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January 21, 1992 92 JAN 23 11:34

A WORK PLAN FOR A SOIL INVESTIGATION AND THE INSTALLATION OF FOUR MONITORING WELLS

at;

GRAND MARINA
2407 GRAND STREET
ALAMEDA, CALIFORNIA

791 HAMILTON AVENUE MENLO PARK, CA. 94025 (415) 363-2181

January 22, 1992

A Work Plan For A Soil Investigation
and The Installation Of Four
Two-Inch Groundwater Monitoring Wells

prepared for

GRAND MARINA
2407 GRAND STREET
ALAMEDA, CALIFORNIA

by

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INTRODUCTION

The following work plan presents a limited assessment developed to determine concentrations of contaminants within areas of concern at Grand Marina, 2407 Grand Street, Alameda, California.

It is anticipated that soil contaminant migration may exceed the scope of this investigation as groundwater is shallow and tidally influenced and migration may be extensive. An attempt will be made to define the lateral and vertical migration of contamination within areas of known contamination. Should lateral migration exceed the Scope of Services within this investigation, laboratory analytical results will be examined and a work plan developed for further assessment.

Site investigations performed by Versar and Harding Lawson Associates in June and July 1987 and November 1989 determined soil contamination to present within the following areas;

Areas Of Concern;

Area 1. Concrete wall contained tank farm and its outer perimeter

Area 2. Previous location of a 1,000 gallon underground gasoline storage tank

Area 3. Product lines which transported fuel from tank farm to pier

Area 4. Pump house

Area 5. Boring B-1, Versar Report , July 17, 1987

Area 6. Sump

Previous work on the Grand Marina property indicate that shallow soil lithology is predominantly bay muds with sand layers. The groundwater table is around five-feet (5') in depth.

The Background and Scope of Services for each of the six areas of concern are described separately as follows:

AREA 1. TANK FARM

BACKGROUND

Located within the tank farm were seven (7) above ground diesel tanks. These tanks were used for the storage of aviation fuel and gasoline at one time. A horizontal skid mounted above ground slop oil/bilge water tank was also located within the tank farm.

The seven above ground diesel tanks and one skid mounted lube oil tank were removed by the Zaccor Corporation on January 21 and 22, 1992. The above ground slop oil/bilge water tank was relocated on site.

SCOPE OF SERVICES

Soil quality will be investigated beneath and beyond the tank farm to determine contaminant concentrations and to gather useful information as to the soil contaminant plume's lateral and vertical migration. The location of cracks and possible seepage points will be noted and soil borings will be placed in these areas.

Sampling Grid - Tank Farm

The tank farm floor will be divided into a grid of twelve sections. A soil boring will be advanced within each section and discrete soil samples collected. Soil borings will be advanced to groundwater using a specially adapted Bobcat 843 which has the capability of collecting discrete and continuous core samples.

Soil Sample Collection

A soil sample will be collected within each soil boring at surface to six-inches (0" - 6") and within the capillary zone (5'-6') . Random continuous core samples will be collected, within each of the six areas to be investigated, for soil characterization.

TANK FARM - Soil Sample Collection - continued

Soil sample depths will alternate from one grid section to the next at surface to six-inches and from the capillary zone.

Tank Farm Outside Perimeter

Soil borings will be placed outside of and adjacent to the tank farm to determine if contaminants in soil have migrated beyond the tank farm.

The longer tank farm walls will be divided into four sections each. Four soil borings will be advanced within each section and soil samples within each section will be composited as one sample for analysis.

The shorter east and west tank farm wall will be divided into three sections. Four soil borings will be advanced within each section and collected soil samples within each section will be composited as one sample for analysis.

Discolored soil appearing to be oil stained and having detectable amounts of Total Petroleum Hydrocarbons exist along the tank farm's north wall. Therefore, soil samples will also be collected within a three-foot strip north of and adjacent to the discolored area. This strip will be divided into four sections. Four soil borings will be advanced within each section and soil samples within each section will be composited as one sample for analysis.

Soil Sample Analysis

Each soil sample will be analyzed for Total Petroleum Hydrocarbons as Diesel (TPH-D, using EPA Method 3550), Total Oil and Grease (TOG, EPA Method 503EF), Total Petroleum Hydrocarbons as Gasoline, Benzene, Toluene, Ethylbenzene and Total Xylenes (TPH-G, BTEX, Using EPA Method 8015/5030, 8020).

AREA 2. PREVIOUS 1,000 GALLON TANK PIT CAVITY

BACKGROUND

In 1988, a 1,000 gallon storage tank was removed from the site. At the time of the 1,000 gallon under ground storage gasoline tank removal, two soil interface samples were obtained from beneath each end of the tank. One sample had concentrations of Total Petroleum Hydrocarbons as Gasoline at 770 ppm, while the other was "non-detect".

SCOPE OF SERVICES

Soil Borings

Six soil borings will be placed outside of the tank pit perimeter to define the lateral and vertical migration of contaminants in soil.

Soil Sample Collection

A soil sample will be collected within the vadose/saturated capillary zone. The soil lithologies will be examined five-feet (5') beneath the first encountered groundwater to determine if groundwater fluctuation may have transported contamination to lower permeable strata. Should a permeable stratum be encountered a soil sample will be collected and analyzed.

Soil Sample Analysis

Soil samples collected within this area will be analyzed for Total Petroleum Hydrocarbons as Gasoline, Benzene, Toluene, Ethylbenzene, Total Xylenes (EPA Method 5030/8015, 8020), Total Oil and Grease (EPA Method 503EF) and Total Oil Petroleum Hydrocarbons as Diesel (TPH-D, EPA Method 3550).

AREA 3. PRODUCT LINES

BACKGROUND

Located on site are product lines which previously transported diesel fuel and slop oil/bilge water from the tank farm to the pier.

SCOPE OF SERVICES

Soil Borings

Soil Borings will be advanced using a Bobcat 843. A discrete soil sample will be collected every twenty-feet (20') along the product lines at a depth of one-foot (1') depth beneath them.

32" depth
40" depth
50" range
Water Indication Test holes determine depth pipe

Soil Sample Analysis

Soil samples collected within this area will be analyzed for Total Petroleum Hydrocarbons as Gasoline, Benzene, Toluene, Ethylbenzene, Total Xylenes (EPA Method 5030/8015, 8020), Total Oil and Grease (EPA Method 503EF) and Total Oil Petroleum Hydrocarbons as Diesel (TPH-D, EPA Method 3550).

3" to 5" pipes
Free product samples from plan for

collected from northern side (laundry HLA)

AREA 4. PUMP HOUSE

BACKGROUND

A detectable amount of Total Petroleum Hydrocarbons as Diesel (900 ppm) was found located beneath the Pump House. The Pump House is located north of and adjacent to the tank farm.

SCOPE OF SERVICES

Soil Borings

Four soil borings will be advanced beneath the pump house floor, using a Bobcat 843 with the capability of advancing slant borings or possibly entering the building. Should the area prove to be inaccessible using the Bobcat, soil borings will be hand augered and soil samples collected using a slide hammer sampler.

only one?

Soil Sample Collection

A soil sample will be collected directly beneath the pump house floor and within the vadose/saturated capillary zone.

Soil Sample Analysis

Soil samples collected within this area will be analyzed for Total Petroleum Hydrocarbons as Gasoline, Benzene, Toluene, Ethylbenzene, Total Xylenes (EPA Method 5030/8015, 8020), Total Oil and Grease (EPA Method 503EF) and Total Oil Petroleum Hydrocarbons as Diesel (TPH-D, EPA Method 3550).

AREA 5. B-1 VERSAR REPORT, July 17, 1987

BACKGROUND

Soil boring B-1 installed by Harding Lawson Associates, in 1987, revealed a detectable amount of Total Petroleum Hydrocarbon Concentrations at 2,300 ppm. This was reported in the Versar Report (17, July 1987)

SCOPE OF SERVICES

Soil Borings

Five soil borings will be advanced within the area of HLA boring B-1 for the purpose of defining the lateral and vertical migration pattern of contaminants in this area.

Soil Sample Collection

A continuous core sample will be collected and field screening will be performed to determine the depth of worst case contamination. A soil sample will be collected within this zone and within the vadose/saturated capillary zone. The vadose zone soil samples will be field screened and those with positive results will be analyzed along with all capillary zone samples at a certified analytical laboratory.

Soil Sample Analysis

Soil samples collected within this area will be analyzed for Total Petroleum Hydrocarbons as Gasoline, Benzene, Toluene, Ethylbenzene, Total Xylenes (EPA Method 5030/8015, 8020), Total Oil and Grease (EPA Method 503EF) and Total Oil Petroleum Hydrocarbons as Diesel (TPH-D, EPA Method 3550).

AREA 6. SUMP

SCOPE OF SERVICES

Soil Sample Collection

A soil sample will be collected from beneath the sump located within the tank farm at a depth of surface to six-inches and within the capillary zone.

Soil Sample Analysis

Soil samples collected within this area will be analyzed for Total Petroleum Hydrocarbons as Gasoline, Benzene, Toluene, Ethylbenzene, Total Xylenes (EPA Method 5030/8015, 8020), Total Oil and Grease (EPA Method 503EF) and Total Oil Petroleum Hydrocarbons as Diesel (TPH-D, EPA Method 3550).

MONITORING WELLS

Four monitoring wells will be installed on-site.

One monitoring well will be placed adjacent to the south property line and the Pennzoil Facility to investigate groundwater quality. The purpose of this monitoring well will be to determine if groundwater contamination has migrated from the Pennzoil facility onto the Grand Marina Site.

One monitoring well will be placed outside of the north tank farm wall between the tank farm and the Inner Harbor. The purpose of this monitoring well will be to investigate possible groundwater contaminant migration from the tank farm.

? But do you know gradient already ?

One monitoring well will be placed near the east property line. The purpose of this well will be to investigate groundwater quality in this area and to form a triangle for the surveying of groundwater gradient.

One monitoring well will be placed to the north of the 1,000 gallon gasoline tank pit cavity. This well will be installed between the tank pit cavity and the tank farm. The purpose of this well will be to investigate groundwater quality in this area.

GROUNDWATER SAMPLING POINTS

Soil borings advanced for the purpose of soil sample collection will be selected at random to be converted into groundwater sampling points by inserting 2" PVC 0.010 slot below groundwater and blank 2" PVC above. A sand pack will be placed in the annular space between the PVC and borehole. Four casings of groundwater will be evacuated and the groundwater parameters (Ph, conductivity and temperature) measured. A groundwater sample will be collected upon the stabilization of the groundwater parameters.

vague Explain How will you determine Give a minimum Requirement

Groundwater Sample Analysis

Groundwater samples will be analyzed for Total Petroleum Hydrocarbons as Gasoline, Benzene, Toluene, Ethylbenzene, Total Xylenes (EPA Method 5030/8015, 602), Total Oil and Grease (EPA Method 503EF) and Total Oil Petroleum Hydrocarbons as Diesel (TPH-D, EPA Method 3550).

The data collected from the groundwater sample points will be used to model the groundwater plume.

APPENDIX A

METHODOLOGIES

METHODOLOGIES

SOIL BORINGS

The drilling of the soil borings will be accomplished using a BOBCAT 843. A hydraulic driven rod equipped with a California Modified Split Spoon Sampler will be advanced to a depth of depth of 5'6" or 7' depending upon the sampling area. Three clean brass sleeves will be placed within the sampler.

Soil borings may be advanced using a hand auger where required. A soil sample will be collected at desired depths by inserting a clean brass sleeve into the clean sample tube of hand driven slide hammer. The hammer will drive the clean brass sleeve into relatively undisturbed soil. Upon retrieval the sample tube will immediately be opened and the brass sleeve removed and properly sealed and labeled.

DRILLING OF MONITORING WELLS

Four deep soil borings will be advanced to 15' below groundwater or to the depth the Registered Geologist determines is most appropriate. The drilling of soil borings will be accomplished using a hydraulic driven truck/trailer-mounted drill rig, equipped with 8-1/4 inch outside diameter hollow-stem augers. A California Modified Split Spoon Sampler will be driven 18 inches into soil using a 140 pound hammer dropped a standard 30-inch fall into relatively undisturbed soils to collect samples. Three clean brass sleeves (2-inch diameter , 6-inch length), will be placed in the sampler.

MONITORING WELL INSTALLATION

The four deep soil borings will be converted to monitoring wells upon completion. Soil samples within these borings will be collected at 5.5' and at 5' intervals thereafter, at changing lithologies or where indications of contamination are present. In addition a soil sample will be collected from immediately above the water table in each boring. During the placement of these soil borings information from the collected samples will be obtained regarding subsurface soil lithologies and characteristics such as color, moisture, density, and hydrocarbon content, and depth to groundwater.

SOIL SAMPLE COLLECTION

Immediately upon retrieval, the sampler will be opened and the bottom brass sleeve will be removed, each end covered with a teflon sheet, fitted with plastic caps, sealed with duct tape, labeled with project number, name and time of sampling, and placed on blue ice, for transport to a certified hazardous waste laboratory, under chain of custody, for analysis. The remaining brass sleeves will be used in classifying soil.

UNIFIED SOIL CLASSIFICATION SYSTEM

Collected samples will be classified using the Unified Soil Classification System (USCS). Boring logs will include soil lithology according to the USCS, data on soil color, moisture, density, hydrocarbon content, and miscellaneous characteristics such as organic content, blow counts at six-inch increments for 18-inch sampler drive. The monitoring well will be constructed according to local and Regional Water Quality Control Board criteria via the LUFT Manual guidelines.

FIELD SCREENING

Soil Contamination will be monitored continuously using a hydrocarbon survey instrument and Thin Layer Chromotography. Vapors will be extracted using a GasTech model 1314 Hydrocarbon Survey Instrument to measure gasoline hydrocarbon vapor content. The maximum relative vapor concentration detected within 30 seconds will be recorded. This field screening will be the criteria for determining samples to be analyzed.

GROUNDWATER GRADIENT

Groundwater will be allowed to stabilize over a 48 hour period following well completion to assess static groundwater depths. Following stabilization groundwater depths will be measured. Groundwater elevations will be determined after top of casing elevations have been obtained by surveying.

GROUNDWATER DEVELOPMENT AND SAMPLING

To establish groundwater quality, monitoring wells will be developed by removing 4 to 5 well volumes of water by pumping. Measurements of pH, temperature, and conductivity will be recorded at consistent intervals, and a sample of groundwater will be obtained only after these parameters have stabilized.

GROUNDWATER DEVELOPMENT AND SAMPLING - continued

Water samples will then be obtained using a clean bailer. Water will be decanted to a positive meniscus into two 40ml VOA vials with teflon septum and two one-liter amber bottles. Bottles will be labeled, placed on blue ice, under chain of custody, for transport to a Certified Department of Health Services Analytical Laboratory.

All groundwater developed during well purgings will be stored in 55 gallon capacity Department of Transportation Drums (DOT 17), sealed and labeled, pending laboratory analysis.

DECONTAMINATION

Prior to arriving at site the drill rig and augers will be decontaminated using a hot high-pressure wash at a temperature of 248 degrees Fahrenheit. Augers will be cleaned in the same manner between borings. Sampling equipment will be decontaminated between samples using a trisodium phosphate wash, tap water rinse, followed by a deionized water rinse. All lubricated drill rig parts that may approach borings will be lubricated using PAM.

Drill cuttings will be placed on a hydrocarbon resistant liner, and covered.

