Versar INC. SACRAMENTO

REVISED INSHORE SEDIMENT IMPAIRMENT STUDY
PACIFIC DRY DOCK AND REPAIR YARD I
OAKLAND, CALIFORNIA

Prepared for:

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Versar Job No. 1457-028

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- The inshore sediments at the facility appear to have been impacted by operations at the site. However, the concentrations of organotin and polynuclear aromatic hydrocarbon compounds detected are not currently impacting the sea water in the vicinity of the facility.

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

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1.0 INTRODUCTION

This report describes the methods, procedures and findings of a sediment impairment study at the Pacific Dry Dock and Repair Yard I facility (PDD) in Oakland, California, (hereinafter referred to as the "Site"). The location of the Site is shown in Figure 1.

This sediment study has been prepared by Versar Inc. (Versar), on behalf of Crowley Maritime Corporation, Pacific Division (Crowley), in response to the letter from the Regional Water Quality Control Board-San Francisco Bay Region (RWQCB) dated August 6, 1990. The letter requested that a sediment study be implemented based on the data collected during a preliminary site assessment of the Site (Versar, 1990) and the analysis of sediment samples collected by the RWQCB. This sediment study was performed to determine the concentrations and the probable areal extent of the compounds which may be a cause of potential environmental impairment, as identified in previous studies.

1.1 Background/Site History

The Site was used as boat repair and dry dock facilities from approximately 1935 to May 1991 by Pacific Dry Dock and Repair or by other companies. Boat repair operations ceased during May 1991. The Site consists of two marine railways, machine and carpentry shops, warehouses and support offices. The Site layout is presented in Figure 2.

The predominant activity at the Site was the repair and refurbishing of boats and ocean-going vessels. Some vessels were placed on the marine railways while some remained afloat for repair work to be performed. Vessels to be placed on the marine railway were aligned at high tide and, as the tide receded, the vessels were secured to the railway platform. The railway platform was then pulled to the high water line, where the work was performed. Some of the vessels' hulls were cleaned by high

pressure water while others were stripped using air-blown grit (sand blasting) to remove barnacles, rust, paint and other debris. The majority of the spent sand-blasting grit (grit) and detritus was recovered on the railway platform. However, some of the spent sand-blasting grit and detritus was allowed to fall from the platform and enter the water of the Brooklyn Basin. The materials collected from the platform were disposed of at a recycling facility.

During September 1989, Versar performed a site assessment of the Site. The site assessment included: (1) a review of historical aerial photographs; (2) a review of appropriate regulatory agency files; (3) interviews with PDD personnel; and (4) soil and sediment sampling and analyses (Versar, 1990).

Twelve discrete sediment samples were collected at the Site and were composited to one sample by the analytical laboratory. The discrete sediment sample locations are shown in Figure 3. The composite sample was analyzed for (1) metals; (2) nonmetals; (3) pesticides; (4) polychlorinated biphenyls; (5) oil and grease; (6) organotin compounds; (7) polynuclear aromatic hydrocarbons; (8) phenols; and (9) pthalates. The analyzed composite sediment sample contained a variety of analytes in a wide range of concentrations. Of principle concern were the elevated concentrations of chromium, copper, lead, and zinc, the identification of mono-, di-, and tributyltin (organotin) compounds, and polynuclear aromatic hydrocarbon (PAH) compounds. A summary of the laboratory analytical results for the sediment composite sample is presented in Table 1 and Table 2.

On May 24, 1990, the RWQCB collected samples in the tidal area of the Site. The approximate locations of the RWQCB samples are shown in Figure 4. Subsequent analysis of the samples also identified elevated concentrations of chromium, copper, lead and zinc, as well as organotin compounds. A summary of the

laboratory analytical results for the RWQCB sediment samples is presented in Table 3.

1.2 Investigation Objectives

The primary purpose of the sediment study was to assess the areal extent of grit and associated detritus in the shallow marine sediment at the Pacific Dry Dock and Repair Yard I facility. The general objectives of the sediment study were to:

- Delineate the vertical and horizontal extent of grit in the inshore sediment.
- Identify and characterize the distribution of sedimentary deposits.
- Accurately determine the concentrations of organotin and PAH compounds, and the California Assessment Manual Metals in the sediments and sea water surrounding the Site.
- Collect and interpret data that are sufficient to evaluate what, if any, further studies should be performed at the Site.

2.0 SITE DESCRIPTION

2.1 Site Location

The Site is located in the city of Oakland, California, at 1441 Embarcadero Avenue on property owned by the Port of Oakland. The Site is leased from the Port of Oakland by Pacific Dry Dock and Repair. The city of Oakland has a population of approximately 400,000 people and is located in the northwest section of Alameda County. The Site is bounded by the 880 Freeway to the north, a motel to the east, a marine supply retailer to the west, and the Brooklyn Basin to the south. The Site is flat lying at a average elevation of approximately 10 feet above mean sea level (amsl).

2.2 Site Layout

The Site is generally flat lying and slopes slightly to the west. The Site is predominantly covered by asphalt, buildings or concrete. Approximately one fifth of the Site is covered by buildings. There is one unused underground storage tank located at the Site. The tank is scheduled for removal.

The Site consists of a two marine railways, a docking area and piers, a warehouse, machine shop, wood working shop, paint store and associated office structures. The inshore area south of the marine railways appear to contain the remnants of decaying marine structures such as pilings, moorings, etc.

2.3 Surface and Marine Geology

The Site is located in the Coast Ranges physiographic province. The area is tectonically active, 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 general area surrounding the Site is underlain by Quaternary marine and nonmarine alluvial sediments consisting of

clays and silts. The local soil geology of the Site consists of fill material overlying silty clays.

The Brooklyn Basin has a maximum water depth of approximately 30 feet. The shallow marine sediments present are known locally as "bay mud" and consist of gray clay which is locally sandy. Distribution of these unconsolidated sediments is affected by both tidal and longshore currents.

2.4 Tidal Waters

The west coast of North America experiences semi-diurnal tides; i.e., two low tides and two high tides occur during each 24-hour period. Magnitudes differ between the two low tides and the two high tides, so that there is a low-low and a high-low, and a low-high and high-high tide each 24-hour period. The lowest low tides and the highest high tides coincide with the full moon.

3.0 SEDIMENT STUDY METHODS AND PROCEDURES

The sediment study included the collection of 20 cores in the marine sediments and four water samples from areas surrounding the Site, and the subsampling, compositing, and analysis of the sediment and water samples. The 20 cores represented seven different areas with three or four stations (coring points) per area as described in the RWQCB-approved work plan for the study (Versar, 1991). The coring and water sampling were performed during June 1991. The approximate locations of the core stations and water sampling points are shown in Figure 5. The sediment sample locations are accurately presented in the insert map included as Appendix D. All sampling was performed from the research vessel Prophesy, a 30-foot motor vessel equipped with a hydraulic winch and A-frame. The vessel is owned and operated by Kinnetic Laboratories Inc.

3.1 Sea-Water Sampling and Analysis

Sea-water samples were collected at four different locations at the Site. The samples included three samples to represent the Site and one sample from the Brooklyn Basin to provide a reference of background conditions. The sea-water samples were collected before any sediment sampling was conducted. To ensure the water sample was representative of the water at the sampling depth, a single-use, PVC, double-ball, check-valve bailer was utilized.

The vessel was positioned on the sample station and the bailer was dropped from the side of the vessel. The bailer was allowed to descend to the approximate water depth recorded on the vessel's fathometer. The bailer was then retrieved and the fluid recovered was emptied into the designated sample bottles. Two one-liter amber bottles were used for the PAH samples; one 500-milliliter (ml) plastic bottle, preserved with HNO_3, was used for the metal and nonmetal samples; and one 40-ml bottle was used for

the organotin samples. The samples were stored in the laboratory-prepared bottles at 4°C for delivery to a Department of Health Services-certified laboratory for compositing and analysis. A chain-of-custody record was completed for the samples and accompanied the samples until the samples were received by the laboratory.

Horizontal and vertical controls were provided for sample locations. Horizontal controls were provided by the vessel's onboard navigational equipment, visual triangulation, and observation of key landmarks within the area. Vertical controls were provided by noting water depth on the vessel's fathometer and recording the tidal stage from a U.S. Army Corps of Engineers tide gauge.

3.1.1 Analytical Methods

The sea-water samples were analyzed by Tox Scan Inc. (Tox Scan) of Watsonsville, California, and Quality Assurance Laboratory (QA Lab), San Diego, California. The following analyses were performed by Tox Scan:

A. California Assessment Manual Metals (CAM 17 Metals) including: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc.

B. Organotin compounds including: monobutyltin, dibutyltin, tributyltin and tetrabutyltin by pentyl derivatization using a gas chromatograph with a flame ionization detector.

The following analysis was performed by QA Lab:

C. Polynuclear Aromatic Hydrocarbons by EPA Method 8270.

The laboratory analytical results are discussed in Section 5.0.

3.2 Sediment Sampling Decontamination Procedures

All sediment sampling equipment was precleaned at Kinnetic Laboratories using EPA-approved metals cleanup protocol as follows:

1. Washed with 2% Micro soap and hot tap water.
2. Rinsed 3 times with hot tap water.
3. Rinsed with 2N nitric acid.
4. Rinsed 3 times with Milli-Q Type I reagent-grade deionized water.
5. Air dried in a dust-free environment.
6. All cleaned equipment was stored in an appropriate manner to prevent contamination (sterile bags or enclosures).

All sampling equipment that came in contact with the core was thoroughly cleaned between samples according to field protocol. The core liners and caps, extruder, cutter, and core catcher were cleaned in this manner. Field cleanup procedures were performed as follows:

1. Any loose, foreign debris was carefully brushed off with a plastic brush.
2. The equipment was rinsed with site water.
3. The equipment was washed with 2% Micro soap.
4. The equipment was rinsed 3 times with Type III deionized water.
5. All equipment received a final site water rinse before deployment.
6. Cleaned equipment was stored in appropriate contamination-free storage (sterile bags or enclosures).
7. Clean, disposable gloves were worn by all field personnel when handling decontaminated equipment.
8. A clean plastic sheet was positioned covering the sampling area to prevent equipment from coming into contact with contaminated materials.

3.3 Sediment Sampling and Analysis

The equipment and the sediment sampling coring device were supplied and operated by Kinnetic Laboratories. The sample stations were based on a predetermined sample grid as presented in the sediment study work plan (Versar, 1991). Horizontal and vertical controls were provided for each sample location. Horizontal controls were provided by a licensed surveyor using an

electronic measuring device and a transit. The surveyor maintained radio communication with the vessel. Once the retrieving line of the coring device had been pulled to the vertical, the surveyor recorded the location coordinates. Vertical controls were provided by noting water depth on the vessel's fathometer and recording the tidal stage from a U.S. Army Corps of Engineers tide gauge. This surveying control determined a precise location for each sample station as it was sampled.

Samples were collected utilizing a gravity coring device. The core barrel was five feet in length and had a #316 stainless-steel cutter and core catcher attached. The core barrel was lined with a precut, decontaminated, butylate core liner. The obtained samples were 3.875 inches in diameter and varied in length depending on coring device penetration.

The vessel was maneuvered into the approximate center of the selected sampling grid. Once the sampling location had been approved by the Versar representative, the coring device was dropped. The weight of the coring device caused it to drop through the water and penetrate the sediment layers. The core station was surveyed and the core barrel was then retrieved and the approximate recovery was noted. At several stations water depths were not sufficient to allow the recovery of a satisfactory length of core (greater than one foot). At these stations a shorter core barrel (four feet in length) was used and lead donuts were added to the barrel to increase penetration.

Upon recovery, the butylate liner was removed from the barrel and the core was measured. The core was then extruded using a Teflon™ covered extruding rod. An attempt was made to quantify the amount of grit in each subsample as the core was extruded. The term "slightly gritty" was applied to sediments estimated to contain 0-10 percent grit; "moderately gritty" was applied to

sediments estimated to contain 10-30 percent grit; and "very gritty" was applied to sediments estimated to contain over 30 percent grit. The core was logged by a geologist as it was extruded. The core-sample descriptive logs are included as Appendix A. The core was sampled at one-foot intervals as it was extruded. At the one-foot intervals, the sample was obtained by removing the center of the core. Care was taken to avoid the outer edges of the core in order to minimize vertical mixing of the sediment. Each sample was placed in an 8-ounce glass jar with a Teflon™-lined lid and stored at 4°C for transport to the laboratory. A chain-of-custody record was completed for the samples and accompanied the samples until the samples were received by the laboratory for compositing and analysis.

The sampling equipment was decontaminated between core stations in the same area, following the procedures outlined in Section 3.2. The butylate core liner and sample catcher were replaced and additional decontamination procedures (as outlined in Section 3.2) were performed between the different sample areas.

3.3.1 Analytical Methods

The sediment samples were analyzed by Tox Scan Inc. (Tox Scan) of Watsonsville, California, and Quality Assurance Laboratory (QA Lab), San Diego, California. The following analyses were performed by Tox Scan:

A. California Assessment Manual Metals (CAM 17 Metals) including: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc.

B. Organotin compounds including: monobutyltin, dibutyltin, tributyltin and tetrabutyltin by pentyl derivatization using a gas chromatograph with a flame ionization detector.

The following analysis was performed by QA Lab:

C. Polynuclear Aromatic Hydrocarbons by EPA Method 8270.

The laboratory analytical results are discussed in Section 5.0.

4.0 SEDIMENT DESCRIPTION AND DISTRIBUTION

The description of the sediment distribution for the site is based on observations of 20 sediment cores collected over an approximate area of 425,000 square feet. The 20 sampled stations yielded an average of 3.83 feet of core per core recovery.

In general, all sediments observed were classified in the field as clays, with occasional local sandy streaks present. The clays were saturated and very soft near the surface, and became very firm and less moist at depths of three to five feet.

Cores from sample locations 1-A, -B, and -C, 2-A, 3-A, 5-A and 5-D, and 6-B, -C, and -D generally contained the following lithology: surface to two feet - light gray clay, very soft and saturated; two feet to five feet - medium gray clay, slightly moist, becoming more firm and less moist with depth, and locally impacted with spent sand-blasting grit. These sample locations did not contain any surficial grit-impacted sediments.

Cores from sample locations 2-B and -C, 3-B and -C, 4-A and -B, 5-B and -C, and 6-A generally contained the following lithology: surface to one foot - gray clay, generally slightly, locally very gritty, very soft, saturated; one foot to two feet - black sediment, locally very gritty, saturated, very soft, occasional oily sheen and/or hydrocarbon odor, occasional hydrogen sulfide odor; two feet to three feet - gray clay, very soft, sticky, decreasing moisture content, slightly gritty; three feet to five feet - dark gray clay, slightly moist, becoming more firm with increasing depth, occasionally slightly sandy or gritty.

Lateral distribution of grit was determined by plotting the cross sections based on the samples described in the sample logs. The relevant lines of section are shown in Figure 5. Figure 6, Figure 7 and Figure 8 present cross sections of the sediments of the Site interpolated from the sediment logs. Figure 9 presents

the areas where grit content is estimated to be greater than 30 percent in the surface sediments.

5.0 LABORATORY ANALYTICAL RESULTS

Tox Scan and QA Lab analyzed six sediment samples and two sea-water samples (one composite sample of PDDI-2, PDDI-3 and PDDI-4, to represent the Site and one discrete sample PDDI-1 to define background conditions) for organotin compounds, CAM 17 Metals, and polynuclear aromatic hydrocarbons, in accordance with EPA protocols. The laboratories utilized the RWQCB-required analytical detection limits for the analyses. These detection limits are included in Appendix B.

5.1 Sea-Water Sample Results

Four sea-water samples were transported to Tox Scan under chain-of-custody documentation. Three sea-water samples, PDDI-2, PDDI-3, and PDDI-4, were filtered and composited by Tox Scan to form one representative sample for the Site. An aliquot of the representative sample and the reference sample (PDDI-1) were analyzed by Tox Scan for CAM 17 metals and organotin compounds, and by QA Lab for PAH compounds.

Tox Scan did not detect any organotin compounds in either the composite or reference sample at or above the method's detection limit of 10 nanograms per liter (equivalent to parts per billion). Neither of the samples contained concentrations of any analyte in excess of the State of California Title 22, Article 3, Section 66261.24 Soluble Threshold Limit Concentration (STLC) values.

QA Lab did not detect any PAH in either sample at or above the method's detection limits. Table 4 presents a summary of the analytical results from both laboratories. Although the results were reported by the laboratories in micrograms per liter, Table 4 presents the results in milligrams per liter to facilitate comparison with previous analyses. The detailed analytical laboratory results and the associated documentation are included in Appendix C.

5.2 Sediment Sample Results

All of the samples which were collected were transported under chain-of-custody documentation to Tox Scan. A total of 93 sediment samples were submitted. These samples represent seven distinct sample areas, three or four cores having been collected per area. Each of the sediment samples collected at one foot below sediment surface within a designated area was composited by Tox Scan. For example, area 5 consisted of four sample stations, 5A, 5B, 5C, and 5D. The one-foot sample from core 5A was composited with the one-foot samples from cores 5B, 5C, and 5D, to form one representative sample for area 5. Tox Scan forwarded a portion of each representative sample to QA Lab for polynuclear aromatic hydrocarbon compound analysis. Tox Scan numbered the samples for internal tracking purposes. The relationship between the laboratory numbering and coring stations is shown in Table 5.

Tox Scan determined that none of the samples analyzed contained monobutyltin at or above the method's detection limits. Only the sediment sample representing area 6 contained tetrabutyltin at the detection limit of 0.002 milligrams per kilogram (mg/kg). All samples analyzed contained concentrations of di- and tributyltin. Dibutyltin and tributyltin concentrations ranged from 0.009 mg/kg and 0.012 mg/kg, respectively, in the sample representing area 3, to 0.53 mg/kg and 1.30 mg/kg, respectively, in the sample representing area 4. Table 6 summarizes the analytical results for organotin compounds. Although the laboratory reported the results in micrograms per kilogram, Table 6 presents the results in milligrams per kilogram to facilitate comparison with previous analyses.

Tox Scan determined that all the samples analyzed contained some concentration of all analytes included in the CAM 17 Metals analytical procedure. Many of the samples contained

concentrations of various analytes which are between the State of California Title 22, Article 3, Section 66261.24 Soluble Threshold Limit Concentration (STLC) values and the Total Threshold Limit Concentration (TTLC) values. Table 7 summarizes the analytical results for the CAM 17 Metals. Although the laboratory reported the results in micrograms per gram, Table 7 presents the results in milligrams per kilogram to facilitate comparison with previous analyses.

QA Lab reported that all samples analyzed contained detectable concentrations of polynuclear aromatic hydrocarbons (PAH). The sample representing area 6 contained the highest concentrations of PAH. Table 8 summarizes the analytical results for PAH. Although the laboratory reported the results in micrograms per kilogram, Table 8 presents the results in milligrams per kilogram to facilitate comparison with previous analyses. The detailed analytical laboratory results and the associated documentation are included in Appendix C.

6.0 CONCLUSIONS

Based on the laboratory analytical results and the distribution of spent sand-blasting material found in the sediment samples, it is probable that historical operations at the Pacific Dry Dock and Repair Yard I facility have impacted the inshore sediments in the vicinity of the Site. Figure 9 presents an map indicating that the areas in the vicinity of the marine railways and eastern shoreline contain the highest concentrations of spent sand-blasting material. This distribution may be explained by grit having been transported by longshore currents carrying material parallel to the shore and tidal currents carrying material out from the shore.

However, not all the analytes detected in the sediment appear to be directly related to the operation of the Site, and the detected concentrations do not appear to be impacting the sea water in the vicinity of the Site.

A total of two sea-water and six sediment samples were analyzed as part of the inshore sediment investigation at the Site. The two sea-water samples represented four discrete sample locations and the six composite sediment samples represented 20 discrete sample locations.

The sea-water sample representing the Site does not exhibit appreciably different analytical results from those of the background sea-water sample. The organotin and PAH compounds detected in the sediment samples were not detected in the sea water in the vicinity of the Site. The concentrations of the CAM metals detected in the sediments do not appear to be impacting the sea water in the vicinity of the Site.

The RWQCB sediment sample PDD#3 appears to have been collected in the intertidal zone at the marine railway number 2. This sample contained the most elevated concentrations of organotin compounds (25 mg/kg of tributyltin) and copper and zinc

(9,600 mg/kg and 1,600 mg/kg respectively) of all samples analyzed. The second RWQCB sample (PDD#4) appears to have been collected within the Versar composite sample zone number 1. The analytical results for the composite sample and PDD#4 appear to be within the same orders of magnitude.

The sediments in the vicinity of the marine railways and pier appear to have been impacted by Site activities. However, none of the metals concentrations identified in these areas are in excess of TTLC values. The composite samples from all the sediment sample areas contain concentrations of various metals whose values are between the STLC and the TTLC. All sample areas contain the following metals in concentrations between the STLC and TTLC; antimony, copper, lead, mercury, nickel, thallium and vanadium. The following metals were found in concentrations between the STLC and TTLC in some but not all sample areas; barium (areas 2 and 4), beryllium (areas 4, 5 and 6), cadmium (area 3), and zinc (areas 3 and 4).

