324 Embarcadero
Yard II

WP

Versar INC.
ENVIRONMENTAL RISK MANAGEMENT

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Versar INC. SACRAMENTO

SITE INVESTIGATION WORK PLAN
PACIFIC DRY DOCK AND REPAIR YARD II
OAKLAND, CALIFORNIA

321 Embarcadero

Prepared for:

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Versar Job No. 7703.29.1

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FOREWORD

This site investigation work plan was prepared by Versar Inc. of Sacramento, California for Crowley Maritime Corporation. Ms. Yvonne M. Lembi, Geologist, prepared this work plan. Mr. R. Stephen Wilson, Senior Geologist and Project Manager, reviewed this plan. This work will be performed under the supervision of Mr. Wilson and Mr. James R. Frantes, a Registered Geologist in the State of California (R.G.), Department Head, Environmental Geoscience Department.

Reviewed By:

Yvonne M. Lembi

Yvonne M. Lembi
Geologist

Approved for Release:

for M. P. Sellers

James R Frantes, R.G.
Department Head, Environmental
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DISCLAIMER

The purpose of this site investigation work plan is only to inform the client of the environmental conditions as they currently exist at the subject site. Versar Inc. 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, state or federal laws or any modifications or changes thereto. In many cases, federal, state, or local codes require the prompt reporting to relevant authorities if a release occurs. It is the responsibility of the client 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 report are subject to professional interpretation, they could result in differing conclusions. In addition, the findings and conclusions contained in this work plan are based on various quantitative and qualitative factors as they existed on or near the date of the survey. Therefore, if the recommendations made in this work plan are not implemented within a reasonable period of time, there can be no assurances that intervening factors will not arise that will affect the conclusions reached herein.

Versar makes no warranty and assumes no liability with respect to the use of information contained in this report. No changes to its form or content may be made without Versar's express written approval.

This work plan reflects conditions, operations, and practices as observed on the date of the site visit. Changes or modifications to procedures and/or facilities made after the site visit are not included.

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1.0 INTRODUCTION

Versar Inc. (Versar) has been retained by Crowley Maritime Corporation to perform a site investigation of the inactive Pacific Dry Dock and Repair Yard II (PDD II) facility located at 320 Embarcadero in Oakland, California. This site investigation is the initial phase of the plan for correction required by the Alameda Health Care Agency (ACHCA).

1.1 Proposed Scope of Work

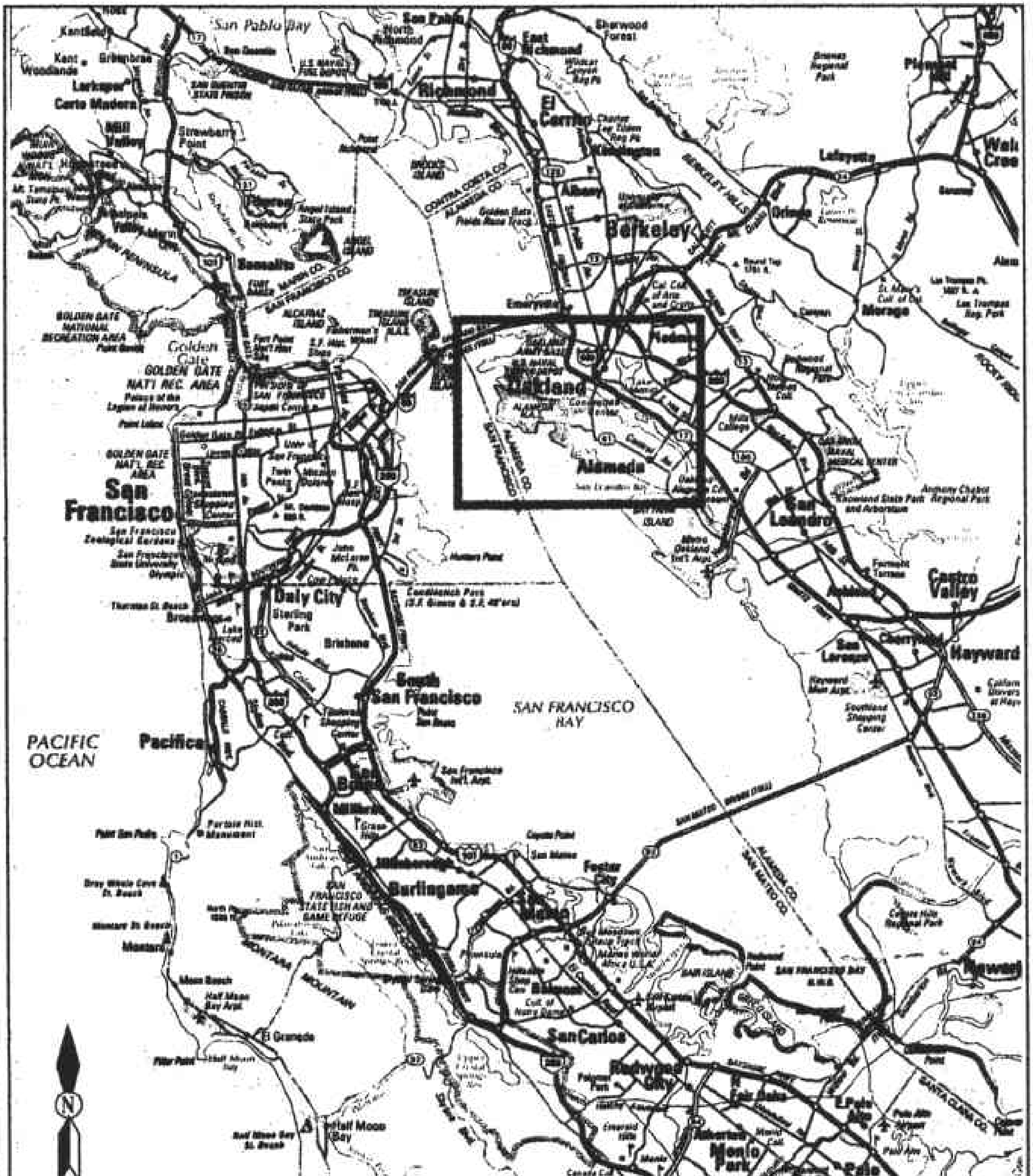
This work plan presents the background, rationale and methodology of the proposed site investigation. The site investigation will include: (1) performing a magnetometer and magnetic locator geophysical survey of the site to potentially identify unrecorded underground storage tanks (USTs); (2) drilling approximately 19 boreholes to a depth between six to eight feet below the ground surface; (3) drilling and installing six ground-water monitoring wells; (4) collecting soil and ground-water samples for laboratory analysis; (5) analyzing soil and ground-water samples to determine accurate constituent concentrations; and (6) preparing a comprehensive report presenting the results and conclusions of the site investigation.

1.2 Project Location

The PDD II is located at 320 Embarcadero in Oakland, California. The city and the site location are presented in Figures 1-1 and 1-2, respectively. The layout of PDD II is shown in Figure 1-3.

1.3 Site History

The PDD II site was used as a boat repair and dry dock facility from approximately 1935 to May 1991, by Crowley Maritime Corporation or by other companies. From review of historical aerial photographs, the area surrounding PPD II appears to have

