CROWLEY ENVIRONMENTAL SERVICES

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Crowley Corporate office
155 Grand Ave
Oakland
94612

November 6, 1992

Fang was
Andrea Livingston 256-4239

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

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

Versar INC. SACRAMENTO

92 NOV 26 8:57

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

Prepared for:

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

Prepared by:

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

Versar Job No. 1457-028

October 30, 1992

Versar INC. SACRAMENTO

PROJECT SUMMARY

During the period of June 4 to June 6, 1991, Versar collected inshore sediment samples at the Crowley Maritime Corporation Pacific Dry Dock and Repair Yard II facility in Oakland, California, as part of a sediment impairment study. The study included the collection, description and sampling of cores from the nearshore sediments and the collection of sea-water samples; the compositing of sea-water and sediment samples; analysis of sediment and sea-water samples for California Assessment Manual Metals, organotin compounds, and polynuclear aromatic hydrocarbon compounds; and the generation of this report. Mr. Stephen Wilson, Senior Geologist, and Mr. James Jensen, Geologist, conducted the sediment study. Mr. Wilson prepared this report. Mr. Lawrence Kleinecke, Geohydrologist/ Chemist amended this report.

The following brief conclusions summarize the findings of Versar's sediment impairment study:

- The sea-water samples did not contain any organotin or polynuclear aromatic hydrocarbon compounds at or above the relevant methods' detection limits.

- The sea-water samples did not contain concentrations of California Assessment Manual Metals in excess of the State of California Administrative Code, Title 22, Soluble Threshold Limit Concentration values.

- All sediment samples except the sample from area number 5 contained detectable amounts of mono-, di-, and tributlytin. None of the samples analyzed contained tetrabutyltin. The highest concentrations were detected in samples collected east and west of the dry dock pier.

- All sediment samples contained detectable amounts of polynuclear aromatic hydrocarbon compounds. The highest concentrations were detected in samples collected in the area of decaying marine structures and pilings.

- The Soluble Threshold Limit Concentration (STLC) for mercury is exceeded in each of the samples analyzed. However, only two of the results exceed ten times the [redacted] indicating a potential exceedance of the actual STLC after appropriate diluation.

This is incorrect logic

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

Prepared by:

Lawrence Kleinecke
Geohydrologist/Chemist

Approved for release:

REGISTERED GEOLOGIST
James R. Frantes
No. 4534
STATE OF CALIFORNIA

James Frantes
Pacific Regional Manager
R.G. 4534

DISCLAIMER

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

Factual information regarding operations, conditions, and test data was obtained, in part, from the client and is assumed by Versar to be correct and complete. Since the facts stated in this report are subject to professional interpretation, they could result in differing conclusions. In addition, the findings and conclusions contained in this report are based on various quantitative and qualitative factors as they existed on or near the date of the investigation. Therefore, if the recommendations made in this report are not implemented within a reasonable period of time, there can be no assurances that intervening factors will not arise that will affect the conclusions reached herein.

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

This 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 II 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 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 a floating dry dock, 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 in the dry dock, while some remained afloat for repair work to be performed. Vessels to be placed in the dry dock were aligned, the dry dock was raised, and the vessels were secured to the dry dock platform. Some of the vessels' hulls of the vessels were pressure cleaned with 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 dry dock platform. Curtains were installed at each end of the dry dock to minimize the amount of grit which could enter the water. However, some of the spent sand-blasting grit and detritus did fall from the platform and enter the water of the Oakland Inner Harbor. The materials collected from the dry dock 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) phthalates. The analyzed composite sediment sample contained a variety of analytes in a wide range of concentrations. Of principle concern were the concentrations of chromium, copper, lead, and zinc, the identification of mono- and tributyltin (organotin) compounds, and polynuclear aromatic hydrocarbon (PAH) and total petroleum hydrocarbon 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 two 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 mono-, di-, tri-, and tetrabutyltin. 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 II 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 320 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 Embarcadero Avenue and the 880 Freeway to the north, a cement works to the east, a marine supply retailer to the west, and the Oakland Inner Harbor 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, however, the north-western property boundary is not covered. Approximately one half of the Site is covered by buildings.

The Site consists of a floating dry dock, two piers, a moving crane gantry and associated work area, a warehouse, machine shop, carpentry shop, power generating house and associated office structures. The southern pier is in a state of severe disrepair. The inshore area south of this pier appears to contain the remnants of decaying marine structures such as piers, 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 Oakland Inner Harbor in the vicinity of the Site has a maximum water depth of approximately 50 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 21 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 21 cores represented six different areas with three or five 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 on the 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 Oakland Inner Harbor 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.

at what depth were water samples collected?

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. The core was logged by a geologist as it was extruded. 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-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.

43,560 ft² = 1 acre

4.0 SEDIMENT DESCRIPTION AND DISTRIBUTION

4.3 acres surveyed

The description of the sediment distribution for the site is based on observations of 21 sediment cores collected over an approximate area of 191,250 square feet. The 21 sampled stations yielded an average of 4.20 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 light grey to brown in color, saturated and soft near the surface, and became darker in color, very firm and less moist at depths of three to four feet below the sediment surface.

Cores from sample locations 1-C, 4-B and -C, 5-A, -B, -C, and -D, and 6-E generally contained the following lithology: surface to one foot - light gray to orange-brown clay, very soft and saturated; one foot to three feet - medium to dark gray clay, slightly moist, becoming firm and contained lenses of spent sand-blasting material; three feet to four feet - medium dark gray clay, firm and dry.

Cores from sample locations 1-A, and -B, 2-A, -B, and -C, 3-3-A, -B, and -C, 4-A and -B, and 6-A, -B, -C, and -D, generally contained the following lithology: surface to one foot - gray to light brown clay, slightly to locally very gritty, very soft, saturated; one foot to two feet - black sediment, lenses of very gritty material, 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, locally high hydrogen sulphide content, locally slightly gritty; three feet to five feet - dark gray clay, slightly moist, becoming more firm with increasing depth, occasional slightly gritty lenses.

Lateral distribution of sediment types and grit was determined by plotting three cross sections of the Site based on the samples described in the sample logs. The relevant lines of

section are shown in Figure 5. Interpolated cross sections of the sediments are presented in Figure 6, Figure 7 and Figure 8. Figure 9 presents the areas where the 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 PDDII-2, PDDII-3, and PDDII-4 to represent the Site and one discrete sample, PDDII-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, PDDII-2, PDDII-3, and PDDII-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 (PDDII-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 Concentrations (STLC).

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 laboratories reported in results 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 103 sediment samples were submitted. These samples represent six distinct sample areas, three to five 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 sample for sample 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. A portion of each sample was shipped to QA Lab for PAH analysis.

Tox Scan determined that all of the samples contained concentrations of mono-, di-, and tributyltin compounds, except the sample representing area 5 (PDDII-5) which only contained di- and tributyltin compounds. None of the samples analyzed contained concentrations of tetrabutyltin in excess of the method's detection limit of 0.002 milligrams per kilogram (mg/kg).

Concentrations of monobutyltin ranged from 2 mg/kg in the sample representing area 0.002 to 0.013 mg/kg in the sample representing area 1. Concentrations of dibutyltin ranged from 0.008 mg/kg in the sample representing area 5 to 0.27 mg/kg in the sample representing area 6. Concentrations of tributyltin ranged from 0.006 mg/kg in the sample representing area 5 to 0.24 mg/kg in the samples representing areas 1 and 6. Table 6 summarizes the analytical results for organotin compounds. Although the laboratories reported the results in micrograms per

kilogram, Table 6 presents the results in milligrams per kilogram to facilitate comparison with previous analyses. The detailed analytical laboratory results and associated documentation are included as Appendix C.

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 Concentrations (STLC) and the Total Threshold Limit Concentration (TTLC). 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 as milligrams per kilogram to facilitate comparison with previous analyses. The detailed analytical results and associated documentation are included as Appendix C.

QA Lab reported that all samples analyzed contained detectable concentrations of polynuclear aromatic hydrocarbons (PAH). The sample representing area 3 contained the highest concentrations (a total of 4.908 mg/kg) 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 II facility have impacted the inshore sediments in the vicinity of the Site. Figure 6 indicates that the highest concentrations of grit are east and west of the dry dock pier.

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 21 discrete sample locations.

The sea-water sample representing the Site exhibits almost identical analytical results to those of the background sea-water sample, except in the case of lead. The lead concentration detected in the composite sample was approximately three times greater than the background sea-water sample [0.52 micrograms per liter (µg/L) compared to 0.19 µg/L]. 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#1 appears to have been collected in the intertidal zone west of the dry dock pier close to the Site/Embarcadero Avenue boundary. This sample contained the most elevated concentrations of organotin compounds (0.422 mg/kg of dibutyltin). This area corresponds to Versar sediment

sample area number 6, which contained approximately half the concentrations of organotin compounds. The sediment core log for area 6A indicates that the sediments in this area contain a high percentage of spent sand-blasting material.

The second RWQCB sediment sample, PDD#2, appears to have been collected in the intertidal zone east of the dry dock pier. The analytical results for the composite sample for area 1 and PDD#2 appear to be within the same orders of magnitude.

The general widespread distribution of organotins is probably due to the low density of the medium causing the paint flakes/organotins to be spread by wave, current and tide action. The elevated concentrations of organotin compounds in sample areas number 1 and 6 are probably associated with the high percentage of spent sand-blasting in the sediments in these areas.

Sample area number 3 contained the highest concentration of polynuclear aromatic hydrocarbons. These PAHs may be associated with the remnants of numerous abandoned pier and mooring structures which are located in this sample area.

All of the areas sampled contained detectable levels of the CAM 17 Metals. The composite samples from all the sediment sample areas contain concentrations of various metals whose values are between the State of California, Title 22, Article 3, Soluble Threshold Limit Concentrations (STLC) and the TTLC. All of the 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 (area 2); beryllium (areas 1, 2, 4 and 5); cadmium (area 2); and zinc (area 3).

Title 22, Article 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 (two samples) concentrations in the composite samples were greater than 10 times the respective STLC values. 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.

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.

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

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.