REPORT

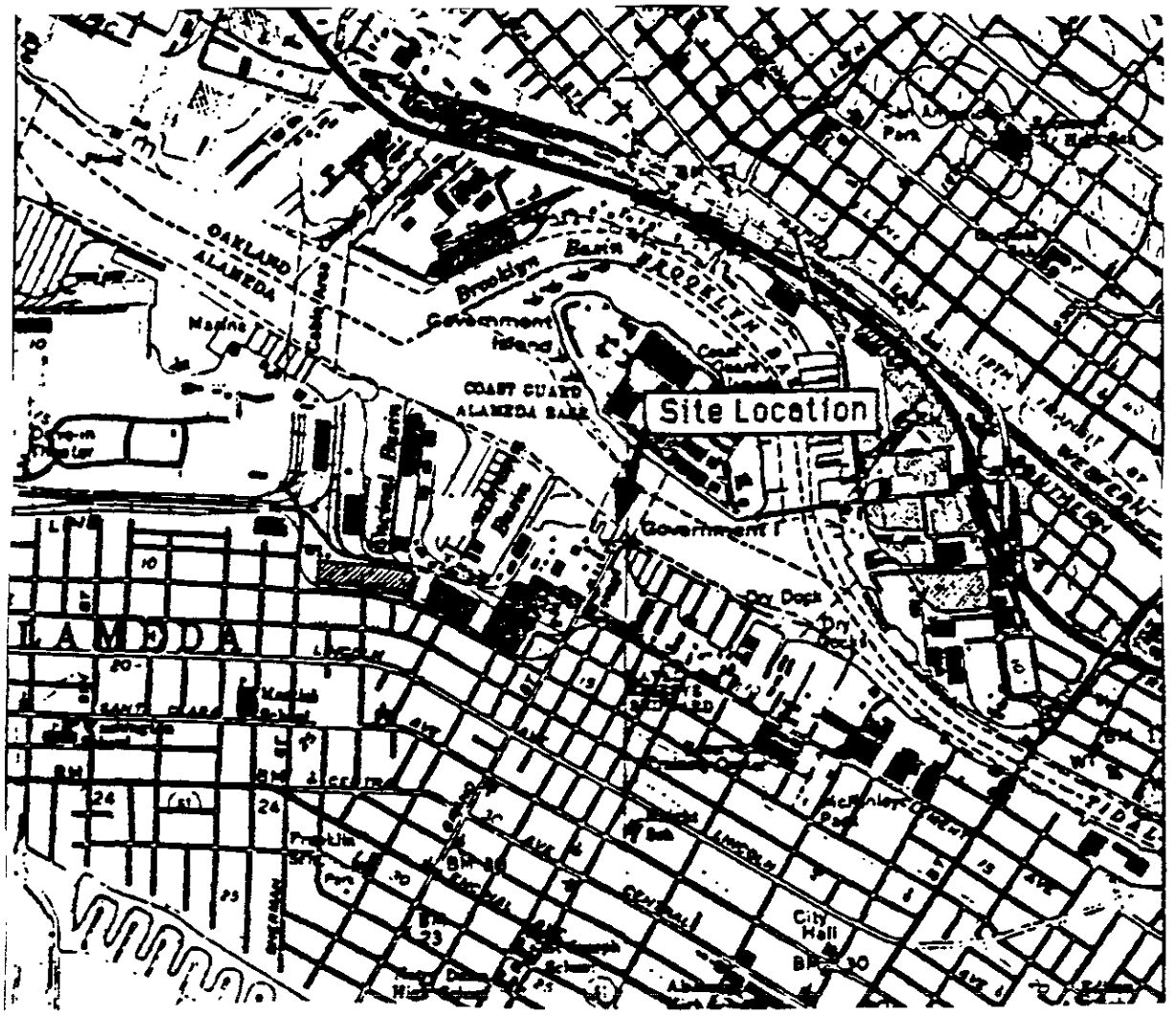
Upon completion of the above work plan a report will be developed documenting a description of task performed including but not limited to a description of methodologies used in insertion of soil borings, collection of samples, sample locations, quality assurance and quality control, monitoring well construction, soil boring logs and sample analytical results.

APPENDIX B

MAPS

Figure 1. Site Location Map

Figure 2. Areas Of Concern
Location Map



GRAND MARINA

NORTH

Figure 1. Site Location Map

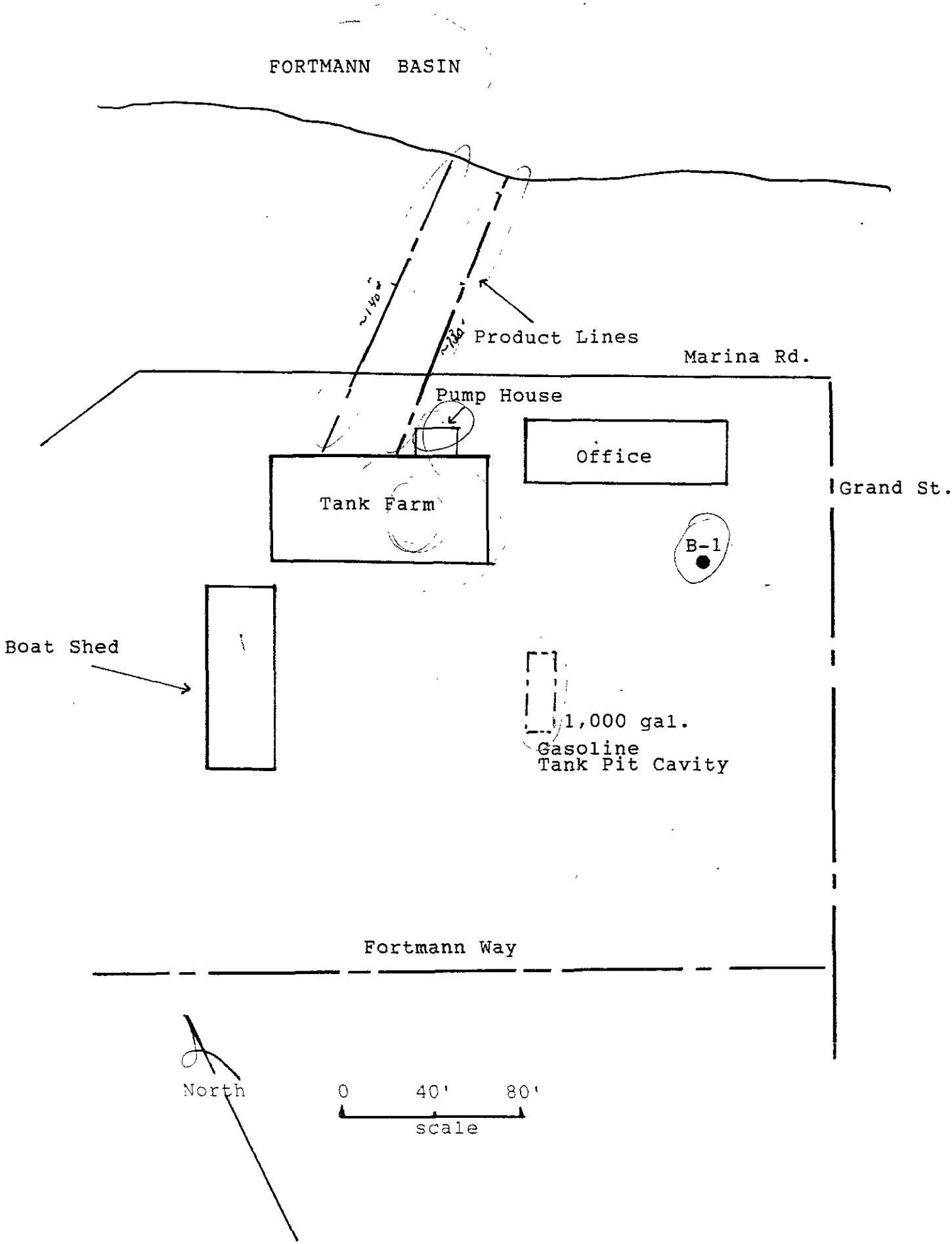
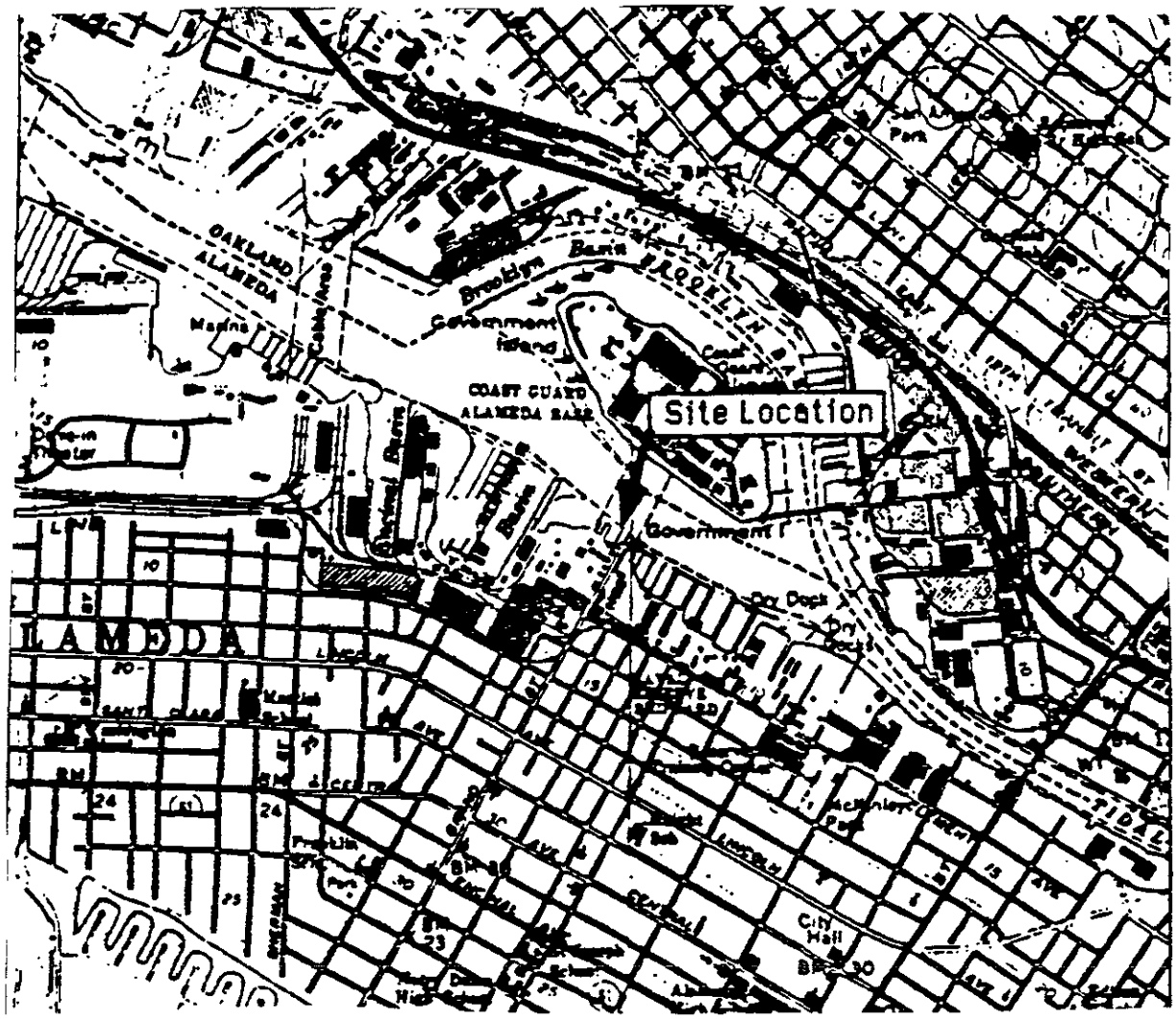