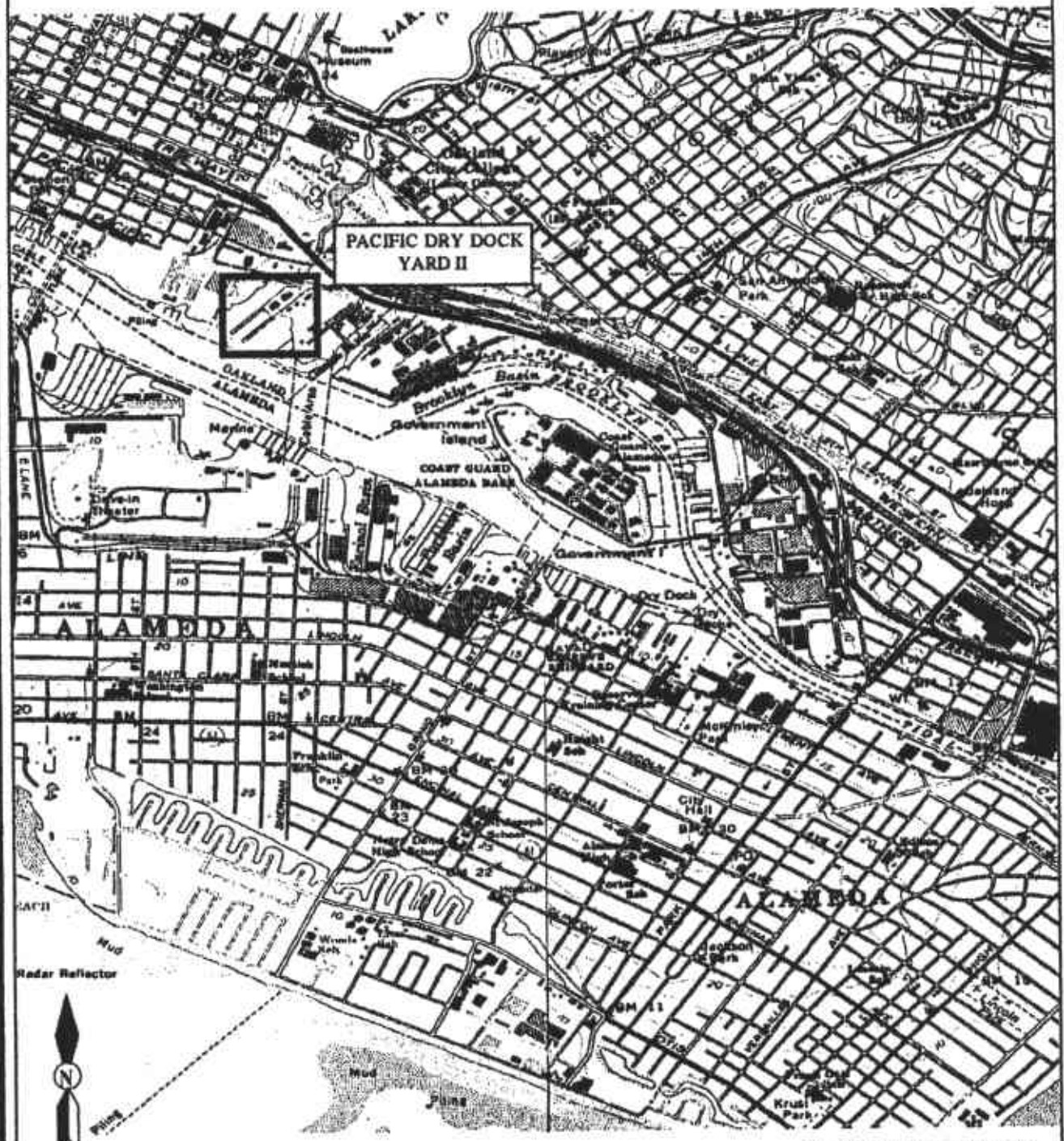


SOURCE: RAND MCNALLY, 1990

approximate scale
0 miles 5

FIGURE 1-1. LOCATION OF THE CITY OF OAKLAND, CALIFORNIA

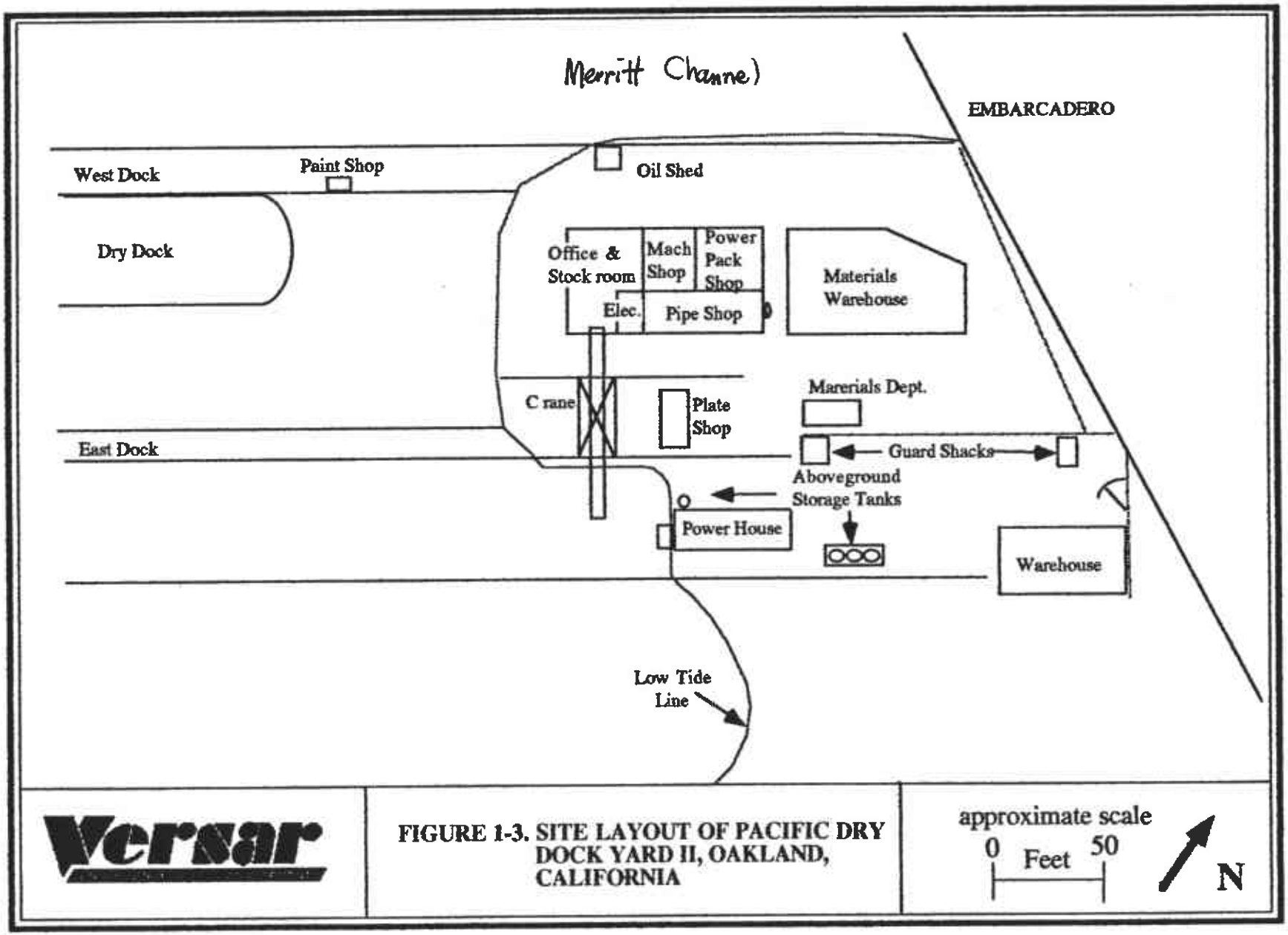
Versar



SOURCE: USGS TOPO 1959

FIGURE 1-2. LOCATION OF PACIFIC DRY DOCK SITE YARD II, OAKLAND, CALIFORNIA

Versar


Merritt Channel
EMBARCADERO
West Dock
Paint Shop
Oil Shed
Dry Dock
Office & Stock room
Mach Shop
Power Pack Shop
Elec.
Pipe Shop
Materials Warehouse
Crane
Plate Shop
Marerials Dept.
East Dock
Guard Shacks
Aboveground Storage Tanks
Power House
Warehouse
Low Tide Line
Versar
FIGURE 1-3. SITE LAYOUT OF PACIFIC DRY DOCK YARD II, OAKLAND, CALIFORNIA
approximate scale
0 Feet 50
N

been a mature industrial area in 1934. The site to the northwest of PDD II was converted from an industrial and commercial area(1934 to 1969) to a park and recreation area (1971 to present). The site to the southeast of PDD II is currently used for lime, gravel, and cement operations.

During research conducted for the site assessment of the property, aerial photographs from 1934 to 1987 were reviewed. In all the aerial photographs reviewed, the PDD II site is surrounded by industrial and commercial facilities. The surrounding site uses, as interpreted from aerial photographs, have varied from factories to lime, gravel and cement operations. A 1957 photograph shows that a factory occupied the site to the southeast of PDD II. The factory site shows evidence of above-ground storage tanks and features which may be interpreted as stockpiles of drums and other materials. PDD II also shows evidence of drum storage.

The practice of repairing and refurbishing sea-going vessels has generated many different forms of both regulated and non-regulated wastes, and also utilizes many products which are themselves regulated materials. These products and wastes include but are not limited to: waste sand blasting materials, oil-based paints, solvents, acids, bases, waste oils, hydrocarbon-contaminated water, and motor fuels. Crowley Maritime Corporation ceased boat repair operations at the site during May, 1991.

2.0 SITE DESCRIPTION

The following section describes the site location, surface water, topography, geology, geohydrology and previous investigations for the PDD II facility.

2.1 Site Location

Oakland, a city with a population of approximately 400,000 people, is located in the northwest section of Alameda County, California. PDD II is located at 320 Embarcadero, in the southwest section of the city of Oakland.

2.2 Surface Water and Topography

PDD II is situated on the Oakland Inner Harbor Waterway. The Inner Harbor Waterway divides the city of Oakland from the island of Alameda. San Francisco Bay is approximately 1.5 miles southwest of the site.

2.3 Geology and Geohydrology

Oakland is located in the Coast Ranges geomorphic province, at an average elevation of 70 feet above mean sea level. The area is tectonically active as a result of being situated between the Hayward Fault on the east and the San Andreas Fault on the west. The underlying bedrock consists of Mesozoic volcanic and metavolcanic rocks found throughout the Coast Ranges. The Oakland area is underlain by Quaternary marine and nonmarine alluvial sediments consisting of clays and silts. The local soil geology of the PDD II consists of fill material overlying silty clays and bay area muds.

Ground water at the site is anticipated to be at depths varying between three and six feet below the ground surface, dependent on tide and seasonal conditions. The direction of ground-water flow at the site has not been determined; however, ground water is expected to flow from on shore towards the harbor. Both ground-water flow direction and depth would be subject to tidal fluctuations. The ground water is saline, and considered nonpotable; it currently has no beneficial use.

2.4 Previous Investigation

Between December 1989 and October 1990, Versar conducted a site assessment of the Pacific Dry Dock Yards I and II. Based on the reported historical operations, Versar sampled the soil of PDD II. The yard is covered by asphalt, and is underlain by varying thicknesses of fill material, which overlies young bay area mud. Due to the uneven sorting and nature of the fill material, and the sampling technique, it was only possible to obtain surface samples at certain locations. The PDD II soil sample locations are shown in Figure 2-1 and are more fully described below.

A total of 20 soil samples were collected from PDD II. The samples were taken with a hand auger, which was decontaminated between each borehole drilling. The soil samples were stored in laboratory prepared glass jars with Teflon™ lined lids and were delivered, under chain of custody, to a State of California, Department of Health Services (DHS)-certified laboratory for analysis. The exact locations and the rationale for the locations are outlined below.

PDDII-1-0.5/2.5: The samples were collected at depths of 0.5 feet and 2.5 feet, on the northwestern edge of the property on the edge of the estuary, to provide a background for the yard.

PDDII-2-0.5/2.5: The samples were collected at depth of 0.5 feet and 2.5 feet, adjacent to an oil storage shed in a run-off channel from a machine shop.

PDDII-3-0.5/2.5/5.0: The samples were collected at depths of 0.5 feet, 2.5 feet, and 5.0 feet, at the northern door to the power pack shop, beside the wash task. The October 1989 earthquake raised the concrete slab on which the wash tank is situated; the wash tank is not equipped with spill containment.