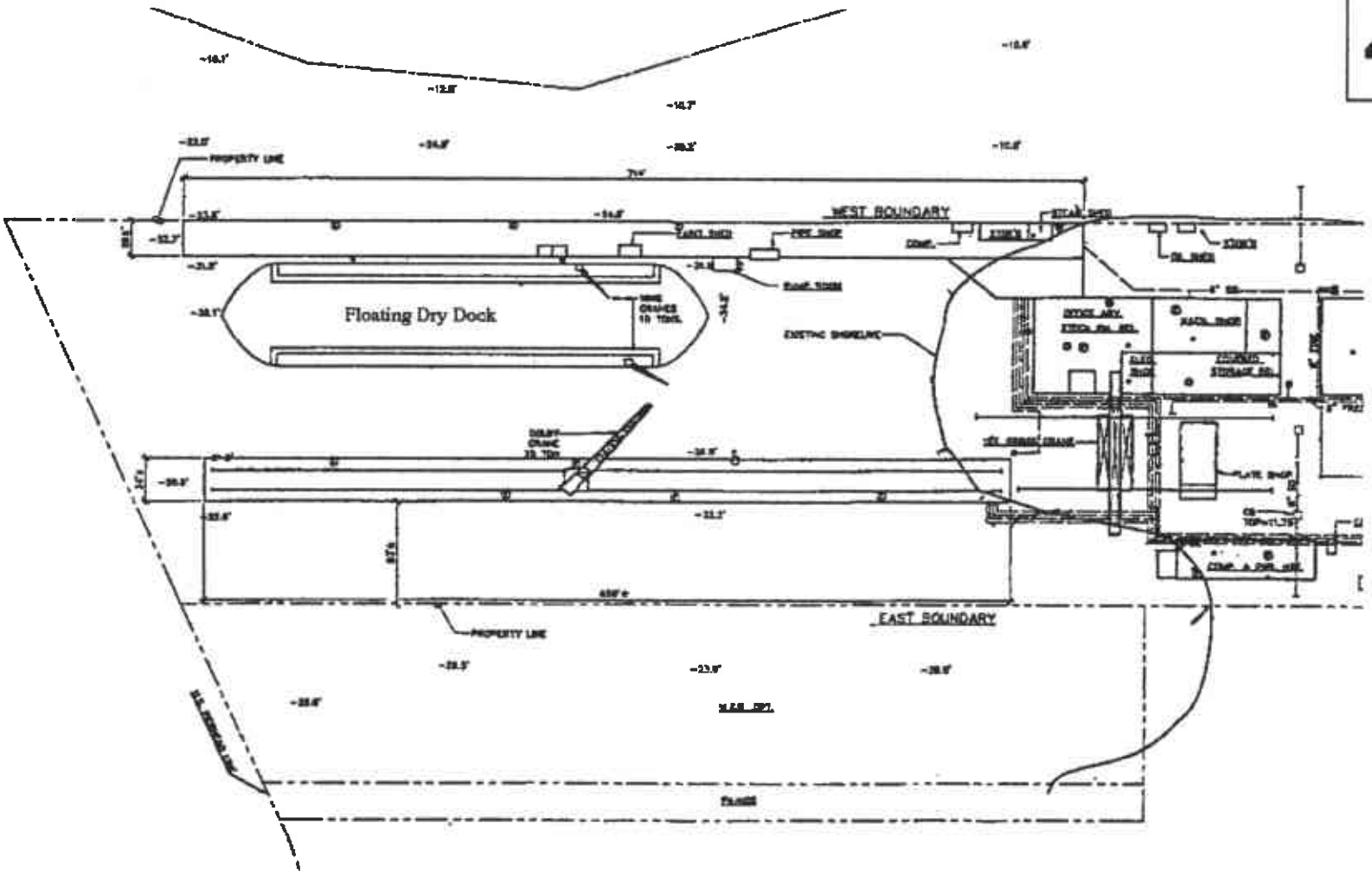
8.0 APPENDIX LISTING

The following appendices constitute the technical appendix to this report.

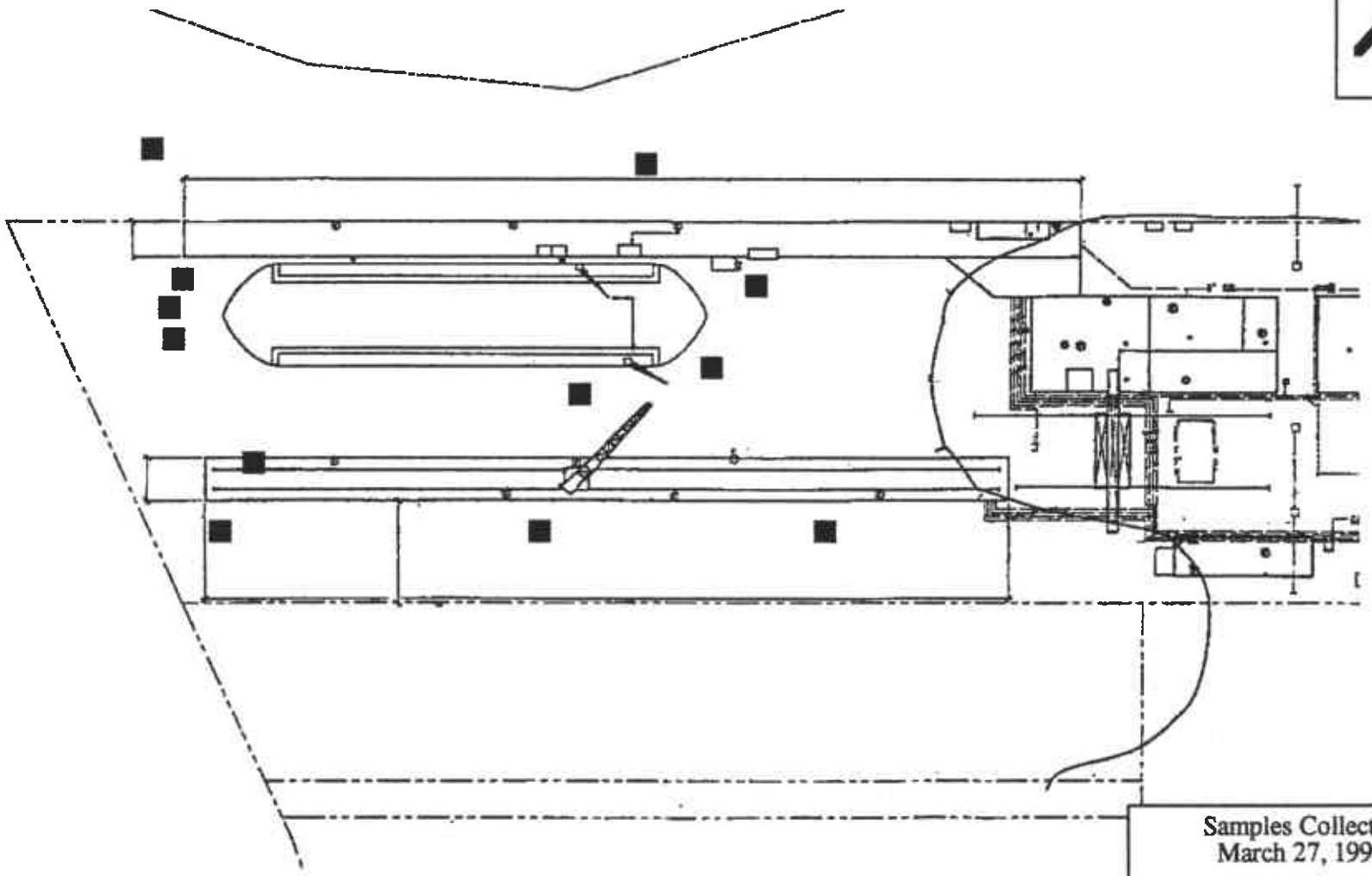
Appendix A.	Sediment Lithology Logs
Appendix B.	RWQCB-Required Analytical Detection Levels
Appendix C.	Laboratory Analytical Results
Appendix D.	Yard II Sediment Sample Location Map

SOURCE : USGS TOPO 1959

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



0 Feet 100 SCALE	SITE LAYOUT	Figure 2
Project No. 1457-028	Pacific Dry Dock and Repair Yard II, Oakland, California	**Versar Inc.**



0 Feet 100
SCALE

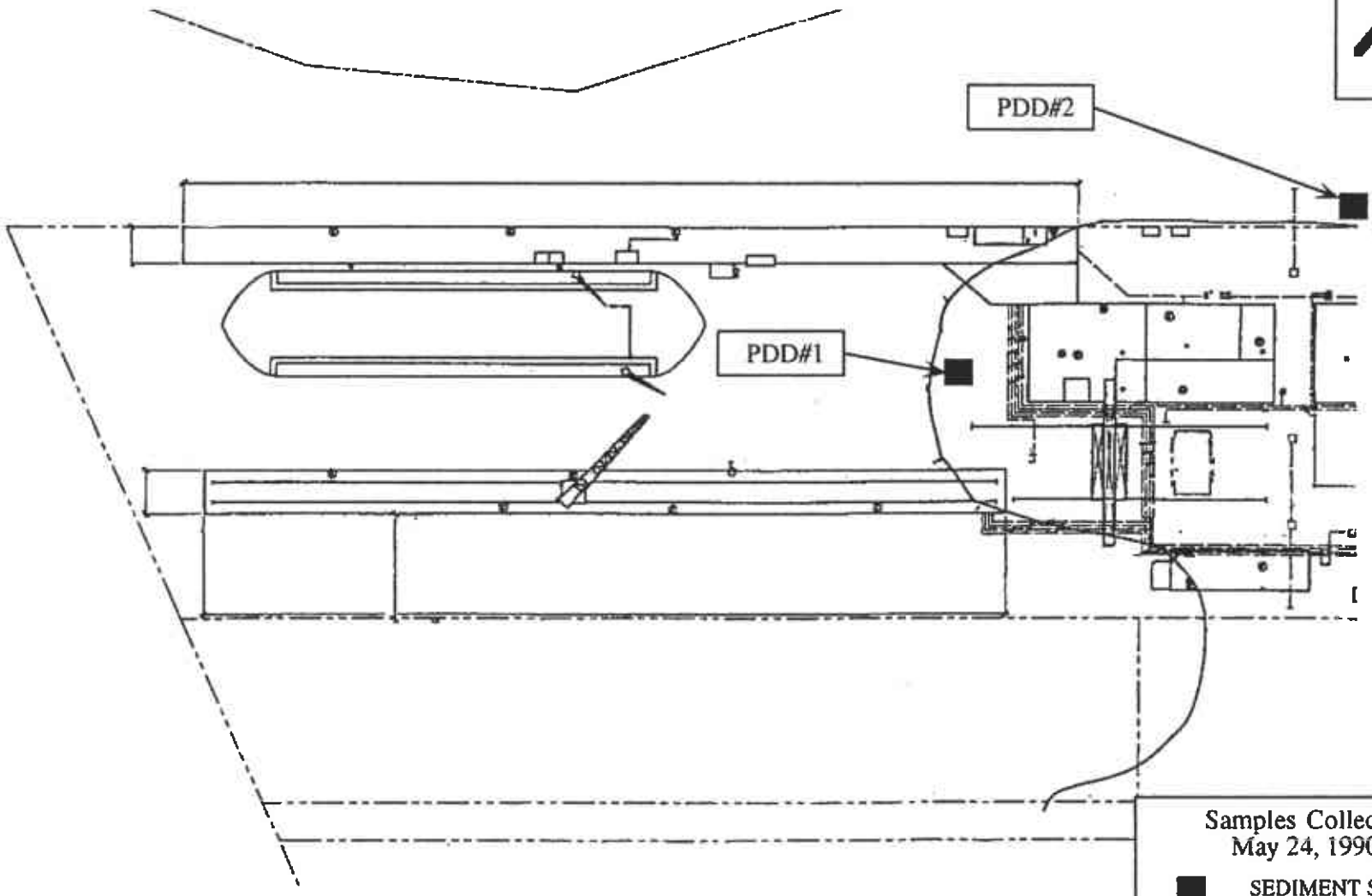
SITE ASSESSMENT SEDIMENT
SAMPLE LOCATIONS

Figure 3

Project No.
1457-028

Pacific Dry Dock and Repair
Yard II, Oakland, California

Versar Inc.



