)

(Printed)

Date / Time

Received for Laboratory by: (Signature)

(Printed): MIKE DUGAN

Date / Time: 10/25 5:50

Remarks: HOLD ALL SAMPLES

Modified 10/29/91 WS

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME	INDUSTRIAL HYGIENE SAMPLE Y/N
7703.26	PDDI - WEST (WATER & SOIL)	

SAMPLERS: (Signature) K. Stephen Wilson (Printed) R. STEPHEN WILSON

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TPH-CT	TPH-D	BTEX 8020	MTBE 8020	O+G (418.1)	EP TOX METALS (CD, CR, PB, NI & ZN)	8010	REMARKS
BH5	10/25	1:50		X	water	7	X	X	X	X	X	X	7	X — pa Yvonne 10/30/91 11:35
BH9	10/25	3:20		X	↓	9	X	X	X	X	X	X		X
BH2	10/25	2:15		X	↓	3	X	X	X					
BH12-6	10/25	15:50		X	soil	1								Hold
BH12-8	↓	15:55		X	↓	1								Hold
BH12-10		16:00		X		1								Hold
BH13-5		16:30		X		1								Hold
BH13-9		16:35		X		1	X	X	X	X	X	X	X	
BH14-4		17:05		X		1	[illegible]	X				X		
BH14-6		17:10		X		1								Hold
BH14-11	↓	17:40		X	↓	1								Hold

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
K. Stephen Wilson	10/25 5:50				
(Printed)		(Printed)	(Printed)		(Printed)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	HOLD ALL SAMPLES
					NORMAL TURN AROUND TIME
(Printed)		(Printed)			FILTER ALL SAMPLES BEFORE ANALYSES
		[illegible]		Modified 10/29/91 NB	

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

VERSAR CHAIN OF CUSTODY

PROJECT NO. 7703.26

PROJECT NAME PDDI-WEST (SOIL)

SAMPLERS R. Stephen Wilson R. STEPHEN WILSON

FIELD SAMPLE NO.	DATE	TIME	GRAB	NO OF CONTAINERS	PARAMETERS: O+G	TPH-D	TPH-G	BTEX	8270	METALS
BH6-4	10/25	13:50	X	1						
BH6-6	10/25	13:55	X	1	X					
BH6-8	10/25	14:00	X	1						
BH6-10	10/25	14:05	X	1						

RELINQUISHED BY R. Stephen Wilson R. STEPHEN WILSON 10/25 5:50

RECEIVED BY Mike Duncan MIKE DUNCAN

HOLD ALL SAMPLES

Also, on the handwritten Chain of Custody, please analyze sample BH16-6 (soil) for oil & grease (5220 E&F)

Joanne Jembi
10/29/91
10:10 AM

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545
Telephone (510) 783-6960
Facsimile (510) 783-1512

TAL

January 28, 1992

RECEIVED
FEB - 4 1992
Ans'd.....

Mr. Larry Kleinecke
Versar, Inc.
5330 Primrose Drive, Suite 228
Fair Oaks, California 95628

Dear Mr. Kleinecke:

Trace Analysis Laboratory received twenty two soil samples and six water samples on January 8, 1992 for your Project No. 7703.26, PDDI (custody log number 1640).

These samples were analyzed according to your chain of custody, except Total Petroleum Hydrocarbons as Motor Oil was performed rather than Oil and Grease by Standard Method 5520CF. Our analytical report, the completed chain of custody form, and our analytical methodologies are enclosed for your review.

Trace Analysis Laboratory is certified under the California Environmental Laboratory Accreditation Program. Our certification number is 1199.

If you should have any questions or require additional information, please call me.

Sincerely yours,

Jennifer Pekol
Project Specialist

Enclosures

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545
Telephone (510) 783-6960
Facsimile (510) 783-1512

TAL

LOG NUMBER: 1640
DATE SAMPLED: 01/06/92 and 01/07/92
DATE RECEIVED: 01/08/92
DATE EXTRACTED: 01/09/92
DATE ANALYZED: 01/16/92 and 01/17/92
DATE REPORTED: 01/28/92

CUSTOMER: Versar, Inc.