Figure 2. Areas of Concern Location Map

APPENDIX C

SAMPLING LOCATIONS



GRAND MARINA

NORTH

Figure 1. Site Location Map

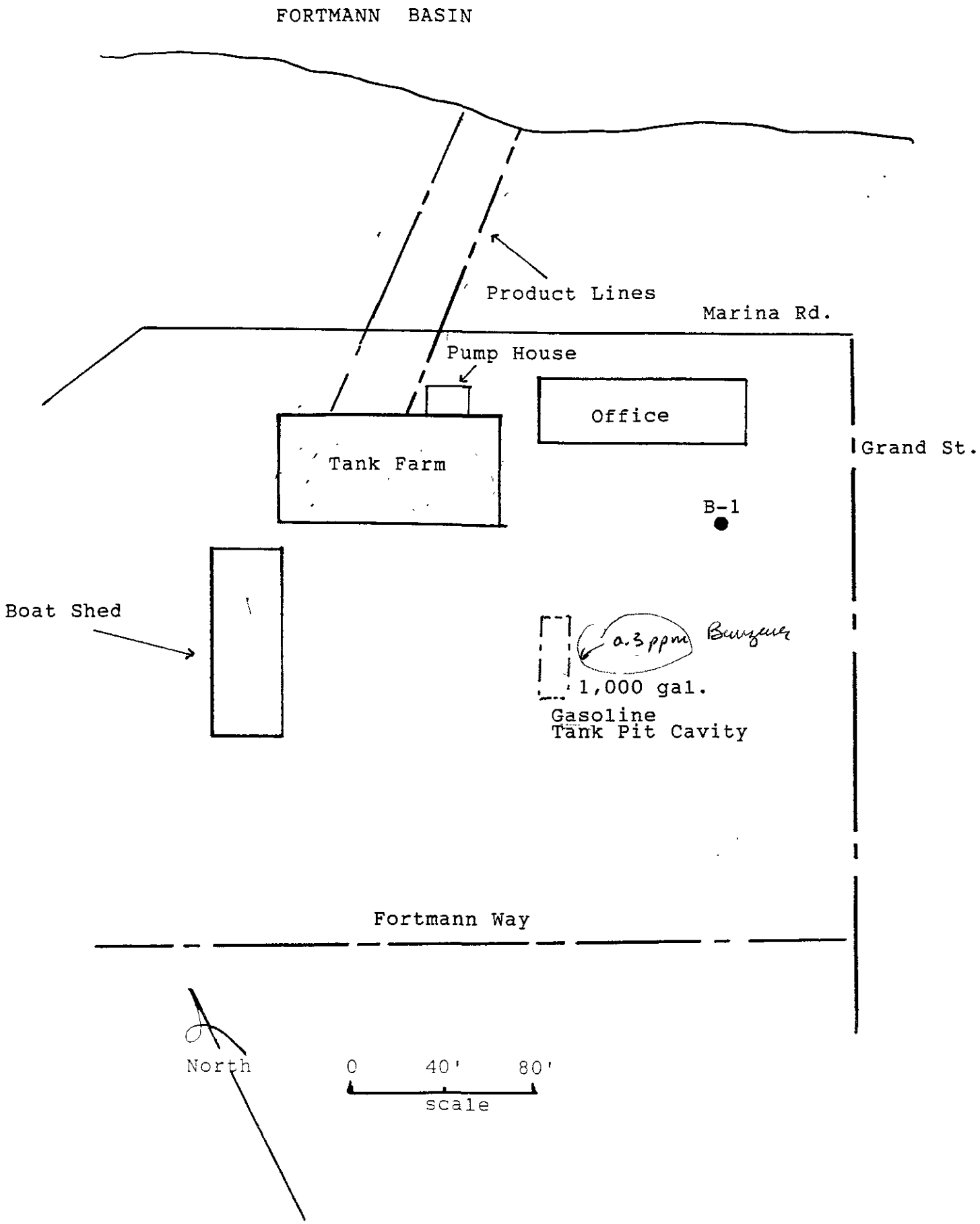


Figure 2. Areas of Concern Location Map

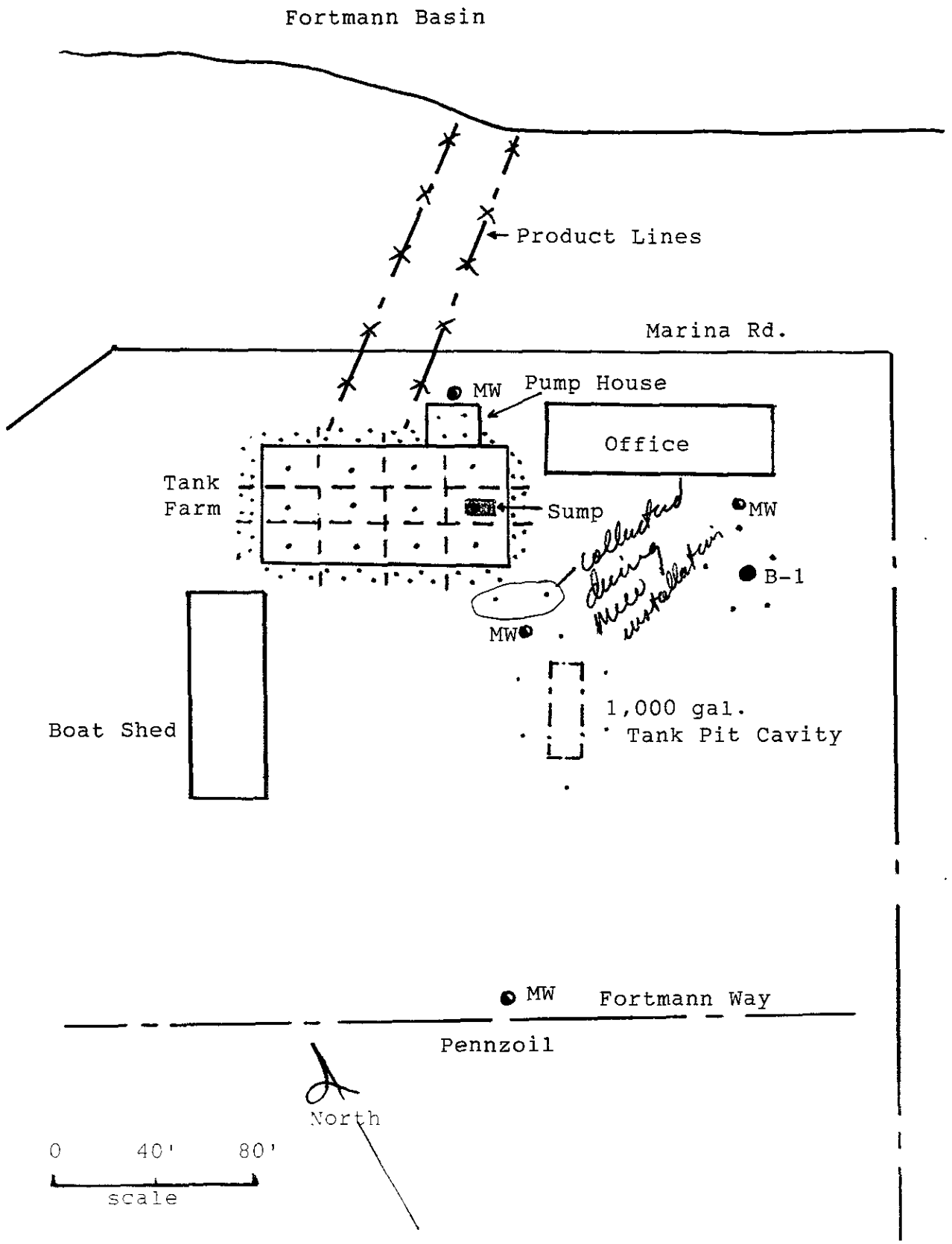


Figure 3. Sample Location Map

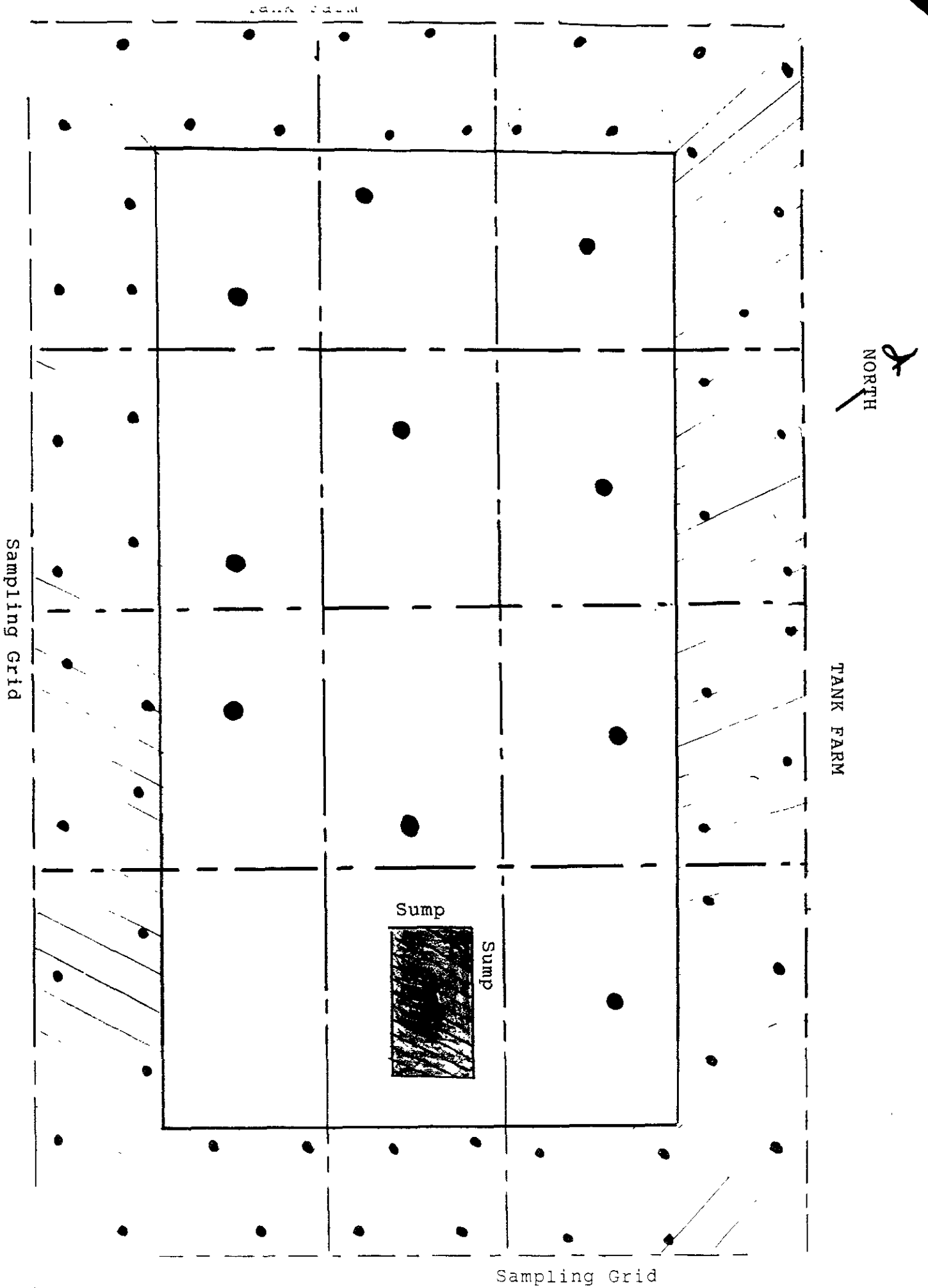


Figure 4. Tank Farm & Sump Sample Map

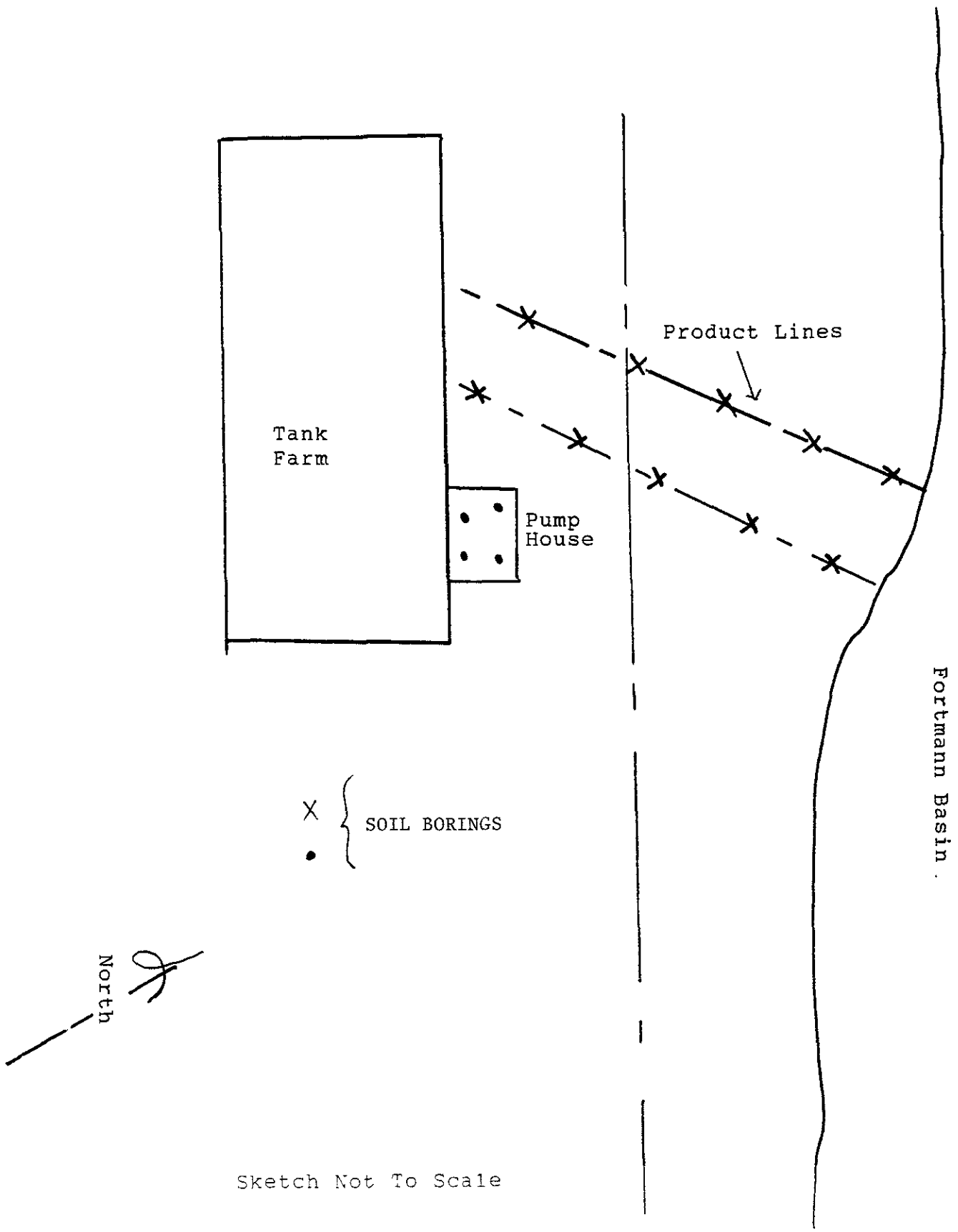


Figure 5. Product Line & Pump House Sample Location Map

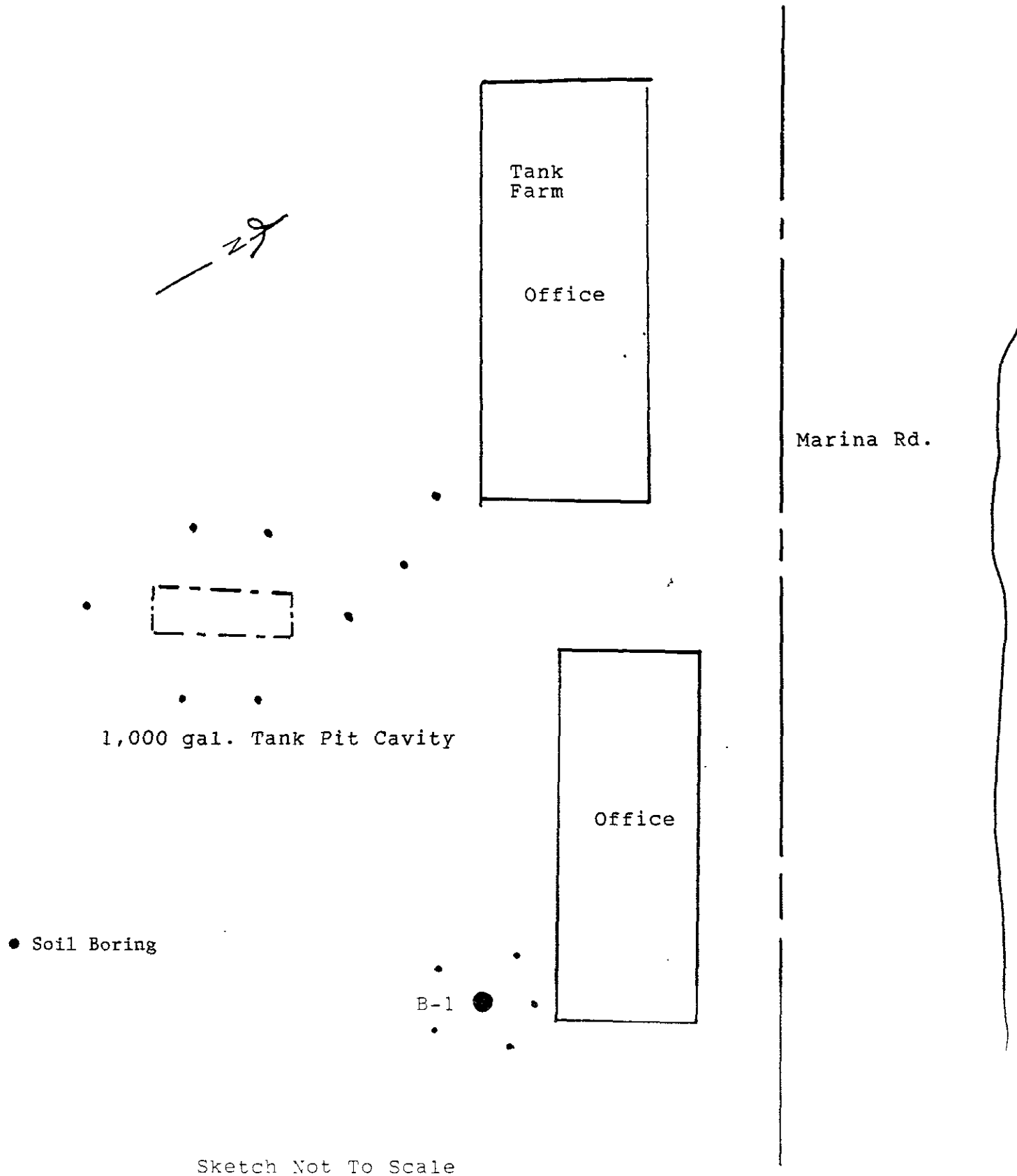


Figure 6. B-1 and 1,000 gal. Tank Pit Sample LOcation Map

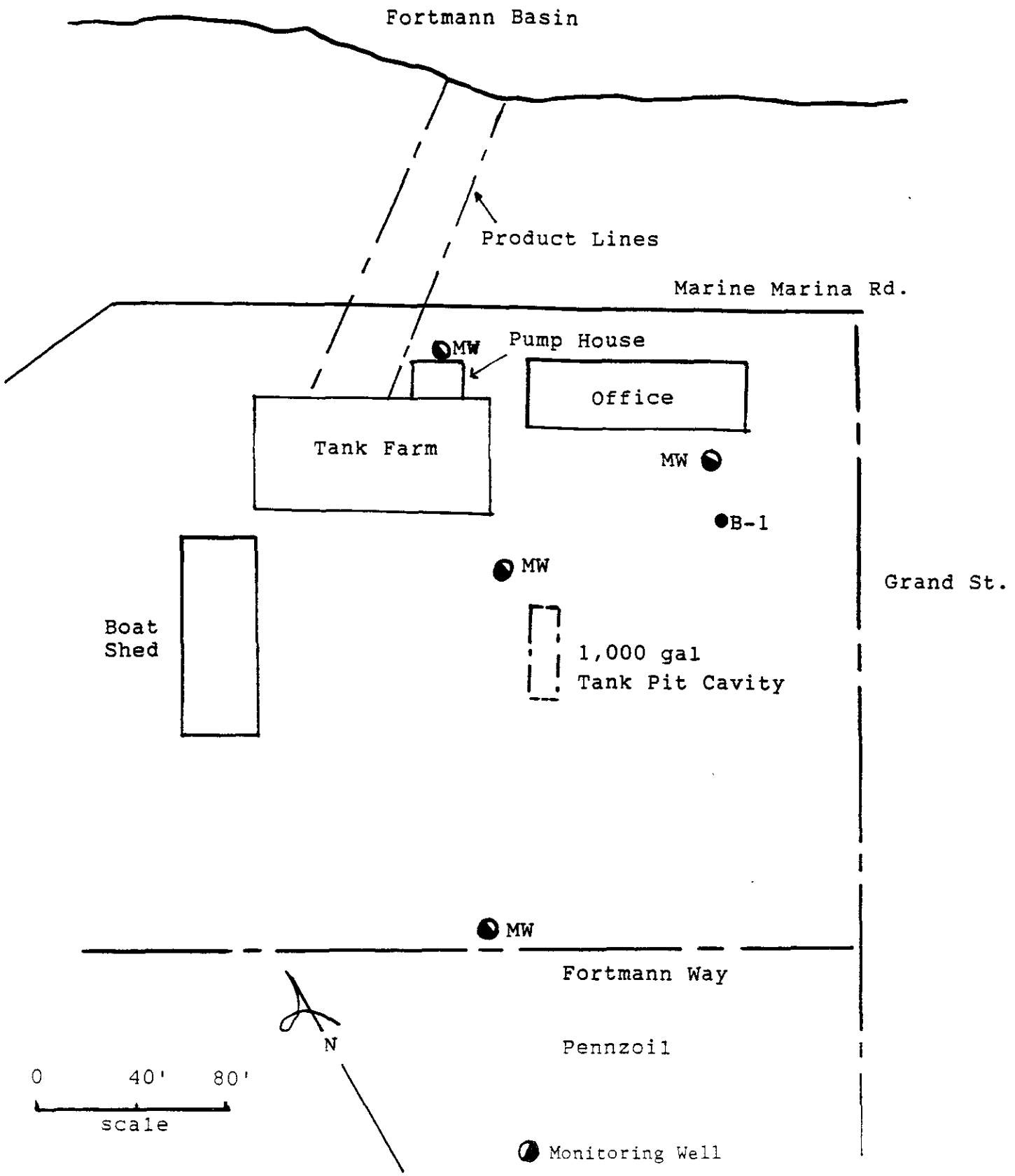


Figure 7. Monitoring Well Location Map

APPENDIX D
HARDING LAWSON ASSOCIATES REPORTS

REPORT 1. Petroleum Hydrocarbons
In Soil & Groundwater

REPORT 2. Environmental Assessment

July 17, 1987

APPENDIX D
HARDING LAWSON ASSOCIATES
PETROLEUM HYDROCARBONS IN SOIL & GROUNDWATER
FUEL STORAGE AREA
July 17, 1987

A Report Prepared for

Encinal Marina, Inc.
Foot of Grand Street
Alameda, California 94501

PETROLEUM HYDROCARBONS IN SOILS AND GROUND WATER FUEL STORAGE AREA ENCINAL MARINA ALAMEDA, CALIFORNIA

HT&B LEASED PROPERTY

HLA Job No. 18247,001.02

by

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July 17, 1987

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ENCINAL MARINA
ALAMEDA, CALIFORNIA
July 17, 1987

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INTRODUCTION

This report describes Harding Lawson Associates' (HLA) investigation of the distribution of petroleum hydrocarbons in soil and ground water at the fuel storage facility leased by Harbor Tug and Barge Company, (a wholly owned subsidiary of Crowley Maritime, Inc.) at the foot of Grand Street, Alameda, California. The facility is owned by Encinal Marina, Inc., and is located within the area that will be developed for the proposed Encinal Marina (Plate 1).

The fuel storage facility consists of eight aboveground tanks located within a concrete wall containment structure, two pump houses, and an underground pipeline leading from the tanks to the pier where vessels are fueled. Six tanks are used for the storage of diesel fuel and one for lube oil: three of the tanks are approximately 22 feet in diameter and 25 feet high, and four are approximately 10 feet in diameter and 27 feet high. The eighth tank is used to store slop oil and bilge water from vessels. The containment wall is approximately 6 inches thick and 11 feet tall. The tanks were constructed by the Union Oil Company in 1938. It appears that the tanks were originally constructed on individual concrete pads, with the containment wall and interior asphalt paving added at a later date.

Because soil discoloration indicative of fuel spillage was observed on the soil on the north side of the tank area, Crowley Environmental Services (CES) (a division of Crowley Maritime, Inc.) installed five shallow ground-water monitoring wells on April 2, 1987, at the locations shown on Plate 2. Total Petroleum Hydrocarbon (TPH) concentrations of 12 and 13 parts per million (ppm) were measured in ground water samples from Wells 1 and 2, respectively, and a TPH

Table 2. Chemical Analysis of Ground Water
(parts per million)

Well	TPH	Benzene	Toluene	Xylenes	Ethyl Benzene	Salinity	Free Product Thickness
W-1	36	0.0066	ND(2)	0.013	ND	14,000	0.25-0.5 in.(1)
W-2	1.3	0.350	ND	0.023	0.018	12,000	Sheen
W-3	ND	0.0041	ND	ND	ND	9,900	None
W-4	ND	ND	ND	ND	ND	3,700	None
W-5	ND	ND	ND	ND	ND	13,000	Sheen
B-7	ND	ND	ND	ND	ND	10,000	None

(1)Only sheen observed after purging well.

(2)ND = Not Detected
Refer to laboratory reports for limits of detection

Observations Concerning Operating Practices

During the field investigation, we noted the following conditions, which have resulted or could result in diesel fuel or other petroleum products being spilled or discharged to the ground around the tank area.

- It was reported that during filling of the storage tanks from tank trucks, residual fuel in a truck's discharge hose is routinely allowed to spill onto the ground in front of the pump houses, when the discharge hose is disconnected.
- A small slop oil tank was observed outside the tank containment wall. It was reported that this tank overflows onto the ground in rainy weather.
- Spilled fuel was observed in the concrete ditch just outside the containment wall on the north side. This may have resulted from pipe leaks or spills while pipes were being repaired.

- A spill of what appeared to be lube oil was observed to remain on the concrete pad of the small pump house for a period of several days.

DISCUSSION OF RESULTS

Soils

Soils exhibiting TPH concentrations above 100 ppm have typically been considered "contaminated" by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB). Therefore, 100 ppm TPH has been used as an action level when evaluating the distribution of hydrocarbons the fuel tank area.

Significant soil contamination (above 100 ppm TPH) appears to be limited to the sandy soil on the northern and eastern sides of the tank area, to depths of less than 3 feet below ground surface. In the area in front of the pump houses, significant contamination appears to be limited to a depth of less than 1.5 feet, as evidenced by the concentration of 11 ppm TPH at that depth in Boring B-3. Contamination may extend deeper at the location of Boring B-2, but the inability to recover a sample at the 1.5 foot depth did not allow us to confirm this. The absence of detectable TPH values in samples from Boring B-5 indicates that soil contamination does not extend that far to the west.

The highest TPH value obtained during the investigation, 2200 ppm, was measured at the eastern end of the tank compound in Boring B-1 in sandy soil at a depth of 1 foot. However, TPH was not detected in the dark gray clay at 2-1/2 feet.

The extent of contaminated soil to the north is indicated by Boring B-4, which contained no detectable TPH in any sample. Contaminated soil was also not

observed in Boring B-7, south of the tank enclosure. Although 53 ppm TPH was detected at 1.5 feet in Boring B-6, this is below the action level of 100 ppm.

Ground Water

Fuel constituents are present in ground water on the northern side of the tank area. Benzene was present in Wells W-1, W-2, and W-3, while xylenes were present in W-1 and W-2, and ethylbenzene in W-2. Only benzene was present at levels that exceed action levels for drinking water established by the U.S. Environmental Protection Agency or the California Department of Health Services.

Free product was encountered floating on ground water in Well W-1. The absence of measurable free product in Wells W-2 and W-5 indicates that the extent of the product plume is limited to the area in front of the pump houses. Because of the high salinity levels, shallow ground water in this area would not be suitable for use as a drinking water supply, and would have only limited, if any, industrial use.