Title 22, Chapter 3, Appendix II(b) states that a waste extraction test (WET) shall be performed if the total concentration in a waste, or other material, listed in Section 66261.24 equals or exceeds the STLC value, to determine the amount of extractable material. However, since the WET laboratory procedure requires a 10 times dilution factor, it is theoretically impossible for WET results to be higher than the STLC, unless the total concentration in the waste is 10 times higher than the STLC. Only lead (all samples) and mercury concentrations (two samples) in the composite samples were greater than 10 times the respective STLC value. Therefore these samples should be reanalyzed following the WET procedure to determine the extractable amounts of lead and mercury in the sediments.

It should be noted that the Site is located in the Coast Ranges physiographic province, which is noted as the leading American source of mercury (Norris and Webb, 1990). It is possible that the identified concentrations of mercury are to some extent a natural derivative of the erosion of the Coast Ranges and the detritus of mercury mining operations in the San Jose area.

All of the areas sampled contained a range of concentrations of PAH compounds. Only pyrene was detected in all sample areas. The sample from area 6, the area selected to represent background conditions, contained the highest concentrations of PAH compounds. It is possible that these elevated concentrations are the result of the deterioration of wooden structures in the general area of the Site which have been treated with preservatives containing PAH compounds.

7.0 REFERENCES

The following documents were used in the preparation of this report.

Versar Inc., Site Assessment of the Pacific Dry Dock and Repair Yards I and II, October 2, 1990.

Versar Inc., Work Plan for the Characterization of the Shoreline Sediment at the Pacific Dry Dock and Repair Yards 1 and 2, Oakland, California, March 11, 1991.

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U.S. Department of Transport, United States Coast Guard, Chemical Hazard Response Information System (CHRIS) Hazard Chemical Data, Commandant Instruction M.16465.12A, 1984.

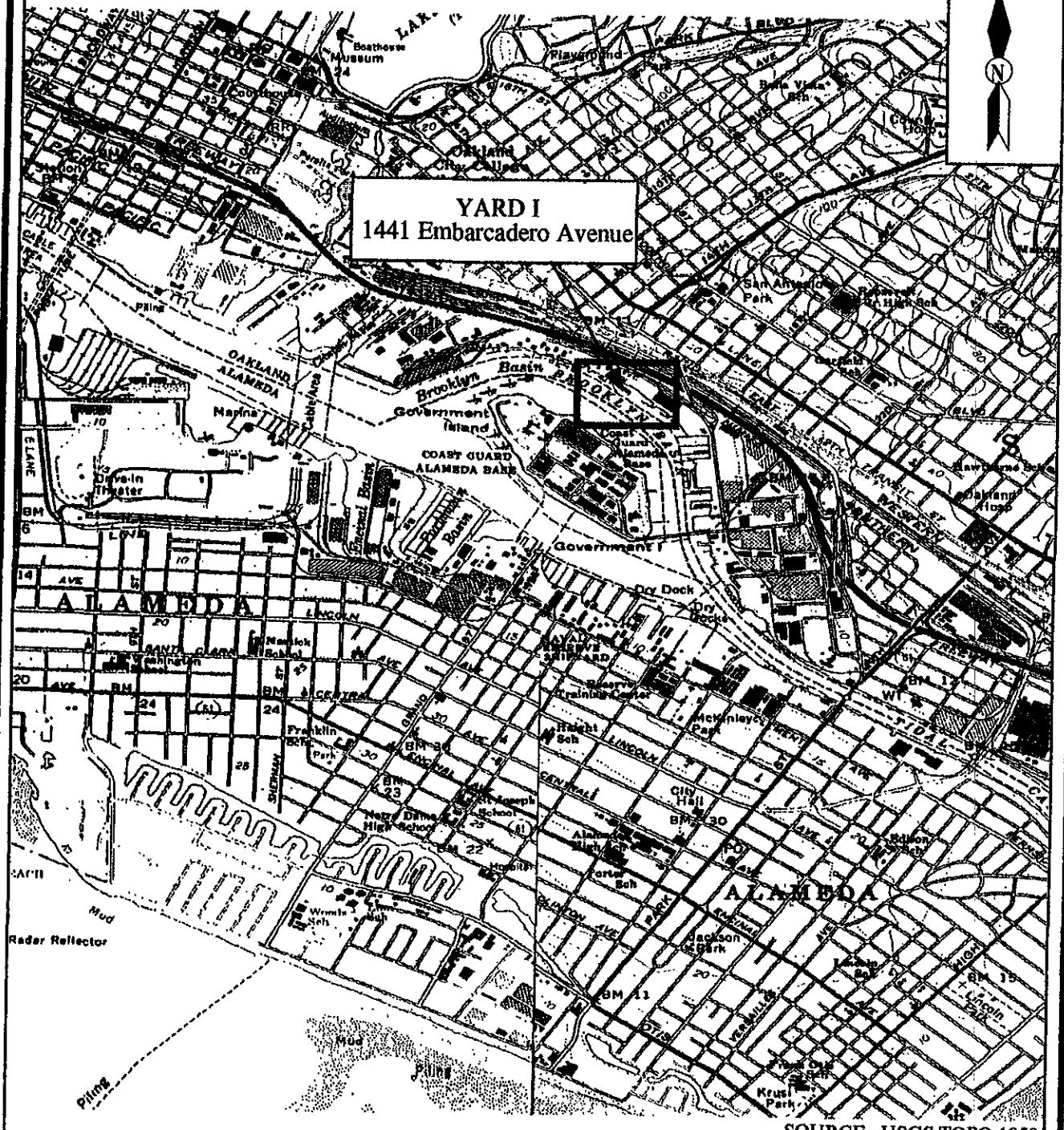
Center for Lake Superior Environmental Studies, Ambient Water Quality Criteria for Tributylin - 1988, University of Wisconsin, Superior, 1988.

Norris, R. M. and Webb, R. W., Geology of California, John Wiley and Sons, New York, 1990.

8.0 APPENDIX LISTING

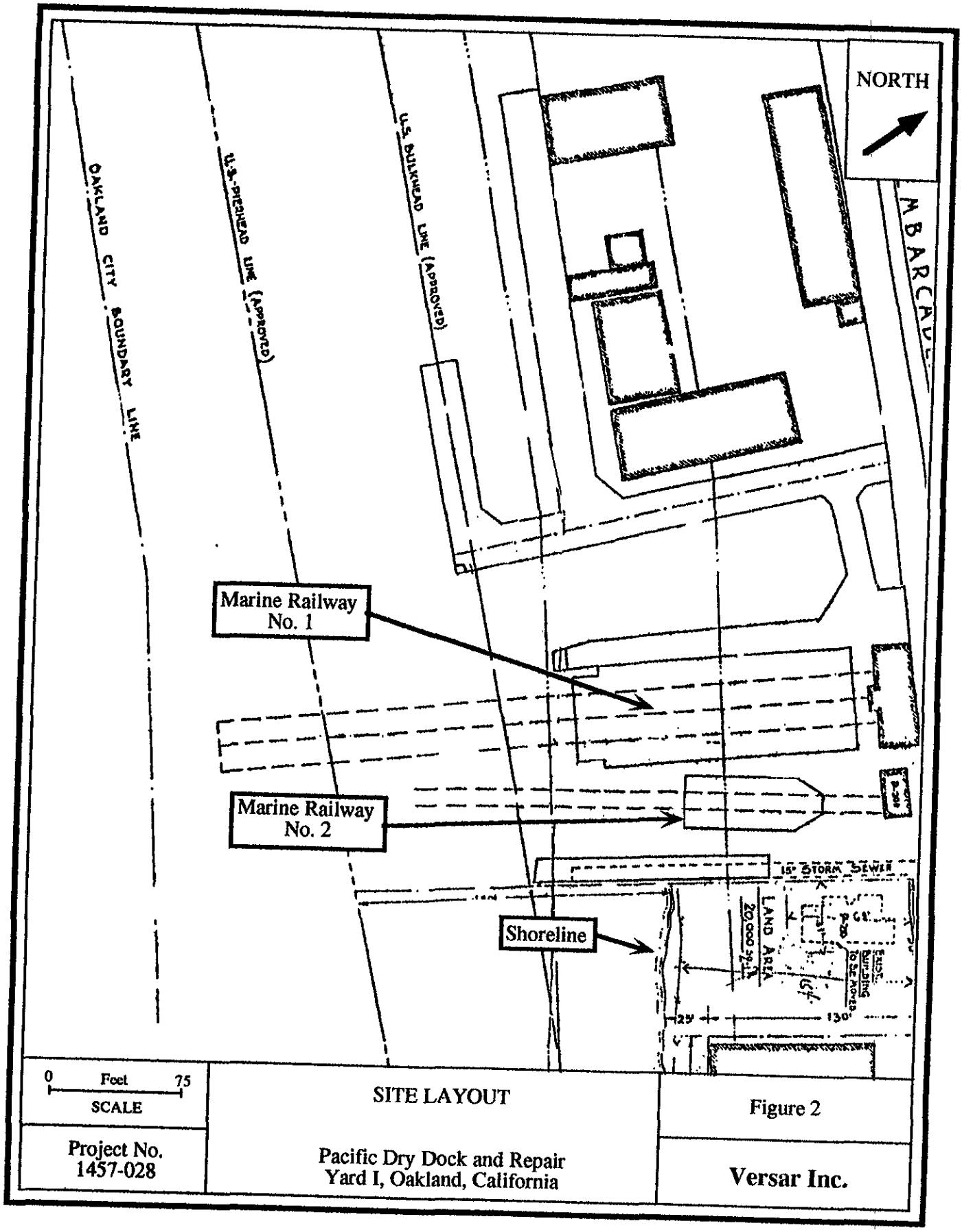
The following appendices constitute the technical appendix to this report.

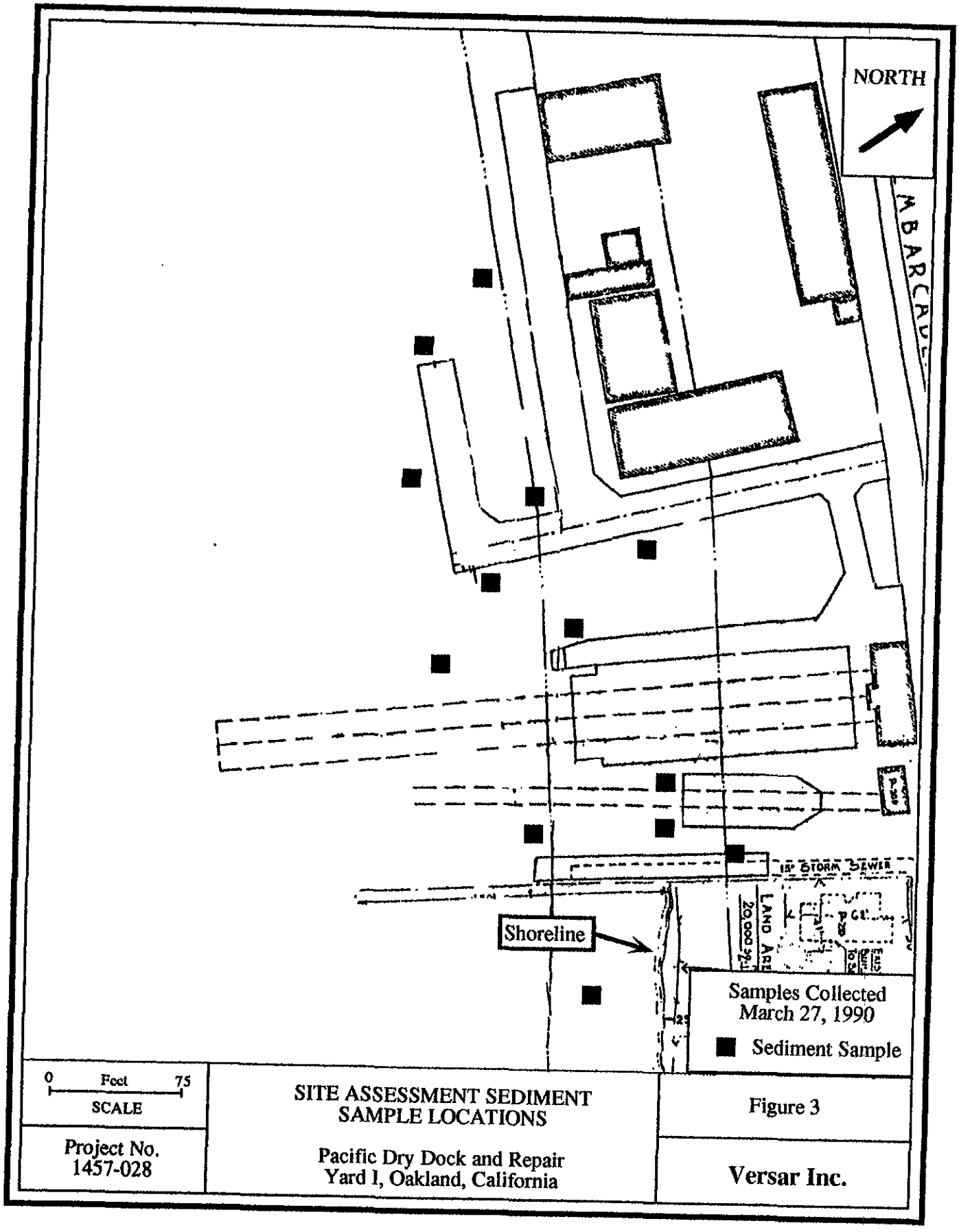
Appendix A.	Sediment Lithology Logs
Appendix B.	RWQCB-Required Analytical Detection Levels
Appendix C.	Laboratory Analytical Results
Appendix D.	Yard I Sediment Sample Location Map



SOURCE : USGS TOPO 1959

Scale 1 : 24000	SITE LOCATION	Figure 1
Project No. 1457-028	Pacific Dry Dock and Repair Yard I, Oakland, California	**Versar Inc.**


NORTH
OAKLAND CITY BOUNDARY LINE
U.S. PIERHEAD LINE (APPROVED)
U.S. BULKHEAD LINE (APPROVED)
MBARCAD
Marine Railway No. 1
Marine Railway No. 2
Shoreline
15" STORM SEWER
LAND AREA
20,000 SQ.FT.
P.O.B.
EXIST. BUILDING TO BE REMOVED
25'
130'
0 Feet 75
SCALE
SITE LAYOUT
Figure 2
Project No. 1457-028
Pacific Dry Dock and Repair
Yard I, Oakland, California
Versar Inc.



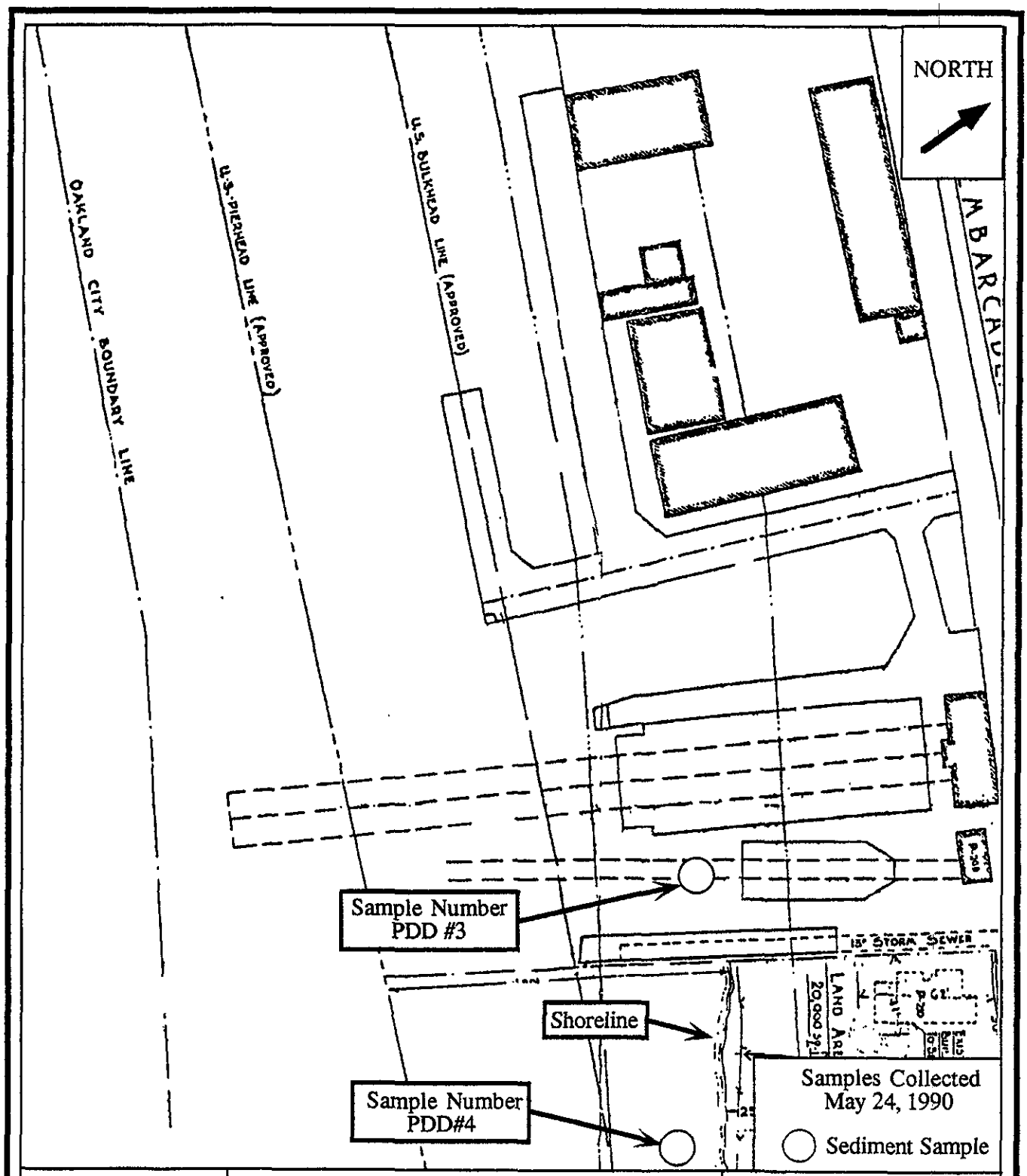
SITE ASSESSMENT SEDIMENT SAMPLE LOCATIONS

Pacific Dry Dock and Repair
Yard I, Oakland, California

Figure 3

Project No.
1457-028

Versar Inc.



