Versar INC. SACRAMENTO

# SITE INVESTIGATION WORK PLAN
# PACIFIC DRY DOCK AND REPAIR YARD I
# EASTERN SECTION
# OAKLAND, CALIFORNIA

Prepared for:

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Versar Job No. 7703.27.1

June 13, 1991

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## FOREWORD

This site investigation work plan was prepared by Versar Inc. of Sacramento, California for Crowley Maritime Corporation. Mr. John C. Bird, R.E.A., Hydrogeologist, prepared this work plan. Mr. R. Stephen Wilson, Senior Geologist, reviewed this plan. This work will be performed under the supervision of Mr. Wilson and Mr. James R. Frantes, R.G., Department Head, Environmental Geoscience Department.

Reviewed By:

John C. Bird

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Hydrogeologist

Approved for Release:

for Michael 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 work plan. 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 eastern section of the inactive Pacific Dry Dock and Repair Yard I (PDD I) facility located at 1441 Embarcadero in Oakland, California. Crowley Maritime Corporation has elected to divide the PDD I facility into the western section and eastern section in order to facilitate their future development plans for the western section. The site investigation work plan for the western section of the PDD I facility has previously been developed and submited to the Alameda County Health Agency. The following site investigation work plan encompasses the eastern section of the PDD I and will provide information for remedial action recommendations, if deemed necessary. As of May 1991, Crowley Maritime Corporation has ceased dry dock and boat repair operations at the PDD I facility.

## 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) driving approximately 20 boreholes to a depth between six and eight feet below the ground surface; (2) collecting soil and ground-water samples for laboratory analysis; (3) analyzing soil and ground-water samples to determine accurate constituent concentrations; and (4) preparing a comprehensive report presenting the results and conclusions of the site investigation.

## 1.2 Project Location

The PDD I facility is located at 1441 Embarcadero in Oakland, California. The city and the site location are presented in Figures 1-1 and 1-2, respectively. The eastern section of the PDD I is shown in Figure 1-3.