CONCLUSIONS AND RECOMMENDATIONS

Soil and ground water on the northern and eastern sides of the tank farm are contaminated with petroleum hydrocarbons, including diesel fuel. This contamination has probably resulted from surface spills of product during truck unloading operations and other leaks from pipes and containers outside the tank containment structure. Soil contamination appears to extend less than 50 feet north of the tanks and at least 60 feet to the east. Ground-water contamination is limited to an area within 50 feet east of the tanks, but the lateral limit has not been defined in the northern direction.

We recommend that soils on the northern and eastern sides of the tank area be excavated if they exhibit discoloration or a hydrocarbon odor. Excavation should generally be limited to the sandy soils above bay mud. Soils should be stockpiled after excavation. Soils that are highly contaminated with heavy oily material should be stockpiled separately. Stockpiles should be covered to comply with Bay Area Air Quality Management District (BAAQMD) Regulation 8-40.

An alternative option to disposal of contaminated soil at a hazardous waste site is aeration to reduce contaminant levels pursuant to the requirements of BAAQMD Regulation 8-40. However, in our experience at other sites, aeration has been only marginally effective in significantly reducing the concentrations of diesel fuel or heavier hydrocarbons. In the interest of reducing overall cost of the remedial action program, aeration could be attempted on a trial basis if the notification and quantity restrictions of Regulation 8-40 are adhered to. A test aeration program should be conducted involving approximately 5 cubic yards of soil. The soil for the test should not be selected from the heavily contaminated material described above. A composite sample should be collected and analyzed for TPH prior to the test, and the soil should be collected for odor and emission of volatile hydrocarbons. The test soil should be spread in a 1-foot-thick lift, and should be mixed on a weekly basis. Odors, emission of volatile hydrocarbons, and visual evidence of oily material should be checked weekly. If these three parame ters can be brought below the limit of detection within 3 to 4 weeks, the soil should be resampled, and disposed of in the manner indicated below. If the test is successful in reducing the hydrocarbon concentration to the point where a less expensive disposal option can be utilized, additional soils should be aerated. If

significant concentration reduction cannot be achieved, further aeration should not be attempted.

Soil should be sampled at a frequency of one composite sample per 50 cubic yards and analyzed for TPH. Soils with TPH concentrations greater than 1000 ppm should be disposed at a permitted hazardous waste facility. Soils with TPH concentrations between 100 and 1000 ppm may also require disposal at a hazardous waste facility if a suitable Class II facility in the Bay Area cannot be located. Soils with TPH concentrations below 100 ppm can be disposed at a Class III sanitary landfill.

When soils are excavated around Well W-1, the excavations should be extended below the water table, and any accumulated fuel pumped into the slop tank inside the tank enclosure. This excavation should be observed over a several day period and a large diameter recovery well installed if fuel continues to accumulate on the ground-water surface. If a recovery well is installed, accumulated fuel should be pumped into the slop tank weekly.

Removal of the source material, as described above, coupled with implementation of changes in operating procedures to prevent spills, as outlined below, should result in a reduction in the level of dissolved fuel constituents in ground water over time. We recommend that the existing wells be monitored for free product, TPH, benzene, toluene, and xylenes on quarterly basis, and that no further action be taken if levels decrease. If levels of dissolved constituents do not decrease, extraction and treatment of the ground water should be performed.

To prevent contamination from recurring, we recommend that the following steps be taken.

PLATES

Plate 1	Location Map
Plate 2	Site Plan
Plates 3 through 9	Logs of Borings B-1 through B-7
Plate 10	Well Construction Details

BROWN AND CALDWELL LABORATORIES
1255 POWELL STREET EMERYVILLE, CA 94608 • (415) 420-2300

ANALYTICAL REPORT

RECEIVED
APR 17 1987
RUSS JOHNSON

LOG NO: E87-04-051

Received: 03 APR 87
Reported: 16 APR 87

Mr. Luther Blevins
Crowley Environmental Services
321 Embarcadero
Oakland, CA 94606

REPORT OF ANALYTICAL RESULTS

LAB NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
04-051-1	Well #1	02 APR 87
04-051-2	Well #2	02 APR 87
04-051-3	Well #3	02 APR 87
04-051-4	Well #4	02 APR 87
04-051-5	Well #5	02 APR 87

PARAMETER	04-051-1	04-051-2	04-051-3	04-051-4	04-051-5
Total Fuel Hydrocarbons, mg/L	12	13	<1	<1	<1

BROWN AND CALDWELL LABORATORIES
1255 POWELL STREET EMERYVILLE, CA 94608 • (415) 428-2300

ANALYTICAL REPOR

LOG NO: E87-04-051

Received: 03 APR 87
Reported: 16 APR 87

Mr. Luther Blevins
Crowley Environmental Services
321 Embarcadero
Oakland, CA 94606

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLE
04-051-6	Soil Composite from Wells #1 thru #5	02 APR 8

PARAMETER	04-051-6
Total Fuel Hydrocarbons, mg/kg	3800

D. A. McLean, Laboratory Director

UNDERGROUND STORAGE TANK UNAUTHORIZED RELEASE (LEAK)/CONTAMINATION SITE REPORT

ERGENCY YES ☐ NO | HAS STATE OFFICE OF EMERGENCY SERVICES REPORT BEEN FILED? ☐ YES ☐ NO | STATE TANK ID #

ORT DATE M M D D Y Y | LOCAL CASE # | REGIONAL BOARD CASE # | US EPA ID #

NAME OF INDIVIDUAL FILING REPORT | PHONE ( ) | SIGNATURE

REPRESENTING ☐ LOCAL AGENCY ☐ OTHER ☐ OWNER/OPERATOR ☐ REGIONAL BOARD | COMPANY OR AGENCY NAME

ADDRESS STREET | CITY | STATE | ZIP

NAME ☐ UNKNOWN | CONTACT PERSON | PHONE ( )

ADDRESS STREET | CITY | STATE | ZIP

FACILITY NAME (IF APPLICABLE) | OPERATOR | PHONE ( )

ADDRESS STREET | CITY | COUNTY | ZIP

CROSS STREET | TYPE OF AREA ☐ COMMERCIAL ☐ INDUSTRIAL ☐ RESIDENTIAL ☐ RURAL ☐ OTHER | TYPE OF BUSINESS ☐ RETAIL FUEL STATION ☐ UNKNOWN ☐ OTHER

LOCAL AGENCY | AGENCY NAME | CONTACT PERSON | PHONE ( )

REGIONAL BOARD | ( )

TSCD | ( )

CAS # (ATTACH EXTRA SHEET IF NEEDED) | NAME | QUANTITY LOST (GALLONS)

(1) ☐ UNKNOWN

(2) ☐ UNKNOWN

DATE DISCOVERED M M D D Y Y | HOW DISCOVERED ☐ INVENTORY CONTROL ☐ SUBSURFACE MONITORING ☐ ROUTINE MONITORING ☐ TANK REMOVAL ☐ NUISANCE CONDITIONS ☐ OTHER:

DATE DISCHARGE BEGAN M M D D Y Y ☐ UNKNOWN

HAS DISCHARGE BEEN STOPPED? ☐ YES ☐ NO IF YES, DATE M M D D Y Y

METHOD USED TO STOP DISCHARGE (CHECK ALL THAT APPLY)
☐ REMOVE CONTENTS ☐ REPLACE TANK ☐ CLOSE TANK ☐ REPAIR TANK ☐ REPAIR PIPING ☐ CHANGE PROCEDURES ☐ OTHER

SOURCE(S) OF DISCHARGE
☐ TANK LEAK ☐ UNKNOWN ☐ PIPING LEAK ☐ OTHER (SPECIFY)

TANKS ONLY/CAPACITY GAL
AGE YRS. ☐ UNKNOWN
MATERIAL ☐ STEEL ☐ FIBERGLASS ☐ OTHER

CAUSE(S)
☐ OVERFILL ☐ CORROSION ☐ RUPTURE/FAILURE ☐ SPILL ☐ UNKNOWN ☐ OTHER

RESOURCES AFFECTED	YES	NO	THREATENED	UNKNOWN
AIR (VAPOR)	☐	☐	☐	☐
SOIL (VADOSE ZONE)	☐	☐	☐	☐
GROUNDWATER	☐	☐	☐	☐
SURFACE WATER OR STORM DRAIN	☐	☐	☐	☐
BUILDING OR UTILITY VAULT	☐	☐	☐	☐
OTHER (SPECIFY)	☐	☐	☐	☐

GROUNDWATER BASIN NAME ☐ UNKNOWN

WATER SUPPLIES AFFECTED	YES	NO	THREATENED	UNKNOWN	# OF WELLS
PUBLIC DRINKING WATER	☐	☐	☐	☐	
PRIVATE DRINKING WATER	☐	☐	☐	☐	
INDUSTRIAL	☐	☐	☐	☐	
AGRICULTURAL	☐	☐	☐	☐	
OTHER (SPECIFY)	☐	☐	☐	☐	

COMMENTS:

COMPLETE AND ATTACH A CLEANUP TRACKING REPORT IF ANY CLEANUP WORK OR PLANNING HAS STARTED

BROWN AND CALDWELL LABORATORIES
1255 POWELL STREET EMERYVILLE, CA 94608 • (415) 428-2300

ANALYTICAL REPORT

LOG NO: E87-06-291

Received: 12 JUN 87
Reported: 16 JUN 87

Mr. John Blasco
Crowley Environmental Services
321 Embarcadero
Oakland, CA 94606

Project: 18247,001.02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
06-291-21	8706615	11 JUN 87
06-291-22	8706710	11 JUN 87
06-291-23	87067100	11 JUN 87

PARAMETER	06-291-21	06-291-22	06-291-23
Total Fuel Hydrocarbons, mg/kg	53	<10	<10

Daniel Mew for
J. A. McLean, Laboratory Director

BROWN AND CALDWELL LABORATORIES
1255 POWELL STREET EMERYVILLE, CA 94608 • (415) 428-2300

ANALYTICAL REPORT

LOG NO: E87-06-291

Received: 12 JUN 87
Reported: 16 JUN 87

Mr. John Blasco
Crowley Environmental Services
321 Embarcadero
Oakland, CA 94606

Project: 18247,001.02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
06-291-16	8706855	11 JUN 87
06-291-17	8706110	11 JUN 87
06-291-18	8706315	11 JUN 87
06-291-19	8706410	11 JUN 87
06-291-20	8706520	11 JUN 87

PARAMETER	06-291-16	06-291-17	06-291-18	06-291-19	06-291-20
Total Fuel Hydrocarbons, mg/kg	<10	2300	11	<10	<10

BROWN AND CALDWELL LABORATORIES
1256 POWELL STREET EMERYVILLE, CA 94608 • (415) 428-2300

ANALYTICAL REPORT

LOG NO: E87-06-291

Received: 12 JUN 87
Reported: 16 JUN 87

Mr. John Blasco
Crowley Environmental Services
321 Embarcadero
Oakland, CA 94606

Project: 18247,001.02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
06-291-11	8706635	11 JUN 87
06-291-12	8706655	11 JUN 87
06-291-13	8706735	11 JUN 87
06-291-14	8706750	11 JUN 87
06-291-15	8706830	11 JUN 87

PARAMETER	06-291-11	06-291-12	06-291-13	06-291-14	06-291-15
Total Fuel Hydrocarbons, mg/kg	<10	<10	<10	<10	<10

BROWN AND CALDWELL LABORATORIES
1255 POWELL STREET EMERYVILLE, CA 94608 • (415) 428-2300

ANALYTICAL REPORT

LOG NO: - E87-06-291

Received: 12 JUN 87
Reported: 16 JUN 87

Mr. John Blasco
Crowley Environmental Services
321 Embarcadero
Oakland, CA 94606

Project: 18247,001.02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
06-291-6	8706355	11 JUN 87
06-291-7	8706435	11 JUN 87
06-291-8	8706455	11 JUN 87
06-291-9	8706535	11 JUN 87
06-291-10	8706555	11 JUN 87

RAMETER	06-291-6	06-291-7	06-291-8	06-291-9	06-291-10
Total Fuel Hydrocarbons, mg/kg	<10	<10	<10	<10	<10

BROWN AND CALDWELL LABORATORIES
1255 POWELL STREET EMERYVILLE, CA 94608 • (415) 428-2300

ANALYTICAL REPORT

LOG NO: E87-06-302

Received: 12 JUN 87
Reported: 16 JUN 87

HARDING LAWSON ASSOC.
JUL 20 1987

Mr. John Blasco
Crowley Environmental Services
321 Embarcadero
Oakland, CA 94606

Project: 18247,001.02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, WATER SAMPLES	DATE SAMPLED
-302-1	M-1	12 JUN 87
06-302-2	M-2	12 JUN 87
-302-3	M-3	12 JUN 87
-302-4	M-4	12 JUN 87
06-302-5	M-5	12 JUN 87

RAMETER	M-1 06-302-1	M-2 06-302-2	M-3 06-302-3	M-4 06-302-4	M-5 06-302-5
Salinity, ppt	14	12	9.9	3.7	13
tal Fuel Hydrocarbons, mg/L	36	1.3	<1.0	<1.0	<1.0
A Method 602					
Date Extracted	06.15.87	06.15.87	06.15.87	06.15.87	06.15.87
,2-Dichlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
,3-Dichlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
,4-Dichlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene, ug/L	6.6	350	4.1	<0.5	<0.5
hlorobenzene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
thylbenzene, ug/L	<0.5	18	<0.5	<0.5	<0.5
Toluene, ug/L	<0.5	<0.5	<0.5	<0.5	<0.5
dditional Compounds:					
Total Xylene, ug/L	13	23	<0.5	<0.5	<0.5

BROWN AND CALDWELL LABORATORIES
1256 POWELL STREET EMERYVILLE CA 94608 • (415) 428-2300

ANALYTICAL REPORT

LOG NO: E87-06-302

Received: 12 JUN 87
Reported: 16 JUN 87

Mr. John Blasco
Crowley Environmental Services
321 Embarcadero
Oakland, CA 94606

Project: 18247,001.02

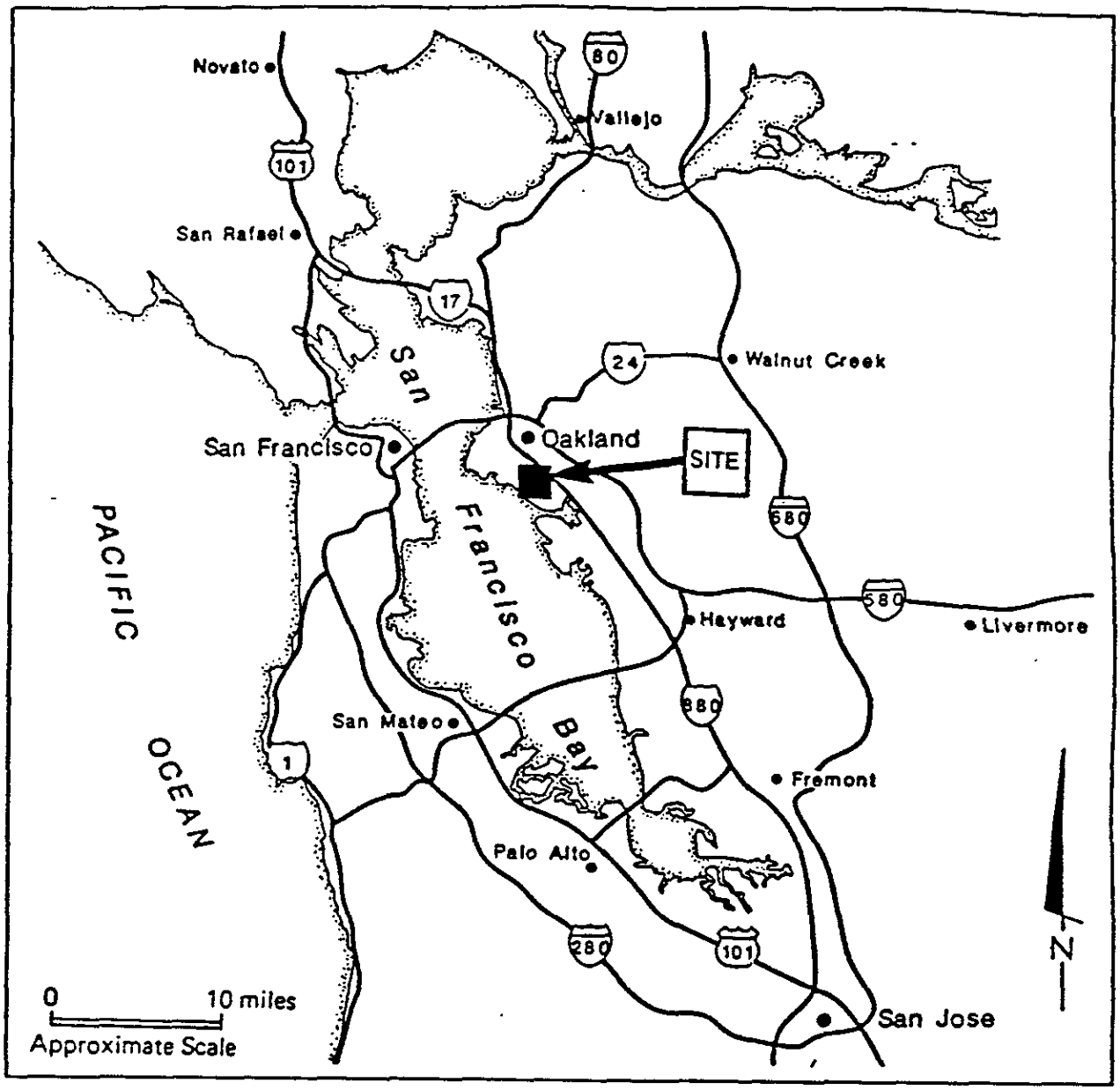
REPORT OF ANALYTICAL RESULTS

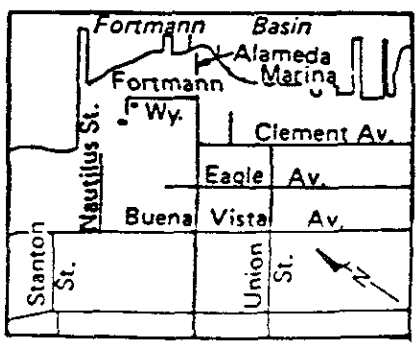
LOG NO	SAMPLE DESCRIPTION, WATER SAMPLES	DATE SAMPLED
06-302-6	B-7	12 JUN 87
06-302-7	B-1	12 JUN 87

PARAMETER	06-302-6	06-302-7
Salinity, ppt	10	<3.6
Total Fuel Hydrocarbons, mg/L	<1.0	<1.0
EPA Method 602		
Date Extracted	06.15.87	06.15.87
1,2-Dichlorobenzene, ug/L	<0.5	<0.5
1,3-Dichlorobenzene, ug/L	<0.5	<0.5
1,4-Dichlorobenzene, ug/L	<0.5	<0.5
Benzene, ug/L	<0.5	<0.5
Chlorobenzene, ug/L	<0.5	<0.5
Ethylbenzene, ug/L	<0.5	<0.5
Toluene, ug/L	<0.5	<0.5
Additional Compounds:		
Total Xylene, ug/L	<0.5	<0.5

Daniel Mew for
D. A. McLean, Laboratory Director

105649





Harding Lawson Associates
Engineers and Geoscientists

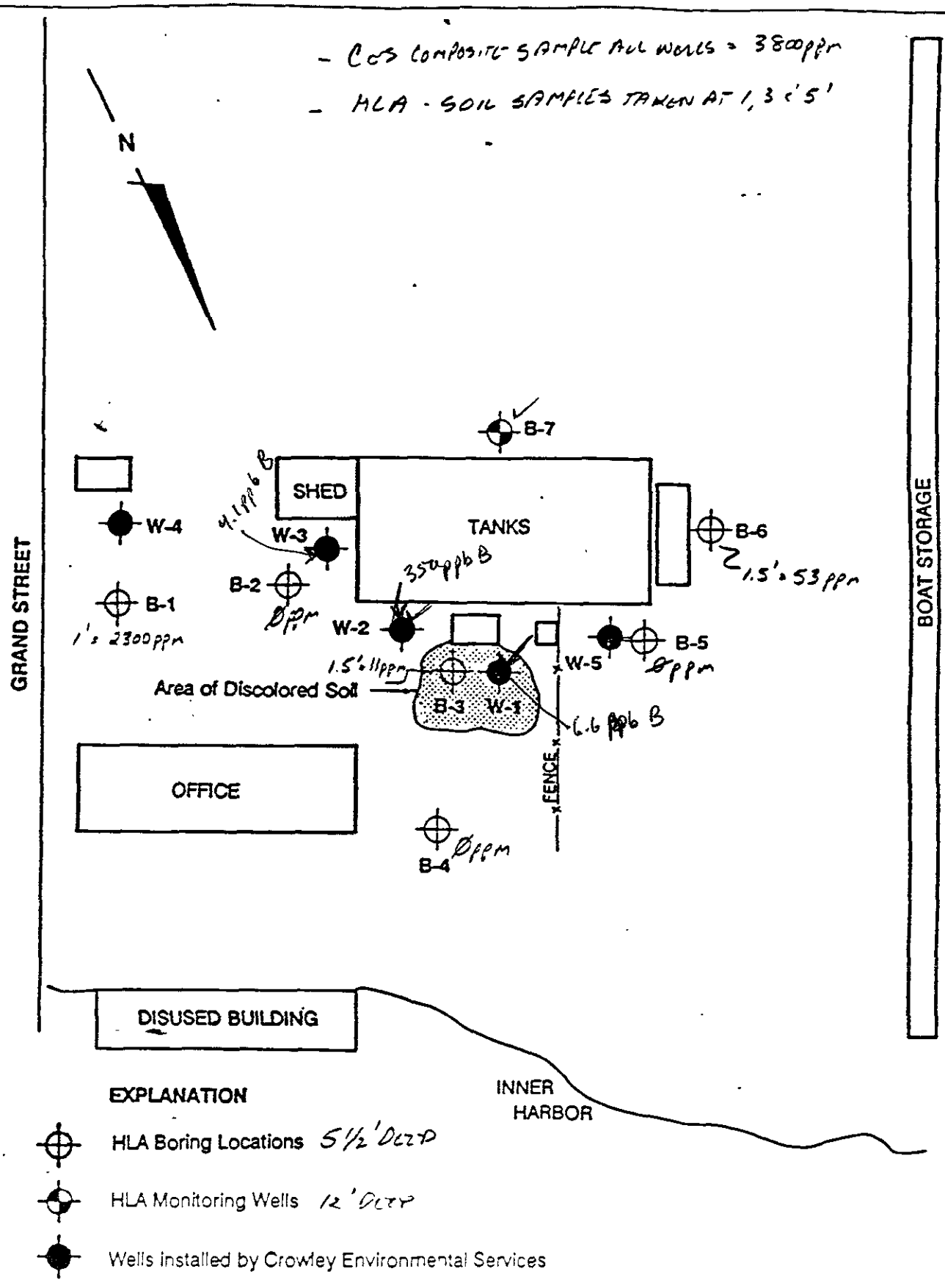
Location Map
Environmental Assessment
Proposed Encinal Marina
Alameda, California