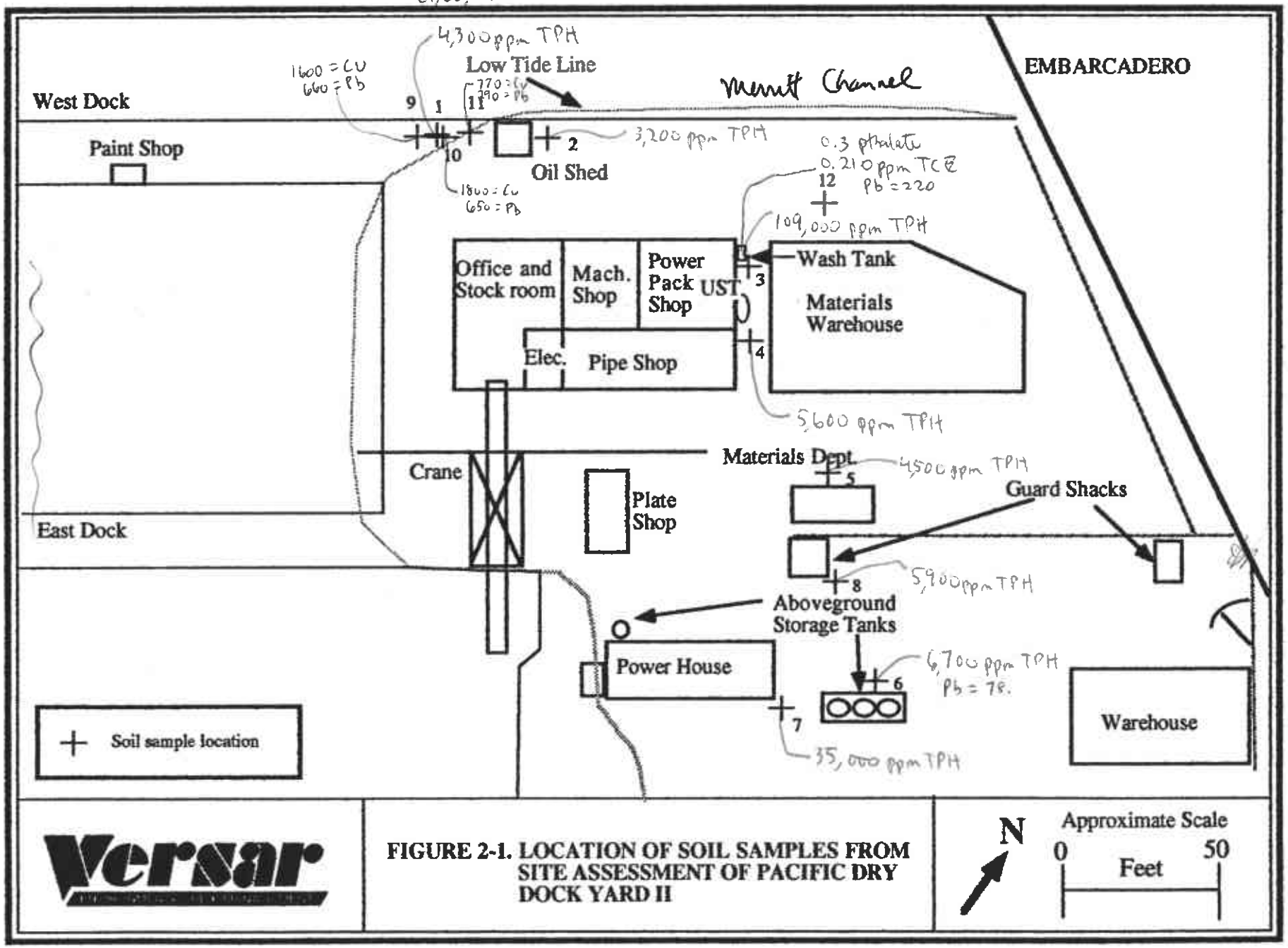


FIGURE 2-1. LOCATION OF SOIL SAMPLES FROM SITE ASSESSMENT OF PACIFIC DRY DOCK YARD II

PDDII-4-0.5: The sample was collected at a depth of 5.0 feet at the northwest end of a known underground storage tank (UST). Fill debris prevented deeper sampling.

PDDII-5-0.5: The sample was collected at a depth of 0.5 feet at the northeast side of the sales office. A second layer of asphalt was encountered at 0.75 feet. This sample was taken in an attempt to establish a background level for Yard 2.

PDDII-6-0.5/2.5/5.0: The samples were collected at depths of 0.5 feet, 2.5 feet, and 5.0 feet adjacent to the northern containment walls surrounding above-ground storage tanks. Dark staining at the bottom of the containment walls indicate that the walls are no longer impermeable. The sample had a silver sheen and oily texture.

PDDII-7-0.5/2.5: The samples were collected at depths of 0.5 feet and 2.5 feet at the southern edge of an above-ground storage tank. Heavy surface staining is evident in the area.

PDDII-8-0.5/5.0: The samples were collected at depths of 0.5 feet and 5.0 feet adjacent to the septic tank northeast of the guard house. These samples were taken in order to establish a background for the yard.

After laboratory analytical results had been received for the above samples, four additional samples were collected. PDDII-9-2.5, PDDII-10-2.5, and PDDII-11-1.5 were taken in the area of sample PDDII-1 in order to attempt to delineate the elevated concentrations of petroleum hydrocarbons detected in PDDII-1-0.5/2.5. A further sample, PDDII-12, was taken and held for a waste extraction test.

The 16 original samples were analyzed for total petroleum hydrocarbons (TPH) by EPA Method 418.1. The samples contained a wide range of petroleum hydrocarbon concentrations from 80

milligrams per kilogram (mg/kg) in sample PDDII-6-2.5, to 109,000 mg/kg in sample PDDII-3-0.5. One sample, PDDII-3-0.5, was analyzed for volatile organics by EPA Method 8240. The sample contained 0.21 mg/kg of tetrachloroethene. One sample, PDDII-3-3.0 was analyzed for semi-volatile organic compounds by EPA Method 8270, and was found to contain 0.30 mg/kg of bis (2-ethylexyl) pthalate. The results of the analyses are summarized in Tables 2-1 and 2-2.

Three samples were analyzed for California Assessment Manual (CAM) metals. The sample PDDII-1-2.5 contained lead and mercury concentrations in excess of the permissible Total Threshold Limit Concentration (TTLC). Three samples were analyzed only for copper and lead. None of these samples contained lead or copper concentrations in excess of the TTLC. The results of the analyses are summarized in Table 2-3.

3.0 PROPOSED INVESTIGATION METHODS AND PROCEDURES

Versar's proposed investigation includes conducting a magnetic locator and magnetometer geophysical survey of the site; drilling approximately 19 boreholes for the collection of soil samples; and drilling and installing six monitoring wells for the collection of ground-water samples.

3.1 Geophysical Survey

The following section describes the procedures which will be followed in conducting the geophysical survey of the site to potentially locate unrecorded USTs.

Versar will, with the aid of Crowley personnel, perform a site visit to identify areas which are potential sites of unrecorded USTs and other underground structures. Some indicators of USTs are concrete pads, vent and fill lines and fuel dispensers. Versar will then perform a gross screening of

Table 2-1. Results of the Analysis for Total Petroleum Hydrocarbons by EPA Method 418.1[1] (TPH)

Sample Number	Sample Depth (feet)	Total Petroleum Hydrocarbons (mg/kg)[2]
PDDII-1-0.5	0.5	3,800
PDDII-1-2.5	2.5	4,300
PDDII-2-0.5	0.5	3,200
PDDII-2-2.5	2.5	3,400
PDDII-3-0.5	0.5	109,000
PDDII-3-2.5	2.5	22,000
PDDII-3-5.0	5.0	7,900
PDDII-4-0.5	0.5	5,600
PDDII-5-0.5	0.5	4,500
PDDII-6-0.5	0.5	6,700
PDDII-6-2.5	2.5	80
PDDII-6-5.0	5.0	6,100
PDDII-7-0.5	0.5	35,000
PDDII-7-2.5	2.5	11,000
PDDII-8-1.0	1.0	5,900
PDDII-8-5.0	5.0	114

[1]EPA Method 418.1 detection limits = 25 mg/kg
[2]Milligrams per kilogram

Table 2-2. Results of the Analyses for Volatile[1] and Semi-Volatile[2] Organic Compounds

Sample Number	Sample Depth (feet)	Compound[3]	Amount Detected (mg/kg)	Reporting Limit (mg/kg)
PDDII-3-0.5	0.5	Tetrachloroethene	0.210	0.007
PDDII-3-5.0	5.0	bis (2-Ethylhexyl) phthalate	0.300	0.200

plasticizer

[1]EPA Method 8240

[2]EPA Method 8270

[3]Only detected compounds reported

Table 2-3. Results of the Analyses for CAM Metals

Compound	Soil Sample Number PDDII-1 -2.5 mg/kg	PDDII-3 -2.5 mg/kg	PDDII-6 -5.0 mg/kg	PDDII-9 -2.5 mg/kg	PDDII-10 -2.5 mg/kg	PDDII-11 -1.5 mg/kg	TTLC[1]	STLC
Arsenic	25	5.5	3.3	NA[2]	NA	NA	500	5
Antimony	5.2	BRL[3]	BRL	NA	NA	NA	500	
Barium	51	88	32	NA	NA	NA	10,000	100
Beryllium	BRL	BRL	BRL	NA	NA	NA	75	
Cadmium	BRL	1.6	BRL	NA	NA	NA	100	
Chromium Total	61	27	37	NA	NA	NA	2,500	5
Chromium VI	BRL	BRL	BRL	NA	NA	NA	500	
Cobalt	5.8	9.5	11	NA	NA	NA	8,000	
Copper	1,900	140	90	1,600	1,800	770	2,500	25
Lead	7,500[4]	220	78	660	650	290	1,000	5
Mercury	26[4]	0.38	0.50	NA	NA	NA	20	0.2
Molybdenum	BRL	BRL	BRL	NA	NA	NA	3,500	
Nickel	12	29	31	NA	NA	NA	2,000	
Selenium	BRL	BRL	BRL	NA	NA	NA	100	
Silver	BRL	BRL	BRL	NA	NA	NA	500	
Thallium	BRL	BRL	BRL	NA	NA	NA	700	
Vanadium	20	30	52	NA	NA	NA	2,400	24
Zinc	550	600	360	NA	NA	NA	5,000	250

[1]Total Threshold Limit Concentrations
[2]Not analyzed
[3]Below reporting limits
[4]Exceeds TTLC

the locations with a Schonstedt MAC51 Magnetic Locator. This screening may include inducing a current in a fill or vent line and following the induced signal with the magnetic locator. If any magnetic anomolies are noted, or if areas of high interferences caused by rebar in concrete or metal buildings are encountered, a precision magnetometer survey will be performed with a Gem 21 Magnetometer or equivalent over a predetermined survey grid. The dimensions and spacing of the grid will be dependent upon the size of the anomaly. The magnetometer data will be downloaded from the instrument to a computer and magnetic profiles and contours of the surveyed locations will be generated.