REQUESTER: Larry Kleinecke

PROJECT: 7703.26, PDDI

Sample Type: Soil

Method and Constituent:	Units	BH17-1.0 Concentration	BH17-1.0 Reporting Limit	BH19-2.5 Concentration	BH19-2.5 Reporting Limit	BH26-6.0 Concentration	BH26-6.0 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/kg	1,200,000	8,000	ND	1,000	3,100	1,000

Method and Constituent:	Units	BH27-3.0 Concentration	BH27-3.0 Reporting Limit	BH28-9.0 Concentration	BH28-9.0 Reporting Limit	BH29-6.0 Concentration	BH29-6.0 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/kg	5,900	1,000	120,000	1,000	ND	1,000

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1640
DATE SAMPLED: 01/07/92 and 01/08/92
DATE RECEIVED: 01/08/92
DATE EXTRACTED: 01/09/92
DATE ANALYZED: 01/15/92, 01/16/92 and 01/17/92
DATE REPORTED: 01/28/92
PAGE: Two

Sample Type: Soil

Method and Constituent:	Units	BH30-4.0 Concentration	BH30-4.0 Reporting Limit	BH31-1.5 Concentration	BH31-1.5 Reporting Limit	BH33-2.0 Concentration	BH33-2.0 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/kg	2,100,000	8,000	2,800,000	8,000	340,000	8,000

Method and Constituent:	Units	BH34-2.0 Concentration	BH34-2.0 Reporting Limit	BH34-10.0 Concentration	BH34-10.0 Reporting Limit	BH35-6.0 Concentration	BH35-6.0 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/kg	9,400	1,000	73,000	1,000	450,000	1,000

Method and Constituent:	Units	BH37-4.0 Concentration	BH37-4.0 Reporting Limit	BH38-4.0 Concentration	BH38-4.0 Reporting Limit	BH39-6.0 Concentration	BH39-6.0 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/kg	ND	1,000	ND	1,000	ND	1,000

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1640
DATE SAMPLED: 01/08/92
DATE RECEIVED: 01/08/92
DATE EXTRACTED: 01/09/92
DATE ANALYZED: 01/15/92 and 01/16/92
DATE REPORTED: 01/28/92
PAGE: Three

Sample Type: Soil

Method and Constituent:	Units	BH46-3.0 Concentration	BH46-3.0 Reporting Limit	BH47-8.5 Concentration	BH47-8.5 Reporting Limit	BH48-3.0 Concentration	BH48-3.0 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/kg	ND	1,000	1,400,000	1,000	75,000	8,000

Method and Constituent:	Units	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:			
Total Petroleum Hydrocarbons as Diesel	ug/kg	ND	1,000

QC Summary:

% Recovery: 96*
% RPD: 0.9

Concentrations reported as ND were not detected at or above the reporting limit.

Samples BH26-6.0, BH27-3.0, BH34-2.0, BH34-10.0, BH35-6.0 contain compounds eluting later than the diesel standard.

* The Recovery is for the Laboratory Control Sample, due to the high concentration in the spiked sample.

LOG NUMBER: 1640
DATE SAMPLED: 01/06/92 and 01/07/92
DATE RECEIVED: 01/08/92
DATE EXTRACTED: 01/08/92
DATE ANALYZED: 01/09/92 and 01/17/92
DATE REPORTED: 01/28/92
PAGE: Four

Sample Type: Soil

Method and Constituent:	Units	BH17-1.0 Concentration	BH17-1.0 Reporting Limit	BH19-2.5 Concentration	BH19-2.5 Reporting Limit	BH26-6.0 Concentration	BH26-6.0 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/kg	32,000	2,200	ND	500	ND	500
EPA Method 8020 for:							
Benzene	ug/kg	ND	76	5.9	5.0	ND	5.0
Toluene	ug/kg	ND	80	14	5.0	11	5.0
Ethylbenzene	ug/kg	ND	84	31	5.0	ND	5.0
Xylenes	ug/kg	ND	200	92	15	21	15