0 Feet 100
SCALE

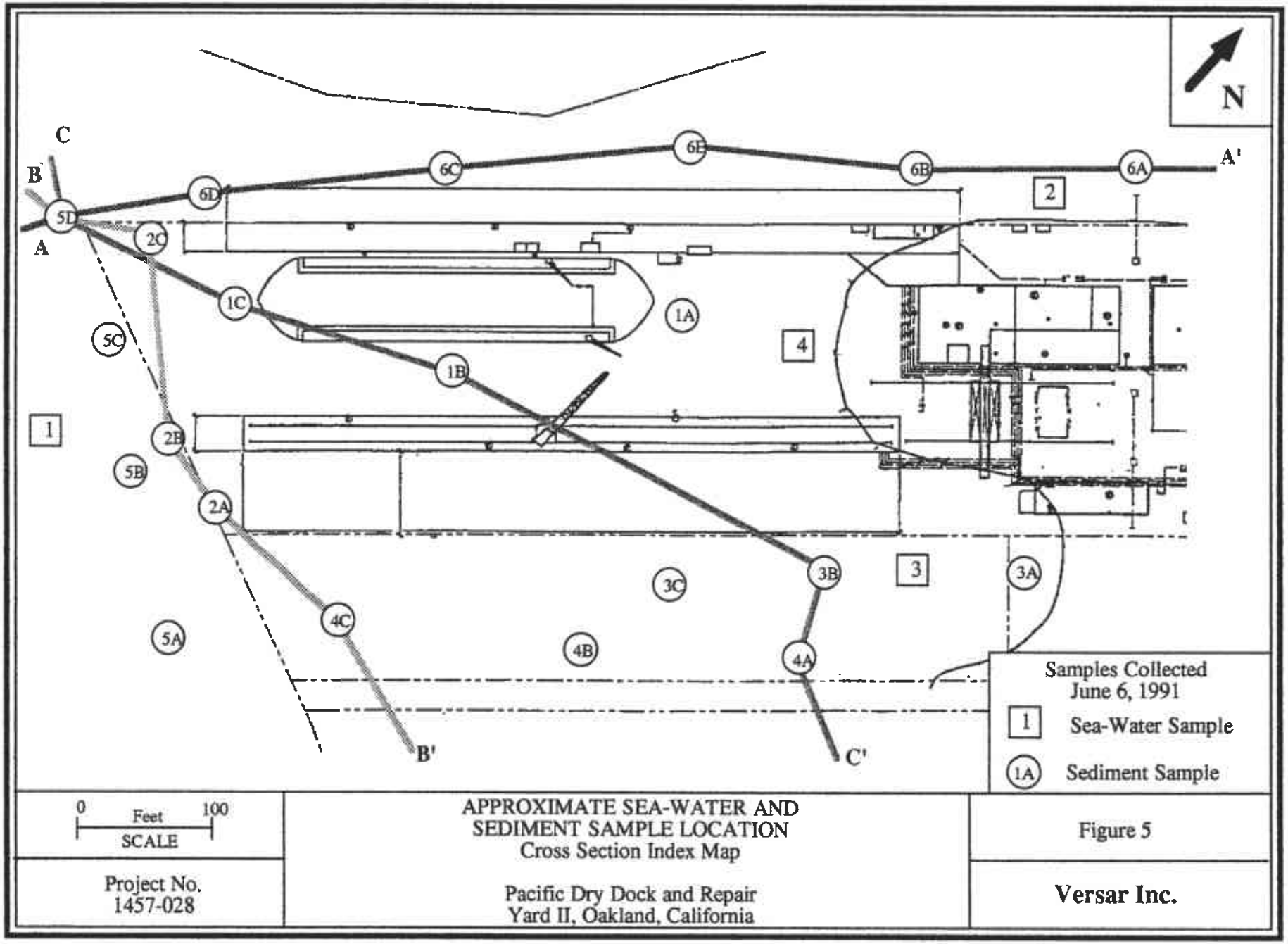
APPROXIMATE RWQCB SEDIMENT SAMPLE LOCATIONS

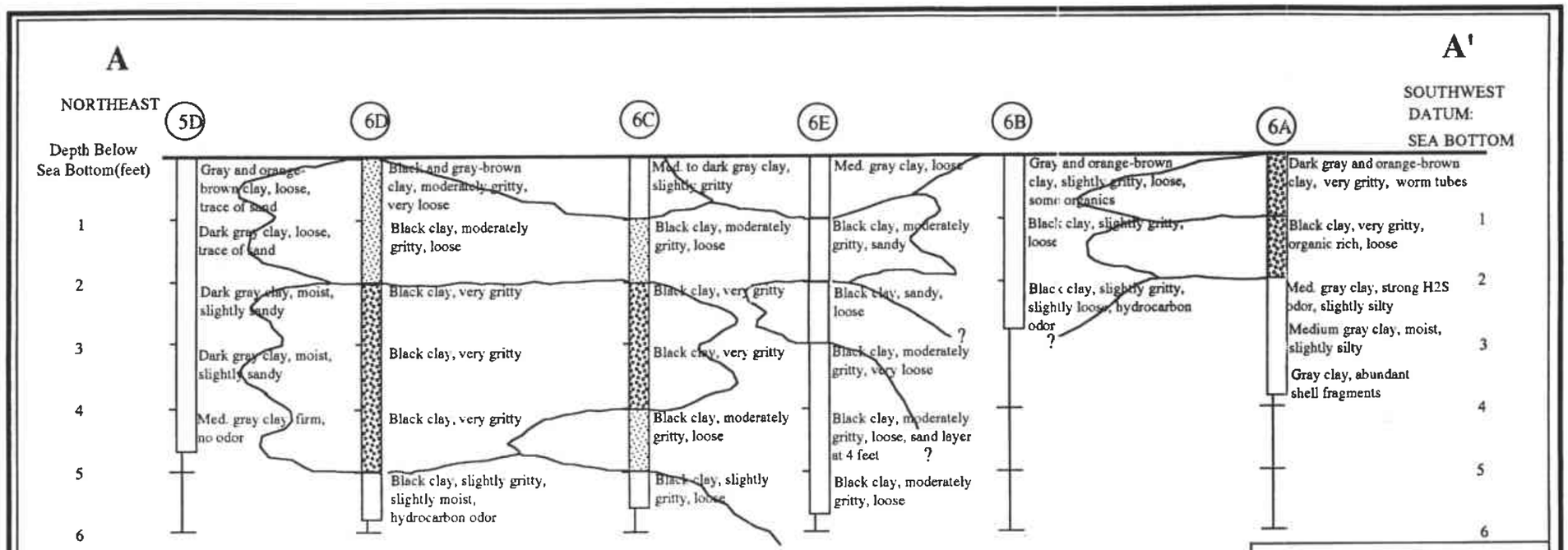
Figure 4

Project No.
1457-028

Pacific Dry Dock and Repair
Yard II, Oakland, California

Versar Inc.


N
A
A'
B
B'
C
C'
1
2
3
4
1A
1B
1C
2A
2B
2C
3A
3B
3C
4A
4B
4C
5A
5B
5C
5D
6A
6B
6C
6D
6E
Samples Collected
June 6, 1991
1 Sea-Water Sample
1A Sediment Sample
0 Feet 100
SCALE
APPROXIMATE SEA-WATER AND
SEDIMENT SAMPLE LOCATION
Cross Section Index Map
Pacific Dry Dock and Repair
Yard II, Oakland, California
Figure 5
Project No.
1457-028
Versar Inc.



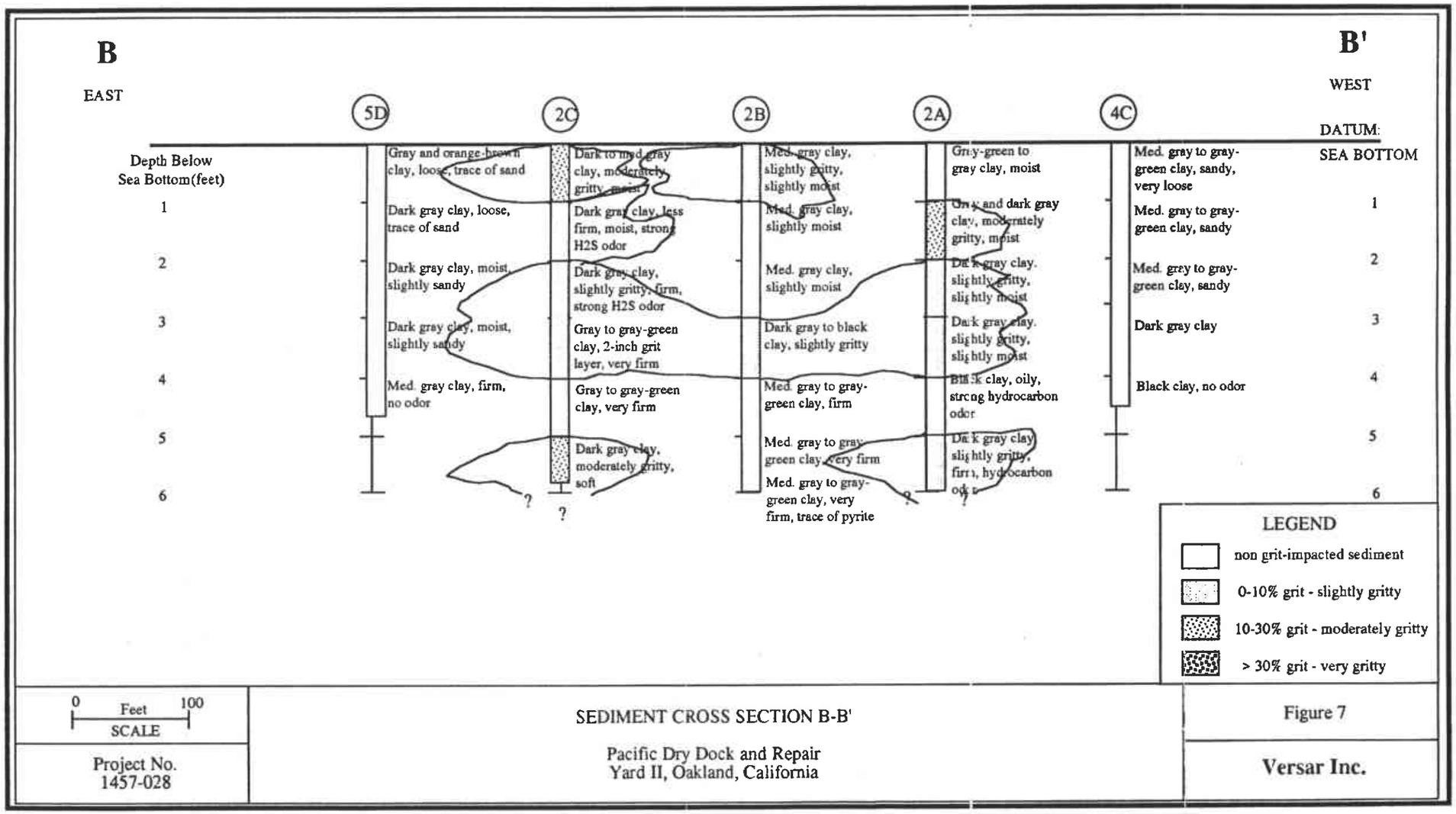
Project No.
1457-028

SEDIMENT CROSS SECTION A-A'

Pacific Dry Dock and Repair
Yard II, Oakland, California

Figure 6

Versar Inc.