APPROXIMATE RWQCB SEDIMENT SAMPLE LOCATIONS

Figure 4

Project No. 1457-028

Pacific Dry Dock and Repair
Yard I, Oakland, California

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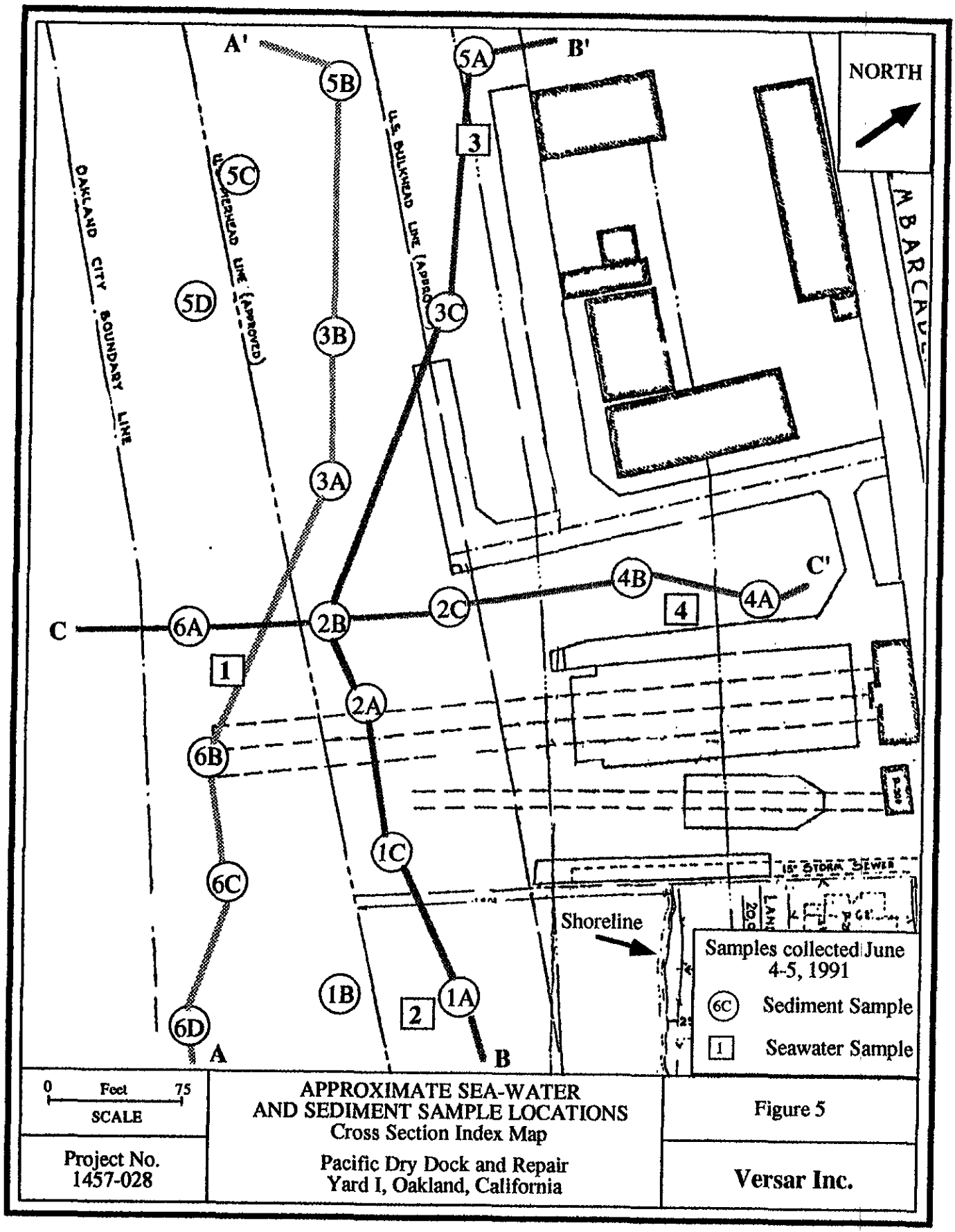
A'
B'
C
C'
A
B
5A
5B
5C
5D
3A
3B
3C
2A
2B
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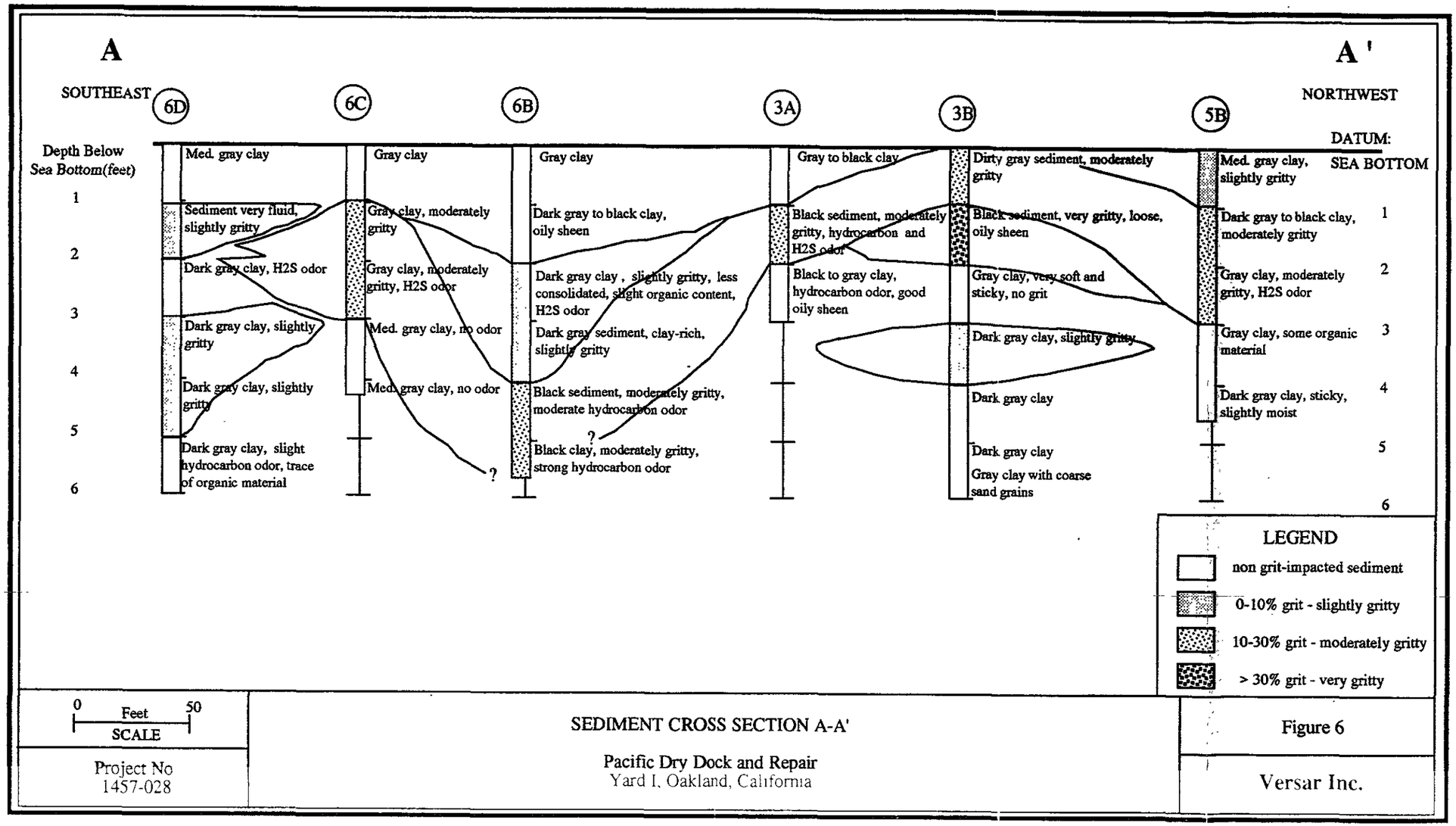
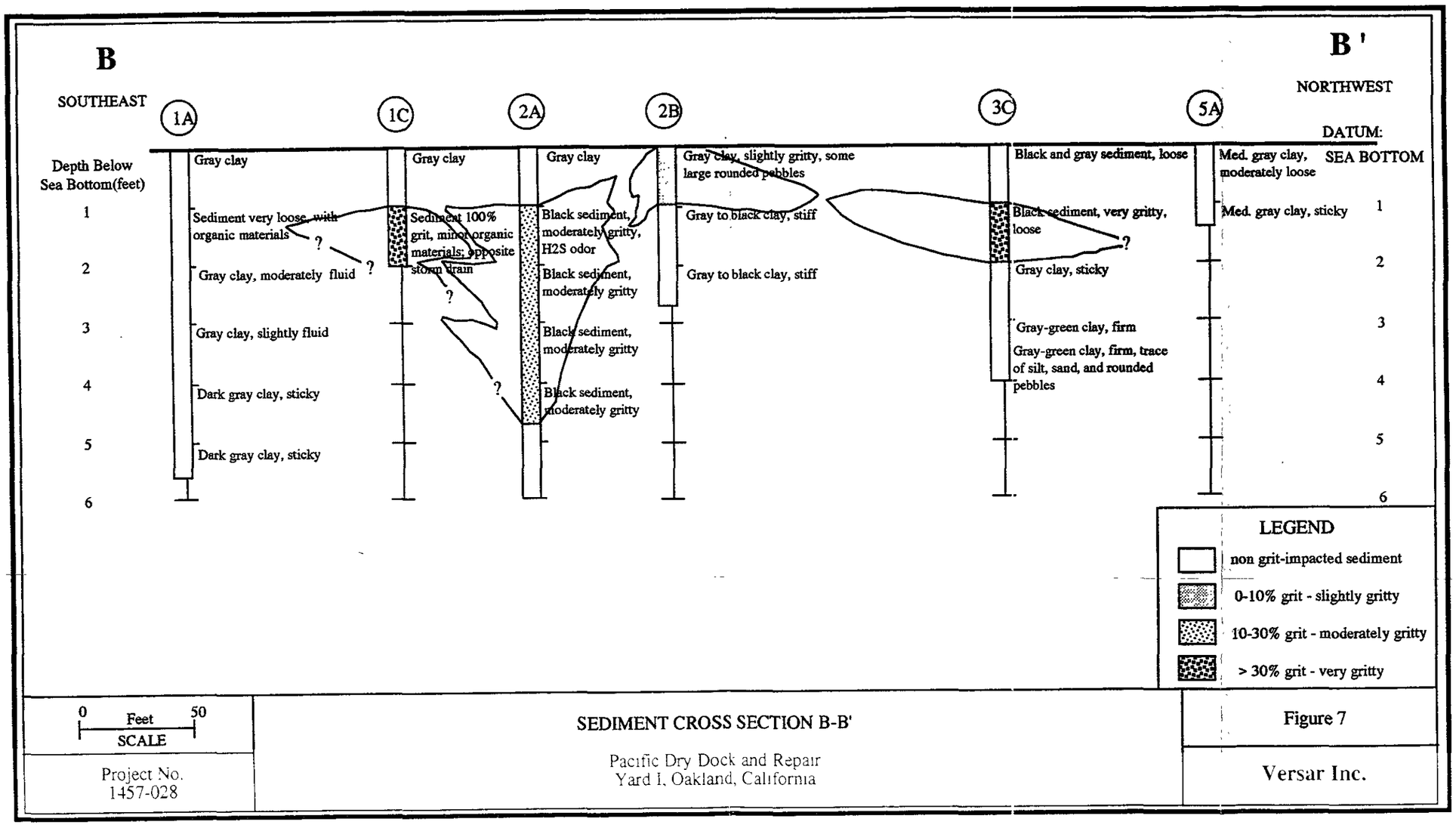
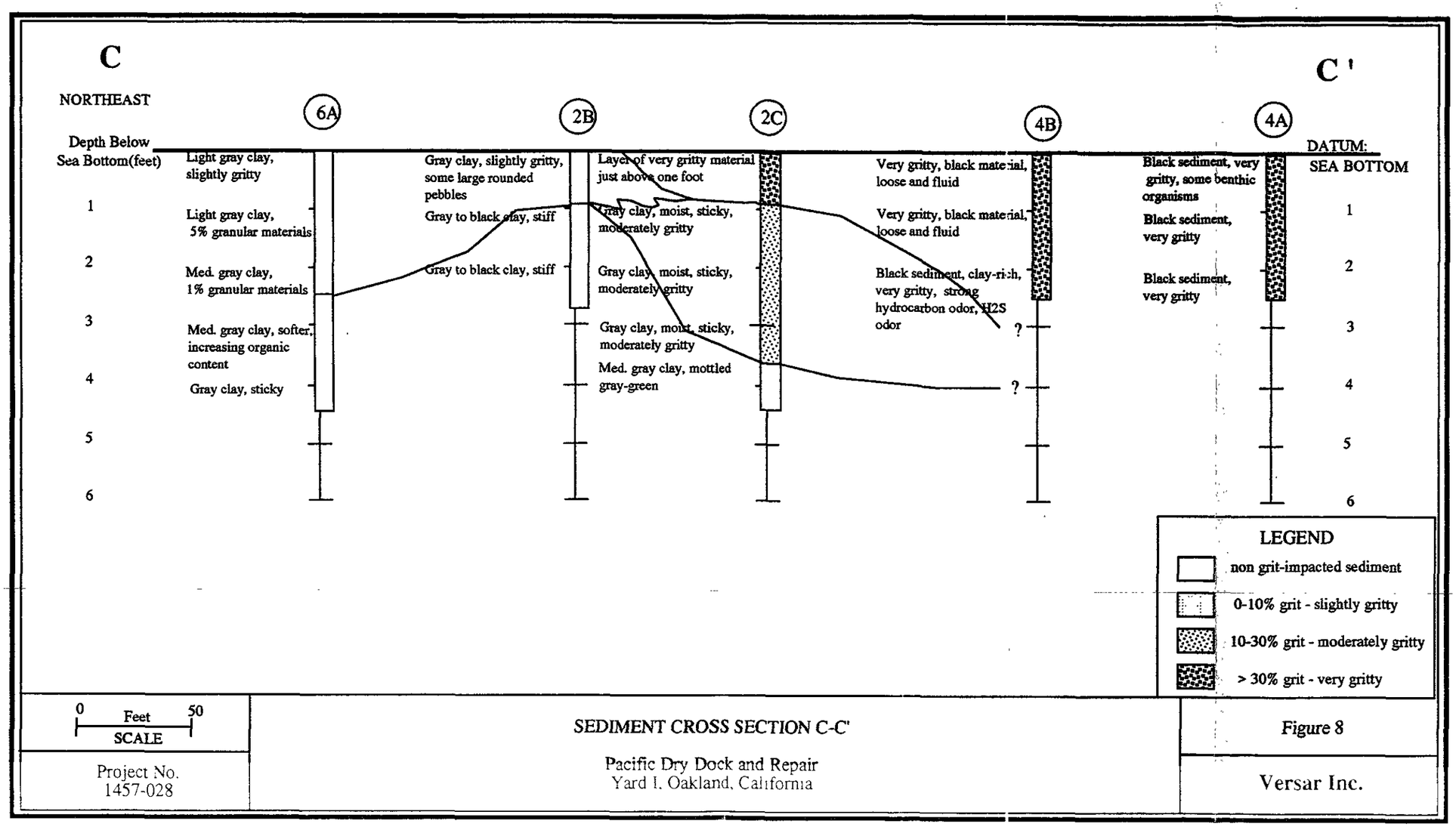
1A
1B
1C
6A
6B
6C
6D
4A
4B
1
2
3
4
NORTH
OAKLAND CITY BOUNDARY LINE
U.S. BULKHEAD LINE (APPROVED)
U.S. BULKHEAD LINE (APPROVED)
MARGINAL WAY
15" STORM SEWER
Shoreline
Samples collected June 4-5, 1991
6C Sediment Sample
1 Seawater Sample
0 Feet 75
SCALE
APPROXIMATE SEA-WATER AND SEDIMENT SAMPLE LOCATIONS
Cross Section Index Map
Pacific Dry Dock and Repair
Yard I, Oakland, California
Figure 5
Project No. 1457-028
Versar Inc.


A
SOUTHEAST
6D
6C
6B
3A
3B
5B
A'
NORTHWEST
DATUM:
SEA BOTTOM
Depth Below Sea Bottom(feet)
1
2
3
4
5
6
Med. gray clay
Sediment very fluid, slightly gritty
Dark gray clay, H2S odor
Dark gray clay, slightly gritty
Dark gray clay, slightly gritty
Dark gray clay, slight hydrocarbon odor, trace of organic material
Gray clay
Gray clay, moderately gritty
Gray clay, moderately gritty, H2S odor
Med. gray clay, no odor
Med. gray clay, no odor
?
Gray clay
Dark gray to black clay, oily sheen
Dark gray clay , slightly gritty, less consolidated, slight organic content, H2S odor
Dark gray sediment, clay-rich, slightly gritty
Black sediment, moderately gritty, moderate hydrocarbon odor
?
Black clay, moderately gritty, strong hydrocarbon odor
Gray to black clay
Black sediment, moderately gritty, hydrocarbon and H2S odor
Black to gray clay, hydrocarbon odor, good oily sheen
Dirty gray sediment, moderately gritty
Black sediment, very gritty, loose, oily sheen
Gray clay, very soft and sticky, no grit
Dark gray clay, slightly gritty
Dark gray clay
Dark gray clay
Gray clay with coarse sand grains
Med. gray clay, slightly gritty
Dark gray to black clay, moderately gritty
Gray clay, moderately gritty, H2S odor
Gray clay, some organic material
Dark gray clay, sticky, slightly moist
1
2
3
4
5
6
LEGEND
non grit-impacted sediment
0-10% grit - slightly gritty
10-30% grit - moderately gritty
> 30% grit - very gritty
0
Feet
50
SCALE
SEDIMENT CROSS SECTION A-A'
Pacific Dry Dock and Repair
Yard I, Oakland, California
Figure 6
Project No
1457-028
Versar Inc.


B
SOUTHEAST
B '
NORTHWEST
1A
1C
2A
2B
3C
5A
DATUM:
SEA BOTTOM
Depth Below Sea Bottom(feet)
1
2
3
4
5
6
Gray clay
Sediment very loose, with organic materials
Gray clay, moderately fluid
Gray clay, slightly fluid
Dark gray clay, sticky
Dark gray clay, sticky
Gray clay
Sediment 100% grit, minor organic materials; opposite storm drain
Gray clay
Black sediment, moderately gritty, H2S odor
Black sediment, moderately gritty
Black sediment, moderately gritty
Black sediment, moderately gritty
Gray clay, slightly gritty, some large rounded pebbles
Gray to black clay, stiff
Gray to black clay, stiff
Black and gray sediment, loose
Black sediment, very gritty, loose
Gray clay, sticky
Gray-green clay, firm
Gray-green clay, firm, trace of silt, sand, and rounded pebbles
Med. gray clay, moderately loose
Med. gray clay, sticky
LEGEND
non grit-impacted sediment
0-10% grit - slightly gritty
10-30% grit - moderately gritty
> 30% grit - very gritty
0 Feet 50
SCALE
SEDIMENT CROSS SECTION B-B'
Pacific Dry Dock and Repair
Yard I, Oakland, California
Figure 7
Project No.
1457-028
Versar Inc.



0 Feet 50
SCALE

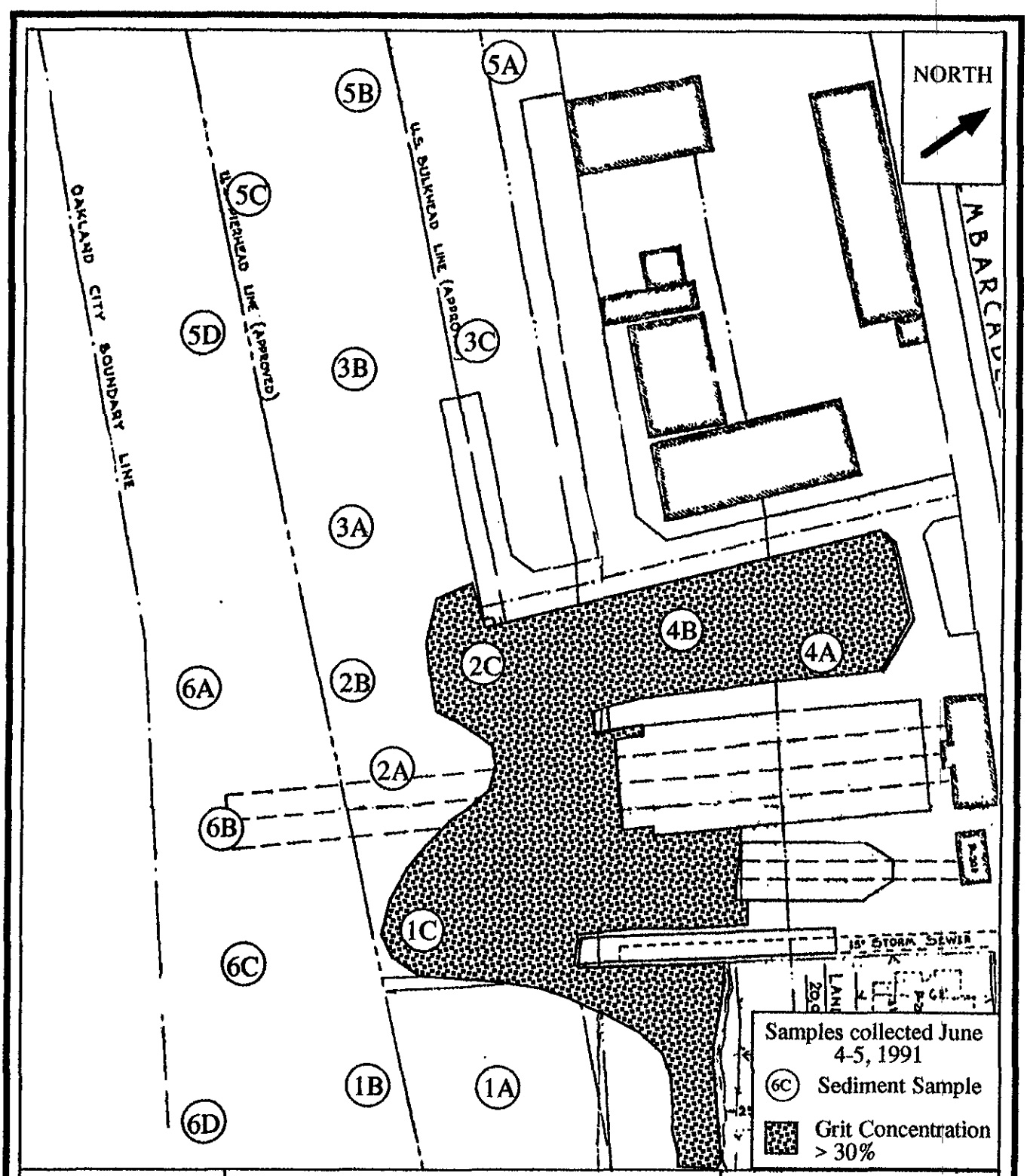
Project No.
1457-028

SEDIMENT CROSS SECTION C-C'

Pacific Dry Dock and Repair
Yard I, Oakland, California

Figure 8

Versar Inc.