Method and Constituent:	Units	BH27-3.0 Concentration	BH27-3.0 Reporting Limit	BH28-9.0 Concentration	BH28-9.0 Reporting Limit	BH29-6.0 Concentration	BH29-6.0 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/kg	ND	500	1,800	500	ND	500
EPA Method 8020 for:							
Benzene	ug/kg	ND	5.0	ND	5.0	ND	5.0
Toluene	ug/kg	17	5.0	ND	5.0	ND	5.0
Ethylbenzene	ug/kg	9.4	5.0	ND	5.0	20	5.0
Xylenes	ug/kg	55	15	30	15	21	15

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1640
DATE SAMPLED: 01/07/92
DATE RECEIVED: 01/08/92
DATE EXTRACTED: 01/08/92
DATE ANALYZED: 01/10/92, 01/17/92, 01/18/92 and 01/20/92
DATE REPORTED: 01/28/92
PAGE: Five

Sample Type: Soil

Method and Constituent:	Units	BH30-4.0 Concentration	BH30-4.0 Reporting Limit	BH31-1.5 Concentration	BH31-1.5 Reporting Limit	BH33-2.0 Concentration	BH33-2.0 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/kg	22,000	500	14,000	1,700	ND	500
EPA Method 8020 for:							
Benzene	ug/kg	ND	6.0	ND	76	ND	5.0
Toluene	ug/kg	ND	5.0	ND	80	8.3	5.0
Ethylbenzene	ug/kg	ND	7.9	89	84	20	5.0
Xylenes	ug/kg	550	18	ND	280	37	15

Method and Constituent:	Units	BH34-2.0 Concentration	BH34-2.0 Reporting Limit	BH34-10.0 Concentration	BH34-10.0 Reporting Limit	BH35-6.0 Concentration	BH35-6.0 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/kg	6,300	500	2,500	500	1,700	500
EPA Method 8020 for:							
Benzene	ug/kg	17	5.0	16	5.0	6.5	5.0
Toluene	ug/kg	11	5.0	16	5.0	17	5.0
Ethylbenzene	ug/kg	ND	5.0	51	5.0	27	5.0
Xylenes	ug/kg	260	15	140	15	87	15

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1640
DATE SAMPLED: 01/07/92 and 01/08/92
DATE RECEIVED: 01/08/92
DATE EXTRACTED: 01/08/92
DATE ANALYZED: 01/10/92, 01/14/92 and 01/18/92
DATE REPORTED: 01/28/92
PAGE: Six

Sample Type: Soil

Method and Constituent:	Units	BH37-4.0 Concentration	BH37-4.0 Reporting Limit	BH38-4.0 Concentration	BH38-4.0 Reporting Limit	BH39-6.0 Concentration	BH39-6.0 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/kg	ND	500	780	500	ND	500
EPA Method 8020 for:							
Benzene	ug/kg	ND	5.0	ND	5.0	ND	5.0
Toluene	ug/kg	ND	5.0	5.6	5.0	13	5.0
Ethylbenzene	ug/kg	ND	5.0	ND	5.0	22	5.0
Xylenes	ug/kg	ND	15	110	15	40	15

Method and Constituent:	Units	BH46-3.0 Concentration	BH46-3.0 Reporting Limit	BH47-8.5 Concentration	BH47-8.5 Reporting Limit	BH48-3.0 Concentration	BH48-3.0 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/kg	ND	500	9,200	500	47,000	1,700
EPA Method 8020 for:							
Benzene	ug/kg	ND	5.0	ND	5.0	ND	76
Toluene	ug/kg	ND	5.0	11	5.0	ND	80
Ethylbenzene	ug/kg	ND	5.0	ND	5.0	ND	84
Xylenes	ug/kg	ND	15	260	15	1,000	280