0 Feet 100
SCALE

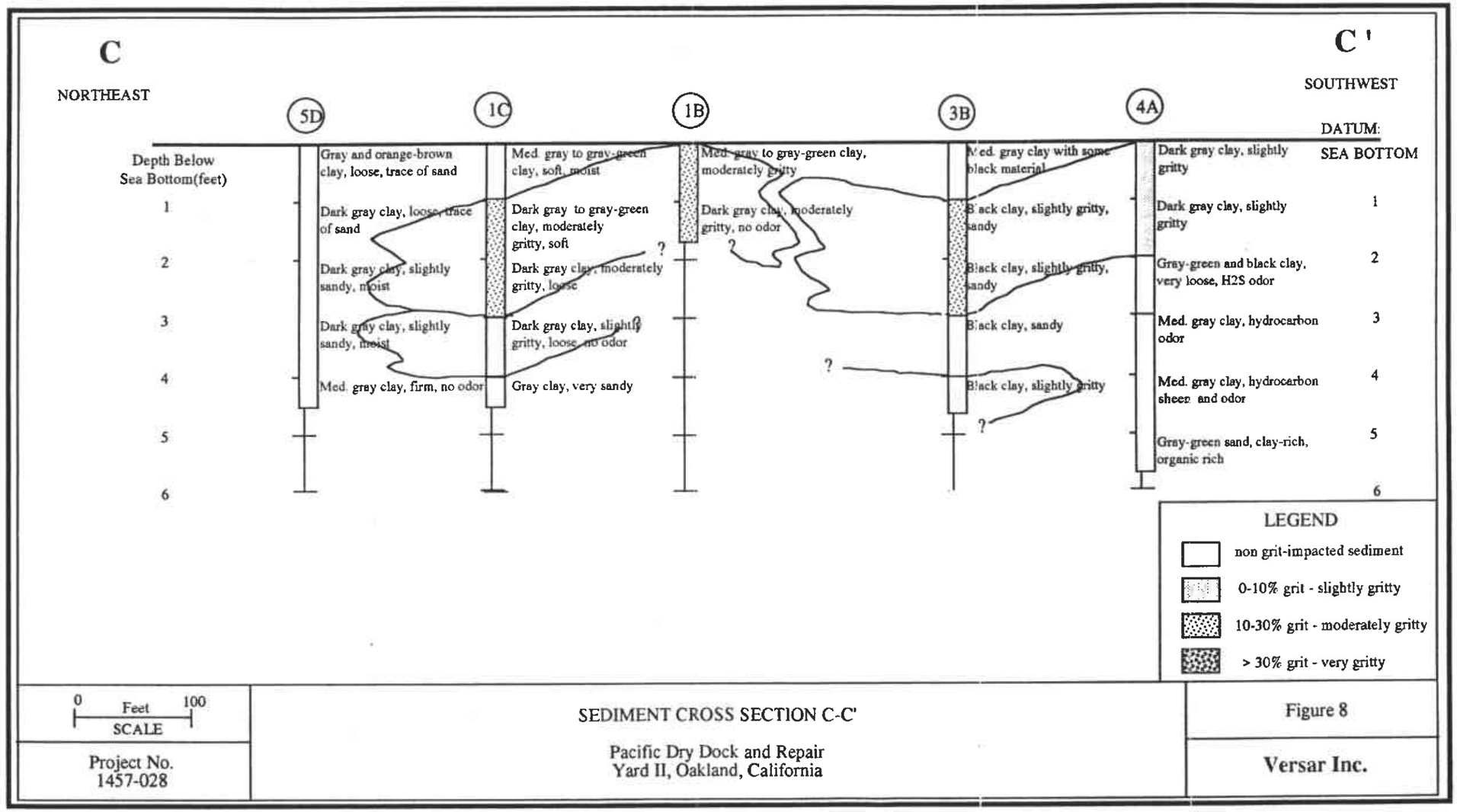
Project No.
1457-028

SEDIMENT CROSS SECTION B-B'

Pacific Dry Dock and Repair
Yard II, Oakland, California

Figure 7

Versar Inc.



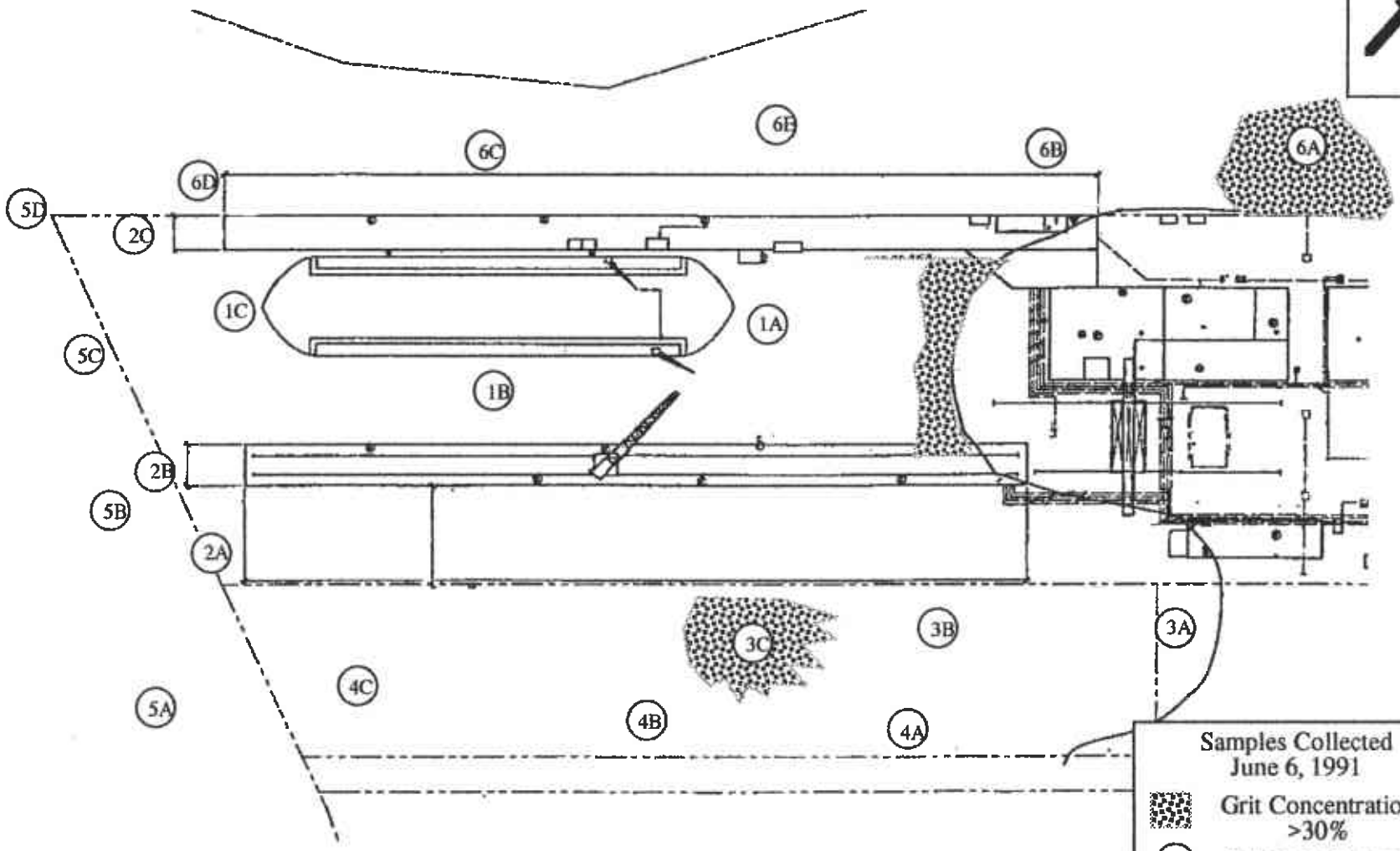
SEDIMENT CROSS SECTION C-C'

Pacific Dry Dock and Repair
Yard II, Oakland, California

Figure 8

Project No.
1457-028

Versar Inc.



0 Feet 100
SCALE

DISTRIBUTION OF SEDIMENT SURFACE
GRIT CONCENTRATIONS (>30%)

Pacific Dry Dock and Repair
Yard II, Oakland, California

Figure 9

Project No.
1457-028

Versar Inc.

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TABLE 1

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

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

Compound	Yard II Composite Sample[3]
Antimony	6.43
Arsenic	24.98
Cyanide	0.370
Cadmium	0.74
Chromium	246
Copper	480
Lead	113
Mercury	0.02
Nickel	138
Selenium	0.72
Silver	3.7
Thallium	33
Zinc	507
TPH[4]	1,800
Monobutyltin	0.013
Dibutyltin	<0.0005
Tributyltin	0.007

ppm

[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

TABLE 2

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

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

Compound[3]	Yard II Composite Sample (mg/kg)[4]
Anthracene	0.043
Benzo(a)Anthracene	0.096
Benzo(a)Pyrene	0.230
Benzo(k) Fluoranthene	0.520
bis(2-Ethylhexyl) Phthalate	0.120
Chrysene	0.190
Fluoranthene	0.190
Phenanthrene	0.069
Pyrene	0.180

[1]Detection limits for EPA Method 8270 dependent on compound

[2]Sample date March 27, 1990

[3]Only detected compounds reported

[4]Milligrams per kilogram

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TABLE 3

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

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

	PDD #1		PDD #2	
	mg/kg[4]	W.E.T.[3] mg/L[5]	mg/kg	W.E.T. mg/L
Inorganic Analysis				
Arsenic	21	0.21	13	0.11
Cadmium	4.3	<0.01	1.2	0.01
Chromium	47	1.0	230	6.5
Copper	1,500	5.3	280	0.24
Lead	92	4.1	42	3.8
Mercury	1.2	<0.0002	0.45	<0.0002
Nickel	25	0.39	140	11
Selenium	<10	<0.0002	<10	<0.0002
Silver	<1	<0.01	<1	<0.01
Zinc	450	24	210	29
Organotin Compounds				
Monobutyl	0.075		0.064	
Dibutyl	0.422		0.246	
Tributyl	0.404		0.246	
Tetrabityl	0.0094		<0.005	

[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

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TABLE 4

SUMMARY OF SEA-WATER ANALYTICAL RESULTS[1]

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

Analyte[2,3]	Sample Number PDDII-1	Composite[4]
Antimony	<0.0006	<0.0006
Arsenic	0.002	0.002
Barium	<0.1	<0.1
Beryllium	<0.01	<0.01
Cadmium	0.00017	0.0001
Chromium	<0.0025	<0.0025
Cobalt	<0.005	<0.005
Copper	0.0057	0.0056
Lead	0.00019	0.00052
Mercury	0.000125	0.00017
Molybdenum	0.0088	0.0097
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	0.008	0.0088
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. ppm

[3] Various EPA analytical methods for CAM metals.

[4] Composite sample of PDDII-2, PDDII-3, and PDDII-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 II, Oakland, California

Field Number (Composite of)	Tox Scan (CAM 17 Metals and Organotins)	QA Lab (PAH)
PDDII-1A-1 PDDII-1B-1 PDDII-1C-1	-255	-254
PDDII-2A-1 PDDII-2B-1 PDDII-2C-1	-258	-257
PDDII-3A-1 PDDII-3B-1 PDDII-3C-1	-249	-248
PDDII-4A-1 PDDII-4B-1 PDDII-4C-1	-252	-251
PDDII-5A-1 PDDII-5B-1 PDDII-5C-1 PDDII-5D-1	-261	-260
PDDII-6A-1 PDDII-6B-1 PDDII-6C-1 PDDII-6D-1 PDDII-6E-1	-265	-264

TABLE 6

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

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

Sample Area[3]	Monobutyltin (mg/kg[4])	Dibutyltin (mg/kg)	Tributyltin (mg/kg)	Tetrabutyltin (mg/kg)
PDDII-1	0.013	0.260	0.240	<0.002
PDDII-2	0.002	0.014	0.017	<0.002
PDDII-3	0.005	0.074	0.058	<0.002
PDDII-4	0.007	0.031	0.015	<0.002
PDDII-5	<0.002	0.008	0.006	<0.002
PDDII-6	0.007	0.270	0.240	<0.002