3.2 Drilling of Boreholes

The following section describes the procedures to be used in the drilling of approximately 19 boreholes in areas of known or suspected environmental impairment at the PDDII site. The drilling will be performed by Woodward Drilling Inc. of Rio Vista, California, a C57 licensed contractor. The rationale for choosing the areas are as follows:

Area No. 1, Northwest of Office and Stockroom: This area was identified in the site assessment as an area with high concentrations of metals in the soil. Approximately five boreholes will be drilled in this area to further define the areal extent of the soils with high concentrations of metals.

Area No. 2, West and Southwest of the Materials Warehouse: One recorded and at least one unrecorded UST are located in this area. Soil samples taken in this area for the site assessment contained high levels of petroleum hydrocarbons and some solvents. Approximately four boreholes will be drilled and two monitoring wells installed in this area to help assess the status of the USTs (unrecorded and recorded) and the source of the solvents.

Area No. 3, Above-ground Tank West of Powerhouse: This area is the location of an aboveground tank. The bottom of the containment pit under the tank is heavily stained and may not be lined. Three boreholes will be drilled and samples collected to assess the efficiency of the tank spill containment.

Area No. 4, Area Surrounding the Materials Department Building: Excavation to repair burst water lines in this vicinity encountered floating product on the ground water. Two boreholes will be drilled to assess the extent of the free product present in the area. One monitoring well will also be installed in this area. This well may be used to recover free product if such is present on the water table.

Area No. 5, East Corner of Yard: Crowley personnel have indicated that this area formerly may have been used as a bilge water disposal site. One monitoring well and two boreholes will be drilled in this area to determine the impact of these reported activities.

Area No. 6, Area Surrounding Aboveground Tank Farm: Three boreholes and one monitoring well will be drilled in this area to further assess the petroleum hydrocarbon contamination identified in the soil during the site assessment.

One ground-water monitoring well will also be installed along the north boundary of the site to establish up-gradient background conditions.

The proposed borehole locations are presented in Figure 3-1. The actual number and location of boreholes will be determined on site based on encountered field conditions.

The boreholes will be drilled to a depth of approximately six to eight feet or to the water table. The borings will be advanced using a truck-mounted drilling rig or a hand auger, depending on the location of the boreholes. If a truck-mounted drilling rig is employed, the boreholes will be drilled with 6-

3/4 inch inside diameter hollow-stem augers. Soil samples will be collected with the use of a modified California split-spoon sampler at three-foot intervals. The method of soil sample collection is more fully described in Section 3.4.

All down-hole equipment will be decontaminated between each borehole as described in subsection 3.4.1. The boreholes will be abandoned by filling them with cement to ground surface.

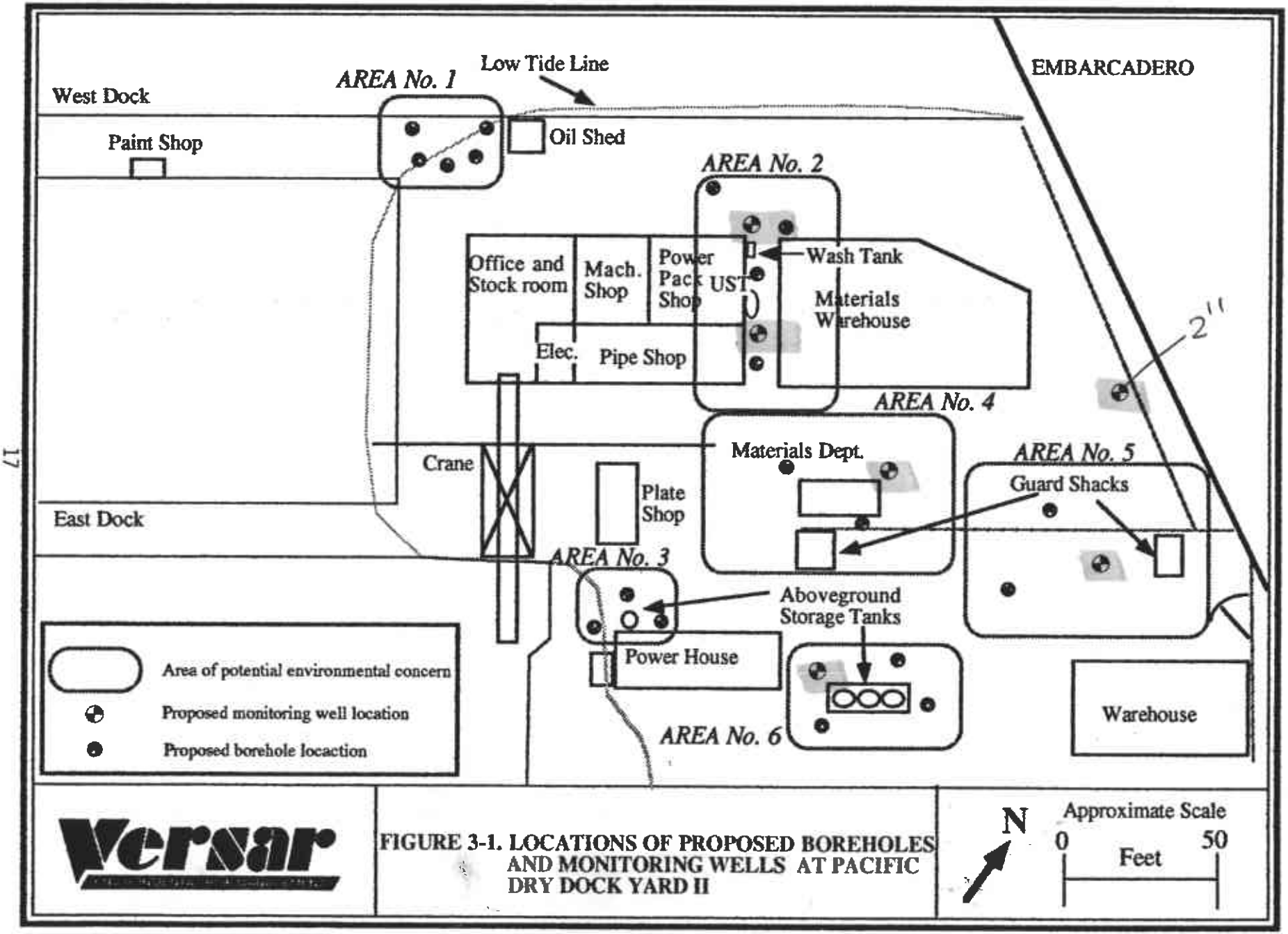
3.3 Installation of Monitoring Wells

This section sets forth the procedure to be followed in installing the six ground-water monitoring wells for this investigation. The locations and rationale for the placement of the monitoring wells is described in Section 3.2 and depicted in Figure 3-1. Actual well locations will be decided on site depending on encountered field conditions.

In addition to the approximately 19 boreholes drilled for soil sample collection, five boreholes will be drilled and converted to four-inch inside diameter ground-water monitoring wells. One additional borehole will be drilled and converted to a two-inch inside diameter ground-water monitoring well. These wells will be used for ground-water sample collection, ground-water gradient and flow direction determination, and possible ground-water extraction if free product is encountered on the water table.

The five boreholes to be converted to four-inch monitoring wells will be drilled utilizing a truck-mounted drilling rig and 6-5/8 inch inside diameter hollow-stem augers as described above. The borehole to be converted to a 2-inch monitoring well will be drilled utilizing 4-1/4 inch inside diameter hollow stem augers.

The monitoring wells will be installed at a depth that ensures the interception of the water table and a 10-foot penetration of the water-bearing horizon beneath the site. The


AREA No. 1
Low Tide Line
EMBARCADERO
West Dock
Paint Shop
Oil Shed
AREA No. 2
Office and Stock room
Mach. Shop
Power Pack Shop
UST
Wash Tank
Materials Warehouse
Elec.
Pipe Shop
AREA No. 4
2"
Crane
Materials Dept.
AREA No. 5
Guard Shacks
Plate Shop
East Dock
AREA No. 3
Aboveground Storage Tanks
Power House
Warehouse
AREA No. 6
Area of potential environmental concern
Proposed monitoring well location
Proposed borehole locaction
Versar
FIGURE 3-1. LOCATIONS OF PROPOSED BOREHOLES AND MONITORING WELLS AT PACIFIC DRY DOCK YARD II
N
Approximate Scale
0
Feet
50

monitoring wells will be constructed using pre-cleaned, four-inch (or two-inch) inside diameter, Schedule 40 PVC screen with 0.010inch slots, unless the sieve analysis described in Section 3.4 indicates that another size slot is more appropriate. Schedule 40 PVC casing will extend from the screen to just below groundsurface. If necessary, bentonite chips will be placed in the bottom of the hole to ensure that no confining layers are breached. Clean sand will be placed in the annular space between the screen and the boring wall to a height of two feet above the top of the screen. A one-foot layer of bentonite chips will be placed above the sand, and neat cement will be used to fill the annular space to six inches below the surface. Locking well caps will be placed on the PVC casing and traffic covers will be set in concrete over the well. The traffic cover, which will identify the well as a monitoring well, will be set slightly above grade to help prevent surface water from entering the well. Figure 3-2 shows the typical construction of a ground-water monitoring well.