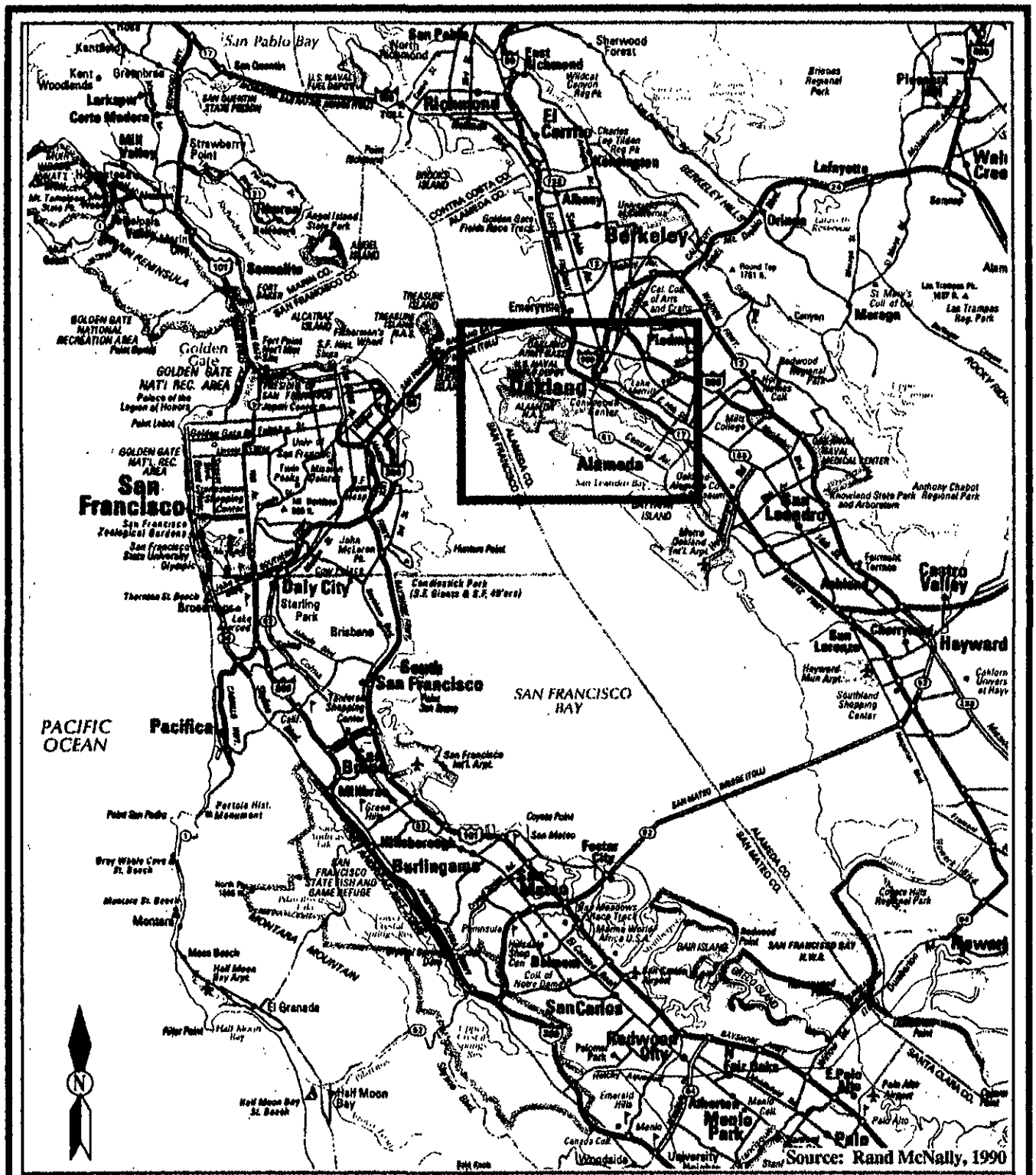


**FIGURE 1-1. LOCATION OF THE CITY OF OAKLAND, CALIFORNIA**

Versar

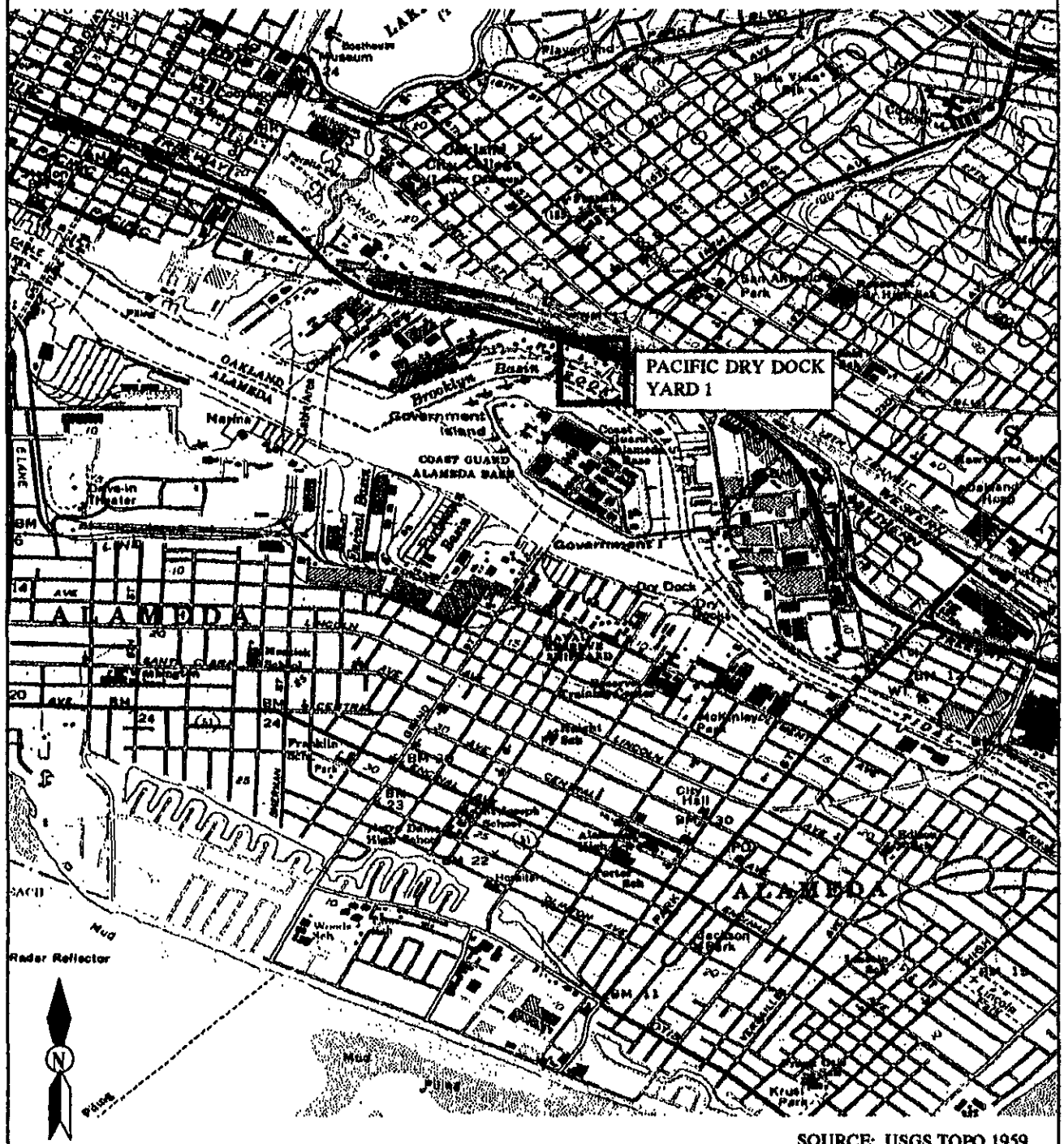


**FIGURE 1-2. LOCATION OF PACIFIC DRY DOCK YARD I**

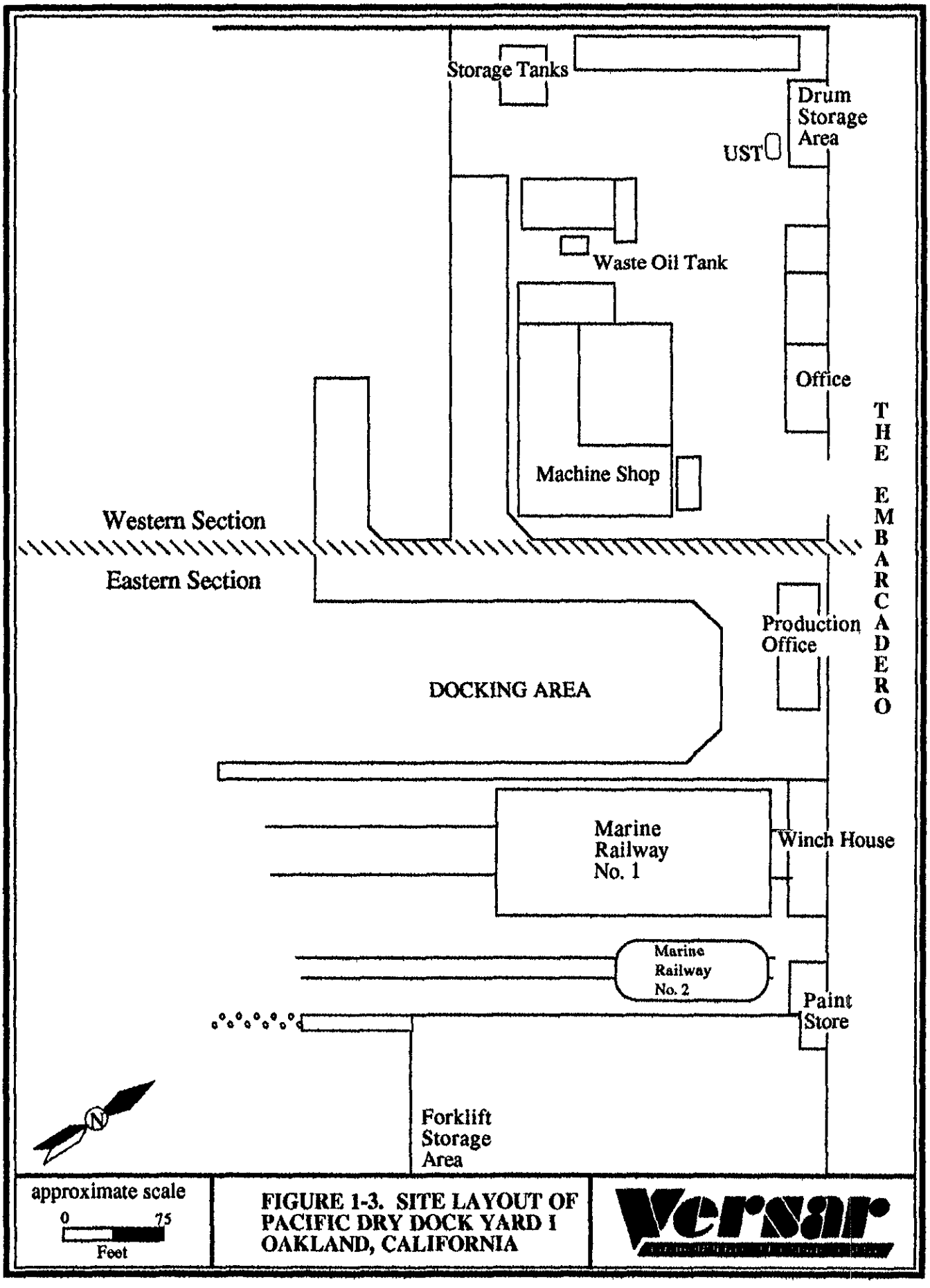


**FIGURE 1-3. SITE LAYOUT OF PACIFIC DRY DOCK YARD 1 OAKLAND, CALIFORNIA**

### 1.3 Site History

Crowley Maritime Corporation has ceased dry dock and boat repair operations at the PDD I facility. The PDD I facility had been used as a boat repair and dry dock facility from approximately 1935 to May 1991, by Crowley Maritime Corporation or by other companies. A review of historical aerial photograghs indicated that the PDD I facility was the first commercial facility to be located west of the railway tracks. The land use in the area surrounding the PDD I facility appears to have been light industrial and commercial offices from 1953 to the present day.

During research conducted for the Site Assessment of the property, aerial photographs from 1934 to 1987 were reviewed. The PDD I facility is shown in the 1953 photograph as the only developed site in the area of the shoreline. Review of historical aerial photographs did not identify any specific environmental concerns in the area around PDD I facility.