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1640
DATE SAMPLED: 01/06/92, 01/07/92 and 01/08/92
DATE RECEIVED: 01/08/92
DATE EXTRACTED: 01/08/92
DATE ANALYZED: 01/09/92, 01/10/92, 01/14/92, 01/17/92, 01/18/92 and 01/20/92
DATE REPORTED: 01/28/92
PAGE: Seven

Sample Type: Soil

Method and Constituent:	Units	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:			
Total Petroleum Hydrocarbons as Gasoline	ug/kg	ND	500
EPA Method 8020 for:			
Benzene	ug/kg	ND	5.0
Toluene	ug/kg	ND	5.0
Ethylbenzene	ug/kg	ND	5.0
Xylenes	ug/kg	ND	15

QC Summary:

% Recovery: 111, 70, 110, 64, 63, 98
% RPD: 22, 8.0, 22, 17, 9.5, 4.1

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1640
DATE SAMPLED: 01/06/92 and 01/08/92
DATE RECEIVED: 01/08/92
DATE EXTRACTED: 01/15/92
DATE ANALYZED: 01/20/92
DATE REPORTED: 01/28/92
PAGE: Eight

Sample Type: Soil

Method and Constituent:	Units	BH22-12.0 Concentration	BH22-12.0 Reporting Limit	BH24-12.0 Concentration	BH24-12.0 Reporting Limit	BH25-4.0 Concentration	BH25-4.0 Reporting Limit
Standard Method 5520EF Hydrocarbons:							
Oil and Grease	ug/kg	63,000	50,000	ND	50,000	58,000	50,000

Method and Constituent:	Units	BH26-6.0 Concentration	BH26-6.0 Reporting Limit	BH46-9.0 Concentration	BH46-9.0 Reporting Limit	BH47-8.5 Concentration	BH47-8.5 Reporting Limit
Standard Method 5520 Hydrocarbons:							
Oil and Grease	ug/kg	80,000	50,000	ND	50,000	ND	50,000

Method and Constituent:	Units	BH48-3.0 Concentration	BH48-3.0 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
Standard Method 5520 Hydrocarbons:					
Oil and Grease	ug/kg	230,000	50,000	ND	50,000

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1640
DATE SAMPLED: 01/08/92
DATE RECEIVED: 01/08/92
DATE EXTRACTED: 01/13/92
DATE ANALYZED: 01/14/92
DATE REPORTED: 01/28/92
PAGE: Nine

Sample Type: Water

Method and Constituent:	Units	BH24 Concentration	BH24 Reporting Limit	BH31 Concentration	BH31 Reporting Limit	BH33 Concentration	BH33 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/l	ND	50	ND	50	ND	50

Method and Constituent:	Units	BH37 Concentration	BH37 Reporting Limit	BH39 Concentration	BH39 Reporting Limit	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Diesel	ug/l	ND	50	ND	50	ND	50

QC Summary:

% Recovery: 96
% RPD: 3.1

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1640A
DATE SAMPLED: 01/08/92
DATE RECEIVED: 01/08/92
DATE EXTRACTED: 01/13/92
DATE ANALYZED: 01/31/92
DATE REPORTED: 01/31/92
PAGE: Ten

Sample Type: Water

Method and Constituent:	Units	BH24 Concentration	BH24 Reporting Limit	BH31 Concentration	BH31 Reporting Limit	BH33 Concentration	BH33 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Motor Oil	ug/l	ND	500	ND	500	ND	500

Method and Constituent:	Units	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:			
Total Petroleum Hydrocarbons as Motor Oil	ug/l	ND	500

QC Summary:

% Recovery: 94
% RPD: 5.3

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1640
DATE SAMPLED: 01/08/92
DATE RECEIVED: 01/08/92
DATE ANALYZED: 01/16/92
DATE REPORTED: 01/28/92
PAGE: Eleven