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DM	18,247,001.02	J. Blasco	6/87		

105648

TPH = TOTAL PETROLEUM HYDROCARBONS

- COS COMPOSITE SAMPLE ALL WELLS = 3800ppm
- HLA - SOIL SAMPLES TAKEN AT 1, 3 & 5'



Harding Lawson Associates
Engineers and Geoscientists

Sampling Locations
Fuel Storage Area
Encinal Marina
Alameda, California

PLATE 2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DM	18,247,001.02	J. Blasco	6/87		

Equipment CME 55

Elevation N/A Date 6/11/87

Laboratory Tests	Blows/6 in.	Inches driven	Inches recovered	Depth (ft)	Sample
	1	6	0	0	
	2	6	0		
	1	6	0		
	1	6	6		
	1	6	6		
	1	6	6		
	1	6	6	5	
	1	6	6		
	1	6	6		

CONCRETE RUBBLE AND GRAVEL (fill)

BLACK SAND (SP) (5YR 2.5/1) loose, wet, hydrocarbon odor (fill)

DARK GRAY FAT CLAY (CH) (5YR 3/1) stiff, wet, slight hydrocarbon odor (bay mud)

DARK GRAY PLASTIC SILT (MH) (5YR 3/1) soft, wet, strong hydrocarbon odor

bottom of hole at 6.5 ft (bay mud)

10
15
20
25
30
35
40

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring B-1
Encinal Marina
Alameda, California

PLATE 3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DM	18,247,001.02	J. Blaes	6/87		

Equipment CME 55

Elevation N/A Date 6/11/87

Laboratory Tests	Blows/6 in	Inches driven	Inches recovered	Depth (ft)	Sample
	3	6	0	0	
	3	6	0		
	3	6	0		
	1	6	0		
	2	6	6		
	5	6	6	5	
	1	6	6		
	2	6	6		
	2	6	6		

CONCRETE RUBBLE AND GRAVEL (fill)

BLACK SAND WITH SILT (SP) (2.5YR N2/0) loose, dry (fill)

DARK GRAY FAT CLAY (CH) (5YR 3/1) stiff, wet, strong hydrocarbon odor (bay mud)

BLACK PLASTIC SILT (MH) soft, wet, hydrocarbon odor bottom of hole at 6.5 ft (bay mud)

10 15 20 25 30 35 40

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring B-2
Encinal Marina
Alameda, California

PLATE 4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DM	18,247,001.02	J. Blasco	6/87		

Equipment CME 55

Elevation N/A Date 6/11/87

Laboratory Tests	Blows/6 in	Inches driven	Inches recovered	Depth (ft)	Sample
	5	6	1	0	
	6	6	3		
	8	6	1		
	1	6	5		
	1	6	6		
	1	6	6		
	1	6	1	5	
	2	6	6		
	1	6	6		

CONCRETE RUBBLE AND GRAVEL (fill)

VERY DARK GRAY CLAYEY SAND WITH FINE GRAVEL (SC) (5YR 3/1) loose, wet, strong hydrocarbon odor (fill)

DARK OLIVE-GRAY SILTY SAND (SM) (5YR 3/1) loose, wet, strong hydrocarbon odor (fill)

DARK OLIVE-GRAY PLASTIC SILT (MH) (5YR 3/2) soft, wet, hydrocarbon odor

bottom of hole at 6.5 ft (bay mud)

10 15 20 25 30 35 40

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring B-3
Encinal Marina
Alameda, California

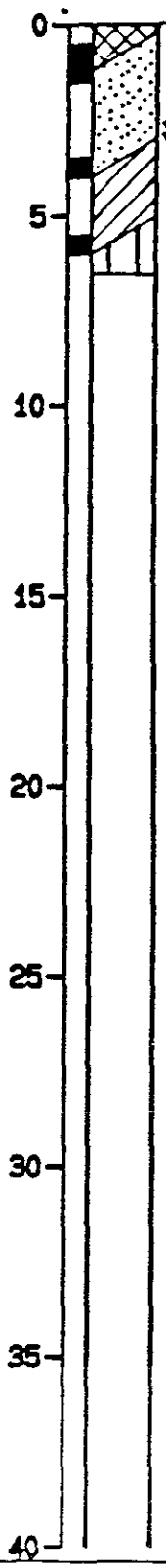
PLATE 5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DM	18,247,001.02	J. Blanco	6/87		

Equipment CME 55

Elevation N/A Date 6/11/87

Laboratory Tests	Blows/6 in	Inches driven	Inches recovered	Depth (ft)	Sample
	4	6	6	0	
	7	6	6		
	8	6	6		
	1	6	6		
	3	6	6		
	1	6	6		
	1	6	6	5	
	1	6	6		
	1	6	6		



CONCRETE RUBBLE AND GRAVEL (fill)

OLIVE-GRAY SAND (SP) (5YR 4/2) loose, wet, strong hydrocarbon odor (fill)

VERY DARK GRAY SILTY CLAY (CL) (5YR 3/1) soft, wet, hydrocarbon odor (bay mud)

VERY DARK GRAY PLASTIC SILT (MH) (5YR 3/1) soft, wet, slight odor

bottom of hole at 6.5 ft (bay mud)

10 15 20 25 30 35 40

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring B-4
Encinal Marina
Alameda, California

PLATE 6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DM	18,247,001.02	J. Blasco	6/87		

Equipment CME 55

Elevation N/A Date 6/11/8

Laboratory Tests	Blows/6 in	Inches driven	Inches recovered	Depth (ft)	Sample
	4	6	5	0	
	9	6	4		
	7	6	6		
	1	6	6		
	2	6	6		
	1	6	6		
	2	6	6		
	2	6	6	5	
	3	6	6		

CONCRETE RUBBLE AND GRAVEL (fill)

DARK GRAY-BROWN CLAYEY SAND (SC) (2.5YR 4/2) loose, wet, slight hydrocarbon odor (fill)

DARK GRAY FAT CLAY (CH) (5YR 4/1) stiff, wet, slight hydrocarbon odor

bottom of hole at 6.5 ft (bay mud)

10 15 20 25 30 35 40

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring B-5
Encinal Marina
Alameda, California

PLA

7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DM	18,247,001.02	J. Blasco	6/87		

Equipment CME 55

Elevation N/A Date 6/11/87

Laboratory Tests	Blows/6 in	Inches driven	Inches recovered	Depth (ft)	Sample
	7	6	2	0	
	7	6	6		
	6	6	6		
	1	6	6		
	1	6	6		
	1	6	3		
	2	6	6		
	3	6	6		
	4	6	6		

CONCRETE RUBBLE AND GRAVEL (fill)

VERY DARK GRAY-BROWN SILTY SAND WITH GRAVEL (SM) (2.5YR 3/2) medium stiff, wet, no odor (fill)

DARK OLIVE-GRAY SANDY SILT (MH) (5YR 3/2) soft, wet, faint hydrocarbon odor (bay mud)

VERY DARK GRAY FAT CLAY (CH) (5YR 3/1) stiff, wet, no apparent odor (bay mud)

bottom of hole at 6.5 ft

0
5
10
15
20
25
30
35
40

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring B-6
Encinal Marina
Alameda, California

PLATE 8

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DM	18,247,001.02	J. Blasco	6/87		

Equipment CME 55

Elevation N/A Date 6/11/87

Laboratory Tests	Blows/6 in	Inches driven	Inches recovered	Depth (ft)	Sample
	7	6	3	0	
	7	6	3		
	9	6	6		
	1	6	6		
	2	6	6		
	3	6	6		
	1	6	6		
	2	6	6	5	
	2	6	6		
	1	6	6		
	1	6	6		
	1	6	6	10	
				15	
				20	
				25	
				30	
				35	
				40	

DARK YELLOW-BROWN SILTY SAND WITH GRAVEL (SM) (10YR 4/4) dry, stiff, no odor (fill)

VERY DARK GRAY-BROWN CLAYEY SAND WITH SILT (SC) (2.5YR 3/2) loose, wet to saturated, no odor (fill)

VERY DARK GRAY FAT CLAY (CH) (2.5YR N3/0) soft, wet, hydrocarbon odor (bay mud)

DARK OLIVE-GRAY PLASTIC SILT (MH) (5YR 3/2) soft, saturated, strong sulfide odor bottom of hole at 12 ft (bay mud)

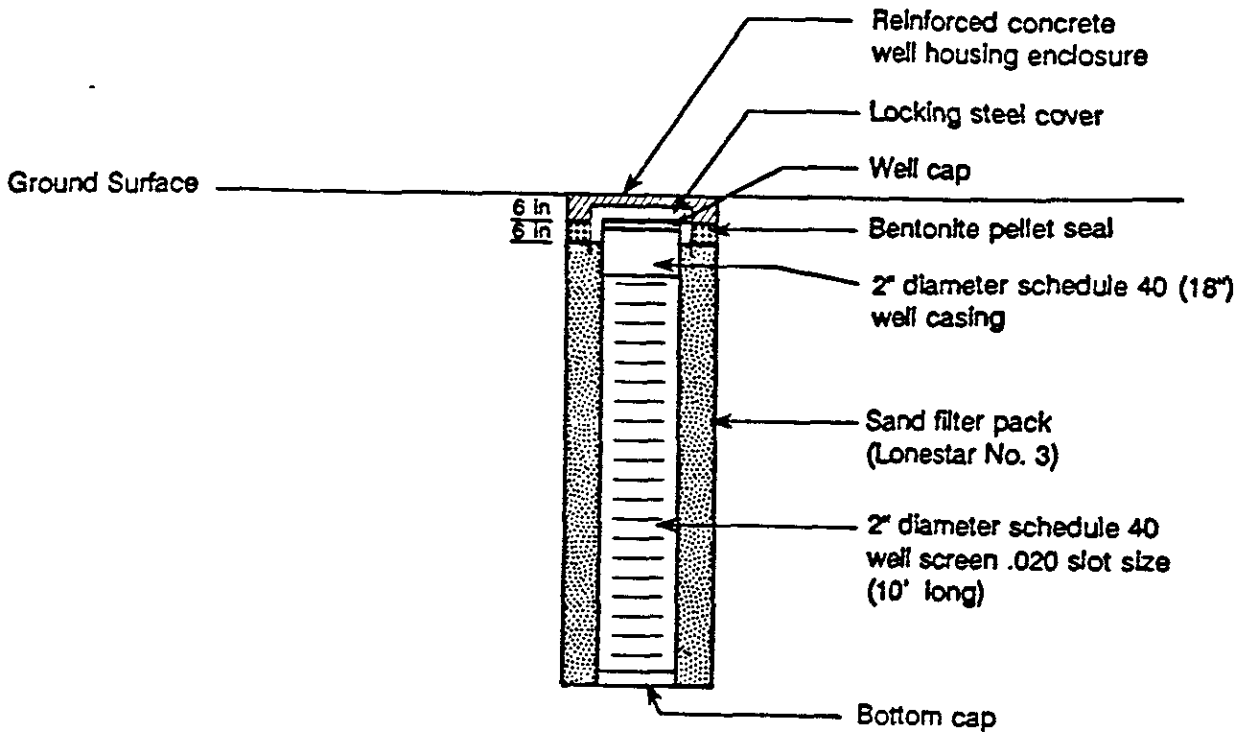
Harding Lawson Associates
Engineers and Geoscientists

Log of Boring B-7
Encinal Marina
Alameda, California

PLATE 9

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DM	18,247,001.02	J. Blasco	6/87		

105649



Harding Lawson Associates
Engineers and Geoscientists

Well Construction Details for Boring B-7
Encinal Marina
Alameda, California

PLATE
10

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DM	18,247,001.02	J. Blood	6/87		

DISTRIBUTION
PETROLEUM HYDROCARBONS IN
SOILS AND GROUND WATER
FUEL STORAGE AREA
ENCINAL MARINA
ALAMEDA, CALIFORNIA
July 17, 1987

Copy No. _____

		Copy No.
3 copies:	Encinal Marina, Inc. Foot of Grand Street Alameda, California 94501 Attention: Mr. Dean Anderson	1-3
1 copy:	QA/QC File	4
1 copy:	Bound Report File	5

JCB/CAH/clm/F0775-R

QUALITY CONTROL REVIEWER

Donald G. Gray
Civil Engineer

LABORATORY CERTIFICATE

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
290 Division Street, San Francisco, CA 94103, Phone (415) 861-1863

Laboratory No. 12905
Preliminary No.

Reported 06/19/87
Sampled
Received 06/15/87

For HARDING LAWSON ASSOCIATES

Report on 2 Water Samples

Mark Job ID: Encinal Marina
Job Number: 18247.001.02

SEE ATTACHED RESULTS

Deborah Hammond
Laboratory Director

Curtis & Tompkins, Ltd

LAB NUMBER: 12905-1A
CLIENT: HARDING LAWSON ASSOCIATES
CLIENT ID: B7CT
CLIENT JOB #: 18,247,001.02

DATE RECEIVED: 06/15/87
DATE ANALYZED: 06/15-18/87
DATE REPORTED: 06/19/87

13 PRIORITY POLLUTANT METALS BY ATOMIC ABSORBTION IN WATER
EPA METHOD 7000 SERIES
DIGESTION METHOD EPA 3010

COMPOUND	Results mg/L	LOD mg/L
Antimony	ND	0.02
Arsenic	ND	0.02
Beryllium	ND	0.01
Cadmium	ND	0.01
Chromium	ND	0.05
Copper	ND	0.05
Lead	0.14	0.05
Nickel	ND	0.05
Selenium	ND	0.02
Silver	ND	0.05
Thallium	ND	0.1
Zinc	ND	0.05

EPA METHOD 7470

Mercury	ND	0.001

QA - QC SUMMARY

	%RPD	%SPIKE		%RPD	%SPIKE
Antimony	1	121	Lead	17	100
Arsenic	1	107	Nickel	1	99
Beryllium	1	98	Selenium	1	83
Cadmium	1	98	Silver	1	91
Chromium	1	80	Thallium	1	105
Copper	1	104	Zinc	1	103
Mercury	1	82			

ND = NONE DETECTED. mg/Kg = parts per million.

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 12905-1B
CLIENT: HARDING LAWSON ASSOCAITES
CLIENT ID: B7CT

DATE RECIEVED: 06/15/87
DATE ANALYZED: 06/15-16/87
DATE REPORTED: 06/19/87

EPA 601
Purgeable Halocarbons in Water

Compound	Result ug/L	LOD ug/L
chloromethane	ND	1
bromomethane	ND	1
vinyl chloride	ND	1
chloroethane	ND	1
methylene chloride	ND	5
trichlorofluoromethane	ND	1
1,1-dichloroethene	ND	1
1,1-dichloroethane	ND	1
trans-1,2-dichloroethene	ND	1
chloroform	ND	1
freon 113	ND	1
1,2-dichloroethane	ND	1
1,1,1-trichloroethane	ND	1
carbon tetrachloride	ND	1
bromodichloromethane	ND	1
1,2-dichloropropane	ND	1
cis-1,3-dichloropropene	ND	1
trichloroethylene	ND	1
1,1,2-trichloroethane	ND	1
trans-1,3-dichloropropene	ND	1
dibromochloromethane	ND	1
2-chloroethylvinyl ether	ND	1
bromoform	ND	1
tetrachloroethene	ND	1
1,1,2,2-tetrachloroethane	ND	1
chlorobenzene	ND	1
1,3-dichlorobenzene	ND	1
1,2-dichlorobenzene	ND	1
1,4-dichlorobenzene	ND	1

ND = None Detected. Limit of detection (LOD) in last column.