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. The PDD I facility currently appears to be following a hazardous materials management plan regarding the regulated wastes which were previously generated at the site.

## 2.0 SITE DESCRIPTION

The following section describes the site location, surface water, topography, geology, geohydrology and previous investigations for the PDD I 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. The PDD I facility is located at 1441 Embarcadero, in the southwest section of the city of Oakland.

## 2.2 Surface Water and Topography

The PDD I facility 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

The City of Oakland is located in the Coast Range geomorphic province, at an average elevation of 70 feet above mean sea level. The area, situated between the Hayward Fault on the east and the San Andreas Fault on the west, is tectonically active. 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 I facility consists of fill material overlying silty clays and younger 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, it is expected to move from on shore towards the harbor. Both ground-water flow direction and depth are subject to tidal fluctuations. The ground water is considered nonpotable, and saline and has no beneficial uses at this time.

## 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 and as part of a two phased field investigation, Versar sampled the soil on the eastern section of the PDD I facility. The facility is covered by asphalt and is generally underlain by varying thicknesses of fill material, overlying 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 I facility, eastern section, soil sample locations are shown in Figure 2-1 and are more fully described below.

A total of eight soil locations were sampled during two phases from the eastern section of the PDD I facility. A total of 11 samples were collected from the eight locations using 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.

PDDI-4-0.5/3.0: Samples were taken at 0.5 feet and 3.0 feet in an area below the production office. The area is a trap for spent sand blasting material and dark staining of the material was indicative of possible hydrocarbon contamination.

PDDI-5-0.5/2.5: Used batteries and forklift trucks are stored on on the southeastern edge of the site. Samples were taken at 0.5 feet and 2.5 feet in the intratidal zone after a sheen was noticed on the surface.