After the well screen, casing, and sand pack are installed and prior to the grout placement, the wells will be developed by surge block and bailing, in order to flush the fine particles from the surrounding formation materials. The well development will increase the yield of the well and decrease the turbidity of the ground water entering the well. Well development will continue until the turbidity is judged to be sufficiently reduced. After development is complete, the annular seal will be placed and allowed to set for 72 hours. The monitoring wells will then be purged by removing a minimum of five casing volumes of water, allowed to recover to approximately 80 percent of their original volume, and then sampled. One ground-water sample will be collected from each of the five monitoring wells to be submitted for laboratory analysis, as more fully described in Section 3.4.

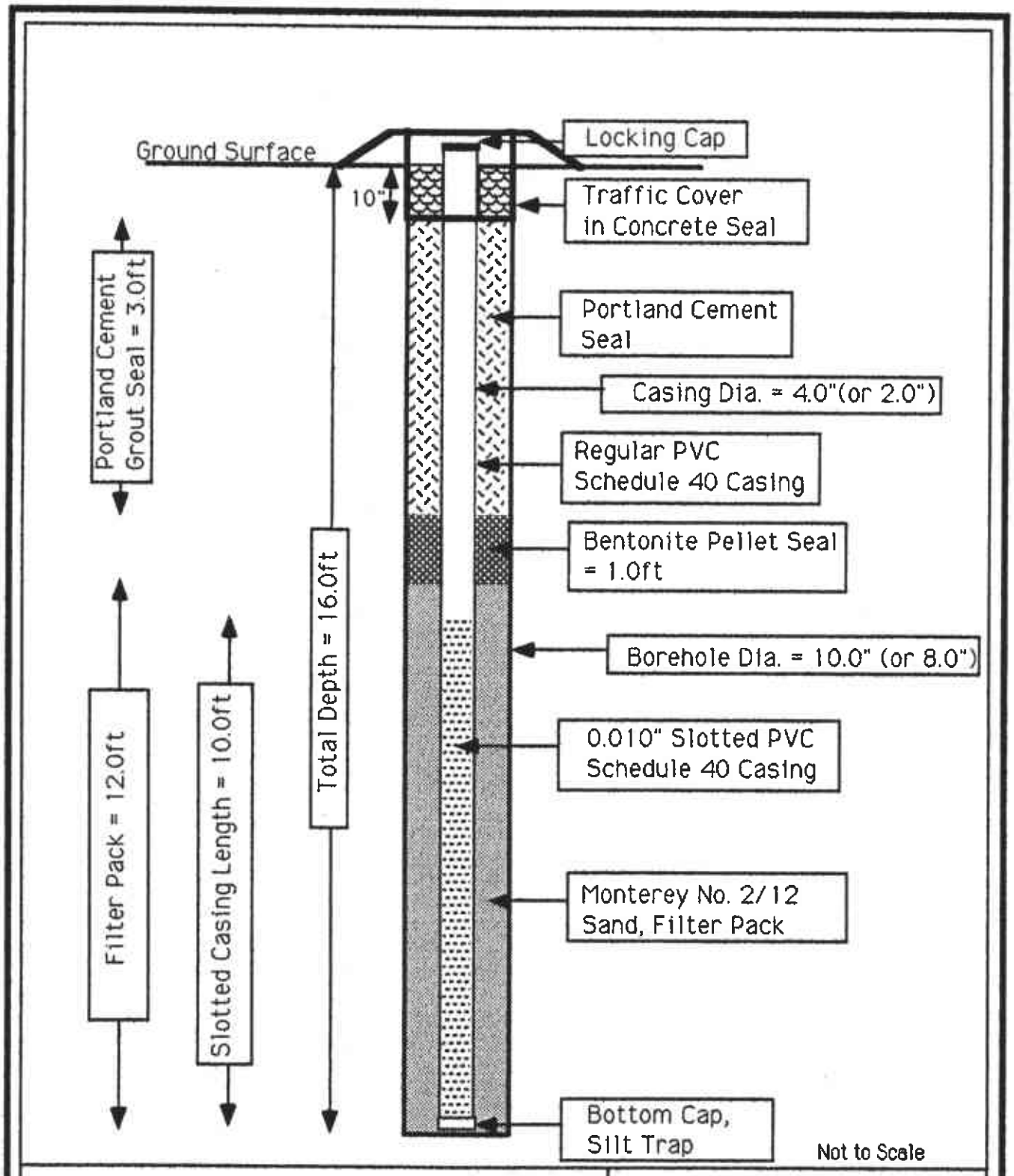


FIGURE 3-2. TYPICAL GROUND-WATER MONITORING WELL CONSTRUCTION

For all monitoring wells on site, the elevation of the top of the casing will be determined to mean sea level by a qualified land surveyor. These elevations will be used to determine ground-water gradient and direction of flow.

3.4 Collection of Samples

The following sections describe the procedures to be used for decontamination, soil sampling, and ground-water sampling to be performed at the PDD II site.

3.4.1 Decontamination Procedures

Ground-water sample containers will be pre-cleaned by the laboratory. The decontamination procedures for field sampling equipment and monitoring well purging equipment are presented below. Nondedicated and nondisposable sampling and well purging equipment will be carefully cleaned prior to each use, as follows:

- Carefully brush off any loose, foreign debris with a soft bristle brush.
- Rinse the equipment thoroughly in clean water.
- Wash the equipment in a nonphosphate detergent.
- Rinse thoroughly in clean water.
- Rinse thoroughly with deionized water.
- Air dry in a dust-free environment.
- Store in clean, disposable plastic bags or other suitable clean cover until use.

Clean, disposable gloves will be worn by all field personnel when handling decontaminated equipment.

3.4.2 Soil Sampling

As discussed in Section 3.1, soil samples will be collected either by driving a California modified split-spoon sampler or manually with a hand auger. Soil samples will be collected from

the split-spoon sampler in brass tubes which line the sampler. Samples will be collected at three-foot intervals in each borehole. The site supervisor will ensure that the samplers and the brass tubes are cleaned prior to collecting each sample as described in Section 3.2.1. Soil samples will be subjected to field analysis with either an organic vapor analyzer (OVA) or a photo-ionization detector (PID) as soon as the split spoon sampling device is opened. The middle brass sample tube will be reserved for possible laboratory analysis. No headspace will be present within the sample tube, in order to prevent the escape of volatiles. The ends of the tube will be covered with Teflon™ film, and fitted with plastic end caps; each tube will be labeled and sealed in a plastic bag. The laboratory samples will be immediately placed in an ice chest and stored at approximately 4°C. Soil samples will be selected for chemical analysis based on visual observations and field screening by on-site personnel.

Representative samples of the soil from another brass tube will be placed in a glass jar for headspace analysis. The jar will be sealed with aluminum foil and a lid, and warmed, allowing a portion of any volatile hydrocarbons present to vaporize and collect in the headspace. After approximately 10 minutes, the aluminum foil cover will be punctured using the probe of the OVA or PID, and a sample collected with the instrument to detect if organic vapors are present.

The upper brass tube will be used for descriptive logging of the soil using the Unified Soil Classification System (ASTM D-2487). This portion may also be used for sieve tests to facilitate the logging and selection of the sand pack and screen slot size for the potential of installation monitoring wells.

A maximum of 48 soil samples will be submitted for laboratory analysis, based on field screening techniques using the OVA or PID. The soil samples will be analyzed for Oil and

Grease by EPA Method 5520 C&F; total petroleum hydrocarbons (TPH) as diesel (TPH-D) by the Leaking Underground Fuel Tank (LUFT) Field Manual method; TPH as gasoline (TPH-G) with benzene, toluene, ethylbenzene, and xylene by a modified LUFT Field Manual method and semi-volatile organic compounds by EPA Method 8270; lead, copper, and mercury by EPA Methods 7420, 7210, and 7471, respectively; and CAM metals. Not all of the samples will be analyzed for all the above constituents.

3.4.3 Ground-Water Sampling

A maximum of six ground-water samples will be collected to determine if contamination is present in the ground water. The samples will be taken from the well after the removal of approximately five casing volumes of water. A dedicated bailer will be used for purging and sampling of the monitoring wells.

Ground-water samples will be collected, delivered to the laboratory, and analyzed for the same constituents as the soil samples (with the exception of lead, copper, and mercury), referenced in Section 3.2.2. Not all of the samples will be analyzed for all of the listed constituents. The following section summarizes the Versar protocol for purging a monitoring well prior to ground-water sampling.

- Remove the well cover and check the ambient air surrounding the well casing using either an OVA or a PID and record the reading in the field notebook.
- Remove the locking well cap and check the air space inside the well casing with either an OVA or a PID and record the reading in the field notebook.
- Measure the water level in the monitoring well using a decontaminated electronic water level detector with a visible or acoustical indicator. All measurements must be made to the nearest 0.01 foot and measured relative to the top of the well casing. Record the depth of water in the field notebook.

- Lower a decontaminated transparent bailer to the water surface in the monitoring well and carefully sample the uppermost interval of water. Retrieve the bailer and examine the surface of the water for floating product.

- Lower either a decontaminated, weighted wire line or the electronic water level detector, as appropriate, to the bottom of the monitoring well and note the total depth of the monitoring well. Record the depth measurement in the field notebook.

- Insert a dedicated bailer into the monitoring well and begin to purge. A calibrated receptacle must be positioned near the monitoring well to receive all of the fluid purged. The water will be withdrawn from the top of the water column. A minimum of five casing volumes will be purged from the monitoring well (or to dryness, as applicable). Do not allow the purge rate to reach a point where the recharge water is entering the well bore in an agitated state. In addition to removing five casing volumes of water, a grab sample of the purged fluid will be taken at the commencement of monitoring well evacuation and after each casing volume. The conductivity, temperature and pH of the grab sample will be measured and recorded in the field notebook. Purging will continue until the measured conductivity temperature and pH stabilize in the grab samples.