0 Feet 75 SCALE	DISTRIBUTION OF SEDIMENT SURFACE GRIT CONCENTRATIONS (>30%)	Figure 9
Project No. 1457-028	Pacific Dry Dock and Repair Yard I, Oakland, California	**Versar Inc.**

Versar INC. SACRAMENTO

TABLE 1

SUMMARY OF SITE ASSESSMENT SEDIMENT ANALYTICAL RESULTS[1,2]

Pacific Dry Dock and Repair Facility
Yard I, Oakland, California

Compound	Yard I Composite Sample[3]
Antimony	<1.0
Arsenic	36.88
Cyanide	0.075
Cadmium	0.42
Chromium	167
Copper	2,870
Lead	236
Mercury	0.02
Nickel	51
Selenium	0.85
Silver	5.6
Thallium	17
Zinc	886
TPH[4]	75
Monobutyltin	0.015
Dibutyltin	0.006
Tributyltin	0.032

[1]Detection limits vary dependent on compound

[2]Sample date March 27, 1990

[3]Results reported in equivalent to parts per million

[4]TPH = Total petroleum hydrocarbons

Versar INC. SACRAMENTO

TABLE 2

SUMMARY OF SITE ASSESSMENT SEDIMENT ANALYTICAL RESULTS FOR POLYNUCLEAR AROMATIC HYDROCARBON COMPOUNDS[1,2]

Pacific Dry Dock and Repair Facility
Yard I, Oakland, California

Compound[3]	Yard I Composite Sample (mg/kg)[4]
Anthracene	0.073
Benzo(a)Anthracene	0.250
Benzo(g,h,i)Perylene	0.340
Benzoic Acid	0.290
bis(2-Ethylhexyl) Phthalate	0.430
Chrysene	0.560
Dibenzo(a,h) Anthracene	0.170
Fluoranthene	0.480
Indeno(1,2,3-cd) Pyrene	0.250
Pentachlorophenol	0.110
Phenanthrene	0.150
Phenol	0.100
Pyrene	0.500

[1]Detection limits for EPA Method 270 dependent on compound

[2]Sample date March 27, 1990

[3]Only detected compounds reported

[4]Results reported in milligrams per kilogram

Versar INC. SACRAMENTO

TABLE 3

SUMMARY OF RWQCB[1] SEDIMENT SAMPLE ANALYTICAL RESULTS[2]

Pacific Dry Dock and Repair Facility
Yard I, Oakland, California

	PDD #3		PDD #4	
	mg/kg[4]	W.E.T.[3] mg/L[5]	mg/kg	W.E.T.[3] mg/L
Inorganic Analysis				
Arsenic	27	0.28	10	0.2
Cadmium	6.8	<0.01	<1.0	<0.02
Chromium	85	1.6	92	2.2
Copper	9,600	170	720	0.64
Lead	230	9.1	160	6.4
Mercury	1.9	<0.0002	7.7	<0.0002
Nickel	41	0.9	80	5.6
Selenium	<10	<0.0002	<10	<0.0002
Silver	2.6	<0.01	<1	<0.01
Zinc	1,600	92	300	15
Organotin Compounds				
Monobutyl	<0.065		0.194	
Dibutyl	0.264		0.640	
Tributyl	25		0.888	
Tetrabityl	0.289		0.011	

[1] Regional Water Quality Control Board - San Francisco Bay Region

[2] Sample date May 24, 1990

[3] Waste Extraction Test Results

[4] Results reported in milligrams per kilogram

[5] Results reported in milligrams per liter

Versar INC. SACRAMENTO

TABLE 4

SUMMARY OF SEA-WATER ANALYTICAL RESULTS[1]

Pacific Dry Dock and Repair Facility
Yard I, Oakland, California

Analyte[2,3]	Sample Number PDDI-1	Composite[4]
Antimony	<0.0006	<0.0006
Arsenic	0.002	0.002
Barium	<0.1	<0.1
Beryllium	<0.01	<0.01
Cadmium	0.00014	0.00013
Chromium	<0.0025	<0.0025
Cobalt	<0.005	<0.005
Copper	0.0065	0.0059
Lead	0.00018	0.00024
Mercury	<0.000075	<0.000075
Molybdenum	0.011	0.0082
Nickel	0.005	<0.005
Selenium	<0.002	<0.002
Silver	<0.00008	<0.00008
Thallium	<0.1	<0.1
Vanadium	<1.0	<1.0
Zinc	0.012	0.0085
Organotin Compounds[5,6]	<10	<10
Polynuclear Aromatic[7] Hydrocarbon Compounds	N.D.[8]	N.D.

[1] Sample date June 4, 1991

[2] Results reported in milligrams per liter.

[3] Various EPA analytical methods for CAM metals.

[4] Composite sample of PDDI-2, PDDI-3, and PDDI-4

[5] Pentyl derivatization using GC/MS

[6] Results reported in nanograms per liter

[7] EPA Method 8100

[8] Not detected at or above method's detection limits

TABLE 5

CORRELATION OF LABORATORY SAMPLE NUMBERS AND FIELD SAMPLE NUMBERS

Pacific Dry Dock and Repair Facility
Yard I, Oakland, California

Field Number (Composite of)	Tox Scan (CAM 17 Metals and Organotins)	QA Lab (PAH)
PDDI-1A-1 PDDI-1B-1 PDDI-1C-1	-71	-70
PDDI-2A-1 PDDI-2B-1 PDDI-2C-1	-242	-241
PDDI-3A-1 PDDI-3B-1 PDDI-3C-1	-239	-238
PDDI-4A-1 PDDI-4B-1	-237	-236
PDDI-5A-1 PDDI-5B-1 PDDI-5C-1 PDDI-5D-1	-245	-244
PDDI-6A-1 PDDI-6B-1 PDDI-6C-1 PDDI-6D-1	-74	-73

TABLE 6

SUMMARY OF SEDIMENT ANALYTICAL RESULTS
FOR ORGANOTIN COMPOUNDS[1,2]

Pacific Dry Dock and Repair Facility
Yard I, Oakland, California

Sample Area[3]	Monobutyltin (mg/kg)[4]	Dibutyltin (mg/kg)	Tributyltin (mg/kg)	Tetrabutyltin (mg/kg)
PDDI-1	<0.002	0.230	0.300	<0.002
PDDI-2	<0.002	0.036	0.077	<0.002
PDDI-3	<0.002	0.009	0.012	<0.002
PDDI-4	<0.002	0.530	1.300	<0.002
PDDI-5	<0.002	0.065	0.055	<0.002
PDDI-6	<0.002	0.110	0.100	0.002

[1] Sample date June 4/5, 1991

[2] Pentyl derivatization using GC/Flame photometric detector

[3] Composite sample from the one-foot subsample of each core in area

[4] Results reported in milligrams per kilogram

TABLE 7

SUMMARY OF SEDIMENT ANALYTICAL RESULTS
FOR CALIFORNIA ASSESSMENT MANUAL METALS[1]

Pacific Dry Dock and Repair Facility
Yard I, Oakland, California

Analyte[2]	Sample Area[3]					
	PDDI-1 (mg/kg)[4]	PDDI-2 (mg/kg)	PDDI-3 (mg/kg)	PDDI-4 (mg/kg)	PDDI-5 (mg/kg)	PDDI-6 (mg/kg)
Antimony	19	20	22	38	16	19
Arsenic	1.8	1.7	2.1	4.2	3.1	2.3
Barium	77	100	17	100	81	80
Beryllium	0.64	1.0	0.6	1.1	0.76	0.84
Cadmium	0.50	0.42	1.7	0.52	0.21	0.60
Chromium	69	85	63	220	71	73
Cobalt	10	13	9.2	31	9.4	10
Copper	120	110	150	1,300	70	110
Lead	140	110	460	350	370	150
Mercury	0.7	0.6	3.2	4.6	0.5	1.3
Molybdenum	5.6	5.2	5.7	78	4.2	3.9
Nickel	93	62	40	79	39	46
Selenium	0.20	0.21	0.18	0.35	0.16	0.21
Silver	0.95	1.2	2.3	1.9	0.82	1.1
Thallium	8.6	11	9.4	18	7.6	8.7
Vanadium	61	68	60	71	54	54
Zinc	180	130	340	630	94	200

[1] Sample date June 4/5, 1991
[2] Various EPA analytical methods for CAM 17 Metals
[3] Composite sample from one-foot subsample of each core in area
[4] Results reported in milligrams per kilogram

TABLE 8

SUMMARY OF SEDIMENT ANALYTICAL RESULTS
FOR POLYNUCLEAR AROMATIC HYDROCARBON COMPOUNDS[1,2]

Pacific Dry Dock and Repair Facility
Yard I, Oakland, California

Analyte[3]	Sample Area[4]					
	PDDI-1 (mg/kg)[5]	PDDI-2 (mg/kg)	PDDI-3 (mg/kg)	PDDI-4 (mg/kg)	PDDI-5 (mg/kg)	PDDI-6 (mg/kg)
Acenapthene	<0.020	<0.020	<0.020	0.185	<0.020	0.337
Acenapthylene	0.746	<0.020	0.117	<0.020	<0.020	<0.020
Benzo(a)anthracene	<0.020	<0.020	<0.020	<0.020	0.036	0.435
Benzo(b)fluoranthene	<0.020	0.117	<0.020	0.086	<0.020	0.485[6]
Chrysene	0.357	0.114	<0.020	1.210	<0.020	<0.020
Fluoranthene	0.103	0.066	<0.020	0.595	0.070	0.610
Fluorene	<0.020	<0.020	<0.020	0.053	<0.020	0.152
Naphthalene	<0.020	<0.020	0.212	0.038	<0.020	<0.020
Phenanthrene	<0.020	0.058	<0.020	0.850	<0.020	0.715
Pyrene	0.242	0.192	2.170	1.232	0.109	0.977

[1] EPA Method 8100
[2] Sample date June 4/5, 1991
[3] Only detected compounds reported
[4] Composite sample from one-foot subsample of each core in area
[5] Results reported in milligrams per kilogram wet weight
[6] Benzo(b) and Benzo(k) Fluoranthene detected - reported in combined total

APPENDIX A

Sediment Lithology Logs

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 472799.4
Easting 1495491.4

Contractor : Kinnetic Laboratories, Inc.

Station No. PDDI-1A
Date Sampled 6-4-91
Time 10:42
Water Depth 16'
Tidal Stage
Recovery 5'
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
		PDDI-1A-SURF.	
1	Dark gray to black clay	PDDI-1A-1.0	Composited
2	Dark gray to black clay, becoming more fluid, increasing H2S odor	PDDI-1A-2.0	
3	Dark gray to black clay, more organic, becoming fluid at 3 feet	PDDI-1A-3.0	
4	Dark gray to black clay, sticky, sandy	PDDI-1A-4.0	
5	Dark gray to black clay, sticky, sandy	PDDI-1A-5.0	

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 472760.0
Easting 1495448.9

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-1B
Date Sampled 6-4-91
Time 11:33
Water Depth 19'
Tidal Stage
Recovery 5'3"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
		PDDI-1B-Surf.	
1	Sediment very loose, organic materials	PDDI-1B-1.0	Composited
2	Gray clay, fluid	PDDI-1B-2.0	
3	Gray clay, becoming more fluid	PDDI-1B-3.0	
4	Dark gray clay, sticky	PDDI-1B-4.0	
5	Dark gray clay, sticky	PDDI-1B-5.0	

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinantes):
Northing 472916.1
Easting 1495338.3

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-1C
Date Sampled 6-4-91
Time 12:44
Water Depth 12'
Tidal Stage
Recovery 1'
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
1	Sediment 100% sandblasting material, minor organic materials; sample taken opposite storm drain.	PDDI-1C-Surf. PDDI-1C-1	Composited
2			
3			
4			
5			

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 472939.3
Easting 1495208.1

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-2A
Date Sampled 6-5-91
Time 11:21
Water Depth 16'
Tidal Stage
Recovery 4' 3"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
		PDDI-2A-Surf.	
1	Black sediment, moderately gritty, H_2S odor	PDDI-2A-1	Composited
2	Black sediment, moderately gritty	PDDI-2A-2	
3	Black sediment, moderately gritty	PDDI-2A-3	
4	Black sediment, moderately gritty	PDDI-2A-4	
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 472945.4
Easting 1495182.9

Station No. PDDI-2B
Date Sampled 6-5-91
Time 11:35
Water Depth 22'
Tidal Stage
Recovery 2' 6"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
	Gray clay, slightly gritty; some pebble-size rounded rock fragments	PDDI-2B-Surf	
1	Gray to black clay, stiff	PDDI-2B-1	Composited
2	Gray to black clay, stiff	PDDI-2B-2	
3			
4			
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 472999.7
Easting 1495216.3

Contractor :Kinnetic Laboratories, Inc.

Station No. PDD-2C.
Date Sampled 6-5-91
Time 11:55
Water Depth 20'
Tidal Stage
Recovery 3' 6"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
		PDDI-2C-Surf.	
1	Layer of gritty material just above one foot Gray clay, moist, very gritty, sticky	PDDI-2C-1	Composited
2	Gray clay, moist, moderately gritty, sticky	PDDI-2C-2	
3	Gray clay, moist, moderately gritty, sticky	PDDI-2C-3	
	Sediment at bottom of core barrel - med. gray clay, gray-green mottled		
4			
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 472997.4
Easting 1495137.7

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-3A
Date Sampled 6-5-91
Time 10:47
Water Depth 20'
Tidal Stage
Recovery 2'
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
	Gray to black clay	PDDI-3A-Surf.	
1	Black sediment, moderately gritty, hydrocarbon and H_2S odor	PDDI-3A-1	Composited
2	Black to gray clay; hydrocarbon odor, good oily sheen	PDDI-3A-2	
3			
4			
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 473059.4
Easting 1495046.0

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-3B
Date Sampled 6-5-91
Time 10:24
Water Depth 23'
Tidal Stage
Recovery 5' 3"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
	Dirty gray sediment, moderately gritty	PDDI-3B-Surf.	
1	Black sediment, very gritty and loose; oily sheen (Heavy grit extends from about 12 inches to 22 inches)	PDDI-3B-1	Composited
2	Gray clay, very soft and sticky, no grit	PDDI-3B-2	
3	Dark gray clay, slightly gritty material present	PDDI-3B-3	
4	Dark gray clay	PDDI-3B-4	
5	Dark gray clay	PDDI-3B-5	
	Sediment at base of core barrel - gray clay with coarse sand grains		

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 473118.4
Easting 1495061.9

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-3C
Date Sampled 6-5-91
Time 10:01
Water Depth 18'
Tidal Stage
Recovery 3' 10"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
	Black and gray sediment, loose	PDDI-3C-Surf.	
1	Black sediment, very gritty, loose	PDDI-3C-1	Composited
2	Gray clay, sticky	PDDI-3C-2	
3	Gray-green clay, firm	PDDI-3C-3	
4	Sediment at base of core barrel - Med. gray-green (slightly mottled with green, mainly gray) clay, firm, slightly moist, trace silt, trace rounded rock fragments, trace f. gr. quartz grains		
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 473145.2
Easting 1495310.5

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-4A
Date Sampled 6-5-91
Time 8:40
Water Depth 7'
Tidal Stage
Recovery 1'
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
	Black sediment, very gritty, some benthic organisms, small (0.25") pieces of (?)metal	PDDI-4A-Surf.	
1	Black sediment, very gritty	PDDI-4A-1	Composited
	Black sediment, very gritty	PDDI-4A-Catcher	
2			
3			
4			
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 473080.7
Easting 1495250.2

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-4B
Date Sampled 6-5-91
Time 9:01
Water Depth 15'
Tidal Stage
Recovery 2'
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
		PDDI-4B-Surf.	
1	Very gritty black material, loose and fluid	PDDI-4B-1	Composited
2	Black sediment, clay-rich, very gritty, strong hydrocarbon odor, H_2S odor	PDDI-4B-2	
3			
4			
5			

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 473216.9
Easting 1494931.2

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-5A
Date Sampled 6-5-91
Time 13:25
Water Depth 14'
Tidal Stage
Recovery 8"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
	Medium gray clay, moderately loose	PDDI-5A-Surf.	
1	Medium gray clay, sticky	PDDI-5A-1	Composited
2			
3			
4			
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 473147.4
Easting 1494906.0

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-5B
Date Sampled 6-5-91
Time 13:50
Water Depth 19'
Tidal Stage
Recovery 4' 9"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
	Med. gray clay, slightly gritty	PDDI-5B-Surf.	
1	Dark gray to black clay, moderately gritty	PDDI-5B-1	Composited
2	Gray clay, moderately gritty, H_2S odor	PDDI-5B-2	
3	Gray clay, some organic material	PDDI-5B-3	
	Organic layer with grass fragments @ 3.5 feet		
4	Dark gray clay, sticky; slightly moist	PDDI-5B-4	
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock -Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 473091.9
Easting 1494937.7

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-5C
Date Sampled 6-5-91
Time 14:07
Water Depth 22'
Tidal Stage
Recovery 5' 1"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
	Med. gray clay, gritty	PDDI-5C-Surf.	
1	Medium gray clay, gritty	PDDI-5C-1	Composited
2	Light gray clay, very soft	PDDI-5C-2	
3	Dark gray clay, sticky, some gritty material	PDDI-5C-3	
4	Dark gray clay, sticky	PDDI-5C-4	
5	Dark gray clay, sticky	PDDI-5C-5	

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 473025.4
Easting 1494993.5

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-5D
Date Sampled 6-5-91
Time 14:37
Water Depth 24'
Tidal Stage
Recovery 5'
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
	Light gray clay, very loose, moist	PDDI-5D-Surf.	
1	Light gray clay, very loose, moist	PDDI-5D-1	Composited
2	Med. gray clay, firm, slightly moist, trace of grit.	PDDI-5D-2	
3	Med. gray clay, firm, slightly moist	PDDI-5D-3	
4	Med. gray clay, firm, slightly moist	PDDI-5D-4	
5	Med. gray clay, firm, slightly moist	PDDI-5D-5	

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 472915.7
Easting 1495160.6

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-6A
Date Sampled 6-4-91
Time 13:12
Water Depth 23'
Tidal Stage
Recovery 4' 8"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
		PDDI-6A-Surf.	
1	Light gray clay, slightly gritty 5% granular materials	PDDI-6A-1	Composited
2	Med. gray clay, slightly gritty, granular material content (1%)	PDDI-6A-2	
3	Med. gray clay, softer, increasing organic content	PDDI-6A-3	
4	Gray clay, sticky	PDDI-6A-4	
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 472882.7
Easting 1495218.1

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-6B
Date Sampled 6-4-91
Time 13:37
Water Depth 20'
Tidal Stage
Recovery 5' 8"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
		PDDI-6B-Surf.	
1	Dark gray to black clay, oily sheen	PDDI-6B-1	Composited
2	Dark gray clay, less consolidated, slightly gritty, increased organic content, H_2S odor	PDDI-6B-2	
3	Dark gray sediment, more clay-rich, slightly gritty	PDDI-6B-3	
4	Black sediment; moderately gritty, less odor.	PDDI-6B-4	
5	Black clay, moderately gritty, strong hydrocarbon odor	PDDI-6B-5	

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 472829.9
Easting 1495259.9

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-6C
Date Sampled 6-4-91
Time 14:37
Water Depth 22'
Tidal Stage
Recovery 4' 8"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
		PDDI-6C-Surf.	
1	Gray clay, moderately gritty	PDDI-6C-1	Composited
2	Gray clay, moderately gritty, H_2S odor	PDDI-6C-2	
3	Med. gray clay, no odor	PDDI-6C-3	
4	Med. gray clay, no odor	PDDI-6C-4	
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 472710.0
Easting 1495401.6

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDI-6D
Date Sampled 6-4-91
Time 15:05
Water Depth 20"
Tidal Stage
Recovery 5' 10.5"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
	Med. gray clay at surface	PDDI-6D-Surf.	
1	Sediment very fluid, slightly gritty	PDDI-6D-1	Composited
2	Dark gray clay, H_2S odor	PDDI-6D-2	
3	Dark gray clay, slighty gritty	PDDI-6D-3	
4	Dark gray clay, slightly gritty	PDDI-6D-4	
5	Dark gray clay, slight hydrocarbon odor, trace of organic material	PDDI-6D-5	
	Sediment at base of core barrel - dark gray clay, hydrocarbon odor	PDDI-6D-6	

Versar

SAMPLE LOG
-Marine Sediment Sampling-

PROJECT : Crowley Maritime
SITE: Pacific Dry Dock - Yard I
JOB NO. 1457-028

POSITION (State Plane Coordinates):
Northing 473040.8
Easting 1495292.3

Contractor : Kinnetic Laboratories, Inc.