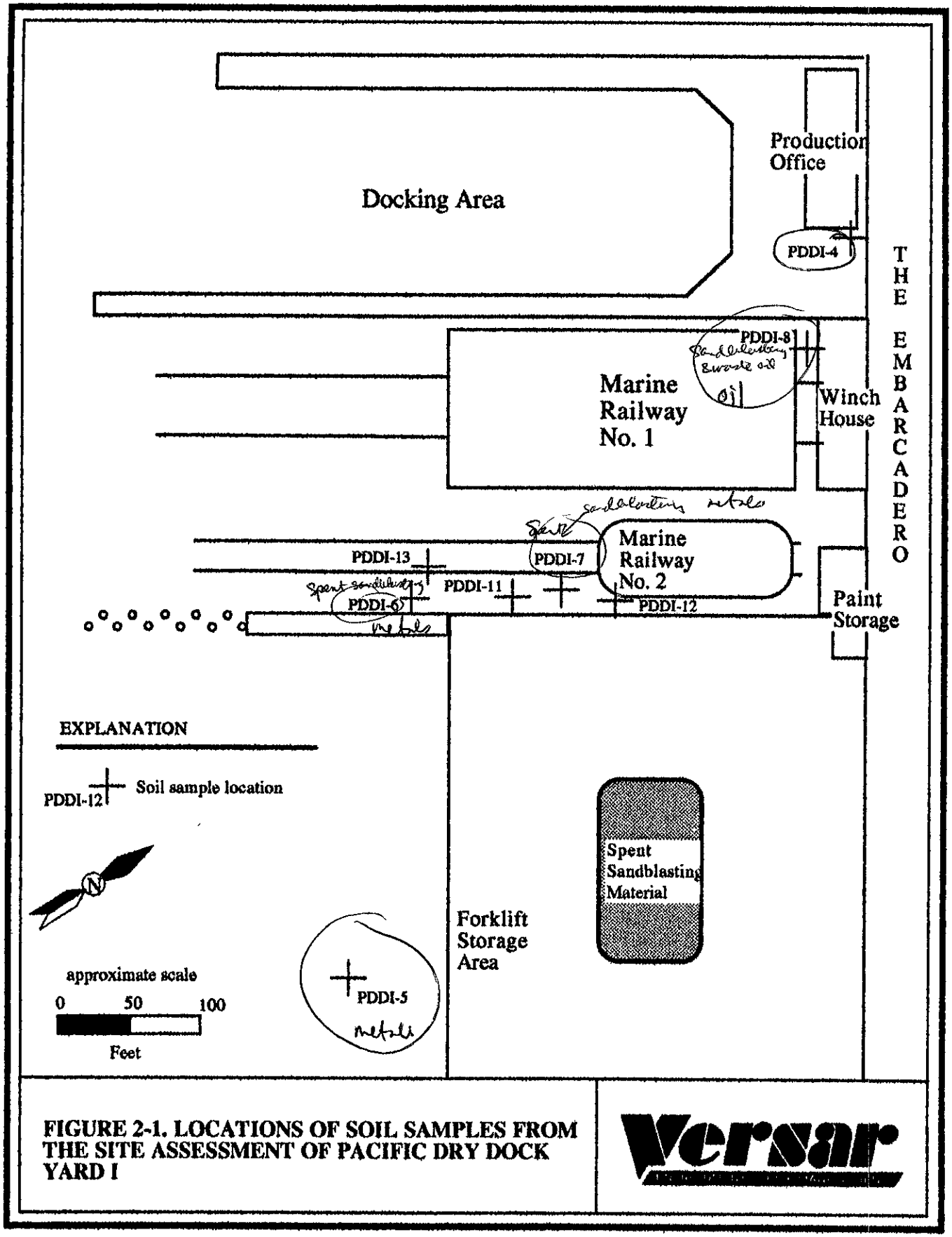


**FIGURE 2-1. LOCATIONS OF SOIL SAMPLES FROM THE SITE ASSESSMENT OF PACIFIC DRY DOCK YARD I**

PDDI-6-0.5/2.5: Samples were taken at 0.5 feet and 2.5 feet in the intratidal area to the west of former Marine Railway No. 2. The sediment section at this point is composed almost completely of spent sand blasting material.

PDDI-7-1.5: A sample was taken at a depth of 1.5 feet below surface to the south of the tracks for former Marine Railway No. 2. The yard historically used spend sand blasting material as a fill material. The sample was taken at the contact between native fill and spent sand blasting material.

PDDI-8-0.5: A sample was taken at 0.5 feet in the area between the paint store and Marine Railway No. 1. The area has a build up of spend sand blasting material and apparent waste oil build up.

After laboratory analytical results had been obtained, six additional samples were collected and analyzed. PDDI-11-1.5 and PDDI-12-0.5 were taken adjacent of PDDI-7-1.5 to determine the lateral extent of high metal concentrations. PDDI-13-1.0 was taken adjacent to PDDI-6-0.5/2.5 to determine if petroleum hydrocarbons were being flushed from the sediment.