LABORATORY CERTIFICATE

Curtis & Tompkins, Ltd., Analytical Laboratories. Since 1878
290 Division Street. San Francisco. CA 94103. Phone (415) 861-1863

Laboratory No. 12916
Preliminary No.

Reported 06/19/87
Sampled
Received 06/15/87

For HARDING LAWSON ASSOCIATES

Report on 1 Water Sample

Mark Job ID: Encinal Marina
Job Number: 18247.001.02

SEE ATTACHED RESULTS

Deborah Hammond
Laboratory Director

Curtis & Tompkins, Ltd.

LAB NUMBER: 12916-1B
CLIENT: HARDING LAWSON ASSOCIATES
CLIENT ID: 87063CT
CLIENT JOB #: 18,247,001.02

DATE RECEIVED: 06/15/87
DATE ANALYZED: 06/15-18/87
DATE REPORTED: 06/19/87

13 PRIORITY POLLUTANT METALS BY ATOMIC ABSORBTION IN WATER
EPA METHOD 7000 SERIES
DIGESTION METHOD EPA 3010

COMPOUND	Results mg/L	LOD mg/L
Antimony	ND	0.02
Arsenic	ND	0.02
Beryllium	ND	0.01
Cadmium	ND	0.01
Chromium	ND	0.05
Copper	ND	0.05
Lead	ND	0.05
Nickel	ND	0.05
Selenium	ND	0.02
Silver	ND	0.05
Thallium	ND	0.1
Zinc	2.7	0.05

EPA METHOD 7470

Mercury	ND	0.001

QA - QC SUMMARY

	%RPD	%SPIKE		%RPD	%SPIKE
Antimony	1	119	Lead	1	101
Arsenic	1	87	Nickel	1	96
Beryllium	1	96	Selenium	1	105
Cadmium	1	108	Silver	1	101
Chromium	1	93	Thallium	1	101
Copper	1	102	Zinc	1	104
Mercury	1	96			

ND = NONE DETECTED. mg/Kg = parts per million.

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 12915-1A
CLIENT: HARDING LAWSON ASSOCIATES
CLIENT ID: 87053CT

DATE RECEIVED: 06/15/87
DATE ANALYZED: 06/15-18/87
DATE REPORTED: 06/19/87

EPA METHOD 624: VOLATILE ORGANICS IN WATER

COMPOUND	Result ug/L	LOD ug/L
enzene	ND	(5)
rbon tetrachloride	ND	(5)
hlorobenzene	ND	(5)
1,2-dichloroethane	ND	(5)
,1,1-trichloroethane	ND	(5)
,1-dichloroethane	ND	(5)
1,1,2-trichloroethane	ND	(5)
,1,2,2-tetrachloroethane	ND	(5)
hloroethane	ND	(10)
2-chloroethylvinyl ether	ND	(10)
hloroform	ND	(5)
,1-dichloroethene	ND	(5)
1,2-trans-dichloroethene	ND	(5)
,2-dichloropropane	ND	(5)
,3-dichloropropene	ND	(5)
thylbenzene	ND	(5)
ethylene chloride	ND	(5)
hloromethane	ND	(10)
romomethane	ND	(10)
omoform	ND	(10)
romodichloromethane	ND	(5)
luorotrichloromethane	ND	(10)
hlorodibromomethane	ND	(5)
etrachloroethene	ND	(5)
oluene	ND	(5)
ichloroethene	ND	(5)
vinyl chloride	ND	(10)

QA/QC SUMMARY

,2 Dichloroethane-d4	118%
oluene-d8:	96%
romofluorobenzene	60%

BROWN AND CALDWELL LABORATORIES
1235 POWELL STREET EMERYVILLE, CA 94608 • (415) 420-2300

ANALYTICAL REPORT

LOG NO: E87-06-333

Received: 16 JUN 87
Reported: 26 JUN 87

Mr. John Blasco
Harding Lawson and Associates
7655 Redwood Blvd.
Novato, CA 94947

Project: 18247.001.02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
06-333-1	8706001	15 JUN 87
06-333-2	8706002	15 JUN 87
06-333-3	8706003	15 JUN 87
06-333-4	8706004	15 JUN 87
06-333-5	8706005	15 JUN 87

PARAMETER	06-333-1	06-333-2	06-333-3	06-333-4	06-333-5
Beryllium, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium, mg/kg	<0.2	<0.2	<0.2	<0.2	0.5
Chromium, mg/kg	26	22	21	32	21
Copper, mg/kg	11	4.6	62	73	100
Lead, mg/kg	21	8.9	840	140	190
Nickel, mg/kg	23	16	26	53	51
Silver, mg/kg	1.3	<1.0	<1.0	<1.0	<1.0
Thallium, mg/kg	<2	<2	<2	5.4	<2
Zinc, mg/kg	27	12	310	270	330
Antimony, mg/kg	21	20	<10	<10	<10
Arsenic, mg/kg	2.6	1.6	4.7	38	0.4
Selenium, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Mercury, mg/kg	0.07	0.03	0.13	0.26	0.17
Nitric Acid Digestion, Date	06.18.87	06.18.87	06.18.87	06.18.87	06.18.87
Total Fuel Hydrocarbons, mg/kg	<10	<10	<10	31000	<10

BROWN AND CALDWELL LABORATORIES
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ANALYTICAL REPORT

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Project: 18247.001.02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
06-333-1	8706001	15 JUN 87
06-333-2	8706002	15 JUN 87
06-333-3	8706003	15 JUN 87
06-333-4	8706004	15 JUN 87
06-333-5	8706005	15 JUN 87

PARAMETER	06-333-1	06-333-2	06-333-3	06-333-4	06-333-5
Purgeable Priority Pollutants					
Extraction	06.17.87	06.17.87	06.17.87	06.17.87	06.25.87
1,1,1-Trichloroethane, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2,2-Tetrachloroethane, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
1,1,2-Trichloroethane, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-Dichloroethane, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
1,1-Dichloroethylene, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichloroethane, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
1,2-Dichloropropane, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
1,3-Dichloropropene, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
2-Chloroethylvinylether, mg/kg	<2	<2	<2	<2	<2
Acrolein, mg/kg	<2	<2	<2	<2	<2
Acrylonitrile, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Bromodichloromethane, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Bromomethane, mg/kg	<0.2	<0.2	<0.2	350	<0.2
Benzene, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorobenzene, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Carbon Tetrachloride, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Chloroethane, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Bromoform, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Chloroform, mg/kg	<0.2	0.4	0.3	<0.2	<0.2

BROWN AND CALDWELL LABORATORIES
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ANALYTICAL REPORT

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Reported: 26 JUN 87

Mr. John Blasco
Harding Lawson and Associates
7655 Redwood Blvd.
Novato, CA 94947

Project: 18247.001.02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
06-333-1	8706001	15 JUN 87
06-333-2	8706002	15 JUN 87
06-333-3	8706003	15 JUN 87
06-333-4	8706004	15 JUN 87
06-333-5	8706005	15 JUN 87

PARAMETER	06-333-1	06-333-2	06-333-3	06-333-4	06-333-5
Chloromethane, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dibromochloromethane, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Ethylbenzene, mg/kg	<0.2	<0.2	<0.2	6	1.2
Methylene chloride, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Tetrachloroethylene, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Trichloroethylene, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Trichlorofluoromethane, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene, mg/kg	<0.2	<0.2	<0.2	130	0.6
Vinyl chloride, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
trans-1,2-Dichloroethylene, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
trans-1,3-Dichloropropene, mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Semi-Quantified Results **					
C5H12, mg/kg	---	---	4	---	---
C6H12, mg/kg	---	---	---	2000	---
C6H14, mg/kg	---	---	---	400	---
C7H14, mg/kg	---	---	---	100	---
C7H16, mg/kg	---	---	---	80	---
C8H16, mg/kg	---	---	---	---	0.7
C9H16, mg/kg	---	---	---	---	0.2
C9H18, mg/kg	---	---	---	---	2

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06-333-2	8706002	15 JUN 87
06-333-3	8706003	15 JUN 87
06-333-4	8706004	15 JUN 87
06-333-5	8706005	15 JUN 87

PARAMETER	06-333-1	06-333-2	06-333-3	06-333-4	06-333-5
Unidentified Compound, mg/kg	---	---	---	5000	---
Xylene Isomers, mg/kg	---	---	---	20	6

** Quantification based upon comparison of total ion count of the compound with that of the nearest internal standard.

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Project: 18247.001.02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
06-333-6	8706SB1	15 JUN 87
06-333-7	8706SB2	15 JUN 87

PARAMETER	06-333-6	06-333-7
Total Fuel Hydrocarbons, mg/kg	<10	<10

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Project: 18247.001.02

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
06-333-6	8706SB1	15 JUN 87
06-333-7	8706SB2	15 JUN 87

PARAMETER	06-333-6	06-333-7
Purgeable Priority Pollutants		
Extraction	06.17.87	06.17.87
1,1,1-Trichloroethane, mg/kg	<0.2	<0.2
1,1,2,2-Tetrachloroethane, mg/kg	<0.2	<0.2
1,1,2-Trichloroethane, mg/kg	<0.2	<0.2
1,1-Dichloroethane, mg/kg	<0.2	<0.2
1,1-Dichloroethylene, mg/kg	<0.2	<0.2
1,2-Dichloroethane, mg/kg	<0.2	<0.2
1,2-Dichloropropane, mg/kg	<0.2	<0.2
1,3-Dichloropropene, mg/kg	<0.2	<0.2
2-Chloroethylvinylether, mg/kg	<2	<2
Acrolein, mg/kg	<2	<2
Acrylonitrile, mg/kg	<0.2	<0.2
Bromodichloromethane, mg/kg	<0.2	<0.2
Bromomethane, mg/kg	<0.2	<0.2
Benzene, mg/kg	<0.2	<0.2
Chlorobenzene, mg/kg	<0.2	<0.2
Carbon Tetrachloride, mg/kg	<0.2	<0.2
Chloroethane, mg/kg	<0.2	<0.2
Bromoform, mg/kg	0.3	<0.2
Chloroform, mg/kg	<0.2	<0.2
Chloromethane, mg/kg	<0.2	<0.2
Dibromochloromethane, mg/kg	<0.2	<0.2
Ethylbenzene, mg/kg		

BROWN AND CALDWELL LABORATORIES
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ANALYTICAL REPORT

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Harding Lawson and Associates
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Novato, CA 94947

Project: 18247.001.02

REPORT OF ANALYTICAL RESULTS

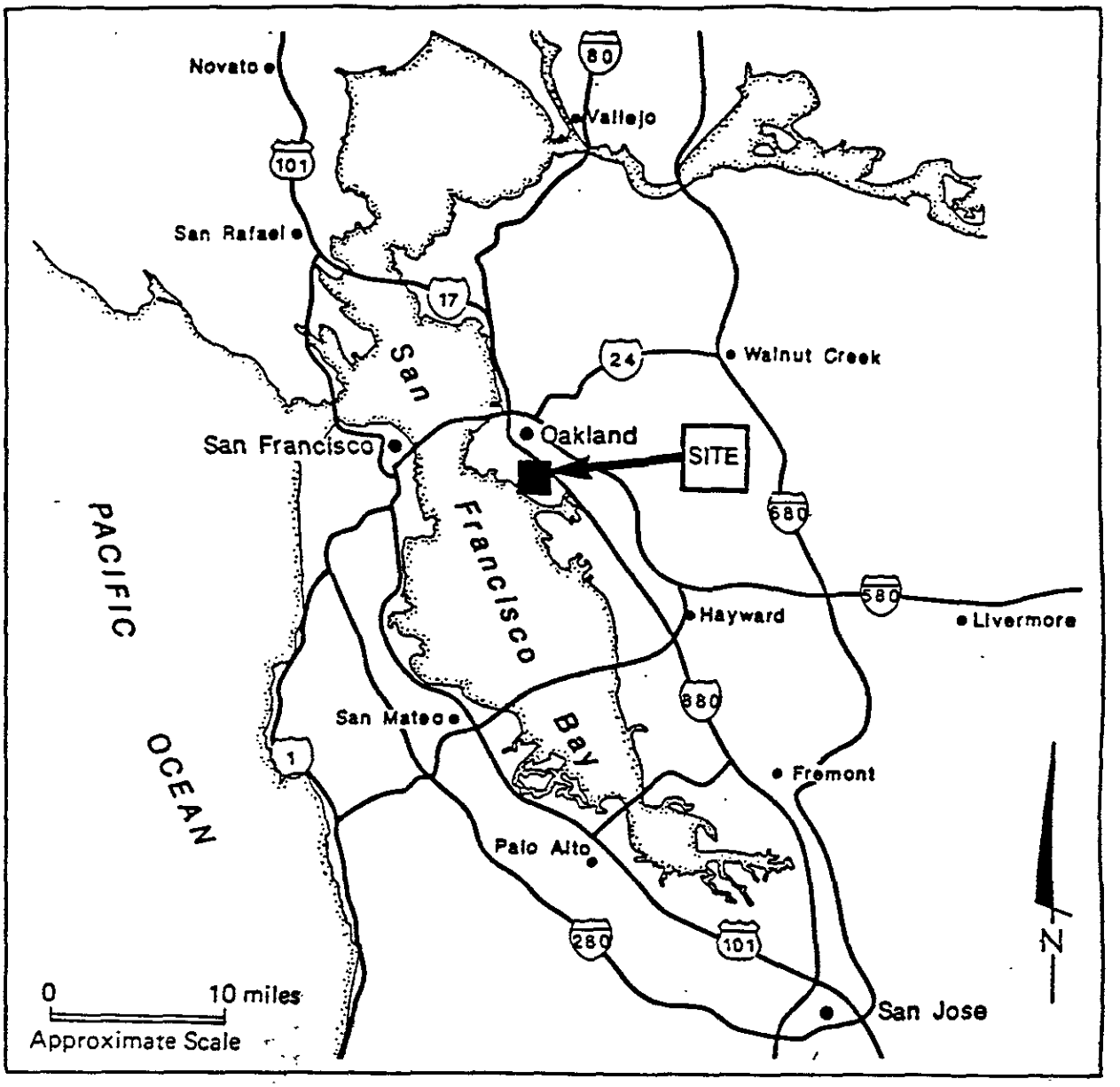
LOG NO	SAMPLE DESCRIPTION, SOIL SAMPLES	DATE SAMPLED
06-333-6	8706SB1	15 JUN 87
06-333-7	8706SB2	15 JUN 87

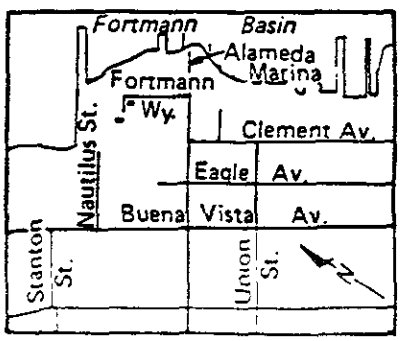
PARAMETER	06-333-6	06-333-7
Methylene chloride, mg/kg	<0.2	<0.2
Tetrachloroethylene, mg/kg	<0.2	<0.2
Trichloroethylene, mg/kg	<0.2	<0.2
Trichlorofluoromethane, mg/kg	<0.2	<0.2
Toluene, mg/kg	<0.2	<0.2
Vinyl chloride, mg/kg	<0.2	<0.2
trans-1,2-Dichloroethylene, mg/kg	<0.2	<0.2
trans-1,3-Dichloropropene, mg/kg	<0.2	<0.2
Semi-Quantified Results **		
Xylene Isomers, mg/kg	1	---