- Measure the purged volume in the designated receptacle. After the minimum specified volume has been withdrawn and the water conductivity, temperature and pH have stabilized (or the well has been pumped dry), stop bailing, note the time, remove the bailer, and measure the depth to water from the top of the ground surface. Make the appropriate entries on the field notebook.

Ground-water samples will be collected using the procedures given below:

- Measure the water level in the monitoring well using a decontaminated measuring device. All measurements must be made to the nearest 0.01 foot, and measured relative to the top of the casing. Record the depth of the water in the field notebook. A sample may be taken after the water level in the well recovers to greater than 80 percent of the original level.

- Inspect the dedicated bailer to ensure that the bottom check valve assembly is working correctly.
- Insert the bailer into the well and carefully lower the bailer. Take extreme care to avoid agitating and aerating the fluid column in the monitoring well.
- Slowly withdraw the bailer and transfer the water sample to the appropriate laboratory precleaned containers.
- Temperature, specific conductance, pH, and organic vapor concentration must be measured on aliquots of water prior to recovery of the primary samples. Water used for field measurements is not to be used to fill sample containers designated for laboratory analysis.

3.5 Field Quality Control

Sampling methods detailed in this work plan will be strictly adhered to; deviations or additions to this plan will be carefully documented in the field notebook. All field observations, field-generated forms, and labels will be noted and attached to the field notebook. Any photographs will be logged in the field notebook and labeled when returned from the photographic developing laboratory.

3.6 Sample Handling

All samples will be collected, placed in containers, preserved, and analyzed within the time constraints consistent with applicable US EPA, and California State and California Regional Water Quality Control Board (CRWQCB)-San Francisco Region procedures. All sample containers will be precleaned in accordance with prescribed EPA methods. Tape will be placed around all sample container lids to prevent leaks and to detect unauthorized tampering with individual samples following collection and prior to the time of analysis.

All samples will be tracked using Versar's standard chain-of-custody form. The chain-of-custody record will include the following information:

1. Sample number
2. Signature of collector
3. Date and time of collection
4. Sample collection location
5. Sample type
6. Signature of persons involved in the chain of possession
7. Inclusive dates of possession
8. Analytical parameters
9. Pertinent field observations

The custody record will be completed using waterproof ink. Any corrections will be made by drawing a line through and initialing the error, then entering the correct information.

Custody of the samples begins at the time of sample collection and will be maintained by the sampling team supervisor until samples are relinquished for shipment to the laboratory, or until samples are hand delivered to the designated laboratory sample custodian. Partial sample sets being accumulated for hand delivery to the laboratory will be stored in coolers with custody tape affixed.

Each sample shipment will be accompanied by a chain-of-custody record identifying its contents. The original record will accompany the shipment and the copy will be retained by the sampling team leader. The original (the top copy) will be enclosed in a plastic ZIPLOC™ bag and secured to the inside of the cooler lid with tape.

3.7 Site Safety Procedures

A designated site safety officer has been appointed for the investigation. The officer will be responsible for the adherence to a site safety plan and will be present during all of the drilling and sampling operations. Site personnel will wear gloves when handling the contaminated drill cuttings and samples. In addition, the drill cuttings and samples will be monitored with an analytical field instrument. If the site safety officer determines that harmful levels of organic vapors are present, all

need copy of

site personnel with don Tyvek™ coveralls and respirators. This equipment will be worn until the site safety officer determines that no harmful vapors are present. A copy of the site safety plan is included as Appendix A.

3.8 Contaminated Materials Control

Drill cuttings and purge water recovered during this investigation will be stored in sealed, Department Of Transportation-approved 55-gallon drums, or similar containers, in a secure area on site. The contents of the drums and the dates of collection will be clearly marked on appropriate labels. All equipment, decontamination material, and disposable personal protective gear will also be placed in appropriate containers. When the hazardous characteristics of these materials have been determined, they will be disposed of using proper procedures.

4.0 ADDITIONAL STUDIES

When the data obtained from the work described in this plan have been analyzed, additional activities may be required at the site. The additional work may include the installation of additional boreholes and/or ground-water monitoring wells to define aquifer characteristics or the extent of potential contamination and the implementation of a remedial action plan.

5.0 WORK SCHEDULE

The work will be initiated following the finalization and approval of this work plan. The mobilization will begin immediately thereafter upon scheduling of the drilling subcontractor and clearance of the borehole locations by utility locators. The drilling and sample collection is expected to take approximately five days. Sample results will be available within 30 working days after the laboratory receives the samples.

6.0 REPORT PREPARATION

The report will be presented in a format consistent with the agencies' request and will include a presentation of the results and conclusions of the site investigation.

7.0 REFERENCES

California Regional Water Quality Control Board-San Francisco Bay, List of Sites-Toxic Substances and List of Sites-Fuel Leaks.

California Regional Water Quality Control Board-Tri Regional Staff Board Recommendations for Investigation of Leaking Underground Tanks, August 1990.

Jennings, C.W., Geological Map of California, Division of Mines.

Norris, R.M. and Web, R.W., Geology of California, John Wiley and Sons, New York, 1976.

Pacific Aerial Surveys Aerial Photograph Library, Photograph Yard I: 1988, 1981, 1975, 1971, 1969, 1959, 1953, 1947, 1940, 1937, and 1934, 444 Pendleton Way, Oakland 94621.

U.S. Geological Survey Topographical Map, 7.5 Minute Series, Oakland East Quadrangle, 1959 (Photorevised, 1980).

U.S. Geological Survey Topographical Map, 7.5 Minute Series, Oakland West Quadrangle, 1959 (Photorevised, 1980).

Versar, Site Assessment of Pacific Dry Dock Yards 1 and 2, Oakland, California; Versar Job No. 6695.9, October 2, 1990.

8.0 APPENDIX

Appendix A comprises the Appendix of this work plan. The content of Appendix A is listed below.

Appendix A. Site Safety Plan

Versar INC. SACRAMENTO

APPENDIX

SITE INVESTIGATION WORK PLAN
PACIFIC DRY DOCK AND REPAIR YARD II
OAKLAND, CALIFORNIA

Appendix A. Site Safety Plan

Versar INC. SACRAMENTO

SITE SAFETY PLAN

FOR THE

PACIFIC DRY DOCK AND REPAIR YARD II
320 EMBARCADERO
OAKLAND, CALIFORNIA

Prepared for:

Crowley Maritime Corporation

Prepared by:

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

Versar Job No. 7703.29.1

Versar INC. SACRAMENTO

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Background

The Crowley Maritime Corporation has retained Versar to perform a site investigation at the Pacific Dry Dock and Repair Yard II located at 320 Embarcadero in Oakland, California.

1.2 Site Characterization

Client Name: Crowley Maritime Corporation

Location of Site: 320 Embarcadero, Oakland, California

Client Contact Person(s):

Name: Mr. George Brooks

Topography of the area surrounding the site:

Hilly ____ Flat __X_ Hummocky ____ Marshy ____
Mountainous ____ Other ____

Area affected:

Urban ____ Rural ____ Residential ____
Industrial__X__ Commercial __X_ Other ____

Types of bodies of water bordering the site, if any:

Stream ____ River ____ Pond ____ Lake ____ Bay __X_
Ocean ____ Other ____ None ____

Are the services being provided as a consequence of orders from local, state, or federal officials?

Yes __X_ No ____

1.3 Purpose

The primary purpose of this site safety plan is to present information in regards to site safety for Versar, Inc., field personnel and contractors involved in the investigation at the site. This plan provides all personnel with an understanding of the potential chemical and physical hazards that may exist while the investigation of the site is being performed. Secondary, the

information contained herein will define the safety precautions necessary to respond to such hazards should they occur.

1.4 Objective

The primary objective is to ensure the well being of all personnel involved in the investigation, and the community surrounding the site. All personnel assigned to this project shall be familiar with the subsurface concerns and this and other site safety plans. In the situation that contaminant material is encountered, all personnel directly related shall be required to sign the Agreement Statement in Section 8.1 to certify that they have read, understood, and agreed to abide by its provisions.

1.5 Hazard Determination

Serious ____ Moderate ____ Low __X_ Unknown ____

1.6 Level of Protection

__X_ Modified level D

The minimum acceptable level of protection at this site is a Modified Level D, as described in the 5.0 Section entitled "Health and Safety Requirements."

1.7 Amendments

Any change in the scope of this project and/or site conditions must be amended in writing in the 8.2 Section entitled Site Safety Plan Amendment Sheet and approved by the Health and Safety Manager.

Proposed time frame for the site work: July 1991 through August 1991.

2.0 PROJECT PERSONNEL

During the investigation of the site, Versar personnel will be available to monitor and assist in the situation that contaminated material is encountered. In the situation that contaminated material is encountered, the following management structure will be instituted for the purpose of safety.

2.1 Project Manager: R. Stephen Wilson

The project Manager will be responsible for implementing the project and obtaining the necessary personnel and resources for the project completion. Specific duties will include:

- providing authority and resources to ensure that the Site Safety Officer is able to implement and manage safety procedures
- preparing reports and recommendations about the project to clients and affected Versar, Inc. personnel
- ensuring that all persons allowed to enter the site (i.e. EPA, contractors, state officials, visitors) are made aware of the potential hazards associated with the substances known or suspected to be on site and are knowledgeable as to the on-site copy of the specific site safety plan
- ensuring that the Site Safety Officer is aware of all of the provisions of this site safety plan and is instructing all personnel on site about the site practices and emergency procedures defined in the plan
- ensuring that the Site Safety Officer is making an effort to monitor the site safety and has designated a Field Team Leader to assist with the responsibility when necessary.