The eight samples were analyzed for total petroleum hydrocarbon (TPH) by EPA Method 418.1. The samples contained a wide range of petroleum hydrocarbon concentrations from 720 milligrams per kilogram (mg/kg) in sample PDDI-4-3.0, to 53,000 mg/kg in PDDI-8-0.5. Two samples, PDDI-4-0.5 and PDDI-8-0.5, were analyzed for volatile organics and semivolatile organic compounds by EPA Method 8240 and EPA Method 8270, respectivley. Neither of the samples contained any of the method's analytes at or above the method's reporting limits.

Three samples, PDDI-5-2.5, PDDI-6-2.5 and PDDI-7-1.5, were analyzed for the California Administrative Manual (CAM) metals. Sample PDDI-7-1.5 contained copper (3,700 mg/kg), lead (4,400 mg/kg), and mercury (21 mg/kg) concentrations in excess of the Total Threshold Limit Concentration (TTLC).

One sample was analyzed for TPH (purgeable and extractable) by the State of California, State Water Resources Control Board, Leaking Underground Fuel Tank (LUFT) Field Manual method, and the DHS Method. Sample PDDI-13-1.0 contained 320 mg/kg of petroleum hydrocarbons as diesel.

## 3.0 PROPOSED INVESTIGATION METHODS AND PROCEDURES

Versar's proposed investigation includes driving approximately 16 boreholes for the collection of soil and ground-water samples. The actual number of boreholes will be decided in the field based on encountered field conditions. The proposed locations of the boreholes are presented in Figure 3-1.

### 3.1 Coring of Boreholes

The following section describes the rationale for borehole placement and the protocol for borehole installation for the collection of soil and ground-water samples in areas of known or suspected environmental impairments. The rationale for the selection of the areas are as follows:

Area No.1 Production Office and Docking Area: This area was identified in the site assessment as an area with elevated concentrations of petroleum hydrocarbons in the shallow soil. Approximately four shallow soil boreholes will be advanced in this area to further define the areal extent and concentration of petroleum hydrocarbons within the shallow soil and ground water.

TPH s,d maybe O&G

Area No.2 Marine Railways and Paint Storage Area: This area was indentified in the site assessment as an area with above TTLC for copper, lead and mercury and elevated concentrations of petroleum hydrocarbons within the shallow soil. Approximately five shallow soil boreholes will be advanced in this area to further define the areal extent and concentrations of the contaminants within the shallow soil and ground water.