[1] Sample date June 6, 1991

[2] Pentyl derivatization using GC/Flame photometric detector

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

[4] Concentrations presented in milligrams per kilogram

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TABLE 7

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

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

Analyte[2]	Sample Area[3]					
	PDDII-1 (mg/kg[4])	PDDII-2 (mg/kg)	PDDII-3 (mg/kg)	PDDII-4 (mg/kg)	PDDII-5 (mg/kg)	PDDII-6 (mg/kg)
Antimony 15/500	19	19	22	18	17	19
Arsenic 5/500	2.3	2.3	3.0	2.1	2.1	3.2
Barium 100/10,000	81	110	57	57	76	84
Beryllium 0.75/75.	0.81	0.85	0.73	0.78	0.87	0.67
Cadmium 1.0/100.	0.35	1.0	0.87	0.79	0.64	0.63
Chromium 5.0/500.	67	86	110	71	69	130
Cobalt 80./8000	11	10	12	9.1	9.4	10
Copper 25/2500	200	55	230	86	41	190
Lead 5./1000.	52	63	170	79	59	160
Mercury 0.2/20.	0.7	2.2	6.9	1.6	1.4	0.6
Molybdenum 350/3500	24	4.8	22	4.4	3.9	19
Nickel 20./2,000	38	56	54	39	40	44
Selenium 1.0/100.	0.27	0.25	0.27	0.24	0.20	0.23
Silver 5./500.	0.93	1.2	1.4	1.2	1.1	0.96
Thallium 7./700	9.4	9.3	10	8.4	8.9	8.8
Vanadium 24./2400	62	69	62	59	62	56
Zinc 250/5000	140	140	310	170	110	290

[1] Sample date June 6, 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. ppm

TABLE 8

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

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

Analyte[3]	Sample Area[4] PDDII-1 (mg/kg)[4]	PDDII-2 (mg/kg)	PDDII-3 (mg/kg)	PDDII-4 (mg/kg)	PDDII-5 (mg/kg)	PDDII-6 (mg/kg)
Acenapthene	<0.020	<0.020	0.428	<0.020	<0.020	0.085
Acenapthylene	<0.020	<0.020	<0.020	0.020	<0.020	<0.020
Benzo(a)anthracene	<0.020	<0.020	0.208	<0.020	<0.020	<0.020
Benzo(b)fluoranthene	<0.020	<0.020	0.104	<0.020	<0.020	0.140
Chrysene	0.100	0.029	0.364	<0.020	<0.020	0.405
Fluoranthene	0.050	<0.020	0.790	0.033	<0.020	0.448
Fluorene	<0.020	0.119	<0.020	<0.020	0.027	0.026
Naphthalene	<0.020	<0.020	0.129	0.110	<0.020	0.025
Phenanthrene	0.062	<0.020	1.095	<0.020	<0.020	0.555
Pyrene	0.109	0.078	1.790	0.285	<0.020	0.744

[1] Sample date June 6, 1991
[2] EPA Method 8100
[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

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APPENDIX A

Sediment Lithology Logs

Versar
ENVIRONMENTAL RESEARCH, INC.

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION (State Plane Coordinates):
Northing 474149.2
Easting 1490444.1

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDII-1A
Date Sampled 6-6-91
Time 10:10
Water Depth 33'
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
	Medium gray clay, slightly gritty	PDDII-1A-Surf.	
1	Dark gray clay, loose, gritty layer	PDDII-1A-1	Composited
2	Medium gray to gray-green clay, organic, slightly gritty	PDDII-1A-2	
3	Black clay, gritty	PDDII-1A-3	
4	Black clay	PDDII-1A-4	
5	Dark gray clay, sandy, dry on bottom, becoming moist, no odor	PDDII-1A-5	

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION (State Plane Coordinates):
Northing 474207.8
Easting 1490268.3

Contractor : Kinnetic Laboratories, Inc.

Station No. PDDII-1B
Date Sampled 6-6-91
Time 10:32
Water Depth 36'
Tidal Stage
Recovery 1' 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 to gray-green clay, moderately gritty	PDDII-1B- Surf.	
1	Dark gray clay, moderately gritty, no odor, large piece of metal at base of sample	PDDII-1B-1	Composited
2			
3			
4			
5			

Versar
ENVIRONMENTAL PERFORMANCE SETS

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION (State Plane Coordinates):
Northing 474035.0
Easting 1490052.6

Contractor : Kinnetic Laboratories, Inc.

Station No. PDDII-1C
Date Sampled 6-6-91
Time 10:52
Water Depth 35'
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
	Med. gray to gray-grn clay, soft, moist	PDDII-1C-Surf.	
1	Dark gray to gray-grn clay, soft, moderately gritty	PDDII-1C-1	Composited
2	Grit unit @ 2' Dark gray clay, loose, moderately gritty	PDDII-1C-2	
3	Dark gray clay, loose, slightly gritty; no odor	PDDII-1C-3	
4	Gray clay, sandy, 90% sand(?) at base of core	PDDII-1C-4	
5			

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SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION (State Plane Coordinates):
Northing 473920.9
Easting 1490159.5

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDII-2A
Date Sampled 6-6-91
Time 11:22
Water Depth 25'
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
	Gray-green to medium gray clay, moist	PDDII-2A-Surf.	
1	Med. gray to gray-green and dark gray clay, moist, moderately gritty	PDDII-2A-1	Composited
2	Dark gray clay, slightly moist, slightly gritty	PDDII-2A-2	
3	Dark gray clay, slightly moist, slightly gritty	PDDII-2A-3	
4	Black clay, oily; strong hydrocarbon odor	PDDII-2A-4	
5	Dark gray clay, firm, hydrocarbon odor, slightly gritty	PDDII-2A-5	

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SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION (State Plane Coordinates):
Northing 473876.2
Easting 1490026.5

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDII-2B
Date Sampled 6-6-91
Time 11:41
Water Depth 28'
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, slightly moist, slightly gritty	PDDII-2B-Surf.	
1	Med. gray clay, slightly moist	PDDII-2B-1	Composited
2	Med. gray clay, slightly moist	PDDII-2B-2	
3	Dark gray to black clay, slightly gritty	PDDII-2B-3	
4	Med. gray to gray-grn clay, stiff, less firm	PDDII-2B-4	
5	Med. gray to gray-grn clay, stiff, very firm	PDDII-2B-5	
	Sediment at base of core barrel - med. gray to gray grn clay, very firm, trace framb. pyrite		

Versar

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION (State Plane Coordinates):
Northing 474024.7
Easting 1489914.7

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDII-2C
Date Sampled 6-6-91
Time 12:05
Water Depth 21'
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
	Dark to medium gray clay, moist, moderately gritty	PDDII-2C-Surf.	
1	Dark gray clay, moist, less firm, strong H_2S odor	PDDII-2C-1	Composited
2	Dark gray clay, firm, strong H_2S odor, slightly gritty	PDDII-2C-2	
3	Med. gray to gray-green clay, very firm, top of sample black and slightly gritty up to 2'10"	PDDII-2C-3	
4	Med. gray to gray-green clay, very firm	PDDII-2C-4	
5	Dark gray clay, soft, moderately gritty	PDDII-2C-5	

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION (State Plane Coordinates):
Northing 474447.9
Easting 1490678.0

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDII-3A
Date Sampled 6-6-91
Time 7:51
Water Depth 7'
Tidal Stage
Recovery 2' 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
	Gray to light gray clay, gritty	PDDII-3A-Surf.	
	Lt. gray silty clay unit @ 10"		
1	Dark gray clay, slightly gritty; oily sheen from 1' to 2'	PDDII-3A-1	Composited
2	Dark gray clay, soft, sticky; H_2S odor	PDDII-3A-2	
3			
4			
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION (State Plane Coordinates):
Northing 474266.4
Easting 1490629.8

Contractor : Kinnetic Laboratories, Inc.

Station No. PDDII-3B
Date Sampled 6-6-91
Time 8:02
Water Depth 19'
Tidal Stage
Recovery 4' 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
	Medium gray clay with some black material	PDDII-3B-Surf.	
1	Black clay, sandy, slightly gritty	PDDII-3B-1	Composited
2	Black clay, sandy, slightly gritty	PDDII-3B-2	
3	Black clay, sandy	PDDII-3B-3	
4	Black clay, slightly gritty	PDDII-3B-4	
5			

Versar
ENVIRONMENTAL RISK MANAGEMENT

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION (State Plane Coordinates):
Northing 474118.2
Easting 1490616.1

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDII-3C
Date Sampled 6-6-91
Time 8:20
Water Depth 27'
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
	Medium to dark gray clay, moist, gritty	PDDII-3C-Surf.	
1	Medium to dark gray clay, moist, gritty	PDDII-3C-1	Composited
2	Medium to dark gray clay, moist, gritty	PDDII-3C-2	
	Grit unit @ 2.5', "greasy grit"		
3	Medium to dark gray clay; hydrocarbon odor	PDDII-3C-3	
4	Gray clay, slightly moist, trace of shell material	PDDII-3C-4	
5	Gray-green clay, firm	PDDII-3C-5	

Versar

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION (State Plane Coordinates):
Northing 474196.6
Easting 1490725.8

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDII-4A
Date Sampled 6-6-91
Time 8:57
Water Depth 20'
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
	Dark gray clay, slightly gritty	PDDII-4A-Surf.	
1	Dark gray clay, slightly gritty	PDDII-4A-1	Composited
2	Gray-green and black clay, very loose, wet; H_2S odor	PDDII-4A-2	
3	Med. gray clay; hydrocarbon odor	PDDII-4A-3	
4	Med. gray clay, hydrocarbon sheen and odor	PDDII-4A-4	
5	Gray-grn sand, very clay-rich, organic rich	PDDII-4A-5	

Versar
ENVIRONMENTAL MANAGEMENT

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION (State Plane Coordinates):
Northing 473999.2
Easting 1490702.6

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDII-4B
Date Sampled 6-6-91
Time 9:16
Water Depth 25'
Tidal Stage
Recovery 5' 4"
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
	No surface sediment recovered	(no surface sample)	
1	Dark gray clay, sandy	PDDII-4B-1	Composited
2	Dark gray clay	PDDII-4B-2	
3	Gray clay	PDDII-4B-3	
4	Gray-green clay, soft	PDDII-4B-4	
5	Dark gray clay; very organic rich, hydrocarbon odor?	PDDII-4B-5	

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION (State Plane Coordinates):
Northing 473814.1
Easting 1490628.6

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDII-4C
Date Sampled 6-6-91
Time 9:36
Water Depth 24'
Tidal Stage
Recovery 4' 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
	Med. gray to gray-grn clay, sandy, very loose	PDDII-4C-Surf.	
1	Med. gray to gray-grn clay, sandy	PDDII-4C-1	Composited
2	Med. gray to gray-grn clay, sandy	PDDII-4C-2	
3	Dark gray clay	PDDII-4C-3	
4	Black clay, no odor	PDDII-4C-4	
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION:
Northing 473767.3
Easting 1490130.2

Contractor : Kinnetic Laboratories, Inc.

Station No. PDDII-5A
Date Sampled 6-6-91
Time 13:29
Water Depth 37'
Tidal Stage
Recovery 1' 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
	Med. gray to gray-green clay, moist, orange-brown color in part	PDDII-5A-Surf.	
1	Dark gray clay, shell fragments, sl. moist, slight H_2S odor, trace of grit.	PDDII-5A-1	Composited
2	Sediment at base of core barrel - med. gray sand, f.gr. to m. gr., subrd to subang, 15% clay, mod. srtd, (80% qtz, 15% clay, 5% rk frags-1/2" size, gray and red in color)	PDDII-5A-2	
3			
4			
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION:
Northing 473854.6
Easting 1490016.9

Station No. PDDII-5B
Date Sampled 6-6-91
Time 13:51
Water Depth 38'
Tidal Stage
Recovery 3' 6"
Logged By: James G. Jensen

Contractor :Kinnetic Laboratories, Inc.