Sample Type: Water

Method and Constituent:	Units	BH24 Concentration	BH24 Reporting Limit	BH28 Concentration	BH28 Reporting Limit	BH31 Concentration	BH31 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/l	ND	50	57	50	ND	50
EPA Method 8020 for:							
Benzene	ug/l	ND	0.50	0.60	0.50	ND	0.50
Toluene	ug/l	ND	0.50	21	0.50	0.77	0.50
Ethylbenzene	ug/l	ND	0.50	0.74	0.50	ND	0.50
Xylenes	ug/l	ND	1.5	3.7	1.5	ND	1.5

Method and Constituent:	Units	BH33 Concentration	BH33 Reporting Limit	BH37 Concentration	BH37 Reporting Limit	BH39 Concentration	BH39 Reporting Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/l	ND	50	ND	50	ND	50
EPA Method 8020 for:							
Benzene	ug/l	ND	0.50	ND	0.50	1.4	0.50
Toluene	ug/l	ND	0.50	1.1	0.50	4.1	0.50
Ethylbenzene	ug/l	ND	0.50	ND	0.50	ND	0.50
Xylenes	ug/l	ND	1.5	ND	1.5	ND	1.5

Concentrations reported as ND were not detected at or above the reporting limit.

LOG NUMBER: 1640
DATE SAMPLED: 01/08/92
DATE RECEIVED: 01/08/92
DATE ANALYZED: 01/16/92
DATE REPORTED: 01/28/92
PAGE: Twelve

Sample Type: Water

Method and Constituent:	Units	Method Blank Concentration	Method Blank Reporting Limit
DHS Method:			
Total Petroleum Hydrocarbons as Gasoline	ug/l	ND	50
EPA Method 8020 for:			
Benzene	ug/l	ND	0.50
Toluene	ug/l	ND	0.50
Ethylbenzene	ug/l	ND	0.50
Xylenes	ug/l	ND	1.5

QC Summary:

% Recovery: 90
% RPD: 5.5

Concentrations reported as ND were not detected at or above the reporting limit.

Louis W. DuPuis
Quality Assurance/Quality Control Manager

TOTAL PETROLEUM HYDROCARBONS AS DIESEL, KEROSENE, OR JET FUEL FOR SOIL

Method:

This method is based on the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California. This method uses an alternative column and flow rate as specified below.

Sample Preparation:

Approximately 50 grams of soil are extracted with 80 ml of solvent on a mechanical shaker for 4 hours. The extract is filtered and dried with anhydrous sodium sulfate. It is then concentrated using a Kuderna-Danish apparatus and brought to 10ml.

Sample Introduction:

The extracts are analyzed by direct injection into a gas chromatograph (GC).

Gas Chromatography Analysis:

The extractable hydrocarbons are separated on a 6-ft by 2 mm I.D. gas chromatography column packed with 10% SP-2100 on Supelcoport and then detected by a flame ionization detector (FID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	250^{o} C
DETECTOR TEMPERATURE:	300^{o} C
INITIAL TEMPERATURE:	40^{o} C
Hold for 4 minutes	
PROGRAM RATE:	10^{o} C/min.
FINAL TEMPERATURE:	265^{o} C
Hold for 10 minutes	

Calculation:

Total Petroleum Hydrocarbons as Diesel is quantified by comparing the sum of the area of peaks from the sample, that elute in the same time range as the standard, to the sum of the area of peaks in the standard. The standard may be diesel, kerosene, jet fuel, or other compounds depending on the source of the sample.

2/20/91

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (TPH-G) FOR SOIL, BY PURGE AND TRAP

Method:

This method is based on the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative column, flow rate, and temperature program as specified below.

Sample Preparation:

Approximately 15 grams of the soil sample are added to 10 ml of methanol. The sample is extracted by agitation.