metals minimally. TPH g,d,org

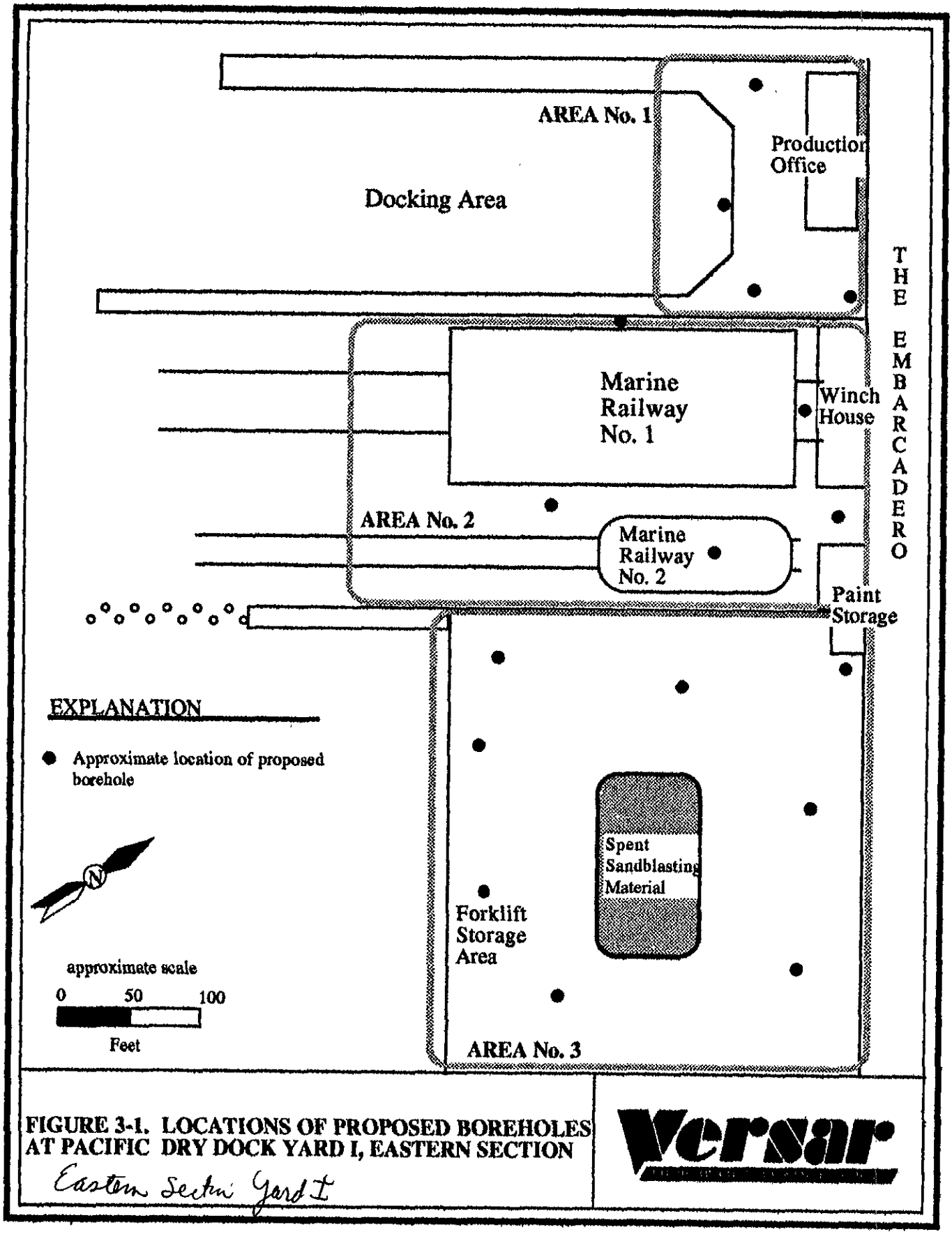


**FIGURE 3-1. LOCATIONS OF PROPOSED BOREHOLES AT PACIFIC DRY DOCK YARD I, EASTERN SECTION**

Eastern Section Yard I

Area No.3 Spent Sandblasting Material and Forklift Storage Area: This area was indentified in the site assessment as an area with elevated concentrations of petroleum hydrocarbons within the shallow soil. Approximately eight shallow soil boreholes will be advanced in this area to further define the areal extent and concentrations of the petroleum hydrocarbons and metals within the shallow soil and ground water.

TPHg, d oils metals

Versar proposes to contract Powercore Soil Sampling, Inc. of Antioch, California to perform the soil sampling on the eastern section of the PDD I facility. Powercore Soil Sampling, Inc. makes use of hydraulically operated machinery to provide the necessary force to drive and retrieve soil samplers.

According to the Powercore Soil Sampling Protocol for Soil Coring, the following procedures will be used.

The samples will be collected by using a hydraulically actuated hammer which is hoisted into position over the drill string and sampler. The hammer is rated at 70 pounds and will deliver this force at 1,000-1,200 blows per minute. The drill string consists of one and three quarters inch diameter steel drilling rod attached to a split spoon sampler. The split spoon sampler is two-inch outside diameter by one and one half inch inside diameter by 24 inches in length. Prior to driving each borehole, the sampling equipment will be decontaminated in accordance with the methodology described in Section 3.2.1 of this work plan. The drill string and sampler will be driven into the ground and then retrieved. Soil samples will be collected at two-foot intervals for field description, field analysis, and possible laboratory analysis. A maximum of four soil samples will be collected from each borehole. Soil sampling within each borehole will be performed in accordance with the methodology described in Section 3.2.2 of this work plan.

If ground water is encountered while driving the borehole, every attempt will be made to obtain a ground-water sample. The ground-water samples will be screened for volatile organic vapors in the field. The sampling will be preformed in accordance with methodology described in Section 3.2.3 of this work plan.

3.2 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 I facility.

3.2.1 Decontamination Procedures

Ground-water sample containers will be pre-cleaned by the laboratory. The decontamination procedures for field sampling equipment and borehole 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.

3.2.2 Soil Sampling

As discussed in Section 3.1, soil samples will be collected by hydraulically driving a split-spoon sampler. Soil samples

will be collected in four brass tubes which line the split-spoon sampler. Samples will be collected at two-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 second 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 the third 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 organic compounds present to vaporize and collect in the headspace. After approximately 10 minutes, the lid will be removed, the aluminum foil cover punctured using the probe of the OVA or PID, and a sample collected with the instrument to detect if volatile organic vapors are present.