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 orange-brown clay; very loose	PDDII-5B-Surf.	
1	Dark gray to black clay	PDDII-5B-1	Composited
2	Dark gray to black clay, softer than below	PDDII-5B-2	
3	Medium gray clay, firm	PDDII-5B-3	
4	Medium gray clay, firm, dry. "bay mud"	PDDII-5B-4	
5			

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION:
Northing 473925.7
Easting 1489917.8

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDII-5C
Date Sampled 6-6-91
Time 14:10
Water Depth 38'
Tidal Stage
Recovery 4'
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 and orange-brown clay, very fluid	PDDII-5C-Surf.	
1	Medium gray clay, no odor	PDDII-5C-1	Composited
2	Medium gray clay, no odor	PDDII-5C-2	
3	Medium gray clay, no odor	PDDII-5C-3	
4	Medium gray clay, firm, no odor	PDDII-5C-4	
5			

Versar
ENVIRONMENTAL RISK MANAGEMENT

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION:
Northing 473979.1
Easting 1489822.6

Station No. PDDII-5D
Date Sampled 6-6-91
Time 14:29
Water Depth 32'
Tidal Stage
Recovery 4' 4"
Logged By: James G. Jensen

Contractor :Kinnetic Laboratories, Inc.

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 and orange-brown clay; loose, trace sand	PDDII-5D-Surf.	
1	Dark gray clay; loose, trace sand	PDDII-5D-1	Composited
2	Dark gray clay; moist, slightly sandy	PDDII-5D-2	
3	Dark gray clay; moist, slightly sandy	PDDII-5D-3	
4	Medium gray clay; firm, no odor	PDDII-5D-4	
5			

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION:
Northing 474757.0
Easting 1490604.6

Station No. PDDII-6A
Date Sampled 6-6-91
Time 15:35
Water Depth 4'
Tidal Stage
Recovery 3' 2"
Logged By: James G. Jensen

Contractor :Kinnetic Laboratories, Inc.

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
	Dark gray and orange-brown clay; worm tubes and very gritty.	PDDII-6A-Surf.	
1	Black clay; organic rich, loose, very gritty	PDDII-6A-1	Composited
2	Medium gray clay; heavy H2S odor, slightly silty	PDDII-6A-2	
3	Medium gray clay; moist, slightly silty	PDDII-6A-3	
	Base of core; gray clay, abundant shell fragments		
4			
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION:
Northing 474578.3
Easting 1490421.6

Contractor :Kinnetic Laboratories, Inc.

Station No. PDDII-6B
Date Sampled 6-6-91
Time 16:02
Water Depth 9'
Tidal Stage
Recovery 2' 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
	Gray and orange-brown clay; loose, some organics, silty, slightly gritty	PDDII-6B-Surf.	
1	Black clay; loose, slightly gritty	PDDII-6B-1	Composited
2	Black clay; hydrocarbon odor, slightly loose and slightly gritty	PDDII-6B-2	
3			
4			
5			

Versar

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION:
Northing 474246.8
Easting 1490063.4

Station No. PDDII-6C
Date Sampled 6-6-91
Time 15:14
Water Depth 19'
Tidal Stage
Recovery 5' 3"
Logged By: James G. Jensen

Contractor :Kinnetic Laboratories, Inc.

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 to dark gray clay; slightly gritty	PDDII-6C-Surf.	
1	Black clay; loose, moderately gritty	PDDII-6C-1	Composited
2	Black clay, very gritty	PDDII-6C-2	
3	Pure grit in black clay	PDDII-6C-3	
4	Black clay; loose, moderately gritty	PDDII-6C-4	
5	Black clay; loose, slightly gritty	PDDII-6C-5	

Versar

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION:
Northing 474128.8
Easting 1489967.8

Contractor : Kinnetic Laboratories, Inc.

Station No. PDDII-6D
Date Sampled 6-6-91
Time 14"54
Water Depth 22'
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
	Black and gray-brown clay; very loose and moderately gritty	PDDII-6D-Surf.	
1	Black gray; moderately gritty and loose	PDDII-6D-1	Composited
2	Black clay; very gritty	PDDII-6D-2	
3	Black clay; very gritty	PDDII-6D-3	
4	Black clay; 40% grit	PDDII-6D-4	
5	Black clay; semi-moist, hydrocarbon odor, slightly gritty	PDDII-6D-5	

Versar
ENVIRONMENTAL RISK MANAGEMENT

SAMPLE LOG
-Marine Sediment Sampling-

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

POSITION:
Northing 474891.5
Easting 1490206.1

Station No. PDDII-6E
Date Sampled 6-6-91
Time 16:21
Water Depth 18'
Tidal Stage
Recovery 5' 2"
Logged By: James G. Jensen

Contractor :Kinnetic Laboratories, Inc.

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; loose	PDDII-6E-Surf.	
1	Black clay; sandy, moderately gritty	PDDII-6E-1	Composited
2	Black, sandy clay; very loose	PDDII-6E-2	
3	Black, moderately gritty clay; very loose	PDDII-6E-3	
4	Black, moderately gritty clay; loose, sand layer at 4'	PDDII-6E-4	
5	Black clay; moderately gritty, loose	PDDII-6E-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. RICH 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:

Paramater	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:

James P. Kelly 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 (OAL)	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

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. Crescente
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

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

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. Cosentino
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

[redacted]N, INC.
E[redacted]ETHOD 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
[redacted]ANTHRENE	20.0	ND	ND	ND	ND
PYRENE	20.0	ND	ND	ND	ND

ND = NONE DETECTED

PETER SHEN
LABORATORY DIRECTOR

[redacted]/lt

QUALITY ASSURANCE
LABORATORY

1452

Vernon 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)		

SAMPLERS: (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	COMPOSITE CAM 17 METALS	COMPOSITE ORGANOTINS	REMARKS
PDD1-1	6-4-91	9:22A		✓	center of channel opp. pier	4	-41 -42	-43	-44				COMPOSITE W/ # 1-2, 1-3, 1-4
PDD1-2	6-4-91	9:43A		✓	east side drydock - near dock	4	-45 -46	-47	-48	X			COMPOSITE W/ # 1-3, 1-4
PDD1-3	6-4-91	9:57A		✓	west side drydock - near dock	4	-49 -50	-51	-52	X	X	X X	COMPOSITE W/ # 1-2, 1-4
PDD1-4	6-4-91	10:10A		✓	center drydock - near dock	4	-53 -54	-55	-56	X			COMPOSITE W/ # 1-2 + 1-3
PDDII-1	6-4-91	3:47P		✓	center - opposite east dock	4	-57 -58	-59	-60				
PDDII-2	6-4-91	3:58P		✓	near shore - west side	4	-61 -62	-63	-64	X			COMPOSITE W/ II-3 + II-4
PDDII-4	6-4-91	4:12P		✓	inside east & west docks	4	-65 -66	-67	-68	X	X	X X	COMPOSITE W/ II-2 + II-3
PDDII-3	6-4-91	4:20P		✓	near pier/drydock - east side	4	-69 -70	-71	-72	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
	8070-1	8071	8072	8073	8074	8075	8076	8077	8078	8079	8080	8081	MM 6.6.91
							1	2	3	4	5	6	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
(Printed) JAMES G. JENSEN	6-4-91 4:45P	(Printed) Richard D. Mathison	(Printed) M. Milazzo via overnight	6/6/91 4:30 PM	(Printed) 6/7/91 @ 9:39
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks: DO FILTER ALL SAMPLES BEFORE COMPOSITION OR SAMPLING per M. Milazzo 6/10/91 @ 10:45
(Printed) Richard D. Mathison	6-5-91 0900	(Printed) Kit Muhs MM		

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

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

	Client I.D.	TSI I.D.	Composite, Subsample Designations (Subsample I.D.'s) 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:

	ToxScan Sample I.D.				
Element	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 G. 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.

42 Hangar Way
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.

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 12, 1991
DATE COMPLETED	JUNE 18, 1991
ANALYZED BY	MF EA
SAMPLE TYPE	10 SEDIMENT
PROJECT NAME	MARINE SEDIMENT
PROJECT NUMBER	T-7710

JULY 8, 1991

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

LOG NUMBER: 8447-91
SAMPLE ID: PDDII-1A-1,1B-1,1C-1

ANALYSIS	DETECTION LIMIT UG/KG	WET WEIGHT UG/KG	DRY WEIGHT UG/KG
% SOLID			36.0
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	ND	ND
BENZO(GHI)PERYLENE	20.0	ND	ND
BENZO(K)FLUORANTHENE	20.0	ND	ND
CHRYSENE	20.0	100	278
DIBENZO(A,H)ANTHRACENE	20.0	ND	ND
FLUORANTHENE	20.0	50.0	139
FLUORENE	20.0	ND	ND
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND
NAPHTHALENE	20.0	ND	ND
PHENANTHRENE	20.0	62.0	172
PYRENE	20.0	109	303

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: 8448-91
SAMPLE ID: PDDII-2A-1,2B-1,2C-1

ANALYSIS	DETECTION LIMIT UG/KG	WET WEIGHT UG/KG	DRY WEIGHT UG/KG
% SOLID			15.0
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	ND	ND
BENZO(GHI)PERYLENE	20.0	ND	ND
BENZO(K)FLUORANTHENE	20.0	ND	ND
CHRYSENE	20.0	29.0	193
DIBENZO(A,H)ANTHRACENE	20.0	ND	ND
FLUORANTHENE	20.0	ND	ND
FLUORENE	20.0	119	793
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND
NAPHTHALENE	20.0	ND	ND
PHENANTHRENE	20.0	ND	ND
PYRENE	20.0	78.0	520

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: 8445-91
SAMPLE ID: PDDII-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	428	973
ACENAPHTHYLENE	20.0	ND	ND
ANTHRACENE	20.0	ND	ND
BENZO(A)ANTHRACENE	20.0	208	473
BENZO(A)PYRENE	20.0	ND	ND
BENZO(B)FLUORANTHENE	20.0	104	236
BENZO(GHI)PERYLENE	20.0	ND	ND
BENZO(K)FLUORANTHENE	20.0	**	**
CHRYSENE	20.0	364	827
DIBENZO(A,H)ANTHRACENE	20.0	ND	ND
FLUORANTHENE	20.0	790	1795
FLUORENE	20.0	ND	ND
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND
NAPHTHALENE	20.0	129	293
PHENANTHRENE	20.0	1095	2489
PYRENE	20.0	1790	4068

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: 8446-91
SAMPLE ID: PDDII-4A-1,4B-1,4C-1

ANALYSIS	DETECTION LIMIT UG/KG	WET WEIGHT UG/KG	DRY WEIGHT UG/KG
% SOLID			39.0
ACENAPHTHENE	20.0	ND	ND
ACENAPHTHYLENE	20.0	20.0	51.3
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	33.0	84.6
FLUORENE	20.0	ND	ND
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND
NAPHTHALENE	20.0	110	282
PHENANTHRENE	20.0	ND	ND
PYRENE	20.0	285	731

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: 8449-91
SAMPLE ID: PDDII-5A-1,5B-1,5C-1,5D-1

ANALYSIS	DETECTION LIMIT UG/KG	WET WEIGHT UG/KG	DRY WEIGHT UG/KG
% SOLID			41.0
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	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	27.0	65.9
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND
NAPHTHALENE	20.0	ND	ND
PHENANTHRENE	20.0	ND	ND
PYRENE	20.0	ND	ND

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: 8450-91
SAMPLE ID: PDDII-6A-1,6B-1,6C-1,6D-1

ANALYSIS	DETECTION LIMIT UG/KG	WET WEIGHT UG/KG	DRY WEIGHT UG/KG
% SOLID			76.0
ACENAPHTHENE	20.0	85.0	112
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	140	184
BENZO(GHI)PERYLENE	20.0	ND	ND
BENZO(K)FLUORANTHENE	20.0	**	**
CHRYSENE	20.0	405	533
DIBENZO(A,H)ANTHRACENE	20.0	ND	ND
FLUORANTHENE	20.0	448	589
FLUORENE	20.0	26.0	34.2
INDENO(1,2,3-CD)PYRENE	20.0	ND	ND
NAPHTHALENE	20.0	25.0	32.9
PHENANTHRENE	20.0	555	730
PYRENE	20.0	744	979

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
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".
COPIES OF PUBLICATIONS ARE AVAILABLE FROM QAL.