Sample Introduction:

Methanol extracts are introduced to the gas chromatograph (GC) by EPA Method 5030, Purge and Trap.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 5% SP-1200/1.75% Bentone-34 on Supelcoport. A flame ionization detector (FID) is used to detect total petroleum hydrocarbons as gasoline (TPH-G). The FID is preceded by a photoionization detector (PID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	240° C
DETECTOR TEMPERATURE:	270° C
INITIAL TEMPERATURE:	50° C
Hold for 2 minutes	
PROGRAM RATE:	6° C/min.
FINAL TEMPERATURE:	90° C
Hold for 17 minutes	

Calculation:

Total Petroleum Hydrocarbons as Gasoline is quantified by comparing the sum of the area of peaks from the sample to the sum of the area of peaks in the gasoline standard.

3/13/91

BENZENE, TOLUENE, XYLENES, AND ETHYLBENZENE (BTXE) FOR SOIL, BY PURGE AND TRAP

Method:

This method is EPA Method 8020 as referenced in the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative carrier gas as specified below.

Sample Preparation:

Approximately 15 grams of the soil sample are added to 10 ml of methanol. The sample is extracted by agitation.

Sample Introduction:

Methanol extracts are introduced to the gas chromatograph (GC) by EPA Method 5030, Purge and Trap.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 5% SP-1200/1.75% Bentone-34 on Supelcoport. A photoionization detector (PID) is used to detect BTXE. The PID is followed by a flame ionization detector (FID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	240° C
DETECTOR TEMPERATURE:	270° C
INITIAL TEMPERATURE:	50° C
Hold for 2 minutes	
PROGRAM RATE:	6° C/min.
FINAL TEMPERATURE:	90° C
Hold for 17 minutes	

Calculation:

BTXE are identified by comparing the retention times of the sample peaks to those of the standards. BTXE are quantified by comparing the area of the sample peaks to those of the standards. If BTX or E is present and Total petroleum Hydrocarbons as Gasoline (TPH-G) is not, the analysis is confirmed by using a second column or a gas chromatograph mass spectrometer (GC/MS).

3/13/91

OIL AND GREASE, HYDROCARBONS

Method:

This is method 5520CF or 5520DF from Standard Methods for the Examination of Water and Wastewater, 17th edition.

Sample Preparation and Analysis

The sample is extracted with freon using a soxhlet extraction apparatus. The freon extract is collected. The extract is then dried with sodium sulfate and treated with silica gel. Non-petroleum oil and grease is removed by absorption onto the silca gel. The freon is evaporated leaving the oil and grease as a residue.

Calculation

The oil and grease is weighed and compared to the sample weight to obtain a final concentration of oil and grease.

11/9/90

TOTAL PETROLEUM HYDROCARBONS AS DIESEL, KEROSENE, OR JET FUEL FOR WATER

Method:

This method is based on the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative column and flow rate as specified below.

Sample Preparation:

EPA Method 3510 (separatory funnel liquid-liquid extraction) is used to prepare water samples. The sample is extracted with methylene chloride three times. The extracts are combined, then filtered and dried with anhydrous sodium sulfate. It is then concentrated using a Kuderna-Danish apparatus and brought to 10ml.

Sample Introduction:

The extracts are analyzed by direct injection into a gas chromatograph (GC).

Gas Chromatography Analysis:

The extractable hydrocarbons are separated on a 6-ft by 2 mm I.D. gas chromatography column packed with 10% SP-2100 on Supelcoport and then detected by a flame ionization detector (FID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	250^{0} C
DETECTOR TEMPERATURE:	300^{0} C
INITIAL TEMPERATURE:	40^{0} C
Hold for 4 minutes	
PROGRAM RATE:	10^{0} C/min.
FINAL TEMPERATURE:	265^{0} C
Hold for 10 minutes	

Calculation:

Total Petroleum Hydrocarbons as Diesel is quantified by comparing the sum of the area of peaks from the sample, that elute in the same time range as the standard, to the sum of the area of peaks in the standard. The standard may be diesel, kerosene, jet fuel, or other compounds depending on the source of the sample.

1/2/90

TOTAL PETROLEUM HYDROCARBONS AS GASOLINE (TPH-G) FOR WATER, BY PURGE AND TRAP

Method:

This method is based on the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative column, flow rate, and temperature program as specified below.