Station No. 7A
Date Sampled 6-5-91
Time 9:32
Water Depth 7'
Tidal Stage
Recovery 5' 2"
Logged By: James G. Jensen

Sampling Mechanism: Gravity Corer

DEPTH (feet)	SAMPLE DESCRIPTION (sediment type, color, grain size, sorting, roundness, plasticity, moisture content, trace materials, odor, staining)	SAMPLE NO.	SENT TO LAB
		PDDI-7-Surf.	
1	Black sediment, gritty	PDDI-7-1	Composited
2	Black sediment, gritty	PDDI-7-2	
3	Gray clay, with abundant gritty material	PDDI-7-3	
4	Medium gray clay, gritty	PDDI-7-4	
5	Medium gray clay	PDDI-7-5	

APPENDIX B

RWQCB-Required Analytical Detection Levels

STATE OF CALIFORNIA
GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1800 HARRISON STREET, SUITE 700
OAKLAND, CA 94612

Phone: Area Code 415
464-1255

PACIFIC DRY DOCK & REPAIR CO.

AUG 1990

RECEIVED

OAKLAND CA

August 6, 1990

file no. 2199.9218 and 2199.9174

Mr. Robert Hartsock
Pacific Dry Dock
and Repair Company
321 Embarcadero
Oakland, CA 94606

REC'D BY
AUG 9 1990
C.M.C. RISK MANAGEMENT
SEATTLE WA

SEDIMENT SAMPLING

Dear Mr. Hartsock:

At our meeting of June 26th at this office Regional Board Staff discussed with you the results of metals analyses performed on sediment and water samples taken from the bay in the tidal area of the two Pacific Dry Dock facilities on May 24, 1990.

The sediment samples and the water samples both contained very high levels of chromium, copper, lead and zinc, all of which are constituents of marine antifouling paint. The sediment samples were also analyzed for organo-tin and contained high levels of this highly toxic class of compounds.

The nearshore area of the two facilities was covered with the sandblasting grit used to remove paint from vessels at your operation. The widespread occurrence of this sandblasting grit observed in the Bay at Pacific Dry Dock and the presence of heavy metals in the sediments indicates that waste material from the activities at Pacific Dry Dock has been allowed to enter the Bay. This is a violation of the waste discharge requirements (Order Numbers 84-11, and 85-115) for the two facilities.

Due to the levels of contaminants present in the samples analyzed it may be necessary to remove contaminated sediments from these sites. Accordingly, the extent of contamination must be determined.

Section 13267 of the California Water Code (Porter - Cologne Act) gives the Regional Water Quality Control Board the authority to investigate water quality in relation to a waste discharge and to require a waste discharger to supply related technical reports deemed necessary. Therefore, in accordance with Section 13267 of the California Water Code we request that you submit a plan including a time schedule for the sampling and analysis necessary to determine the extent of contamination in the Bay sediments at your dry dock facilities at 321 Embarcadero and 1441 Embarcadero

in Oakland. The plan should address the work necessary to determine the area contaminated and the depth to which contamination occurs in the sediments. The following parameters should be analyzed for:

Parameter	Required Detection Limit (mg/Kg)
Arsenic	.10
Cadmium	.10
Chromium	.10
Copper	.10
Lead	.10
Mercury	.20
Nickel	.10
Silver	.10
Zinc	2.00
Organotin	.001
Polynuclear Aromatic Hydrocarbons (1)	.02

(1) Analysis may be dropped if early results indicate these compounds are not a problem.

Finally, every effort must be made to prevent the discharge of waste material such as spent sandblasting grit and paint residue from entering the Bay. The widespread occurrence of such material around your facilities indicates it has been entering the Bay for some time. This is in violation of the waste discharge requirements for the facilities and Pacific Dry Dock and Repair could be subject to enforcement action by the Regional Board.

Please submit the information requested above by September 10, 1990. If you have any questions please call David Barr of our Industrial Section at (415) 464-1246.

Sincerely:

for

Teng-Chung Wu
Chief, Surface Water Protection Division

DIB:crowley

Versar INC. SACRAMENTO

APPENDIX C

Laboratory Analytical Results

WATER SAMPLES - Versar Project, T-7710
(Four samples total)

	PAHs (QAL)	CAM 17 Metals (TSI)	TBTs (TSI)
PDDI-1	(-37,-38 dup)	(-39)	(-40)
COMPOSITE:			
PDDI-2	(-41,-42 dup)	(-43)	(-44)
PDDI-3	(-45,-46 dup)	(-47)	(-48)
PDDI-4	(-49,-50 dup)	(-51)	(-52)
PDDII-1	(-53,-54 dup)	(-55)	(-56)
COMPOSITE:			
PDDII-2	(-57,-58 dup)	(-59)	(-60)
PDDII-4	(-61,-62 dup)	(-63)	(-64)
PDDII-3	(-65,-66 dup)	(-67)	(-68)

ToxScan Inc.

42 Hangar Way
Watsonville, CA 95076

(408) 724-4522

FAX (408) 724-3188

Versar, Inc.
5330 Primrose Drive, Suite 228
Fair Oaks, CA 95628

June 24, 1991
REVISED REPORT: September 17, 1991

Attn: Mr. Steve Wilson

MATERIAL: Seawater samples received June 5-7, 1991
ANALYSIS COMPLETED: June 24, 1991
IDENTIFICATION: Project No. 7703.026
TOXSCAN NUMBER: T-7710
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per liter, (parts per billion) as received:

Analyte	PDDI-1	Composite: PDDI-2 PDDI-3 PDDI-4	PDD-II-1	Composite: PDDII-2 PDDII-3 PDDII-4	Detection Limit
Antimony	ND	ND	ND	ND	0.6
Arsenic	2	2	2	2	2
Barium	ND	ND	ND	ND	100
Beryllium	ND	ND	ND	ND	10
Cadmium	0.14	0.13	0.17	0.10	0.01
Chromium	ND	ND	ND	ND	2.5
Cobalt	ND	ND	ND	ND	5
Copper	6.5	5.9	5.7	5.6	1
Lead	0.18	0.24	0.19	0.52	0.08
Mercury	ND	ND	0.125	0.17	0.075
Molybdenum	11	8.2	8.8	9.7	1
Nickel	5.0	ND	ND	ND	5
Selenium	ND	ND	ND	ND	2
Silver	ND	ND	ND	ND	0.08
Thallium	ND	ND	ND	ND	100
Vanadium	ND	ND	ND	ND	1000
Zinc	12	8.5	8	8.8	4

ND = None detected

Philip D. Carpenter
Laboratory Director

ToxScan Inc.

42 Hangar Way
Watsonville, CA 95076

(408) 724-4522

FAX (408) 724-3188

Versar, Inc.
5330 Primrose Drive, Suite 228
Fair Oaks, CA 95628

REVISED REPORT: August 9, 1991
June 24, 1991

Attn: Mr. Steve Wilson

MATERIAL: Seawater samples received June 5-7, 1991
ANALYSIS COMPLETED: June 24, 1991
IDENTIFICATION: Project No. 7703.026
TOXSCAN NUMBER: T-7710
REPORT: Quantitative chemical analysis for butyltin species by pentyl derivatization using a Gas Chromatograph with a Flame Photometric Detector is as follows, expressed as nanograms per liter (parts per trillion) as received:

Sample ID	Monobutyltin	Dibutyltin	Tributyltin	Tetrabutyltin
PDDI-1	ND	ND	ND	ND
Composite: PDDI-2 PDDI-3 PDDI-4	ND	ND	ND	ND
PDDII-1	ND	ND	ND	ND
Composite: PDDII-2 PDDII-3 PDDII-4	ND	ND	ND	ND

ND = None Detected

Detection Limit = 10 parts per trillion

Philip D. Casperite
Laboratory Director

ToxScan Inc.

42 Hangar Way
Watsonville, CA 95076

(408) 724-4522

FAX (408) 724-3188

Revised September 17, 1991

QA\QC FOR PROJECT # 7710

ELEMENT		SPIKE AMOUNT ug/l	% RECOVERY OF SPIKE	% ERROR	Rep 1	Rep 2
ANTIMONY		20	97	NA	ND	ND
ARSENIC		10	100	0	2.3	2.3
BARIUM		10	*	NA	ND	ND
BERYLLIUM		10	120	NA	ND	ND
CADMIUM		2.0	105	8	0.14	0.10
CHROMIUM		10	130	NA	ND	ND
COBALT		20	70	NA	ND	ND
COPPER		20	90	0	5.6	5.6
LEAD		20	80	2	0.52	0.48
MERCURY		7.5	130	7	0.17	0.13
MOLYBDEUM		20	130	1	9.7	9.4
NICKEL		50	94	NA	ND	ND
SELENIUM		10	111	NA	ND	ND
SILVER		2	99	NA	ND	ND
THALLIUM	**	10	96	NA	ND	ND
VANADIUM	**	75	74	NA	ND	ND
ZINC		100	122	3	8.8	7.8

ND = None Detected
NA = Not applicable
* = Spiked below detection limit
** = Post Spiked
Sample used for QA/QC = Composite 2

Philip D. Carpenter
Laboratory Director

QUALITY ASSURANCE LABORATORY
6605 NANCY RIDGE DRIVE
SAN DIEGO, CALIFORNIA 92121
(619) 552-3636

TOXSCAN, INC.
ATTN: RAY MARKEL
42 HANGAR WAY
WATSONVILLE, CA 95076

DEAR CUSTOMER:

PLEASE FIND ENCLOSED A REVISED REPORT FOR THE FOLLOWING LOG NUMBERS: 8070-91 THROUGH 8085-91

QUALITY ASSURANCE LABORATORY
6605 NANCY RIDGE DRIVE
SAN DIEGO, CALIFORNIA 92121
(619) 552-3636

TOXSCAN, INC.
ATTN: RAY MARKEL
42 HANGAR WAY
WATSONVILLE, CA 95076

DATE OF REPORT	AUGUST 14, 1991
DATE RECEIVED	JUNE 7, 1991
DATE OF SAMPLE	JUNE 4, 1991
DATE COMPLETED	JUNE 17, 1991
ANALYZED BY	EA
SAMPLE TYPE	4 SEA WATER
PROJECT NAME	PDD SEDIMENTS (WATER SAMPLES)
PROJECT NUMBER	7703.026

AUGUST 14, 1991

TOXSCAN, INC.
EPA METHOD 8100
POLYNUCLEAR AROMATIC HYDROCARBONS
SAMPLE TYPE - SEA WATER

ANALYSIS	DETECTION LIMIT UG/L	8070-91 T-7710 37 UG/L	8072-91 T-7710 41, 45, 49 UG/L	8078-91 T-7710 53 UG/L	8080-91 T-7710 57, 61, 65 UG/L
ACENAPHTHENE	20.0	ND	ND	ND	ND
ACENAPHTHYLENE	20.0	ND	ND	ND	ND
ANTHRACENE	20.0	ND	ND	ND	ND
BENZO(A)ANTHRACENE	20.0	ND	ND	ND	ND
BENZO(A)PYRENE	20.0	ND	ND	ND	ND
BENZO(B)FLUORANTHENE	20.0	ND	ND	ND	ND
BENZO(GHI)PERYLENE	20.0	ND	ND	ND	ND
BENZO(K)FLUORANTHENE	20.0	ND	ND	ND	ND
CHRYSENE	20.0	ND	ND	ND	ND
DIBENZO(A,H)ANTHRACENE	20.0	ND	ND	ND	ND
FLUORANTHENE	20.0	ND	ND	ND	ND
FLUORENE	20.0	ND	ND	ND	ND
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND	ND	ND
NAPHTHALENE	20.0	ND	ND	ND	ND
PHENANTHRENE	20.0	ND	ND	ND	ND
[redacted]ENE	20.0	ND	ND	ND	ND

ND = NONE DETECTED

PETER SHEN
LABORATORY DIRECTOR

PS/ft

QUALITY ASSURANCE
LABORATORY

1452

Vers INC. 8070/8085-91

CHAIN OF CUSTODY RECORD

PAGE 1/1

PROJECT NO.	PROJECT NAME	PARAMETERS	INDUSTRIAL HYGIENE SAMPLE Y / N
7703.026	PDD SEDIMENTS (WATER SAMPLES)		N

SAMPLERS: (Signature) [signature]

(Printed) JAMES G JENSEN

T-7710

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PAH	CAM 17 METALS	ORGANOTINS	COMPOSITE	PAH	CAM 17 METALS	ORGANOTINS	REMARKS
PDD I-1	6-4-91	9:22A		✓	center of channel opp. pier	4	X -37 -38	X -39	X -40					
PDD I-2	6-4-91	9:43A		✓	east side of yard - near dock	4	-41 -42	-43	-44	X				COMPOSITE W/ # 1-3 + 1-4
PDD I-3	6-4-91	9:57A		✓	west side of yard - near dock	4	-45 -46	-47	-48	X	X	X	X	COMPOSITE W/ # 1-2 + 1-4
PDD I-4	6-4-91	10:10A		✓	center of yard - near dock	4	-49 -50	-51	-52	X				COMPOSITE W/ # 1-2 + 1-3
PDD II-1	6-4-91	3:47P		✓	center - opposite east dock	4	X -53 -54	X -55	X -56					
PDD II-2	6-4-91	3:58P		✓	near shore - west side	4	-57 -58	-59	-60	X				COMPOSITE W/ II-3 + II-4
PDD II-4	6-4-91	4:12P		✓	inside east & west docks	4	-61 -62	-63	-64	X	X	X	X	COMPOSITE W/ II-2 + II-3
PDD II-3	6-4-91	4:20P		✓	near pier / drydock - east side	4	-65 -66	-67	-68	X				COMPOSITE W/ II-2 + II-4

QA Labs: -37, -38, -41, -42, -45, -46, -49, -50, -53, -54, -57, -58, -61, -62, -65, -66 } only these containers sent MLM 6.6.91

8070-91 8071 8072 8073 8074 8075 8076 8077 8078 8079 8080 8081 8082 8083 8084 8085

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	6-4-91 4:45P	[signature]	[signature] via UPS overnight	6/6/91 4:30 pm	[signature]
(Printed) JAMES G. JENSEN		(Printed) Richard D. Mattison	(Printed)		(Printed) 6/7/91 @ 9:39

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks:
[signature]	6-5-91 0900	[signature]		DO FILTER ALL SAMPLES BEFORE COMPOSITION OR SAMPLING
(Printed) Richard D. Mattison		(Printed) Kit Muhs MLM		

per ML Milazzo 6/10/91 @ 10:45

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

SOIL SAMPLES - Versar Project, T-7710
(Twelve samples total)

			Composite, Subsample Designations (Subsample I.D.'s)	
	Client I.D.	TSI I.D.	PAH's (QAL)	17 CAM Metals +TBTs (TSI)
Composite of:	PDDI-1A-1	(-02)	(-70)	(-71,-72)
	PDDI-1B-1	(-08)		
	PDDI-1C-1	(-14)		
Composite of:	PDDI-6A-1	(-16)	(-73)	(-74,-75,-76)
	PDDI-6B-1	(-21)		
	PDDI-6C-1	(-27)		
	PDDI-6D-1	(-32)		
Composite of:	PDDI-4A-1	(-78)	(-236)	(-237)
	PDDI-4B-1	(-81)		
Composite of:	PDDI-3C-1	(-90)	(-238)	(-239,-240)
	PDDI-3B-1	(-94)		
	PDDI-3A-1	(-100)		
Composite of:	PDDI-2A-1	(-103)	(-241)	(-242,-243)
	PDDI-2B-1	(-108)		
	PDDI-2C-1	(-111)		
Composite of:	PDDI-5A-1	(-115)	(-244)	(-245,-246,-247)
	PDDI-5B-1	(-117)		
	PDDI-5C-1	(-122)		
	PDDI-5D-1	(-128)		
Composite of:	PDDII-3A-1	(-134)	(-248)	(-249,-250)
	PDDII-3B-1	(-137)		
	PDDII-3C-1	(-142)		
Composite of:	PDDII-4A-1	(-148)	(-251)	(-252,-253)
	PDDII-4B-1	(-153)		
	PDDII-4C-1	(-228)		
Composite of:	PDDII-1A-1	(-233)	(-254)	(-255,-256)
	PDDII-1B-1	(-159)		
	PDDII-1C-1	(-161)		
Composite of:	PDDII-2A-1	(-166)	(-257)	(-258,-259)
	PDDII-2B-1	(-172)		
	PDDII-2C-1	(-178)		
Composite of:	PDDII-5A-1	(-184)	(-260)	(-261,-262,-263)
	PDDII-5B-1	(-186)		
	PDDII-5C-1	(-190)		
	PDDII-5D-1	(-195)		
Composite of:	PDDII-6A-1	(-212)	(-264)	(-265,-266,
	PDDII-6B-1	(-216)		-267,-268)
	PDDII-6C-1	(-200)		
	PDDII-6E-1	(-220)		

ToxScan Inc.

42 Hangar Way
Watsonville, CA 95076

(408) 724-4522

FAX (408) 724-3188

Versar, Inc.
5330 Primose Drive, Suite 228
Fair Oaks, CA 95628

July 1, 1991

Attn: Steve Wilson

MATERIAL: Sediment samples received June 5-7, 1991
IDENTIFICATION: Project-7703.026
TOXSCAN NUMBER: T-7710
REPORT: Quantitative chemical analysis for butyltin species by pentyl derivatization using a Gas Chromatograph with a Flame Photometric Detector is as follows, expressed as micrograms per kilogram (parts per billion) as received:

ToxScan Sample ID	Monobutyltin	Dibutyltin	Tributyltin	Tetrabutyltin
-71	ND	230	300	ND
-74	ND	110	100	2
-237	ND	530	1300	ND
-239	ND	9	12	ND
-242	ND	36	77	ND
-245	ND	65	55	ND
-249	5	74	58	ND
-252	7	31	15	ND
-255	13	260	240	ND
-258	2	14	17	ND
-261	ND	8	6	ND
-265	7	270	240	ND

ND = None detected

Detection limit = 2 ppb

Philip D. Carpenter
Laboratory Director

ToxScan Inc.

42 Hangar Way
Watsonville, CA 95076

(408) 724-4522

FAX (408) 724-3188

Crowley Environmental Services Inc.
P.O. Box 2287
Seattle, WA 98111

October 5, 1992

Attn: Steve Wilson

Dear Steve

After carefully reviewing the data for your original Mercury analyses, our ToxScan number T-7710, a discrepancy was noted from the calculated raw data values and that of the reported values. Upon investigation of this problem it was found that the original calculated values were correct and are now the reported values marked as revised. The error was found to be a spreadsheet problem which occurred with the addition of Molybdenum into the cell below. All other values have been checked and found to be correct as reported. Spreadsheets prior and after this data set have also been checked with no further problems being detected. I apologize for the problems and concerns this has caused and I will assure you that this will not happen again.

If I may be of further assistance in contacting agencies or helping you remedy this error please call me at your convenience.

Sincerely,

James Thoits
Inorganic Laboratory Manager

ToxScan Inc.

42 Hangar Way
Watsonville, CA 95076

(408) 724-4522

FAX (408) 724-3188

Versar Inc.
5330 Primrose Dr Suite 228
Fair Oaks, CA 95628

Revised October 5, 1992
June 28, 1991

Att. Steve Wilson

MATERIAL: Sediment
IDENTIFICATION:
TOXSCAN NUMBER: T-7710
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per gram, parts per million, as received:

Element	Sample I.D. 71	74	237	239	242
Antimony	19	19	38	22	20
Arsenic	1.8	2.3	4.2	2.1	1.7
Barium	77	80	100	17	100
Beryllium	0.64	0.84	1.1	0.60	1.00
Cadmium	0.50	0.60	0.52	1.7	0.42
Chromium	69	73	220	63	85
Cobalt	10	10	31	9.2	13
Copper	120	110	1300	150	110
Lead	140	150	350	460	110
Mercury	0.7	1.3	4.6	3.2	0.6
Molybdenum	5.6	3.9	78	5.7	5.2
Nickel	93	46	79	40	62
Selenium	0.20	0.21	0.35	0.18	0.21
Silver	0.95	1.1	1.9	2.3	1.2
Thallium	8.6	8.7	18	9.4	11
Vanadium	61	54	71	60	68
Zinc	180	200	630	340	130

Philip D. Carpenter
Laboratory Director

ToxScan Inc.

42 Hangar Way
Watsonville, CA 95076

(408) 724-4522

FAX (408) 724-3188

Versar Inc.
5330 Primrose Dr Suite 228
Fair Oaks, CA 95628

Att. Steve Wilson

MATERIAL: Sediment
IDENTIFICATION:
TOXSCAN NUMBER: T-7710
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per gram, parts per million, as received:

Element	ToxScan Sample I.D. 245	249	252	255	258
Antimony	16	22	18	19	19
Arsenic	3.1	3.0	2.1	2.3	2.3
Barium	81	57	57	81	110
Beryllium	0.76	0.73	0.78	0.81	0.85
Cadmium	0.21	0.87	0.79	0.35	1.0
Chromium	71	110	71	67	86
Cobalt	9.4	12	9.1	11	10
Copper	70	230	86	200	55
Lead	370	170	79	52	63
Mercury	0.5	6.9	1.6	0.7	2.2
Molybdenum	4.2	22	4.4	24	4.8
Nickel	39	54	39	38	56
Selenium	0.16	0.27	0.24	0.27	0.25
Silver	0.82	1.4	1.2	0.93	1.2
Thallium	7.6	10	8.4	9.4	9.3
Vanadium	54	62	59	62	69
Zinc	94	310	170	140	140

Philip D. Carpenter
Laboratory Director

ToxScan Inc.