2.2 Health and Safety Manager: James R. Frantes

The Health and Safety Manager shall be responsible for the overall coordination and oversight of the site safety plan. Specific duties will include:

- approving the selection of the types of personal protective equipment (PPE) to be used on site for specific tasks

- monitoring the compliance activities and the documentation processes undertaken by the Site Safety Officer

- evaluating weather and chemical hazard information and making recommendations to the Project Manager about any modifications to work plans or personal protection levels in order to maintain personal safety

- coordinating upgrading or downgrading of PPE with Site Safety Officer, as necessary, due to changes in exposure levels, monitoring results, weather, other site conditions

- approving all field personnel working on site, taking into consideration their level of safety training, their physical capacity, and their eligibility to wear the protective equipment necessary for their assigned tasks (i.e. respirator fit testing results)

- overseeing the air-monitoring procedures as they are carried out by site personnel for compliance with all company health and safety policies

2.3 Site Safety Officer: Yvonne M. Lembi

The Site Safety Officer shall be responsible for the implementation of the site safety plan on site. Specific duties will include:

- monitoring the compliance of field personnel for the routing and proper use of the PPE that has been designated for each task

- routinely inspecting PPE and clothing to ensure that it is in good condition and is being stored and maintained properly

- stopping work on the site or changing work assignments or procedures if any operation threatens the health and safety of workers or the public

- monitoring personnel who enter and exit the site and all controlled access points

- reporting any signs of fatigue, work-related stress, or chemical exposures to the Project Manager and/or Health and Safety Manager within 24 hours

- dismissing field personnel from the site if their actions or negligence endangers themselves, co-workers, or the public and reporting the same to the Project Manager and/or Health and Safety Manager within 24 hours

- reporting accidents or violations of the site safety plan to the Project Manager and/or Health and Safety Manager within 24 hours

- knowing emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire and police departments

- ensuring that all project-related personnel have signed the personnel agreement and acknowledgements form contained in this site safety plan

- coordinating upgrading and downgrading of PPE with the Health and Safety Manager, as necessary, due to changes in exposure levels, monitoring results, weather, and other site conditions

- performing air monitoring with approved instruments in accordance with requirements stated in this Site Safety Plan.

2.4 Field Team Leader: Jim Jensen

In the event that the Project Manager and the Site Safety Officer are not on the site, the Field Team Leader will assume all responsibility for enforcing safety procedures.

2.5 Field Personnel

All field personnel shall be responsible for acting in compliance with all safety procedures outlined in this site safety plan. Any hazardous work situations or procedures should be reported to the Site Safety officer so that corrective steps can be taken. The Health and Safety Manager and/or Site Safety Officer has the authority to halt any operation related to any contaminated material that does not follow the provisions of this Site Safety Plan.

3.0 EMERGENCIES

In the event of an accident or emergency situation, immediate action must be taken by the first person to recognize the event. First aid equipment is located on site inside the Versar, Inc. vehicle. Immediately after emergency procedures are implemented, notify (1) the Site Safety Officer and (2) the Project Manager and the Health and Safety Manager about the situation.

3.1 Emergency Telephone Numbers

Immediate Emergencies:

Local Police:	911
Fire:	911
Ambulance:	911
Medical:	911

Medical Emergency:

Highland Hospital
1411 East 31th Street
Oakland, California
(415) 534-8055

Environmental Emergency:

Versar, Inc.	(916) 962-1612
OSHA	(800) 648-1003
Poison Control Center	(800) 532-2222
National Responce Center	(800) 424-8802

3.2 Encountering Hazardous Situations (requiring evacuation)

Personnel encountering a hazardous situation shall **instruct others on site to evacuate the vicinity IMMEDIATELY** and call the (1) Site Safety Officer, (2) the Project Manager, and (3) the Health and Safety Manager for instructions.

The site must not be re-entered until the situation has been corrected (i.e. appropriate back-up help, monitoring equipment, personal protective equipment is at the site).

Usual Procedures for Injury

A. Call for ambulance/medical assistance if necessary. Notify the receiving hospital of the nature of the

physical injury or chemical overexposure. If a telephone is not available, transport the person to the nearest hospital.

B. Send/take this site safety plan with the attached Material Safety Data Sheet (MSDS) to medical facility with the injured person, if applicable.

C. If the injury is minor, proceed to administer first aid.

D. Notify the Site Safety Officer, Project Manager, and Health and Safety Manager of all accidents, incidents, or near miss situations.

3.3 Emergency Treatment

When transporting an injured person to a hospital, bring this site safety plan to assist medical personnel with diagnosis and treatment. In all cases of chemical overexposure, follow standard procedures as outlined below for poison management, first aid, and if applicable, cardiopulmonary resuscitation. Four different routes of exposure and their respective first aid/poison management procedures are outlined below:

A. Ingestion:

IMMEDIATELY transport the person to the nearest medical facility, or call the poison control center at **911**

B. Inhalation/Confined Space:

DO NOT ENTER A CONFINED SPACE TO RESCUE A PERSON WHO HAS BEEN OVERCOME UNLESS PROPERLY EQUIPPED AND A STANDBY PERSON IS PRESENT.

C. Inhalation/Other:

Move the person from the containment environment. Initiate CPR, if necessary. Call, or have someone call, for medical assistance. Refer to Material Safety Data Sheet for additional specific information. If necessary, transport the victim to the nearest hospital as soon as possible.

D. Skin Contact:

IMMEDIATELY wash off skin with a large amount of water. Remove any contaminated clothing and rewash skin. Transport person to a medical facility, if necessary.

E. Eyes:

Hold eyelids open and rinse the eyes IMMEDIATELY with copious amounts of water for 15 minutes. If possible, have the person remove his/her contact lenses (if worn). Never permit the eyes to be rubbed. Transport the person to a hospital as soon as possible.

4.0 CHEMICALS OF CONCERN

4.1 Chemical Hazards

Potential effects of any exposure are dependant on several factors such as: toxicity of substance, timeframe of exposure, concentration of substance producing the exposure, general health of person exposed, and individual use of hazardous reduction methods.

4.1.1 Gasoline

Gasoline is a complex mixture of hydrocarbons and additives. Chronic exposures or exposures to a high concentration of gasoline vapor may cause unconsciousness, coma and possibly death from respiratory failure. Exposure to low concentrations of gasoline vapor may produce flushing of the face, slurred speech, and mental confusion (see chart of properties, page 22 for further explanation).

Gasoline constituents can be divided into five major groups: alkanes, alkenes, cycloalkenes, aromatics, and additives. The aromatics are the constituents generally regarded to be of the greatest toxic concern. The major aromatics in gasoline ar benzene, toluene, and xylenes. Of these, benzene is considered to be the most potent. All of these chemicals can also irritate the skin if repeated or prolonged skin exposure occurs.

4.1.2 Benzene

Benzene can enter the body through inhalation, ingestion, and skin contact. Studies have noted that chronic exposure to benzene vapor can produce neurotoxic and hemopoietic (blood system) effects. Other effects can include headache, dizziness, nausea, convulsions, coma, and possible death if exposure is not reversed. The most significant chronic effect of benzene is bone marrow toxicity. Although the cause-effect relationship is not fully understood, it is believed that there might be a strong association between chronic exposures to benzene and the development of leukemia.

4.1.3 Toluene

Inhalation exposure to toluene vapor can produce effects such as central nervous system depression. Depending on exposure factors, signs and symptoms can include headache, dizziness, fatigue, muscular weakness, lack of coordination, drowsiness, collapse, and possible coma. Studies have noted anemia could be a possible effect of chronic exposure to toluene. Toluene can be a skin and mucous membrane irritant and has been shown to cause liver and kidney damage when overexposure is significant.

4.1.4 Xylenes

Depending on exposure factors, inhalation of xylenes vapor may produce central nervous system excitation followed by depression. Exposure to xylene vapor can produce dizziness, staggering, drowsiness, and unconsciousness. At very high concentrations, xylenes vapor may produce lung irritation, nausea, vomiting, and abdominal pain. Xylene is not known to possess the chronic bone marrow toxicity of benzene, but liver enlargement and nerve cell damage have been noted from chronic overexposure. Ingestion exposures to xylenes can produce temporary liver damage and should be avoided.

4.1.5 Ethylbenzene

Ethylbenzene is an eye, mucous membrane, respiratory tract, and skin irritant. High air levels can cause central nervous system depression, sense of chest constriction, headache and dizziness. Skin contact may cause irritation, inflammation and first or second degree burns.

4.2 Physical Hazard

The physical hazards are those typically associated with general construction. Slips, tripes, and falls are of primary concern in to accidnet prevention. The contractor will exercise care to maintain good housekeeping practices within the tank closure work area.

4.2.1 Heavy Equipment

The more severe accidents will be related to the use of heavy equipment. During activities, backhoes, cranes, and trucks will be used. All heavy equipment used on this project will be in good working order and operated in accordance with recognized industry standard and Cal-OSHA Title 8, Subchapter 4, Construction Safety Orders. Safety maintenance checks of all equipment shall be conducted just prior to the start of each work day. All chains, cables, grounding equipment, lifting machinery

shall be of sufficient grade or rating to handle the weights and conditions at the tank site. Employers and workers at the site shall comply with all Cal OSHA requirements including personal protection, safety, training, and safety planning rules. Removal activities that pose imminent hazard to site personnel will not be permitted. All cables, slings, and locks will be inspected daily by the contractor to insure that they are in safe working order. All cranes and backhoes will use side bracing when in operation to secure against lateral movement. Bracing will have secure footing.

4.2.2 Confined Space

Tank excavation pits are considered a confined space. Personnel may not enter into the pit unless the following conditions are met: (1) no obvious contaminated soil is visible; (2) oxygen levels are above 19.5% within the pit; (3) OVA readings indicate that total organic airborne concentrations are below the predetermined action level; and (4) pit walls are shored or sloped in accordance with Cal-OSHA Title 8, Subchapter 4, Construction Safety Orders, Section 1540.

5.0 HEALTH AND SAFETY REQUIREMENTS

5.1 Work Zone Access

Access in the situation that significant contamination is encountered within a 30-foot radius of any on-site operation is prohibited to all but Versar, Inc. field personnel and subcontractors. Standard work practices, such as performing field activities in the upwind position, will be observed whenever possible. Personal protective equipment indicated in Section 5.4 will be worn by all onsite field personnel, including the subcontractor's personnel.