Sample Preparation:

There is no sample preparation other than dilution.

Sample Introduction:

Water samples are introduced to the gas chromatograph (GC) by EPA Method 5030, Purge and Trap. Up to 5 ml of sample is purged by this method.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 5% SP-1200/1.75% Bentone-34 on Supelcoport. A flame ionization detector (FID) is used to detect total petroleum hydrocarbons as gasoline (TPH-G). The FID is preceded by a photoionization detector (PID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	240° C
DETECTOR TEMPERATURE:	270° C
INITIAL TEMPERATURE:	50° C
Hold for 2 minutes	
PROGRAM RATE:	6° C/min.
FINAL TEMPERATURE:	90° C
Hold for 17 minutes	

Calculation:

Total Petroleum Hydrocarbons as Gasoline is quantified by comparing the sum of the area of peaks from the sample, to the sum of the area of peaks in the gasoline standard.

1/2/90

BENZENE, TOLUENE, XYLENES, AND ETHYLBENZENE (BTXE) FOR WATER, BY PURGE AND TRAP

Method:

This method is EPA Method 8020 as referenced in the "Leaking Underground Fuel Tank (Luft) Field Manual," May 1988, prepared by the State of California, and on the "Regional Board Staff Recommendations," May 1989, by the North Coast, San Francisco, and Central Valley Regional Water Quality Control Boards. This method uses an alternative carrier gas as specified below.

Sample Preparation:

There is no sample preparation other than dilution.

Sample Introduction:

Water samples are introduced to the gas chromatograph (GC) by EPA Method 5030, Purge and Trap.

Gas Chromatography Analysis:

The volatile organics are separated on a 6-ft x 2 mm I.D. gas chromatography column packed with 5% SP-1200/1.75% Bentone-34 on Supelcoport. A photoionization detector (PID) is used to detect BTXE. The PID is followed by a flame ionization detector (FID).

Gas Chromatograph Conditions:

CARRIER GAS:	Nitrogen
FLOW RATE:	30 ml/min.
INJECTOR TEMPERATURE:	240° C
DETECTOR TEMPERATURE:	270° C
INITIAL TEMPERATURE:	50° C
Hold for 2 minutes	
PROGRAM RATE:	6° C/min.
FINAL TEMPERATURE:	90° C
Hold for 17 minutes	

Calculation:

BTXE are identified by comparing the retention times of the sample peaks to those of the standards. BTXE are quantified by comparing the area of the sample peaks to those of the standards. If BTX or E is present and Total petroleum Hydrocarbons as Gasoline (TPH-G) is not, the analysis is confirmed by using a second column or a gas chromatograph mass spectrometer (GC/MS).

1/2/90

Versar INC.

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
7703.26	PDDI

SAMPLERS: (Signature) Yvonne Lembi (Printed) Yvonne Lembi

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: TPH-G	BTEX	TPH-D	O&G	EE				INDUSTRIAL HYGIENE SAMPLE Y/N	REMARKS
✓ BH17-1.0 HR	1-6-92	1040		X	Soil	1	X	X	X							log 1640
✓ BH19-~~3.0~~ 2.5 HR	1-6-92	1110		X		1	X	X	X							
✓ BH22-12.0	1-6-92	1400		X		1				X						
✓ BH24-12.0	1-6-92	1450		X		1				X						
✓ BH25-4.0	1-6-92	1515		X		1				X						
✓ BH26-6.0	1-6-92	1555		X		1	X	X	X	X						
✓ BH27-3.0	1-6-92	1610		X		1	X	X	X							
✓ BH28-9.0	1-7-92	0845		X		1	X	X	X							
✓ BH29-6.0	↓	0910		X		1	X	X	X							
✓ BH30-4.0		0945		X		1	X	X	X							
✓ BH31-1.5		1005		X		1	X	X	X							
✓ BH33-2.0	↓	1230		X		1	X	X	X							

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
(Printed)		(Printed)	(Printed)		(Printed)
Relinquished by: (Signature) Yvonne Lembi	Date / Time 1/8/92 1615	Received for Laboratory by: (Signature) TAL	Date / Time	Remarks: Regular Turnaround Call for O&G Method (916) 962-1612	
(Printed) Yvonne Lembi		(Printed) Louis D Pits			

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

report to Lori Blanchard

Versar INC.