42 Hangar Way
Watsonville, CA 95076

(408) 724-4522

FAX (408) 724-3188

Versar Inc.
5330 Primrose Dr Suite 228
Fair Oaks, CA 95628

Att. Steve Wilson

MATERIAL: Sediment
IDENTIFICATION:
TOXSCAN NUMBER: T-7710
REPORT: Quantitative chemical analysis is as follows, expressed as micrograms per gram, parts per million, as received:

Element	261	265
Antimony	17	19
Arsenic	2.1	3.2
Barium	76	84
Beryllium	0.87	0.67
Cadmium	0.64	0.63
Chromium	69	130
Cobalt	9.4	10
Copper	41	190
Lead	59	160
Mercury	1.4	0.6
Molybdenum	3.9	19
Nickel	40	44
Selenium	0.20	0.23
Silver	1.1	0.96
Thallium	8.9	8.8
Vanadium	62	56
Zinc	110	290

Philip D. Carpenter
Laboratory Director

ToxScan Inc.

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Watsonville, CA 95076

(408) 724-4522

FAX (408) 724-3188

QA\QC FOR PROJECT # T-7710 Revised October 5, 1992
SEDIMENTS

ELEMENT	% RECOVERY OF SPIKE		AMOUNT OF SPIKE ug/ml	% ERROR	REP 1	REP 2
ANTIMONY	80		2.85	2.4	22.0	20.0
ARSENIC	102		2.00	0.0	3.0	3.0
BARIUM	*		0.14	0.9	57.0	55.0
BERYLLIUM	107		2.85	1.4	0.73	0.69
CADMIUM	79		0.28	0.3	0.87	0.86
CHROMIUM	114		2.85	3.7	109	94.0
COBALT	94		2.85	0.0	12.0	12.0
COPPER	60	**	2.85	8.7	327	230
LEAD	106		1.43	2.1	189	174
MERCURY	108		0.05	18.6	8.8	7.3
MOLYBDENUM	118		2.85	1.1	23.0	22.0
NICKEL	45	**	1.43	10.6	83.0	54.0
SELENIUM	83		0.14	4.2	0.32	0.27
SILVER	94		0.28	0.0	1.4	1.4
THALLIUM	100		2.85		11.0	10.0
VANADIUM	87		2.85	1.9	67.0	62.0
ZINC	66	**	2.85	1.2	310	296

* Due to high analyte concentration the spike was diluted past the detection limit.

** Due to high analyte concentration the spike was diluted near the detection limit.

. ToxScan Inc.

42 Hangar Way
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(408) 724-4522

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QA\QC FOR PROJECT # 7710
SEDIMENTS

ELEMENT	VALUE FOUND ug/g	CERTIFIED VALUE ug/g		PERCENT RECOVERY %
ANTIMONY	*			
ARSENIC	8.5	11.6	+/- 1.3	73
BARIUM				
BERYLLIUM				
CADMIUM	0.33	0.36	0.07	92
CHROMIUM	66.9	76.0	3.0	88
COBALT	13.5	10.5	1.3	129
COPPER	17.5	18.0	3.0	97
LEAD	18.0	28.2	1.8	64
MERCURY	0.088	0.063	0.01	140
MOLYBDENUM	*			
NICKEL	25.6	32.0	3.0	80
SELENIUM	*			
SILVER	*			
THALLIUM	*			94
VANADIUM	107	94.0	1.0	114
ZINC	123	138	6	89

SRM = National Institute of Standards and Technology
Estuarine Sediment, 1646.

* No certified value given.

QUALITY ASSURANCE LABORATORY
6605 NANCY RIDGE DRIVE
SAN DIEGO, CALIFORNIA 92121
(619) 552-3636

TOXSCAN, INC.
ATTN: RAY MARKEL
42 HANGAR WAY
WATSONVILLE, CA 95076

DATE OF REPORT	JULY 8, 1991
DATE RECEIVED	JUNE 7, 1991
DATE OF SAMPLE	JUNE 4, 1991
DATE COMPLETED	JUNE 14, 1991
ANALYZED BY	MF EA
SAMPLE TYPE	1 MARINE SEDIMENT
PROJECT NUMBER	T-7710

JULY 8, 1991

TOXSCAN, INC.
EPA METHOD 8100
POLYNUCLEAR AROMATIC HYDROCARBONS
SAMPLE TYPE - MARINE SEDIMENT

LOG NUMBER: 8098-91
SAMPLE ID: COMP.OF PDDI-1A-1,B-1,-1C-1

ANALYSIS	DETECTION LIMIT UG/KG	WET WEIGHT UG/KG	DRY WEIGHT UG/KG
% SOLID			51.5
ACENAPHTHENE	20.0	ND	ND
ACENAPHTHYLENE	20.0	746	1449
ANTHRACENE	20.0	ND	ND
BENZO(A)ANTHRACENE	20.0	ND	ND
BENZO(A)PYRENE	20.0	ND	ND
BENZO(B)FLUORANTHENE	20.0	ND	ND
BENZO(GHI)PERYLENE	20.0	ND	ND
BENZO(K)FLUORANTHENE	20.0	ND	ND
CHRYSENE	20.0	357	693
DIBENZO(A,H)ANTHRACENE	20.0	ND	ND
FLUORANTHENE	20.0	103	200
FLUORENE	20.0	ND	ND
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND
NAPHTHALENE	20.0	ND	ND
PHENANTHRENE	20.0	ND	ND
PYRENE	20.0	242	470

ND = NONE DETECTED

PETER SHEN
LABORATORY DIRECTOR

PS/ft

JULY 8, 1991

TOXSCAN, INC.
EPA METHOD 8100
POLYNUCLEAR AROMATIC HYDROCARBONS
SAMPLE TYPE - SEDIMENT

LOG NUMBER: 8443-91
SAMPLE ID: PDDI-2A-1,2B-1,2C-1

ANALYSIS	DETECTION LIMIT UG/KG	WET WEIGHT UG/KG	DRY WEIGHT UG/KG
% SOLID			48.0
ACENAPHTHENE	20.0	ND	ND
ACENAPHTHYLENE	20.0	ND	ND
ANTHRACENE	20.0	ND	ND
BENZO(A)ANTHRACENE	20.0	ND	ND
BENZO(A)PYRENE	20.0	ND	ND
BENZO(B)FLUORANTHENE	20.0	117	244
BENZO(GHI)PERYLENE	20.0	ND	ND
BENZO(K)FLUORANTHENE	20.0	**	**
CHRYSENE	20.0	114	238
DIBENZO(A,H)ANTHRACENE	20.0	ND	ND
FLUORANTHENE	20.0	66.0	138
FLUORENE	20.0	20.0	41.7
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND
NAPHTHALENE	20.0	ND	ND
PHENANTHRENE	20.0	58.0	121
PYRENE	20.0	192	400

ND = NONE DETECTED

COMPOUNDS DETECTED NOT CONFIRMED SINGLE COLUMN ANALYSIS ONLY

**BENZO(B)FLUORANTHENE AND BENZO(K)FLUORANTHENE COELUTE, RESULTS REPORTED ARE COMBINED TOTAL FOR BOTH.

PETER SHEN
LABORATORY DIRECTOR

PS/ft

QUALITY ASSURANCE LABORATORY

JULY 8, 1991

TOXSCAN, INC.
EPA METHOD 8100
POLYNUCLEAR AROMATIC HYDROCARBONS
SAMPLE TYPE - SEDIMENT

LOG NUMBER: 8442-91
SAMPLE ID: PDDI-3A-1,3B-1,3C-1

ANALYSIS	DETECTION LIMIT UG/KG	WET WEIGHT UG/KG	DRY WEIGHT UG/KG
% SOLID			44.0
ACENAPHTHENE	20.0	ND	ND
ACENAPHTHYLENE	20.0	117	266
ANTHRACENE	20.0	ND	ND
BENZO(A)ANTHRACENE	20.0	ND	ND
BENZO(A)PYRENE	20.0	ND	ND
BENZO(B)FLUORANTHENE	20.0	ND	ND
BENZO(GHI)PERYLENE	20.0	ND	ND
BENZO(K)FLUORANTHENE	20.0	ND	ND
CHRYSENE	20.0	ND	ND
DIBENZO(A,H)ANTHRACENE	20.0	ND	ND
FLUORANTHENE	20.0	ND	ND
FLUORENE	20.0	ND	ND
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND
NAPHTHALENE	20.0	212	482
PHENANTHRENE	20.0	ND	ND
PYRENE	20.0	2170	4932

ND = NONE DETECTED

COMPOUNDS DETECTED NOT CONFIRMED SINGLE COLUMN ANALYSIS ONLY

**BENZO(B)FLUORANTHENE AND BENZO(K)FLUORANTHENE COELUTE, RESULTS REPORTED ARE COMBINED TOTAL FOR BOTH.

PETER SHEN
LABORATORY DIRECTOR

PS/ft

JULY 8, 1991

TOXSCAN, INC.
EPA METHOD 8100
POLYNUCLEAR AROMATIC HYDROCARBONS
SAMPLE TYPE - SEDIMENT

LOG NUMBER: 8441-91
SAMPLE ID: PDDI-4A-1 & 4B-1

ANALYSIS	DETECTION LIMIT UG/KG	WET WEIGHT UG/KG	DRY WEIGHT UG/KG
% SOLID			49.0
ACENAPHTHENE	20.0	185	378
ACENAPHTHYLENE	20.0	ND	ND
ANTHRACENE	20.0	ND	ND
BENZO(A)ANTHRACENE	20.0	ND	ND
BENZO(A)PYRENE	20.0	ND	ND
BENZO(B)FLUORANTHENE	20.0	86.0	176
BENZO(GHI)PERYLENE	20.0	ND	ND
BENZO(K)FLUORANTHENE	20.0	**	**
CHRYSENE	20.0	1210	2469
DIBENZO(A,H)ANTHRACENE	20.0	ND	ND
FLUORANTHENE	20.0	595.0	1214
FLUORENE	20.0	53.0	108
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND
NAPHTHALENE	20.0	38.0	77.6
PHENANTHRENE	20.0	850	1735
PYRENE	20.0	1232	2514

ND = NONE DETECTED

COMPOUNDS DETECTED NOT CONFIRMED SINGLE COLUMN ANALYSIS ONLY

**BENZO(B)FLUORANTHENE AND BENZO(K)FLUORANTHENE COELUTE, RESULTS REPORTED ARE COMBINED TOTAL FOR BOTH.

PETER SHEN
LABORATORY DIRECTOR

PS/ft

JULY 8, 1991

TOXSCAN, INC.
EPA METHOD 8100
POLYNUCLEAR AROMATIC HYDROCARBONS
SAMPLE TYPE - SEDIMENT

LOG NUMBER: 8444-91
SAMPLE ID: PDDI-5A-1,5B-1,5C-1,5D-1

ANALYSIS	DETECTION LIMIT UG/KG	WET WEIGHT UG/KG	DRY WEIGHT UG/KG
% SOLID			54.0
ACENAPHTHENE	20.0	ND	ND
ACENAPHTHYLENE	20.0	ND	ND
ANTHRACENE	20.0	ND	ND
BENZO(A)ANTHRACENE	20.0	36.0	66.7
BENZO(A)PYRENE	20.0	ND	ND
BENZO(B)FLUORANTHENE	20.0	ND	ND
BENZO(GHI)PERYLENE	20.0	ND	ND
BENZO(K)FLUORANTHENE	20.0	ND	ND
CHRYSENE	20.0	ND	ND
DIBENZO(A,H)ANTHRACENE	20.0	ND	ND
FLUORANTHENE	20.0	70.0	130
FLUORENE	20.0	ND	ND
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND
NAPHTHALENE	20.0	ND	ND
PHENANTHRENE	20.0	ND	ND
PYRENE	20.0	109	202

ND = NONE DETECTED

COMPOUNDS DETECTED NOT CONFIRMED SINGLE COLUMN ANALYSIS ONLY

**BENZO(B)FLUORANTHENE AND BENZO(K)FLUORANTHENE COELUTE, RESULTS REPORTED ARE COMBINED TOTAL FOR BOTH.

PETER SHEN
LABORATORY DIRECTOR

PS/ft

QUALITY ASSURANCE LABORATORY
6605 NANCY RIDGE DRIVE
SAN DIEGO, CALIFORNIA 92121
(619) 552-3636

TOXSCAN, INC.
ATTN: RAY MARKEL
42 HANGAR WAY
WATSONVILLE, CA 95076

DATE OF REPORT	JULY 24, 1991
DATE RECEIVED	JUNE 7, 1991
DATE OF SAMPLE	JUNE 4, 1991
DATE COMPLETED	JUNE 14, 1991
ANALYZED BY	MF EA
SAMPLE TYPE	1 MARINE SEDIMENT
PROJECT NUMBER	T-7710

JUNE 24, 1991

TOXSCAN, INC.
E[redacted] METHOD 8100
POLYNUCLEAR AROMATIC HYDROCARBONS
SAMPLE TYPE - MARINE SEDIMENT

LOG NUMBER: 8099-91
SAMPLE ID: COMP. OF PDDI-6A-1,-6B-1,6C-1,6D-1

ANALYSIS	DETECTION LIMIT UG/KG	WET WEIGHT UG/KG	DRY WEIGHT UG/KG
% SOLID			48.5
ACENAPHTHENE	20.0	337	695
ACENAPHTHYLENE	20.0	ND	ND
ANTHRACENE	20.0	ND	ND
BENZO(A)ANTHRACENE	20.0	435	897
BENZO(A)PYRENE	20.0	ND	ND
BENZO(B)FLUORANTHENE	20.0	485 **	1000 **
BENZO(GHI)PERYLENE	20.0	ND	ND
BENZO(K)FLUORANTHENE	20.0	**	**
CHRYSENE	20.0	ND	ND
DIBENZO(A,H)ANTHRACENE	20.0	ND	ND
FLUORANTHENE	20.0	610	1258
FLUORENE	20.0	152	313
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND
NA[redacted]THALENE	20.0	ND	ND
PH[redacted]ANTHRENE	20.0	715	1474
PYRENE	20.0	977	2014

ND = NONE DETECTED

**BENZO(B)FLUORANTHENE AND
BENZO(K)FLUORANTHENE COELUTE, RESULTS
REPORTED ARE COMBINED TOTAL FOR BOTH.

PETER SHEN
LABORATORY DIRECTOR

PS/ft

QUALITY ASSURANCE
LABORATORY

QUALITY ASSURANCE LABORATORY

QUALITY CONTROL DATA REPORT

JUNE 19, 1991

TOXSCAN, INC.
LOG #8070-91 THROUGH 8085-91
DATE EXTRACTED: JUNE 7-10, 1991
DATE ANALYZED: JUNE 14, 1991

EPA METHOD 8100
CONTINUING CALIBRATION CURVE VERIFICATION

COMPOUND	CCCV % RECOVERY
NAPHTHALENE	115%
ACENAPHTENE	118%
FLUORENE	117%
PYRENE	113%
B(A)ANTHRACENE	90%
CHRYSENE	105%
BENZO (B) FLUORANTHENE	94%

SPIKE DATA

Log #8070-91 & 8071-91 composite was spiked with a 0.05ppm EPA method 8100 standard.

COMPOUND	SPIKE % RECOVERY	DUPLICATE RPD
ACENAPHTHENE	108%	0%
FLUORANTHENE	104%	0%
BENZO (B) FLUORANTHENE	94%	1%
PYRENE	103%	2%
NAPHTHALENE	112%	0%

A complete list is available upon request.

LISA MACCLELLAN
QA/QC DIRECTOR

QUALITY CONTROL TERMINOLOGY

*CCCV-CONTINUING CALIBRATION CURVE VERIFICATION. REPORTED AS % RECOVERY OF AN INDEPENDENT STANDARD TO VERIFY LINEARITY OF THE OPERATING STANDARD CURVE. ACCEPTABLE RANGE IS 80%-120% RECOVERY.
*SPIKE-ENVIRONMENTAL SAMPLE IS MATRIX SPIKED WITH METHOD COMPOUNDS AND % RECOVERY OF CONCENTRATION SPIKED INTO SAMPLE IS CALCULATED. REPORTED AS % RECOVERY. ACCEPTABLE RANGE FOR "NORMAL MATRIX SAMPLES" IS 75%-125% RECOVERY.
*SURROGATES-COMPOUNDS REPRESENTATIVE OF A GROUP OF COMPOUNDS. SURROGATES ARE SPIKED INTO ENVIRONMENTAL SAMPLES AND % RECOVERY OF CONCENTRATION SPIKED IS CALCULATED AND REPORTED. ACCEPTABLE RANGE VARIES DEPENDING UPON SAMPLE MATRIX AND ANALYSES METHOD.

FOR A MORE DETAILED EXPLANATION OF QC DATA, PLEASE REFER TO QUALITY ASSURANCE LABORATORY'S "QUALITY ASSURANCE PLAN" OR "UNDERSTANDING YOUR QUALITY CONTROL DATA". BOTH PUBLICATIONS ARE AVAILABLE FROM QAL.

QUALITY ASSURANCE LABORATORY
QUALITY CONTROL DATA REPORT

JUNE 14, 1991

TOXSCAN, INC.
LOG #8098-91
DATE EXTRACTED: JUNE 10, 1991
DATE ANALYZED: JUNE 11, 1991

EPA METHOD 8100
CONTINUING CALIBRATION CURVE VERIFICATION

COMPOUND	CCCV % RECOVERY
ACENAPHTHYLENE	98%
FLUORANTHENE	100%
PYRENE	100%
B (A) ANTHRACENE	95%
CHRYSENE	103%
BENZO (B) FLUORANTHENE	99%

SPIKE DATA

The lab check sample was spiked with 0.1ppm EPA method 8100 standard.

COMPOUND	SPIKE % RECOVERY	DUPLICATE RPD
FLUORENE	96%	2%
PHENANTHRENE	93%	1%
FLUORANTHENE	97%	0%
PYRENE	97%	0%
B (A) ANTHRACENE	104%	17%
CHRYSENE	91%	21%
BENZO (A) PYRENE	100%	0%

A complete list is available upon request.

LISA MACCLELLAN
QA/QC DIRECTOR

QUALITY CONTROL TERMINOLOGY

*CCCV-CONTINUING CALIBRATION CURVE VERIFICATION. REPORTED AS % RECOVERY OF AN INDEPENDENT STANDARD TO VERIFY LINEARITY OF THE OPERATING STANDARD CURVE. ACCEPTABLE RANGE IS 80%-120% RECOVERY.
*SPIKE-ENVIRONMENTAL SAMPLE IS MATRIX SPIKED WITH METHOD COMPOUNDS AND % RECOVERY OF CONCENTRATION SPIKED INTO SAMPLE IS CALCULATED. REPORTED AS % RECOVERY. ACCEPTABLE RANGE FOR "NORMAL MATRIX SAMPLES" IS 75%-125% RECOVERY.
*SURROGATES-COMPOUNDS REPRESENTATIVE OF A GROUP OF COMPOUNDS. SURROGATES ARE SPIKED INTO ENVIRONMENTAL SAMPLES AND % RECOVERY OF CONCENTRATION SPIKED IS CALCULATED AND REPORTED. ACCEPTABLE RANGE VARIES DEPENDING UPON SAMPLE MATRIX AND ANALYSES METHOD.

FOR A MORE DETAILED EXPLANATION OF QC DATA, PLEASE REFER TO QUALITY ASSURANCE LABORATORY'S "QUALITY ASSURANCE PLAN" OR "UNDERSTANDING YOUR QUALITY CONTROL DATA". BOTH PUBLICATIONS ARE AVAILABLE FROM QAL.

QUALITY ASSURANCE LABORATORY
QUALITY CONTROL DATA REPORT

JUNE 14, 1991

TOXSCAN, INC.
LOG #8099-91
DATE EXTRACTED: JUNE 7, 1991
DATE ANALYZED: JUNE 11, 1991

EPA METHOD 8100
CONTINUING CALIBRATION CURVE VERIFICATION

COMPOUND	CCCV % RECOVERY
ACENAPHTHENE	98%
FLUORENE	98%
PHENANTHRENE	98%
FLUORANTHENE	100%
PYRENE	100%
B (A) ANTHRACENE	95%
BENZO (K) FLUORANTHENE	99%
BENZO (B) FLUORANTHENE	99%

SPIKE DATA

The lab check sample was spiked with 0.1ppm EPA method 8100 standard.

COMPOUND	SPIKE % RECOVERY	DUPLICATE RPD
FLUORENE	96%	2%
PHENANTHRENE	93%	1%
FLUORANTHENE	97%	0%
PYRENE	97%	0%
B (A) ANTHRACENE	104%	17%
CHRYSENE	91%	21%
BENZO (A) PYRENE	100%	0%

A complete list is available upon request.