The first and fourth brass tubes will be used for descriptive logging of the soil using the Unified Soil Classification System (ASTM D-2487). These portions may also be used for sieve tests to facilitate the logging and selection of sand pack and screen slot size for any potential future monitoring well installations.

A maximum of 30 soil samples will be submitted for the laboratory analysis, based on field screening techniques using the OVA or PID. The soil samples will be analyzed for total recoverable petroleum hydrocarbons 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) and benzene, toluene, ethylbenzene, and xylene by the LUFT Field Manual method; California Assessment Manual Metals; and semi-volatile organic compounds by EPA Method 8270. Not all of the samples will be analyzed for all the above constituents.

need to be more specific

3.2.3 Ground-Water Sampling

A maximum of five ground-water samples will be collected to determine if contamination is present in the ground water. The samples will be taken from the annular space within the borehole after the removal of approximately four borehole volumes of water. A one and one quarter inch outside diameter dedicated bailer will be used for purging and sampling of the boreholes.

where will gw samples be taken? By how selected?

Ground-water samples will be collected, delivered to the laboratory, and analyzed for the same constituents as the soil samples referenced in Section 3.2.2. The following section summarizes the Versar protocol for purging a borehole prior to ground-water sampling.

- Check the ambient air surrounding the borehole using either an OVA or a PID and record the reading in the field notebook.
- Check the air space inside the borehole with either an OVA or a PID and record the reading in the field notebook.
- Measure the water level in the borehole 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 ground surface. Record the depth of water in the field notebook.

- Lower a decontaminated transparent bailer to the water surface in the borehole 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 borehole and note the total depth of the borehole. Record the depth measurement in the field notebook.

- Insert a dedicated bailer into the borehole and begin to purge the borehole. A calibrated receptacle must be positioned near the borehole to receive all of the fluid purged. The water will be withdrawn from the top of the water column. A minimum of four volumes will be purged from the borehole (or to dryness, as applicable). Not allowing the purge rate to reach a point where the recharge water is entering the borehole in an agitated state. In addition to the requirement to remove four volumes of water, a grab sample of the purged fluid will be taken at the commencement of borehole evacuation and after each borehole 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 borehole 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 borehole using a decontaminated measuring device. All measurements must be made to the nearest 0.01 foot, and measured relative to the ground surface. Record the depth of the water in the field notebook. A sample may be taken after the borehole water level recovers to greater than 80 percent of the original level.

- Inspect the dedicated, one and one quarter inch outside diameter disposable bailer to ensure that the bottom check valve assembly is working correctly.
- Insert the bailer into the borehole and carefully lower the bailer. Take extreme care to avoid agitating and aerating the fluid column in the borehole.
- Slowly withdraw the bailer and transfer the water sample to the appropriate sample 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.

### 3.3 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.

### 3.4 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 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 Zip-Loc™ bag and secured to the inside of the cooler lid with tape.

### 3.5 Site Safety Procedures

A designated site safety officer was appointed for this investigation. He will be responsible for the adherence to a site safety plan and will be present during all of the soil coring and sampling operations. Site personnel will wear gloves when handling the contaminated cuttings, soil samples and water samples. In addition, the 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 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.

### 3.6 Contaminated Materials Control

Borehole 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 further define the aquifer characteristics and 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 Powercore Soil Sampling, Inc. and clearance of the borehole location by utility locators. Soil coring and sample collection is expected to take

one to two days. Laboratory 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, Calfornia; 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

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# APPENDIX

## SITE INVESTIGATION WORK PLAN
## PACIFIC DRY DOCK AND REPAIR YARD I
## EASTERN SECTION
## OAKLAND, CALIFORNIA

Appendix A. Site Safety Plan

Versar INC. SACRAMENTO

# APPENDIX A

## Site Safety Plan

Versar INC. SACRAMENTO

# SITE SAFETY PLAN

FOR THE

SITE INVESTIGATION WORK PLAN
PACIFIC DRY DOCK AND REPAIR YARD I
EASTERN SECTION
OAKLAND, CALIFORNIA

Prepared for:

Crowley Maritime Corporation

Prepared by:

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Versar Job No. 7703.26.1

Versar INC. SACRAMENTO

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## 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 located at 1441 Embarcadero in Oakland, California.

### 1.2 Site Characterization

Client Name: Crowley Maritime Corporation

Location of Site: 1441 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: June 1991 through July 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:** John C. Bird

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 |
|---|---|---|---|
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## 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 _____