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".

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

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".

REPRINTS OF 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".

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
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".

SAMPLING AND ANALYSIS CHAIN OF CUSTODY RECORD

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

CLIENT _____ CONTACT _____ PHONE _____

LABORATORY NO. T-7710

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														
PDDI-6C-1 T-7710-27							Sampled by KEI/Persar 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	↓												

NOV 16 RECEIVED

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. UPS overnight
Mary L Milazzo

RECEIVED BY LABORATORY: John Edson 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 _____

CONTACT _____ PHONE _____

LABORATORY NO. T-7710

ACCOUNT NO. _____

REQUEST			LABORATORY REQUIREMENTS				CHAIN OF CUSTODY							
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.					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-4A-1 T-7710-78 (composite)			and				Composited by 6/11/91.		Wayne Milligan					
PDDI-4B-1 T-7710-81 (composite)			Composite of 6		PDDI-3A-1, 3B-1, 3C-1.		Sampled by KLI/Versar staff	6/5/91.						
	Composite ID's:												6/12	
	-236	PAH's	1-125 ml glass jar		QAL							VEE		8441-91
	-237 dup.	17 CAM metals + TBT	↓		TSI									
PDDI-3C-1 T-7710-90 (composite)														
PDDI-3B-1 T-7710-94 (composite)														
PDDI-3A-1 T-7710-100	Composite ID's:													
	-238	PAH's	1-125 ml glass jar		QAL							VEE	6/12	8442-91
	-239 dup.	17 CAM metals + TBT's	↓		TSI									
	-240 dup.	↓	↓											

RECEIVED
6 JUN 12 AM 11:00

SIGNATURES:

LABORATORY REPRESENTATIVE: _____

RELEASED TO COURIER BY FIELD PERSONEL: _____

RECEIVED BY COURIER: _____

RELEASED TO LABORATORY BY COURIER: _____

RECEIVED BY LABORATORY: W Y Milligan

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

RECEIVED BY LABORATORY: John Eaton Euer

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				ZA-1, ZB-1, ZC-1		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	-241 dup.						Composited by Mary Jo Milgate 6.11.91							
PDDI-2B-1 T-7710-105	-242 dup.						Sampled by KLI/Versar staff	6/5/91.						
PDDI-2C-1 T-7710-111	-243 dup.	Composite IDs: [redacted]												
	[redacted]	[redacted]	1-125 ml glass jar		QAL							6/12	8:43	
	-242 dup.	17 CAM metals + TBTs			TSI									
	-243 dup.	↓	↓											

RECEIVED 6/12 8:43 AM QAL

SIGNATURES:

LABORATORY REPRESENTATIVE: _____

RELEASED TO COURIER BY FIELD PERSONEL: _____

RECEIVED BY COURIER: _____

RELEASED TO LABORATORY BY COURIER: _____

RECEIVED BY LABORATORY: Mary Jo Milgate

RELEASED TO LABORATORY BY COURIER: via UPS overnight 6.11.91 Mary Jo Milgate

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			Please include in analytical report Composite of 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	Composite						Composited by Mary Lou Milazzo 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							JWE	6/12	8444
	-245 dup.	CAM metals +TBT			BI									
	-246 dup.	↓												
	-247 dup.	↓	↓											

SIGNATURES:

LABORATORY REPRESENTATIVE: _____

RELEASED TO COURIER BY FIELD PERSONEL: _____

RECEIVED BY COURIER: _____

RELEASED TO LABORATORY BY COURIER: _____

RECEIVED BY LABORATORY: Mary Lou Milazzo

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

RECEIVED BY LABORATORY: John Cannon Evan

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

SAMPLING AND ANALYSIS CHAIN OF CUSTODY RECORD

5619

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] 4A-1, -4B-1, -4C-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-4A-1 T-7710-148	composite						Composited by Mary Lou Milazzo 6.11.91							
PDDII-4B-1 T-7710-153							Sampled by KLI/Versar Staff 6-6-91.							
PDDII-4C-1 T-7710-228	Composite ID's:													
	[redacted]		1-125ml jar		QAL							[signature]	6/12	8446-91
	-252 dup.	17 CAM Metals + TBT	↓		TSI									
	-253 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: via UPS overnight 6.11.91 M. Milazzo

RECEIVED BY LABORATORY: John E. von Green

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

SAMPLING AND ANALYSIS CHAIN OF CUSTODY RECORD

60/9

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

CLIENT ______________________

CONTACT ______________ PHONE ____________

LABORATORY NO. T-7710

ACCOUNT NO. ______________

REQUEST			LABORATORY REQUIREMENTS				CHAIN OF CUSTODY							
SAMPLE TYPE: Marine sediment			[redacted] PDD II-1A-1, -1B-1, -1C-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
PDD II-1A-1 T-7710-233	Composite						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							staff	6.6.91.						
	Composite ID's: ~~-254~~	~~PAHs~~	1-125ml glass jar		QAL							JEE	6/12	8/4/91
	-255	17 CAM Metals+TBT			TSI									RECEIVED
	-256	↓	↓											

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: via UPS overnight — M Milazzo 6.11.91

RECEIVED BY LABORATORY: John Evan Ewen

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			~~Please identify samples on reports as: composite of PDD II-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
PDD II-2A-1 T-7710-166	Composite						Composited by at ToxScan		Mary Lou Milazzo 6.11.91.					
PDD II-2B-1 T-7710-172														
PDD II-2C-1 T-7710-178	Composite ID's.						Sampled by KLI/Versar staff 6.10.91.							
	~~-257 PAHs~~		1-125ml glass jar		QAL							[signature]	6/12	8448-91
	-258 dup.	17 CAM metals + TBT	↓		TSI									
	-259 dup.		↓		↓									

RECEIVED ... All : 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/Vessel staff 6-6-91.							
PDDII-5C-1 T-7710-190														
PDDII-5D-1 T-7710-195	Composite ID's:													
	[illegible]		1-125 ml glass jar		QAL							EE	6/12	8/19-91
	-261 dup.	17 CAM metals + TBT			TBI								All: 00	VED
	-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 J Milazzo

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

RECEIVED BY LABORATORY: John Evon Evans

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			[illegible] -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
PDDII-6A-1 T-7710-212	Composite						Composited by at ToxScan		Meg Lau 4/11/91	Milazzo				
PDDII-6B-1 T-7710-216														
PDDII-6C-1 T-7710-206							Sampled by staff	KLI/Vessar 6/6/91						
PDDII-6D-1 T-7710-200														
PDDII-6E-1 T-7710-220	Composite ID's:													
	~~264~~	~~PAH's~~	1-125 ml glass jar		QAL							TEE	6/12	8450-91
	-265 dup.	17 CAM metals + TBT	↓		TSI									
	-266 dup.													
	-267 dup.													
	-268 dup.													

SIGNATURES:

LABORATORY REPRESENTATIVE: ______

RELEASED TO COURIER BY FIELD PERSONEL: ______

RECEIVED BY COURIER: ______

RELEASED TO LABORATORY BY COURIER: ______

RECEIVED BY LABORATORY: [signature] Milazzo

RELEASED TO LABORATORY BY COURIER: via UPS overnight [signature] Milazzo

RECEIVED BY LABORATORY: [signature] John E. [illegible]

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

T-7710

1/10

Versar INC.

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS - PDDII

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

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	Organic Tin	CMI-17 METALS	COMPOSITE					REMARKS
PDDII-3A-surf.	6-6-91	7:51A		✓	T-7710-133	1									
PDDII-3A-1	6-6-91	7:51A		✓	-134	1				X					
PDDII-3A-2	6-6-91	7:51A		✓	-135	1									
PDDII-3B-surf	6-6-91	8:02A		✓	-136	1									
PDDII-3B-1	6-6-91	8:02A		✓	-137	1				X					
PDDII-3B-2	6-6-91	8:02A		✓	-138	1									
PDDII-3B-3	6-6-91	8:02A		✓	-139	1									
PDDII-3B-4	6-6-91	8:02A		✓	-140	1									
PDDII-3C-surf	6-6-91	8:20A		✓	-141	1									
PDDII-3C-1	6-6-91	8:20A		✓	-142	1				X					
PDDII-3C-2	6-6-91	8:20A		✓	-143	1									
PDDII-3C-3	6-6-91	8:20A		✓	-144	1									

INDUSTRIAL HYGIENE SAMPLE: Y / N

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James L. Jensen	6-6-91 / 6:30p	Kent Brown	Kent Brown	6-7-91 / 1415	Richard D. McAllison
(Printed) JAMES G. JENSEN		(Printed) KENT BROWN	(Printed) KENT BROWN		(Printed) Richard D. McAllison
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
Richard D. McAllison	6-29-91 / 1530	Mary Lou Milazzo		SCOPE OF WORK TURN AROUND TIME	
(Printed) Richard D. McAllison		(Printed) Mary Lou Milazzo			

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

T-7710

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CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS - PDD II

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

PARAMETERS: NO. OF CONTAINERS; PAH; Organo Tin; CAM-17 METALS; COMPOSITE

INDUSTRIAL HYGIENE SAMPLE: Y / N

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PAH	Organo Tin	CAM-17 METALS	COMPOSITE	REMARKS
PDDII-3C-4	6-6-91	8:20A		✓	T-7710-145	1					
PDDII-3C-5	6-6-91	8:20A		✓	↓ -146	1					
PDDII-3-1 COMPOSITE			✓				X	X	X		LABORATORY TO COMPOSITE PDDII-3A-1, PDDII-3B-1, & PDDII-3C-1 (-134, -137, -141)
PDDII-4A-SURF	6-6-91	8:57A		✓	T-7710-147	1					
PDDII-4A-1	6-6-91	8:57A		✓	-148	1				X	
PDDII-4A-2	6-6-91	8:57A		✓	-149	1					
PDDII-4A-3	6-6-91	8:57A		✓	-150	1					
PDDII-4A-4	6-6-91	8:57A		✓	-151	1					
PDDII-4A-5	6-6-91	8:57A		✓	-152	1					
PDDII-4B-1	6-6-91	9:16A		✓	-153	1				X	
PDDII-4B-2	6-6-91	9:16A		✓	-154	1					
PDDII-4B-3	6-6-91	9:16A		✓	↓ -155	1					

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James G. Jensen	6-6-91 / 6:50P		Kent Brown	6-7-91 / 1415	Richard D. Mathison
(Printed) James G. Jensen		(Printed)	(Printed) Kent Brown		(Printed) Richard D. Mathison
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
	6-7-91 / 1520	Mary Lou Milazzo		SCOPE OF WORK TURN AROUND TIME	
(Printed) Richard D. Mathison		(Printed) Mary Lou Milazzo			

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

Versar INC.