LISA MACCLELLAN
QA/QC DIRECTOR

QUALITY CONTROL TERMINOLOGY

*CCCV-CONTINUING CALIBRATION CURVE VERIFICATION. REPORTED AS % RECOVERY OF AN INDEPENDENT STANDARD TO VERIFY LINEARITY OF THE OPERATING STANDARD CURVE. ACCEPTABLE RANGE IS 80%-120% RECOVERY.
*SPIKE-ENVIRONMENTAL SAMPLE IS MATRIX SPIKED WITH METHOD COMPOUNDS AND % RECOVERY OF CONCENTRATION SPIKED INTO SAMPLE IS CALCULATED. REPORTED AS % RECOVERY. ACCEPTABLE RANGE FOR "NORMAL MATRIX SAMPLES" IS 75%-125% RECOVERY.
*SURROGATES-COMPOUNDS REPRESENTATIVE OF A GROUP OF COMPOUNDS. SURROGATES ARE SPIKED INTO ENVIRONMENTAL SAMPLES AND % RECOVERY OF CONCENTRATION SPIKED IS CALCULATED AND REPORTED. ACCEPTABLE RANGE VARIES DEPENDING UPON SAMPLE MATRIX AND ANALYSES METHOD.

FOR A MORE DETAILED EXPLANATION OF QC DATA, PLEASE REFER TO QUALITY ASSURANCE LABORATORY'S "QUALITY ASSURANCE PLAN" OR "UNDERSTANDING YOUR QUALITY CONTROL DATA". BOTH PUBLICATIONS ARE AVAILABLE FROM QAL.

QUALITY ASSURANCE LABORATORY
QUALITY CONTROL DATA REPORT

JUNE 19, 1991

TOXSCAN, INC.
LOG #8441-91 THROUGH 8450-91
DATE EXTRACTED: JUNE 12, 1991
DATE ANALYZED: JUNE 15, 1991

EPA METHOD 8100
CONTINUING CALIBRATION CURVE VERIFICATION

COMPOUND	CCCV % RECOVERY
NAPHTHALENE	115%
ACENAPHTENE	118%
FLUORENE	117%
PYRENE	113%
B(A)ANTHRACENE	90%
CHRYSENE	105%
BENZO (B) FLUORANTHENE	94%

SPIKE DATA

Log #8070-91 & 8071-91 composite was spiked with a 0.05ppm EPA method 8100 standard.

COMPOUND	SPIKE % RECOVERY	DUPLICATE RPD
ACENAPHTHENE	108%	0%
FLUORANTHENE	104%	0%
BENZO (B) FLUORANTHENE	94%	1%
PYRENE	103%	2%
NAPHTHALENE	112%	0%

A complete list is available upon request.

LISA MACCLELLAN
QUALITY CONTROL MANAGER

QUALITY CONTROL TERMINOLOGY

•CCCV-CONTINUING CALIBRATION CURVE VERIFICATION. REPORTED AS % RECOVERY OF AN INDEPENDENT STANDARD TO VERIFY LINEARITY OF THE OPERATING STANDARD CURVE. ACCEPTABLE RANGE IS 80%-120% RECOVERY.
•SPIKE-ENVIRONMENTAL SAMPLE IS MATRIX SPIKED WITH METHOD COMPOUNDS AND % RECOVERY OF CONCENTRATION SPIKED INTO SAMPLE IS CALCULATED. REPORTED AS % RECOVERY. ACCEPTABLE RANGE FOR "NORMAL MATRIX SAMPLES" IS 75%-125% RECOVERY.
•SURROGATES-COMPOUNDS REPRESENTATIVE OF A GROUP OF COMPOUNDS. SURROGATES ARE SPIKED INTO ENVIRONMENTAL SAMPLES AND % RECOVERY OF CONCENTRATION SPIKED IS CALCULATED AND REPORTED. ACCEPTABLE RANGE VARIES DEPENDING UPON SAMPLE MATRIX AND ANALYSES METHOD.

FOR A MORE DETAILED EXPLANATION OF QC DATA, PLEASE REFER TO QUALITY ASSURANCE LABORATORY'S "QUALITY ASSURANCE PLAN" OR "UNDERSTANDING YOUR QUALITY CONTROL DATA". BOTH PUBLICATIONS ARE AVAILABLE FROM QAL.

QUALITY ASSURANCE LABORATORY
QUALITY CONTROL DATA REPORT

JUNE 14, 1991

TOXSCAN, INC.
LOG #8099-91
DATE EXTRACTED: JUNE 7, 1991
DATE ANALYZED: JUNE 11, 1991

EPA METHOD 8100
CONTINUING CALIBRATION CURVE VERIFICATION

COMPOUND	CCCV % RECOVERY
ACENAPHTHENE	98%
FLUORENE	98%
PHENANTHRENE	98%
FLUORANTHENE	100%
PYRENE	100%
B (A) ANTHRACENE	95%
BENZO (K) FLUORANTHENE	99%
BENZO (B) FLUORANTHENE	99%

SPIKE DATA

The lab check sample was spiked with 0.1ppm EPA method 8100 standard.

COMPOUND	SPIKE % RECOVERY	DUPLICATE RPD
FLUORENE	96%	2%
PHENANTHRENE	93%	1%
FLUORANTHENE	97%	0%
PYRENE	97%	0%
B (A) ANTHRACENE	104%	17%
CHRYSENE	91%	21%
BENZO (A) PYRENE	100%	0%

A complete list is available upon request.

LISA MACCLELLAN
QA/QC DIRECTOR

QUALITY CONTROL TERMINOLOGY

*CCCV-CONTINUING CALIBRATION CURVE VERIFICATION. REPORTED AS % RECOVERY OF AN INDEPENDENT STANDARD TO VERIFY LINEARITY OF THE OPERATING STANDARD CURVE. ACCEPTABLE RANGE IS 80%-120% RECOVERY.
*SPIKE-ENVIRONMENTAL SAMPLE IS MATRIX SPIKED WITH METHOD COMPOUNDS AND % RECOVERY OF CONCENTRATION SPIKED INTO SAMPLE IS CALCULATED. REPORTED AS % RECOVERY. ACCEPTABLE RANGE FOR "NORMAL MATRIX SAMPLES" IS 75%-125% RECOVERY.
*SURROGATES-COMPOUNDS REPRESENTATIVE OF A GROUP OF COMPOUNDS. SURROGATES ARE SPIKED INTO ENVIRONMENTAL SAMPLES AND % RECOVERY OF CONCENTRATION SPIKED IS CALCULATED AND REPORTED. ACCEPTABLE RANGE VARIES DEPENDING UPON SAMPLE MATRIX AND ANALYSES METHOD.

FOR A MORE DETAILED EXPLANATION OF QC DATA, PLEASE REFER TO QUALITY ASSURANCE LABORATORY'S "QUALITY ASSURANCE PLAN" OR "UNDERSTANDING YOUR QUALITY CONTROL DATA". BOTH PUBLICATIONS ARE AVAILABLE FROM QAL.

SAMPLING AND ANALYSIS CHAIN OF CUSTODY RECORD

ToxScan Inc.
42 Hangar Way
Watsonville, CA 95076
(408) 724-4522

CLIENT _____ LABORATORY NO. T-7710

CONTACT _____ PHONE _____ ACCOUNT NO. _____

REQUEST			LABORATORY REQUIREMENTS				CHAIN OF CUSTODY							
SAMPLE TYPE: marine sediment			Please identify sample on report as: "Composite of PDDI-6A-1, -6B-1, 6C-1 & -6D-1." Results required by 6/21/91.				ToxScan Inc.					CONTRACT LABORATORY: Quality Assurance Laboratory.		
SAMPLE ID	LAB ID	PARAMETERS	BOTTLES	PRES.	LABORATORY	PO#	SAMPLED BY	DATE	REC'D BY	DATE	COMMENTS	REC'D BY	DATE	COMMENTS
PDDI-6A-1 T-7710-16	↓						Composited by Mary L Milazzo 6/6/91.							
PDDI-6B-1 T-7710-21	Composite													
PDDI-6C-1 T-7710-27							Sampled by KE/Versar Staff 6/4/91							
PDDI-6D-1 T-7710-32	Composite ID's:													
8099-91	-73	PAH's												
	-74	17 CAM metals + TBT												
	-75	↓												
	-76	↓												

RECEIVED JUN 7 9:39

SIGNATURES:

LABORATORY REPRESENTATIVE: _____

RELEASED TO COURIER BY FIELD PERSONEL: _____

RECEIVED BY COURIER: _____

RELEASED TO LABORATORY BY COURIER: _____

RECEIVED BY LABORATORY: Mary L Milazzo

RELEASED TO LABORATORY BY COURIER: 6/6/91. Via UPS overnight Mary L Milazzo

RECEIVED BY LABORATORY: John Edgar Evans 6/7 @ 9:39

THIS FORM MUST ACCOMPANY THE "ANALYSIS REQUEST FORM" AND SAMPLES TO INITIATE ANALYSIS.

1452

SAMPLING AND ANALYSIS CHAIN OF CUSTODY RECORD

1 of 9

ToxScan Inc.
42 Hangar Way
Watsonville, CA 95076
(408) 724-4522

CLIENT _____ LABORATORY NO. T-7710

CONTACT _____ PHONE _____ ACCOUNT NO. _____

REQUEST			LABORATORY REQUIREMENTS				CHAIN OF CUSTODY					CONTRACT LABORATORY Quality Assurance Laboratory		
SAMPLE TYPE Marine Sediment			Please identifying samples on report as: 'Composite of PDDI-4A-1 and PDDI-4B-1'				Results required by 6/21/91 ToxScan Inc.							
SAMPLE ID	LAB ID	PARAMETERS	BOTTLES	PRES.	LABORATORY	PO#	SAMPLED BY	DATE	REC'D BY	DATE	COMMENTS	REC'D BY	DATE	COMMENTS
PDDI-4A-1 T-7710-78	composite		and				Composited by 6/11/91.		Wayne Milligan					
PDDI-4B-1 T-7710-81	composite		Composite of		PDDI-3A-1, 3B-1, 3C-1		Sampled by KLI/Vessar							
	Composite ID's &						staff	6/5/91.					6/12	
	-236	PAH's	1-125ml glass jar		QAL							VEE	6/12	8441-91
	-237 dup.	17 CAM metals + TBT	↓		TSI								11:	RECEIVED
PDDI-3C-1 T-7710-90	composite												AM	
PDDI-3B-1 T-7710-94	composite												11:00	
PDDI-3A-1 T-7710-100	Composite ID's &													
	-238	PAH's	1-125ml glass jar		QAL							VEE	6/12	8442-91
	-239 dup.	17 CAM metals + TBT's	↓		TSI									
	-240 dup.	↓	↓											

SIGNATURES:

LABORATORY REPRESENTATIVE: _____

RELEASED TO COURIER BY FIELD PERSONEL: _____

RECEIVED BY COURIER: _____

RELEASED TO LABORATORY BY COURIER: _____

RECEIVED BY LABORATORY: Wayne Milligan

RELEASED TO LABORATORY BY COURIER: via UPS overnight 6-11-91 Wayne Milligan

RECEIVED BY LABORATORY: John Evon Even

THIS FORM MUST ACCOMPANY THE "ANALYSIS REQUEST FORM" AND SAMPLES TO INITIATE ANALYSIS.

SAMPLING AND ANALYSIS CHAIN OF CUSTODY RECORD

ToxScan Inc.
42 Hangar Way
Watsonville, CA 95076
(408) 724-4522

CLIENT _____ LABORATORY NO. T-7710

CONTACT _____ PHONE _____ ACCOUNT NO. _____

REQUEST			LABORATORY REQUIREMENTS				CHAIN OF CUSTODY							
SAMPLE TYPE: Marine sediment			[redacted] PDDI-2A-1, -2B-1, -2C-1 Results required by 6/21/91.				ToxScan Inc.					CONTRACT LABORATORY: Quality Assurance Laboratory.		
SAMPLE ID	LAB ID	PARAMETERS	BOTTLES	PRES.	LABORATORY	PO#	SAMPLED BY	DATE	REC'D BY	DATE	COMMENTS	REC'D BY	DATE	COMMENTS
PDDI-2A-1 T-7710-103	*						Composited by Mary Jo Milazzo 6-11-91							
PDDI-2B-1 T-7710-105	composite						Sampled by KLI / Versar staff	6/5/91.						
PDDI-2C-1 T-7710-111		Composite DS&E												
	[redacted]	PAH	1-125 ml glass jar		QAL							8743	6/12	
	-242 dup.	17 CAM metals + TOC's	↓		TSI									
	-243 dup.	↓	↓											

RECEIVED JUN 11 08

SIGNATURES:

LABORATORY REPRESENTATIVE: _____

RELEASED TO COURIER BY FIELD PERSONEL: _____

RECEIVED BY COURIER: _____

RELEASED TO LABORATORY BY COURIER: _____

RECEIVED BY LABORATORY: W J Milazzo

RELEASED TO LABORATORY BY COURIER: via UPS overnight 6-11-91 W J Milazzo

RECEIVED BY LABORATORY: John E. VanLaan

THIS FORM MUST ACCOMPANY THE "ANALYSIS REQUEST FORM" AND SAMPLES TO INITIATE ANALYSIS.

SAMPLING AND ANALYSIS CHAIN OF CUSTODY RECORD

ToxScan Inc.
42 Hangar Way
Watsonville, CA 95076
(408) 724-4522

CLIENT _____ LABORATORY NO. T-7710

CONTACT _____ PHONE _____ ACCOUNT NO. _____

REQUEST			LABORATORY REQUIREMENTS				CHAIN OF CUSTODY							
SAMPLE TYPE: Marine sediment			[redacted] report. Composite PDDI-5A-1, -5B-1, -5C-1, -5D-1 Results required by 6/21/91.				ToxScan Inc.					CONTRACT LABORATORY: Quality Assurance Laboratory		
SAMPLE ID	LAB ID	PARAMETERS	BOTTLES	PRES.	LABORATORY	PO#	SAMPLED BY	DATE	REC'D BY	DATE	COMMENTS	REC'D BY	DATE	COMMENTS
PDDI-5A-1 T-7710-115							Composited by Mary Ann Mitzel 6-11-91							
PDDI-5B-1 T-7710-117							Sampled by KLI / Versar staff 6/5/91							
PDDI-5C-1 T-7710-122														
PDDI-5D-1 T-7710-128	Composite ID's:													
	[redacted]	[redacted]	1-125 ml glass jar		OAL							6/12	8444	
	-245 dup.	CAM metals +TBT	↓		BI									
	-246 dup.	↓												
	-247 dup.	↓	↓											

RECEIVED JUN 11 '91 11:00

SIGNATURES:

LABORATORY REPRESENTATIVE: _____

RELEASED TO COURIER BY FIELD PERSONEL: _____

RECEIVED BY COURIER: _____

RELEASED TO LABORATORY BY COURIER: _____

RECEIVED BY LABORATORY: Mary Ann Mitzel

RELEASED TO LABORATORY BY COURIER: via UPS overnight 6-11-91. Mary Ann Mitzel

RECEIVED BY LABORATORY: John Cannon Evans

THIS FORM MUST ACCOMPANY THE "ANALYSIS REQUEST FORM" AND SAMPLES TO INITIATE ANALYSIS.

SAMPLING AND ANALYSIS CHAIN OF CUSTODY RECORD

5 of 9

ToxScan Inc.
42 Hangar Way
Watsonville, CA 95076
(408) 724-4522

CLIENT _____ LABORATORY NO. T-7710

CONTACT _____ PHONE _____ ACCOUNT NO. _____

REQUEST			LABORATORY REQUIREMENTS				CHAIN OF CUSTODY							
SAMPLE TYPE: Marine sediment			[redacted] Results required by: 6-21-91				[redacted]		ToxScan Inc.			CONTRACT LABORATORY: Quality Assurance Laboratory.		
SAMPLE ID	LAB ID	PARAMETERS	BOTTLES	PRES.	LABORATORY	PO#	SAMPLED BY	DATE	REC'D BY	DATE	COMMENTS	REC'D BY	DATE	COMMENTS
PDDII-4A-1 T-7710-148	-251 Comp.						Composited by Mary Lou Milazzo 6.11.91							
PDDII-4B-1 T-7710-153							Sampled by KLT/Versar staff 6-6-91.						6/12/91 11:00	
PDDII-4C-1 T-7710-228	Composite ID's:													
	[redacted]	[redacted]	1-125 mL glass jar		QAL							[redacted]	6/12	6/12/91 RECEIVED
	-252 Arch.	17 CAM Metals + TBT			TSI									
	-253 Arch.		↓											

SIGNATURES:

LABORATORY REPRESENTATIVE: _____

RELEASED TO COURIER BY FIELD PERSONEL: _____

RECEIVED BY COURIER: _____

RELEASED TO LABORATORY BY COURIER: _____

RECEIVED BY LABORATORY: Mary Milazzo

RELEASED TO LABORATORY BY COURIER: via UPS overnight 6-11-91 Mary Milazzo

RECEIVED BY LABORATORY: John Lawrence

THIS FORM MUST ACCOMPANY THE "ANALYSIS REQUEST FORM" AND SAMPLES TO INITIATE ANALYSIS.

SAMPLING AND ANALYSIS CHAIN OF CUSTODY RECORD

ToxScan Inc.
42 Hangar Way
Watsonville, CA 95076
(408) 724-4522

CLIENT ______________________ LABORATORY NO. T-7710

CONTACT ______________ PHONE ______________ ACCOUNT NO. ______________

REQUEST			LABORATORY REQUIREMENTS				CHAIN OF CUSTODY							
SAMPLE TYPE: Marine sediment			[redacted] PDD II-1A-1, -1B-1, -1C-1's Results required by: 6/21/91						ToxScan Inc.			CONTRACT LABORATORY: Quality Assurance Laboratory.		
SAMPLE ID	LAB ID	PARAMETERS	BOTTLES	PRES.	LABORATORY	PO#	SAMPLED BY	DATE	REC'D BY	DATE	COMMENTS	REC'D BY	DATE	COMMENTS
PDD II-1A-1 T-7710-233							Composited by Mary Lou Milazzo at ToxScan 6-11-91							
PDD II-1B-1 T-7710-159							Sampled by KLI/Versar							
PDD II-1C-1 T-7710-161	Composite ID's:						staff	6-6-91						
	[redacted]		1-125ml glass jar		QAL							JEE	6/12	[illegible]
	-255 dup.	17 CAM metals + TBT			TSI									
	-256 dup.	↓	↓											

SIGNATURES:

LABORATORY REPRESENTATIVE: ____________

RELEASED TO COURIER BY FIELD PERSONEL: ____________

RECEIVED BY COURIER: ____________

RELEASED TO LABORATORY BY COURIER: ____________

RECEIVED BY LABORATORY: M. L. Milazzo

RELEASED TO LABORATORY BY COURIER: via UPS overnight M. L. Milazzo 6-11-91

RECEIVED BY LABORATORY: John E. von Euen

THIS FORM MUST ACCOMPANY THE "ANALYSIS REQUEST FORM" AND SAMPLES TO INITIATE ANALYSIS.

SAMPLING AND ANALYSIS CHAIN OF CUSTODY RECORD

ToxScan Inc.
42 Hangar Way
Watsonville, CA 95076
(408) 724-4522

CLIENT _____ LABORATORY NO. T-7710

CONTACT _____ PHONE _____ ACCOUNT NO. _____

REQUEST			LABORATORY REQUIREMENTS				CHAIN OF CUSTODY							
SAMPLE TYPE: Marine sediment			[redacted] reports. PDDII-2A-1, -2B-1, -2C-1. Results required by 6.21.91					ToxScan Inc.				CONTRACT LABORATORY: Quality Assurance Laboratory.		
SAMPLE ID	LAB ID	PARAMETERS	BOTTLES	PRES.	LABORATORY	PO#	SAMPLED BY	DATE	REC'D BY	DATE	COMMENTS	REC'D BY	DATE	COMMENTS
PDDII-2A-1 T-7710-166	Composite						Composited by at ToxScan		Marylou Milazzo 6.11.91.					
PDDII-2B-1 T-7710-172														
PDDII-2C-1 T-7710-178	Composite 1D's.						Sampled by KLI/Versar staff 6.10.91.							
	[redacted]	[redacted]	1-125ml glass jar		QAL							[redacted]	6/12	8:48-91
	-258 dup.	17 CAM Metals + TBT			TSI								6/12	RECEIVED
	-259 dup.		↓		↓								11:00	

SIGNATURES:

LABORATORY REPRESENTATIVE: _____

RELEASED TO COURIER BY FIELD PERSONEL: _____

RECEIVED BY COURIER: _____

RELEASED TO LABORATORY BY COURIER: _____

RECEIVED BY LABORATORY: M.L. Milazzo

RELEASED TO LABORATORY BY COURIER: via UPS overnight M.L. Milazzo 6.11.91.