CHAIN OF CUSTODY RECORD

Page 2 of

PROJECT NO.	PROJECT NAME	INDUSTRIAL HYGIENE SAMPLE Y / N
7703.26	PDDI	

SAMPLERS: (Signature) Yvonne Lembi (Printed) Yvonne Lembi

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: TPH-G/BTEX	TPH-D	Oil & Grease EPA 413.2	BTEX	REMARKS
BH34-2.0	1-7-92	1300		X	Soil	1	X	X		X	log 1640
BH34-10.0	"	1315		X	"	1	X	X		X	
BH35-6.0	"	1400		X	"	1	X	X		X	
BH37-4.0	"	1535		X	"	1	X	X		X	
BH38-4.0	"	1625		X	"	1	X	X		X	
BH39-6.0	1-8-92	0842		X	"	1	X	X		X	
BH46-9.0 **	"	1105		X	"	1	X	X		X	
BH46-9.0	"	1120		X	"	1			X		
BH47-8.5 **	"	1210		X	"	1	X	X	X	X	
BH48-3.0	"	1320		X	"	1	X	X	X	X	
~~BH48-8.0~~ **											

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
(Printed)		(Printed)	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
Yvonne Lembi	1/8/92 1615	Lois DePris		Regular Turnaround TAT Call for O&G method 7-8 (916) 962-1612
(Printed) Yvonne Lembi		(Printed) Lois DePris		

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

Versar

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
7703.26	PDDI

SAMPLERS: *(Signature)* Yvonne Lembi (Printed) Yvonne Lembi

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: TPH-G/BTEX	PARAMETERS: TPH-D	PARAMETERS: Oil & Grease	PARAMETERS: 1-22-92 IF is down - Spoke to Yvonne Lembi Okay to run by Gravimetric	INDUSTRIAL HYGIENE SAMPLE Y/N	REMARKS
												log 1640
BH 24	1-8-92	1200		X	water	4	X	X	X			2 PresVOAs, 1 Pl unpres, 1 Pl pres
BH 28		1400		X		1	X					? 1 PresVOA (temp?)
BH 31		1330		X		4	X	X	X			2 PresVOAs, " , "
BH 33		1230		X		4	X	X	X			" , " , "
BH 37		1500		X		3	X	X				" , "
BH 39		1430		X		3	X	X				" , "

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
(Printed)		(Printed)	(Printed)		(Printed)

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks
Yvonne Lembi	1/8/92 1615	TAL		Regular turnaround - Green
(Printed) Yvonne Lembi		(Printed) Lewis		Call for O&G method (916) 962-1612

Distribution: Original Plus One Accompanying Shipment (white and yellow); Copy to Department Field File (pink)

Versar INC.

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME	INDUSTRIAL HYGIENE SAMPLE	Y / N
7703.26	PPP No. 1a I-West (water)		

SAMPLERS: *(Signature)* K. Stephen Wilson (Printed) R. STEPHEN WILSON

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TPH-G	TPH-D	BTEX	[illegible]	[illegible]	[illegible]		REMARKS
BH14	10/25	6:15		X		3	X	X	X	[illegible]				

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
K. Stephen Wilson	10/25/91 1800	Yvonne Lemmi	Yvonne Lemmi	10/29/91 1300	FED EX
(Printed) R. STEPHEN WILSON		(Printed) Yvonne Lemmi	(Printed) Yvonne Lemmi		(Printed)

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks
				Regular Turnaround (report with 7703.26 shipment rec'd 10/29)
(Printed)		(Printed)		

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).