CHAIN OF CUSTODY RECORD

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

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

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	Organo Tin	CAM-17 METALS	Composite	REMARKS
PDD II-1A-4	6-6-91	10:10A		✓	T-7710-~~X~~-156	1					
PDD II-1A-5	6-6-91	10:10A		✓	-~~X~~-157	1					
PDD II-1B-surf	6-6-91	10:32A		✓	-~~X~~-158	1					
PDD II-1B-1	6-6-91	10:32A		✓	-~~X~~-159	1			X		
PDD II-1C-surf	6-6-91	10:52A		✓	-~~X~~-160	1					
PDD II-1C-1	6-6-91	10:52A		✓	-~~X~~-161	1			X		
PDD II-1C-2	6-6-91	10:52A		✓	-~~X~~-162	1					
PDD II-1C-3	6-6-91	10:52A		✓	-~~X~~-163	1					
PDD II-1C-4	6-6-91	10:52A		✓	-~~X~~-164	1					Sample not rec'd.
PDD II-1-1 Composite			✓				X	X	X		LABORATORY TO COMPOSITE PDD II-1A-1, PDD II-1B-1, & PDD II-1C-1 (-233, -159, -161)
PDD II-2A-surf	6-6-91	11:22A		✓	T-7710-~~X~~-165	1					
PDD II-2A-1	6-6-91	11:22A		✓	-~~X~~-166	1			X		

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James G. Jensen	6-6-91 / 6:00P	Kent Bacani	Kent Bacani	6-7-91 / 1415	Richard D. Mathison
(Printed) JAMES G. JENSEN		(Printed) KENT BACANI	(Printed) KENT BACANI		(Printed) Richard D. Mathison
Relinquished by: (Signature) Richard D. Mathison	Date / Time 6-7-91 / 1530	Received for Laboratory by: (Signature) Mary Lou Milazzo	Date / Time	Remarks: SCOPE OF WORK TURN AROUND TIME	
(Printed) Richard D. Mathison		(Printed) Mary Lou Milazzo			

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

Versar INC.

CHAIN OF CUSTODY RECORD

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T-7710

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS - PDD II

PARAMETERS

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 Tin	CHM-17 METALS	COMPOSITE	REMARKS
PDDII-2A-2	6-6-91	11:22A		✓	T-7710-167	1					
PDDII-2A-3	6-6-91	11:22A		✓	-168	1					
PDDII-2A-4	6-6-91	11:22A		✓	-169	1					
PDDII-2A-5	6-6-91	11:22A		✓	-170	1					
PDDII-2B-Surf	6-6-91	11:41A		✓	-171	1					
PDDII-2B-1	6-6-91	11:41A		✓	-172	1				X	
PDDII-2B-2	6-6-91	11:41A		✓	-173	1					
PDDII-2B-3	6-6-91	11:41A		✓	-174	1					
PDDII-2B-4	6-6-91	11:41A		✓	-175	1					
PDDII-2B-5	6-6-91	11:41A		✓	-176	1					
PDDII-2C-Surf	6-6-91	12:05P		✓	-177	1					
PDDII-2C-1	6-6-91	12:05P		✓	-178	1				X	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James G. Jensen	6-6-91 / 6:00	Kent Brown	Kent Brown	6-7-91 / 1415	Richard D. Mattison
(Printed) JAMES G. JENSEN		(Printed) KENT BROWN	(Printed) KENT BROWN		(Printed) Richard D. Mattison
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
Richard D. Mattison	6-7-91 / 1530	Mary Lou Milazzo		SCOPE OF WORK TURN AROUND TIME	
(Printed) Richard D. Mattison		(Printed) Mary Lou Milazzo			

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

Versar INC.

CHAIN OF CUSTODY RECORD

6/10 T-7710

PROJECT NO.	PROJECT NAME	INDUSTRIAL HYGIENE SAMPLE (Y / N)
7743.026	PDD SEDIMENTS - PDD II	

SAMPLERS: (Signature) James D. 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	REMARKS
PDD II-2C-2	6-6-91	12:05P		✓	T-7710 -179	1					
PDD II-2C-3	6-6-91	12:05P		✓	-180	1					
PDD II-2C-4	6-6-91	12:05P		✓	-181	1					
PDD II-2C-5	6-6-91	12:05P		✓	-182	1					
PDD II-2-1 COMPOSITE			✓				X	X	X		LABORATORY TO COMPOSITE PDD II-2A-1, PDD II-2B-1, & PDD II-2C-1 (-166, -177, -173)
PDD II-5A-surf	6-6-91	1:29P		✓	T-7710 -183	1					
PDD II-5A-1	6-6-91	1:29P		✓	-184	1				X	
PDD II-5B-surf	6-6-91	1:51P		✓	-185	1					
PDD II-5B-1	6-6-91	1:51P		✓	-186	1				X	
PDD II-5B-2	6-6-91	1:51P		✓	-187	1					
PDD II-5B-3	6-6-91	1:51P		✓	-188	1					
PDD II-5C-surf	6-6-91	2:10P		✓	-189	1					

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James D. Jensen	6-6-91 6PM	Kent Brown	Kent Brown	6-7-91	Richard D. Mathison
(Printed) JAMES G. JENSEN		(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			

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

Versar INC.

CHAIN OF CUSTODY RECORD

7/10 T-7710

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS- PDDII

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

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	Organo Tin $	CAM-17-METALS	COMPOSITE	INDUSTRIAL HYGIENE SAMPLE Y/N	REMARKS
PDDII-5C-1	6-6-91	2:10P		✓	T-7710 -190	1				X		
PDDII-5C-2	6-6-91	2:10P		✓	-191	1						
PDDII-5C-3	6-6-91	2:10P		✓	-192	1						
PDDII-5C-4	6-6-91	2:10P		✓	-193	1						
PDDII-5D-surf	6-6-91	2:29P		✓	-194	1						
PDDII-5D-1	6-6-91	2:29P		✓	-195	1				X		
PDDII-5D-2	6-6-91	2:29P		✓	-196	1						
PDDII-5D-3	6-6-91	2:29P		✓	-197	1						
PDDII-5D-4	6-6-91	2:29P		✓	-198	1						
PDDII-5-1 COMPOSITE			✓				X	X	X			LABORATORY TO COMPOSITE PDDII-5A-1, PDDII-5B-1, PDDII-5C-1, & PDDII-5D-1 (-194, -196, -198, -195)
PDDII-6D-surf	6-6-91	2:54P		✓	T-7710 -199	1						
PDDII-6D-1	6-6-91	2:54P		✓	-200	1				X		

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James G. Jensen	6-6-91 6:00P	Kent Brown	Kent Brown	6-9-91 1415	Richard D. LaHison
(Printed) JAMES G JENSEN		(Printed) Kent Brown	(Printed) Kent Brown		(Printed) Richard D. LaHison

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
Richard D. LaHison	6-29-91 1530	Mary Lou Milazzo		Scope of work Turnaround time.
(Printed) Richard D. LaHison		(Printed) Mary Lou Milazzo		

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

Versar INC.

CHAIN OF CUSTODY RECORD

3/10 T-7710

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS - PDD II

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

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	Organo Tin	CAM-17 METALS	Composite	INDUSTRIAL HYGIENE SAMPLE Y/N	REMARKS
PDD II-4B-4	6-6-91	9:16A		✓	T-7710-225	1						
PDD II-4B-5	6-6-91	9:16A		✓	226	1						
PDD II-4C-surf	6-6-91	9:36A		✓	227	1						
PDD II-4C-1	6-6-91	9:36A		✓	T-7710-228	1				X		
PDD II-4C-2	6-6-91	9:36A		✓	229	1						
PDD II-4C-3	6-6-91	9:36A		✓	230	1						
PDD II-4C-4	6-6-91	9:36A		✓	231	1						
PDD II-4-1 COMPOSITE			✓				X	X	X			LABORATORY TO COMPOSITE PDD II-4A-1, PDD II-4B-1, & PDD II-4C-1 (-148, -153, -235)
PDD II-1A-surf	6-6-91	10:10A		✓	T-7710-232	1						
PDD II-1A-1	6-6-91	10:10A		✓	233	1				X		
PDD II-1A-2	6-6-91	10:10A		✓	234	1						
PDD II-1A-3	6-6-91	10:10A		✓	235	1						

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
James G. Jensen	6-6-91 6:00p	Kent Brown	Kent Brown	6-7-91 1415	Richard D. Mathison
(Printed) JAMES G. JENSEN		(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			SCOPE OF WORK TURN AROUND TIME	
(Printed) Richard D. Mathison		(Printed)			

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

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Versar INC.

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS - PDDII

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

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	ORGANOTINS	CAM-17 METALS	COMPOSITE	INDUSTRIAL HYGIENE SAMPLE (Y/N)	REMARKS
PDDII-6D-2	6-6-91	2:54P		✓	T-7710 - 201	1						
PDDII-6D-3	6-6-91	2:54P		✓	- 202	1						
PDDII-6D-4	6-6-91	2:54P		✓	- 203	1						
PDDII-6D-5	6-6-91	2:54P		✓	- 204	1						
PDDII-6C-Surf	6-6-91	3:14P		✓	- 205	1						
PDDII-6C-1	6-6-91	3:14P		✓	- 206	1			X			
PDDII-6C-2	6-6-91	3:14P		✓	- 207	1						
PDDII-6C-3	6-6-91	3:14P		✓	- 208	1						
PDDII-6C-4	6-6-91	3:14P		✓	- 209	1						
PDDII-6C-5	6-6-91	3:14P		✓	- 210	1						
PDDII-6A-Surf	6-6-91	3:35P		✓	- 211	1						
PDDII-6A-1	6-6-91	3:35P		✓	- 212	1			X			

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
James G. Jensen	6-6-91 6:00P	Kent G. Brown	Kent G. Brown	6-7-91 1415	Richard D. Mathison
(Printed) JAMES G. JENSEN		(Printed) KENT BROWN	(Printed) KENT BROWN		(Printed) Richard D. Mathison
Relinquished by: *(Signature)*	**Date / Time**	**Received for Laboratory by:** *(Signature)*	**Date / Time**	**Remarks**	
	6291 1530	Mary Lou Milazzo		SCOPE OF WORK TURN AROUND TIME	
(Printed) Richard D. Mathison		(Printed) Mary Lou Milazzo			

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

Versar INC.

CHAIN OF CUSTODY RECORD

9/10 T-7710

PROJECT NO.	PROJECT NAME
7703.026	PDD SEDIMENTS - PDD II

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

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	Organic TIN	CAM-17 METALS	COMPOSITE					INDUSTRIAL HYGIENE SAMPLE Y / N	REMARKS
PDDII-CA-2	6-6-91	3:35P		✓	T-7710-213	1										
PDDII-6A-3	6-6-91	3:35P		✓	-214	1										
PDDII-6B-surf.	6-6-91	4:02P		✓	-215	1										
PDDII-6B-1	6-6-91	4:02P		✓	-216	1				X						
PDDII-6B-2	6-6-91	4:02P		✓	-217	1										
PDDII-6B-3	6-6-91	4:02P		✓	-218	1										
PDDII-6E-surf	6-6-91	4:21P		✓	-219	1										
PDDII-6E-1	6-6-91	4:21P		✓	-220	1				X						
PDDII-6E-2	6-6-91	4:21P		✓	-221	1										
PDDII-6E-3	6-6-91	4:21P		✓	-222	1										
PDDII-6E-4	6-6-91	4:21P		✓	-223	1										
PDDII-6E-5	6-6-91	4:21P		✓	-224	1										

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

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

T-7710
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Versar INC.

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
7763.026	PDD SEDIMENTS - PDD II

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

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: PAH	Organo Tin	CAM 17-Metals Composite					INDUSTRIAL HYGIENE SAMPLE Y/N	REMARKS
PDD II-6-1 Composite			X		~~T-7710-225~~		X	X	X						LABORATORY TO COMPOSITE PDD II-6A-1, PDD II-6B-1 PDD II-6C-1 PDD II-6D-1 & PDD II-6E-1. (-212, -216, -206, -200, -220)

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

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

Versar INC. SACRAMENTO

APPENDIX D

Yard II Sediment Sample Location Map

LARGE MAP REMOVED