RECEIVED BY LABORATORY: John E. von Euen

THIS FORM MUST ACCOMPANY THE "ANALYSIS REQUEST FORM" AND SAMPLES TO INITIATE ANALYSIS.

SAMPLING AND ANALYSIS CHAIN OF CUSTODY RECORD

ToxScan Inc.
42 Hangar Way
Watsonville, CA 95076
(408) 724-4522

CLIENT ______ LABORATORY NO. T-7710

CONTACT ______ PHONE ______ ACCOUNT NO. ______

REQUEST			LABORATORY REQUIREMENTS				CHAIN OF CUSTODY							
SAMPLE TYPE: Marine sediment			[redacted] Results required by 6-21-91						ToxScan Inc.			CONTRACT LABORATORY: Quality Assurance Laboratory.		
SAMPLE ID	LAB ID	PARAMETERS	BOTTLES	PRES.	LABORATORY	PO#	SAMPLED BY	DATE	REC'D BY	DATE	COMMENTS	REC'D BY	DATE	COMMENTS
PDDII-5A-1 T-7710-184	Composite						Composited by Mary Lou Milazzo 6-11-91							
PDDII-5B-1 T-7710-186							Sampled by KLI/Vestar staff. 6-6-91.							
PDDII-5C-1 T-7710-190														
PDDII-5D-1 T-7710-195	Composite ID's:													
	[redacted]		1-125ml glass jar		QAL							E.E.	8/12	8/12-91
	-261 dup.	17 CAM metals + TBT			TBI									
	-262 dup.	↓	↓											
	-263 dup.													

SIGNATURES:

LABORATORY REPRESENTATIVE: ______

RELEASED TO COURIER BY FIELD PERSONEL: ______

RECEIVED BY COURIER: ______

RELEASED TO LABORATORY BY COURIER: ______

RECEIVED BY LABORATORY: M. Milazzo

RELEASED TO LABORATORY BY COURIER: 2/2 UPS overnight 6-11-91 M. Milazzo

RECEIVED BY LABORATORY: John Evan Eren

THIS FORM MUST ACCOMPANY THE "ANALYSIS REQUEST FORM" AND SAMPLES TO INITIATE ANALYSIS.

T-7710 (1)

Versar INC.

CHAIN OF CUSTODY RECORD

PAGE 1/4

PROJECT NO.	PROJECT NAME	INDUSTRIAL HYGIENE SAMPLE
7703.026	PDD SEDIMENTS	Y / N

SAMPLERS: (Signature) [signature] (Printed) JAMES G. JENSEN

PARAMETERS: NO. OF CONTAINERS; PAH; ORGANOTIN; CHLORINATED HYDROCARBONS; COMPOSITE

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	TSI Lab ID / STATION LOCATION	NO. OF CONTAINERS	PAH	ORGANOTIN	CHLORINATED HYDROCARBONS	COMPOSITE	REMARKS
PDDI-1A-surf.	6-4-91	10:41A		✓	T-7710-01	1					HOLD
PDDI-1A-1	6-4-91	10:42A		✓	-02	1				X	COMPOSITE W/I-1B-1 + I-1C-1
PDDI-1A-2	6-4-91	10:42A		✓	-03	1					HOLD
PDDI-1A-3	6-4-91	10:42A		✓	-04	1					HOLD
PDDI-1A-4	6-4-91	10:42A		✓	-05	1					HOLD
PDDI-1A-5	6-4-91	10:42A		✓	-06	1					HOLD
PDDI-1B-surf.	6-4-91	11:33A		✓	-07	1					HOLD
PDDI-1B-1	6-4-91	11:33A		✓	-08	1				X	COMPOSITE W/I-1A-1 + I-1C-1
PDDI-1B-2	6-4-91	11:33A		✓	-09	1					HOLD
PDDI-1B-3	6-4-91	11:33A		✓	-10	1					HOLD
PDDI-1B-4	6-4-91	11:33A		✓	-11	1					HOLD
PDDI-1B-5	6-4-91	11:33A		✓	-12	1					HOLD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	6-4-91 4:45P	[signature]			
(Printed) JAMES G. JENSEN		(Printed) Richard D. Mathison	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
[signature]	6-5-91 0800	[signature]		NORMAL TURNAROUND
(Printed) Richard D. Mathison		(Printed) Kit Muhs		

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

T-7710 (2)

Versar INC.

CHAIN OF CUSTODY RECORD

PAGE 2/4

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS

SAMPLERS: (Signature) James G. Jensen (Printed) JAMES G. JENSEN

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	TSI LAB ID / STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	ORGANOTIN	CHLORINATED HYDROCARBONS	COMPOSITE	REMARKS
PDDI-1C-surf.	6-4-91	12:44P		✓	T-7710-13	1					HOLD
PDDI-1C-1	6-4-91	12:44P		✓	-14	1				X	COMPOSITE WI-1B-1 + I-1A-1
PDDI-6A-surf.	6-4-91	1:12P		✓	-15	1					HOLD
PDDI-6A-1	6-4-91	1:12P		✓	-16	1				X	COMPOSITE WI-6B-1, I-6C-1 I-6D-1
PDDI-6A-2	6-4-91	1:12P		✓	-17	1					HOLD
PDDI-6A-3	6-4-91	1:12P		✓	-18	1					HOLD
PDDI-6A-4	6-4-91	1:12P		✓	-19	1					HOLD
PDDI-6B-surf	6-4-91	1:37P		✓	-20	1					HOLD
PDDI-6B-1	6-4-91	1:37P		✓	-21	1				X	HOLD COMPOSITE WI-6A-1 I-6C-1, I-6D-1
PDDI-6B-2	6-4-91	1:37P		✓	-22	1					HOLD
PDDI-6B-3	6-4-91	1:37P		✓	-23	1					HOLD
PDDI-6B-4	6-4-91	1:37P		✓	-24	1					HOLD

INDUSTRIAL HYGIENE SAMPLE: Y / N

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James G. Jensen	6-4-91 4:45P				
(Printed) JAMES G. JENSEN		(Printed) Richard Mathieu	(Printed)		(Printed)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
	6-5-91 0900	Kit Muhs		NORMAL TURNAROUND	
(Printed)		(Printed) Kit Muhs			

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

Versar INC.

CHAIN OF CUSTODY RECORD

PAGE 3/4 T-7710 (3)

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS

SAMPLERS: (Signature) James G. Jensen (Printed) JAMES G. JENSEN

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	TSI Lab ID / STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	PARAMETERS: 3 MM IT-METALS	PARAMETERS: ORGANOTIN	PARAMETERS: COMPOSITE	INDUSTRIAL HYGIENE SAMPLE (Y/N)	REMARKS
PDDI-6B-5	6-4-91	1:37P		✓	T-7710 -25	1						HOLD
PDDI-6C-surf.	6-4-91	2:37P		✓	-26	1						HOLD
PDDI-6C-1	6-4-91	2:37P		✓	-27	1				X		COMPOSITE W 6B-1 + 6A-1 + 6D-1
PDDI-6C-2	6-4-91	2:37P		✓	-28	1						HOLD
PDDI-6C-3	6-4-91	2:37P		✓	-29	1						HOLD
PDDI-6C-4	6-4-91	2:37P		✓	-30	1						HOLD
PDDI-6D-surf	6-4-91	3:05P		✓	-31	1						HOLD
PDDI-6D-1	6-4-91	3:05P		✓	-32	1				X		COMPOSITE W/6A-1, 6B-1 + 6C-1
PDDI-6D-2	6-4-91	3:05P		✓	-33	1						HOLD
PDDI-6D-3	6-4-91	3:05P		✓	-34	1						HOLD
PDDI-6D-4	6-4-91	3:05P		✓	-35	1						HOLD
PDDI-6D-5	6-4-91	3:05P		✓	-36	1						HOLD

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James G. Jensen	6-4-91 4:45P	Richard D. Mathison			
(Printed) JAMES G. JENSEN		(Printed) Richard D. Mathison	(Printed)		(Printed)
Relinquished by: (Signature) Richard D. Mathison	Date / Time 6-5-91 0900	Received for Laboratory by: (Signature) Kit Muhs	Date / Time	Remarks NORMAL TURNAROUND	
(Printed) Richard D. Mathison		(Printed) Kit Muhs			

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CHAIN OF CUSTODY RECORD   PAGE 4/4   T-7710   (4)

PROJECT NO.	PROJECT NAME							INDUSTRIAL HYGIENE SAMPLE Y / N
7703.026	PDD SEDIMENTS							N

SAMPLERS: (Signature) James G. Jensen   (Printed) JAMES G. JENSON

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PAH	ORGANOTIN	CAM 17 METALS						REMARKS
PDDI-6D-6	6-4-91	3:05		✓	T-7710-69.	1									HOLD
PDDI-6-COMP					COMP IN LABORATORY OF I-6A-1, I-6B-1, I-6C-1+ I-6D-1		X	X	X						
PDDI-1-COMP					COMP IN LAB. OF I-1A-1, I-1B-1 + I-1C-1		X	X	X						

These are not samples but instructions.

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James G. Jensen	6-4-91 / 4:45P	Richard D. Mathisen			
(Printed) JAMES G. JENSEN		(Printed) Richard D. Mathisen	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
Richard D. Mathisen	6-5-91 / 0900	K. Minaks		NORMAL TURNAROUND
(Printed) Richard D. Mathisen		(Printed) Keith Minaks		

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Versar INC.

CHAIN OF CUSTODY RECORD

T-7710

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS - PDDI

SAMPLERS: (Signature) James M. Jensen (Printed) JAMES G. JENSEN

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	Organic Tins	Cml. 17 Metals Composite						REMARKS
PDDI-4A-surf.	6-5-91	8:40A		✓	T-7710-77	1									
PDDI-4A-1	6-5-91	8:40A		✓	-78	1				X					
PDDI-4A-catter	6-5-91	8:40A		✓	-79	1									
PDDI-4B-surf	6-5-91	9:01A		✓	T-7710-80	1									
PDDI-4B-1	6-5-91	9:01A		✓	-81	1				X					
PDDI-4B-2	6-5-91	9:01A		✓	-82	1									
PDDI-4-1 COMPOSITE			X				X	X	X						LABORATORY TO COMPOSITE PDDI-4A-C & PDDI-4B-1 (-78, -81)
PDDI-7-surf.	6-5-91	9:32A		✓	T-7710-83	1									
PDDI-7-1	6-5-91	9:32A		✓	-84	1	X	X	X						
PDDI-7-2	6-5-91	9:32A		✓	-85	1									
PDDI-7-3	6-5-91	9:32A		✓	-86	1									

INDUSTRIAL HYGIENE SAMPLE: Y / N

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
(Printed) JAMES G. JENSEN	6-6-91 5:02P	(Printed) Kent Brown	(Printed) Kent Brown	6-7-91 1415	(Printed) Richard D. Mattison
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
(Printed) Richard D. Mattison	6-7-91 1530	(Printed) Mary Lou Milazzo		Scope of Work Turnaround time	

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CHAIN OF CUSTODY RECORD

T-7710

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS - PDDI

SAMPLERS: (Signature) James N Jensen (Printed) JAMES G. JENSEN

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	Organo Tins	CAM-17 METALS	COMPOSITE					INDUSTRIAL HYGIENE SAMPLE Y / N	REMARKS
PDDI-7-4	6-5-91	9:32A		✓	T-7710 -87	1										
PDDI-7-5	6-5-91	9:32A		✓	↓ -88	1										
PDDI-3C-surf	6-5-91	10:01A		✓	T-7710 -89	1										
PDDI-3C-1	6-5-91	10:01A		✓	-90	1				X						
PDDI-3C-2	6-5-91	10:01A		✓	-91	1										
PDDI-3C-3	6-5-91	10:01A		✓	↓ -92	1										
PDDI-3B-surf	6-5-91	10:24A		✓	T-7710 -93	1										
PDDI-3B-1	6-5-91	10:24A		✓	-94	1				X						
PDDI-3B-2	6-5-91	10:24A		✓	-95	1										
PDDI-3B-3	6-5-91	10:24A		✓	↓ -96	1										

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James N Jensen	6-6-91 502PM	Kent Brown	Kent Brown	6-7-91 1415	Richard D. Mottisan
(Printed) JAMES G. JENSEN		(Printed) Kent Brown	(Printed) Kent Brown		(Printed) Richard D. Mottisan
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
Richard D. Mottisan	6-7-91 1530	Mary Lou Milazzo		Scope of work turnaround time.	
(Printed) Richard D. Mottisan		(Printed) Mary Lou Milazzo			

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CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS - PDDI

SAMPLERS: (Signature) James G. Jensen (Printed) JAMES G. JENSEN

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	Organic Tins	CAM-17 Metals	Composite	REMARKS
PDDI-3B-4	6-5-91	10:24A		✓	T-7710-97	1					
PDDI-3B-5	6-5-91	10:24A		✓	↓ -98	1					
PDDI-3A-Surf.	6-5-91	10:47A		✓	T-7710 -99	1					
PDDI-3A-1	6-5-91	10:47A		✓	| -100	1			X		
PDDI-3A-2	6-5-91	10:47A		✓	↓ -101	1					
PDDI-3-1 COMPOSITE				X			X	X	X		LABORATORY TO COMPOSITE PDDI-3C-1, PDDI-3B-1 & PDDI-3A-1 (-90, -94 -100)
PDDI-2A-Surf.	6-5-91	11:21A		✓	T-7710 -102	1					
PDDI-2A-1	6-5-91	11:21A		✓	| -103	1			X		
PDDI-2A-2	6-5-91	11:21A		✓	| -104	1					
PDDI-2A-3	6-5-91	11:21A		✓	| -105	1					
PDDI-2A-4	6-5-91	11:21A		✓	↓ -106	1					

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James G. Jensen	6-6-91 5:02P		Kent Brown	6-7-91 1415	
(Printed) JAMES G. JENSEN		(Printed) Kent Brown	(Printed) Kent Brown		(Printed) Richard D. Mathis
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
	6-7-91 1530			Scope of work	
(Printed) Richard D. Mathis		(Printed) Mary Lou Milazzo		Turnaround time	

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PAGE 4/6

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS - PDDI

INDUSTRIAL HYGIENE SAMPLE: Y / (N)

SAMPLERS: (Signature) James G. Jensen (Printed) JAMES G. JENSEN

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PAH	Organo Tins	CHILL-17 METALS	COMPOSITE					REMARKS
PDDI-2B-surf.	6-5-91	11:35A		✓	T-7710-107	1									
PDDI-2B-1	6-5-91	11:35A		✓	-108	1				X					
PDDI-2B-2	6-5-91	11:35A		✓	-109	1									
PDDI-2C-surf	6-5-91	11:55A		✓	-110	1									
PDDI-2C-1	6-5-91	11:55A		✓	-111	1				X					
PDDI-2C-2	6-5-91	11:55A		✓	-112	1									
PDDI-2C-3	6-5-91	11:55A		✓	-113	1									
PDDI-2-1 composite			X				X	X	X						LABORATORY TO COMPOSITE PDDI-2A-1, PDDI-2B-1, & PDDI-2C-1 (-103, -108, -111)
PDDI-5A-surf.	6-5-91	1:25P		✓	-114	1									
PDDI-5A-1	6-5-91	1:25P		✓	-115	1				X					

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James G. Jensen	6-6-91 5:02P	Kent Brown	Kent Brown	6-7-91 1615	Richard D. Mathison
(Printed) JAMES G. JENSON		(Printed) KENT BROWN	(Printed) KENT BROWN		(Printed) Richard D. Mathison

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
Richard D. Mathison	6-7-91 1530	Mary Lou Milazzo		scope of work turn around time
(Printed) Richard D. Mathison		(Printed) Mary Lou Milazzo		

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CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS - PDD I

SAMPLERS: (Signature) James G. Jensen (Printed) JAMES G. JENSEN

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	Organo Tins	CHM-17 METALS	Composite					REMARKS
PDDI-SB-Surf	6-5-91	1:50P		✓	T-7710-116	1									
PDDI-SB-1	6-5-91	1:50P		✓	-117	1				X					
PDDI-SB-2	6-5-91	1:50P		✓	-118	1									
PDDI-SB-3	6-5-91	1:50P		✓	-119	1									
PDDI-SB-4	6-5-91	1:50P		✓	-120	1									
PDDI-SC-Surf.	6-5-91	2:07P		✓	T-7710-121	1									
PDDI-SC-1	6-5-91	2:07P		✓	-122	1				X					
PDDI-SC-2	6-5-91	2:07P		✓	-123	1									
PDDI-SC-3	6-5-91	2:07P		✓	-124	1									
PDDI-SC-4	6-5-91	2:07P		✓	-125	1									
PDDI-SC-5	6-5-91	2:07P		✓	-126	1									

INDUSTRIAL HYGIENE SAMPLE: Y / N

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James G. Jensen	6-6-91 5:02P	Kent Brown	Kent Brown	6/7/91 1415	Richard D. McTigue
(Printed) JAMES G. JENSEN		(Printed) Kent Brown	(Printed) KENT BROWN		(Printed) Richard D. McTigue
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
Richard D. McTigue	6-7-91 1530	Mary Lou Milazzo		Scope of work Turnaround time	
(Printed) Richard D. McTigue		(Printed) Mary Lou Milazzo			

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CHAIN OF CUSTODY RECORD

T-7710

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS - PDDI

SAMPLERS: (Signature)	(Printed)
[signature]	JAMES G. JENSEN

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	Organo Tins	CHM-17 METALS	Composite					REMARKS
PDDI-SD-surf.	6-5-91	2:37P		✓	T-7710-127	1									
PDDI-SD-1	6-5-91	2:37P		✓	-128	1				X					
PDDI-SD-2	6-5-91	2:37P		✓	-129	1									
PDDI-SD-3	6-5-91	2:37P		✓	-130	1									
PDDI-SD-4	6-5-91	2:37P		✓	-131	1									
PDDI-SD-5	6-5-91	2:37P		✓	-132	1									
PDDI-5-1 Composite			X				X	X	X						LABORATORY TO COMPOSITE PDDI-SA-1, PDDI-SB-1, PDDI-SC-1 & PDDI-SD-1 (-115, -117, -122, -123)

INDUSTRIAL HYGIENE SAMPLE: Y / N

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	6-6-91 5:02P	[signature]	[signature]	6-9-91 1415	[signature]
(Printed) JAMES G. JENSEN		(Printed) Kent Brown	(Printed) Kent Brown		(Printed) Richard D. Mathis
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
[signature]	6-7-91 1530	[signature]		Scope of work Turn-around time	
(Printed) Richard D. Mathis		(Printed) Mary Lou Milazzo			

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APPENDIX D

Yard I Sediment Sample Location Map

CROWLEY ENVIRONMENTAL SERVICES

November 6, 1992

Ms. Selena Tam
California Regional Water Quality
Control Board - San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, California 94612

Reference: Pacific Dry Dock and Repair Company Yards I and II, Oakland, California

Dear Ms. Tam:

Enclosed please find a copy of the revised inshore sediment impairment studies for the Crowley Marine Services' (Crowley) facilities located at 1441 and 321 Embarcadero in Oakland, California. The inshore sediment impairment studies were originally submitted to your Department on October 25, 1991.

At that time, the analytical laboratory identified mercury concentrations in excess of the Total Threshold Limit Concentration (TTLC) in two (2) of the samples from each facility. Crowley recently requested that the samples be reanalyzed for mercury to determine if there had been a definable decrease in mercury concentrations. The reanalyzed mercury concentrations were all reported to be ten times less than the originally reported results. After checking the QA/QC of both sets of data and confirming that the raw data for both anlayses were correct, the laboratory identified an error in tranposing the original raw data to the laboratory report.

The transposition error caused the original mercury concentrations to be in error by a factor of ten (10). The accurate mercury results are ten (10) times lower than those originally reported. The laboratory explanation of this error has been included in Appendix C of the reports. The correct analtyical data now indicates that in fact none of the mercury concentrations are in excess of the TTLC.

The inshore sediment impairment reports have therefore been revised accordingly to present the accurate data. I request that you replace the previous reports entitled " Inshore Sediment Impairment Study, Pacific Dry Dock and Repair Yard

Crowley Maritime Plaza, Post Office Box 2287, Seattle, Washington 98111 - (206) 443-8100 - Telex 6838207 - Fax (206) 443-8072
Corporate Office: 155 Grand Avenue, Oakland, California 94612 - (510) 251-7500 - Telex 6771520 - Fax (510) 251-7625

I, Oakland, California" dated October 18, 1991, and " Inshore Sediment Impairment Study, Pacific Dry Dock and Repair Yard II, Oakland, California" dated October 18, 1991 with the enclosed reports.

If you have any questions or comments cornerning these reports, please contact me at (206) 443-8042.

Sincerely,

R. Stephen Wilson
Manager, Site Remediation

encl.

cc: Charlie Nalen
Beth L. Hamilton - PM&S - San Jose
Michael Steel - PM&S - San Francisco
Paul Smith - Alameda County - Yard II
Barney M. Chan - Alameda County - Yard I