Exclusion Zones

Formal exclusion zones are not expected to be required. The site is fenced and will remain so throughout all field activities. Unauthorized personnel will not be permitted near the work zone area.

Decontamination Zone

A formal decontamination zone may be required. It would be sited in the upwind direction from the work zone area. Decontamination procedures are covered in Section 5.5. All site personnel will be required to follow the procedures.

Support Zones

No formal requirements will be necessary for the support zone area, although the general practice of locating the zone in the upwind direction will be followed.

5.2 Air/Gas/Vapor Monitoring Procedures

The greatest potential hazards to safety and health at this site include:

1) Exposure to chemical vapors - through inhalation

2) Exposure to chemical contamination - through skin contact and ingestion

In the situation that soil and/or ground water contamination is encountered, ongoing air monitoring during project tasks will be provide data to ensure that vapor concentrations are within acceptable ranges and will provide adequate selection criteria for respiratory and dermal protection.

- If PID/FID readings exceed 50 units, an air purifying respirator with organic cartridges must be worn by all site workers within any area where monitoring results exceed 50 units.

- If PID/FID readings exceed 500 units, Level B protection will be required. Personnel must leave the site immediately and contact the Site Safety Officer or the Health and Safety Manager for further instructions.

- Respirator cartridges will be changed once per day as a minimum. This can be accomplished at the end of the work day during respirator decontamination. If odor breakthrough is detected while wearing the respirator or breathing becomes difficult, change cartridges immediately.

5.3 Action Levels/Level of Personal Protection Equipment (PPE)

Air monitoring instrument	LEVEL D <50 units	LEVEL C 50-500 units	LEVEL B >500 units

5.4 Personal Protective Equipment

Modified Level D is the minimum acceptable level for this site. Modified Level D provides minimal dermal protection. Respiratory protection is optional unless air monitoring data indicates otherwise.

Modified Level D includes:

- coveralls/work uniform
- Tyvek (optional)
- Nitrile butyl-rubber or Viton gloves (optional)
- boots/shoes, leather or chemical resistant, with steel shank and approved toe protection
- approved safety glasses or chemical splash goggles if the potential for splash exists
- hard hat
- reflective traffic vest (if traffic, construction, or other related activities are present)
- hearing protection (as appropriate)

B. Additional equipment upgrade:

1. Protocols for upgrading

   Once air monitoring data are complete and results are tabulated on the initial site entry, the Site Safety Officer and/or Health and Safety Manager will determine if changes in PPE are needed.

2. Upgraded equipment

   a. Respirators

      Respirators with organic vapor cartridges shall be worn by all personnel if photo-ionization detector readings exceed 50 units.

   b. Other

Tyvek suits and appropriate gloves shall be worn if potential for dermal exposure exists while performing job tasks.

C. First Aid Equipment

Vehicles used for site work will be equipped with a first aid kit and safety equipment including:

- cones and flags
- barricades
- fire extinguisher
- water, suitable for drinking
- portable eye wash
- appropriate emergency bandage material

5.5 Decontamination Procedures

All operations conducted at this site have the potential to contaminate field equipment and personal protective equipment (PPE). To prevent the transfer of any contamination to vehicles, administrative areas, and other personnel, the following procedures must be followed:

1. Whenever possible, field equipment should be decontaminated with a solution of Alconox or Green Soap and thoroughly rinsed with water prior to leaving the site. This must be done outside of any work area or the hot zone.

2. Disposable PPE (for example, Tyvek suits, respirator cartridges) must be bagged and disposed of at the site.

Personal Decontamination

Level D: Segregated Equipment Drop

- wash/rinse outer boot (as appropriate)
- wash/rinse chemical resistant outer glove, then remove as appropriate
- remove and throw out inner disposable gloves in designated, lined receptacles

Level C: Segregated Equipment Drop

- wash/rinse outer boots
- wash/rinse chemical resistant outer gloves, then remove tape and gloves
- remove chemical resistant suit (remove by rolling down suit from the inside)
- remove outer boots
- remove first pair(s) of disposable gloves

- remove respirator, hard hat/faceshield and properly dispose of cartridges; wash respirator
- remove last pair of disposable gloves

Level B: Segregated Equipment Drop
- wash/rinse outer boots
- wash/rinse chemical resistant outer gloves
- cross hotline (into clean area) and change air tanks, then redress or
- cross hotline (into clean area)
- remove boots and gloves
- remove SCBA, if worn over chemical resistant suit
- if SCBA is worn under the suit, remove the chemical resistant suit, then the SCBA
- remove hard hat

5.6 Field Procedures

A digsafe number must be obtained from appropriate agency prior to drilling, excavation or trenching. To determine presence of subsurface metal utility lines, tanks and/or drums, a metal detector should be used before excavating on a site.

During the operation, two persons (one designated as "operator" and the other as the "helper") must be present at all times. The helper (whether Versar, Inc. personnel or subcontractors) must be instructed as to the whereabouts of the emergency shut-off switch. Every attempt must be made to keep unauthorized personnel from entering the work area. If this is not possible, the operation should be shut down until the area is cleared. The Site Safety Officer or the Field Team Leader has the authority and responsibility to shut down the excavating operations whenever a hazardous situation is deemed present.

The arm of the any equipment should maintain a preferred clearance of 20 feet from any overhead electrical cables, with 10 feet being the minimum. All operations will immediately cease during any hazardous weather conditions.

Hard hats and safety boots shall be worn at all times.

5.7 Electrical Equipment and Ground Fault Circuit Interrupters

All electrical equipment and power cables used in and around wells or structures containing chemical contamination must be explosion-proof and/or intrinsically-safe and equipped with a three-wire ground lead that has been rated as explosion-proof for hazardous atmospheres (Class 1 Div 1&2). In accordance with OSHA 29 CFR 1926.404, approved ground fault circuit interrupters

(GFCI) must be utilized for all 120 vault, single-phase, 15 and 20 amp receptacle outlets on the site that are in use by employees and that are not part of the permanent wiring as defined by the NEC 1987. Receptacles on the ends of the extension cords are not part of the permanent wiring and therefore, must be protected by GFCI's whether or not the extension cord is plugged into permanent wiring.

The GFCI is a fast-acting circuit breaker that senses small imbalances in the circuit caused by current leakage to ground, and in a fraction of a second, shuts off the electricity. However, the GFCI will not protect the employee from line-to-line contact hazards such as a person holding two "hot" wires or a hot and neutral wire in each hand. The GFCI does provide protection against the most common form of electrical hazard - the ground fault. It also provides protection against fires, overheating, and destruction of wire insulation.

GFCI's can be used successfully to reduce electrical hazards on construction sites. Tripping of GFCI's interruption of current flow, is sometimes caused by wet connectors and tools. It is good practice to limit exposure of connectors and tools to excessive moisture by using watertight or sealable connectors. Providing more GFCI's on shorter circuits can prevent tripping caused by the cumulative leakage from several tools or by leakages from extremely long circuits. (Adapted from OSHA 3007; Ground-Faulting Protection on Construction Sites - 1987.)

5.8 Fire Protection

Only approved metal cans will be used to transport and store flammable liquids. All gasoline and diesel-driven engines requiring refueling must be shut down and allowed to cool before filling. No open flame or spark is allowed in any area containing petroleum products or other flammable liquids.

Smoking is not allowed during any operations within the work area in which petroleum products or solvents in free-floating, dissolved or vapor forms, or other flammable liquids may be present.

5.9 General Health

Medicine and alcohol can increase the effects of exposure to toxic chemicals. Unless specifically approved by a qualified physician, prescription drugs should not be taken by personnel assigned to operations where the potential for absorption, inhalation, or ingestion of toxic substances exists.

Drinking and driving is prohibited at any time. Driving at excessive speeds is always prohibited. Skin abrasions must be thoroughly protected to prevent chemicals from penetrating the abrasion.

It is recommended that contact lenses not be worn by persons working on the site.

6.0 EMPLOYEE TRAINING

All Versar employees with the potential for hazardous exposures are required to participate in an initial minimum of 40 hours of training to recognize, evaluate, and control site hazards. Three days of supervised field-training is also included within the initial training program. Project manager level and above must also participate in an additional eight-hour supervisory training course. Once employees have received the above training, they receive a certificate of completion and are scheduled for an eight-hour refresher training session within one year of their initial training. Versar training includes specific details on the following:

- regulatory requirements
- confined space entry
- respiratory protection
- hazard communication
- decontamination procedures
- incident command system
- first aid/CPR
- air monitoring
- toxicology
- Prop. 65 (California)
- fire technology
- personal protective equipment

7.0 MEDICAL MONITORING PROGRAM

All Versar Inc. field personnel are required to have annual medical evaluations in accordance with the company's Health and Safety Program policy. Additional re-evaluation will be considered in the event of chemical over-exposure while working on this site.

The chemicals typical of this site can affect specific organ systems producing characteristic health effects. The medical evaluation will, therefore, focus on the liver, kidney, nervous system, blood systems, and skin and lung function. Laboratory testing will include complete blood count, and applicable kidney and liver function tests. Other tests include skin examination.

8.0 DOCUMENTATION

8.1 Site Safety Plan Agreement

In the situation that significant contamination is encountered which could come into contact with site development personnel, all details of this site safety plan will be implemented. Versar personnel have the authority to stop work performed by our subcontractors at this site if any work is not performed in accordance with the requirements of this Site Safety Plan.

All Versar Inc. project personnel and subcontractor personnel are required to sign the following agreement prior to conducting work at the site.

A. I have read and fully understand the Site Safety Plan and my individual responsibilities.

B. I agree to abide by the provisions of the Site Safety Plan.

Name	Company	Date	Signature

Versar INC. SACRAMENTO

8.2 Site Safety Plan Amendment Sheet

Project Name: _____

Project Number: _____

Location: _____

Changes in field activities or hazards:

Proposed Amendment:

Proposed By: _____ Date _____

Approved By: _____ Date _____
Project Manager

_____ Date _____
Health & Safety Manager

Declined By: _____ Date _____

Amendment Effective Date _____