** Quantification based upon comparison of total ion count of the compound with that of the nearest internal standard.

D. A. McLean, Laboratory Director

105649



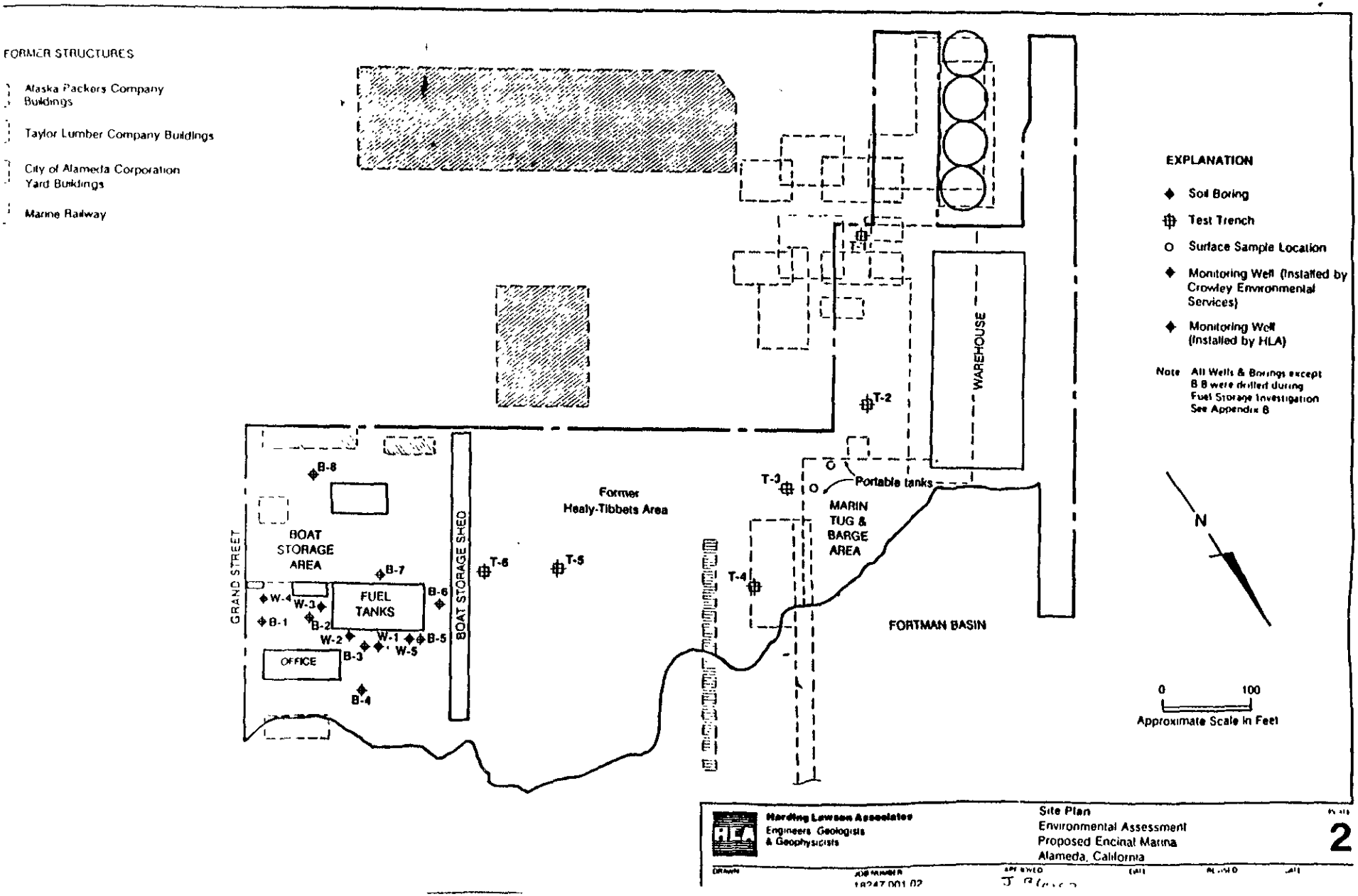


Harding Lawson Associates
Engineers and Geoscientists

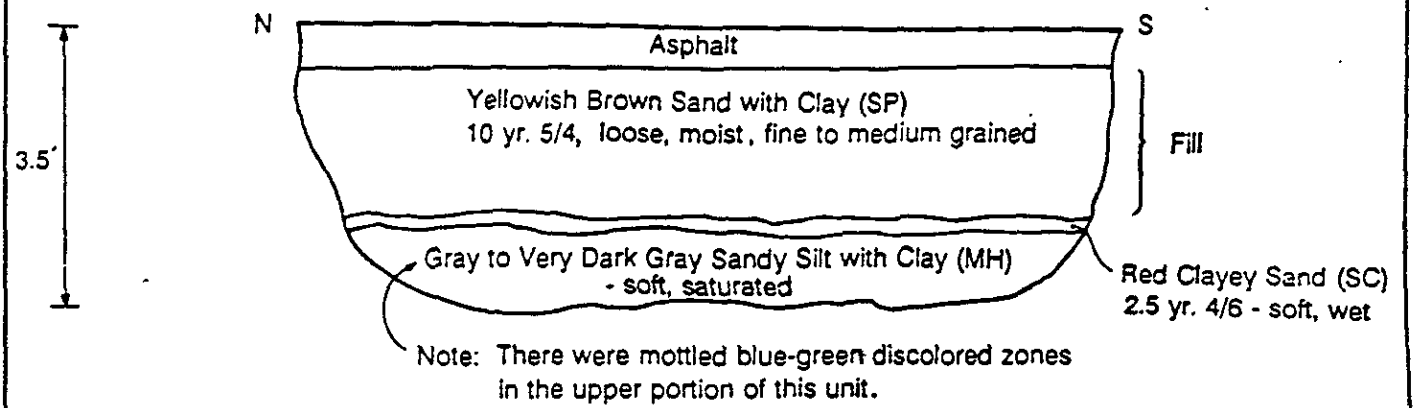
Location Map
Environmental Assessment
Proposed Encinal Marina
Alameda, California

PLATE 1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DM	18,247.001.02		6/87		


FORMER STRUCTURES
Alaska Packers Company Buildings
Taylor Lumber Company Buildings
City of Alameda Corporation Yard Buildings
Marine Railway
EXPLANATION
Soil Boring
Test Trench
Surface Sample Location
Monitoring Well (Installed by Crowley Environmental Services)
Monitoring Well (Installed by HLA)
Note All Wells & Borings except B 8 were drilled during Fuel Storage Investigation See Appendix B
WAREHOUSE
Former Healy-Tibbets Area
Portable tanks
MARIN TUG & BARGE AREA
FORTMAN BASIN
BOAT STORAGE AREA
BOAT STORAGE SHED
GRAND STREET
FUEL TANKS
OFFICE
B-8
B-7
B-6
B-5
B-4
B-3
B-2
B-1
W-4
W-3
W-2
W-1
W-5
T-1
T-2
T-3
T-4
T-5
T-6
N
0
100
Approximate Scale in Feet
Harding Lawson Associates
Engineers Geologists & Geophysicists
Site Plan
Environmental Assessment
Proposed Encinal Marina
Alameda, California
2

TRENCH 1



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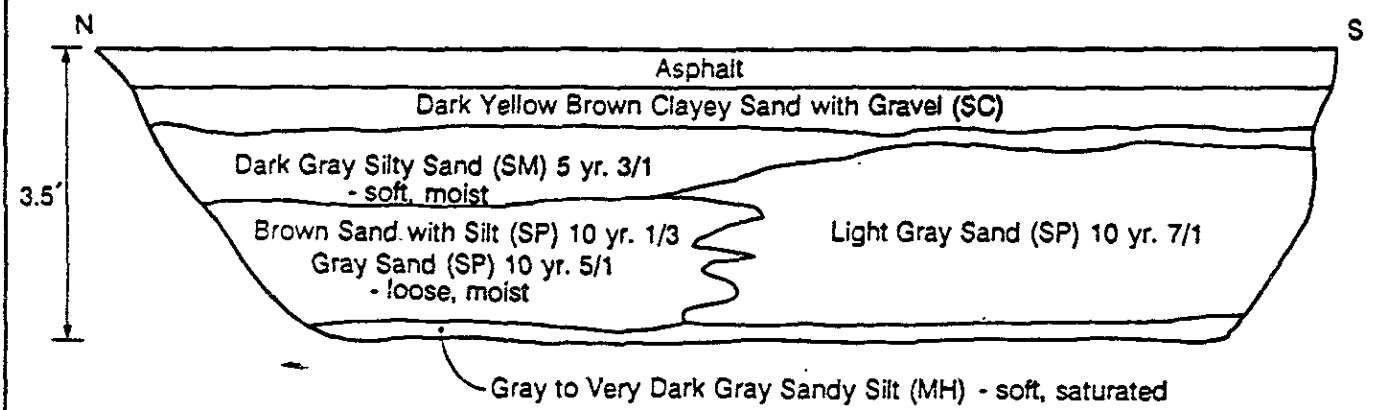


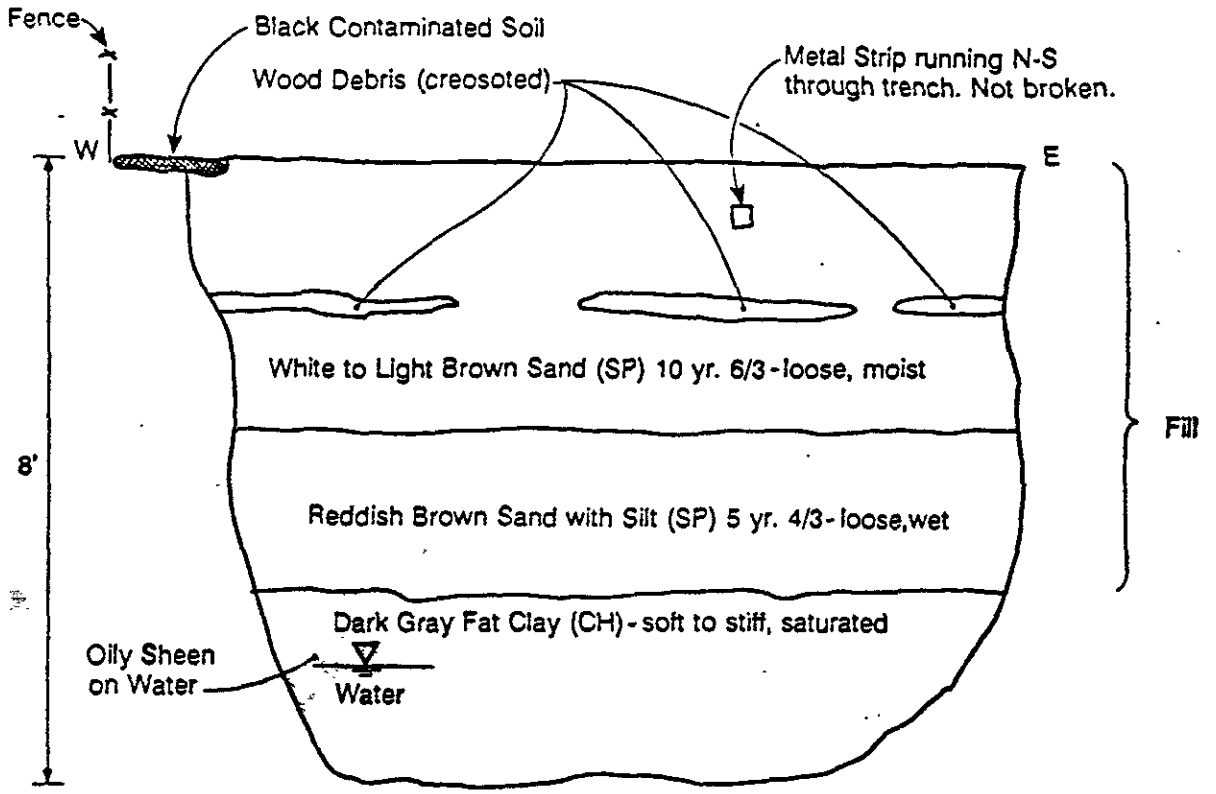
Harding Lawson Associates
Engineers Geologists
& Geophysicists

Logs of Trenches 1 and 2
Environmental Assessment
Proposed Encinal Marina
Alameda, California

PLATE 3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	18247 001.02		6/87		

TRENCH 3



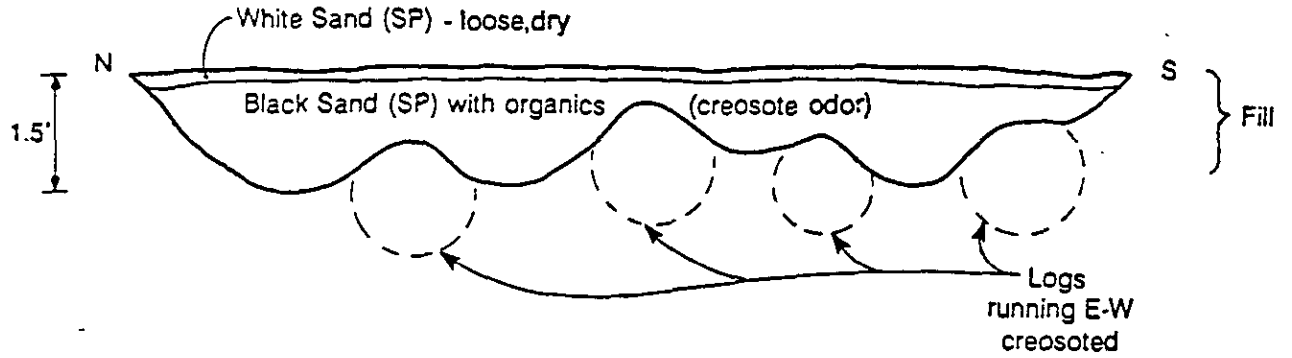
Harding Lawson Associates
Engineers Geologists
& Geophysicists

Log of Trench 3
Environmental Assessment
Proposed Encinal Marina
Alameda, California

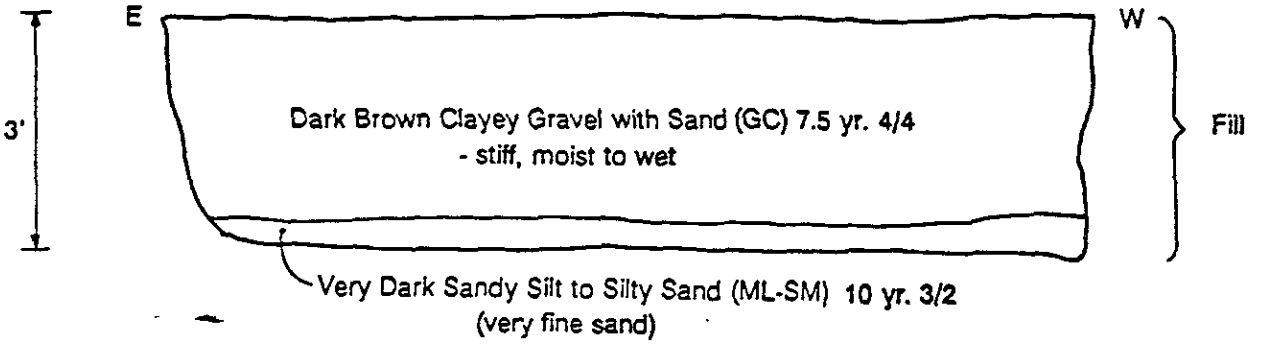
PLATE
4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	18247.001 02	T. Blake	4-27		

TRENCH 4



TRENCH 5



Harding Lawson Associates
Engineers Geologists
& Geophysicists

Logs of Trenches 4 and 5
Environmental Assessment
Proposed Encinal Marina
Alameda, California

PLATE 5

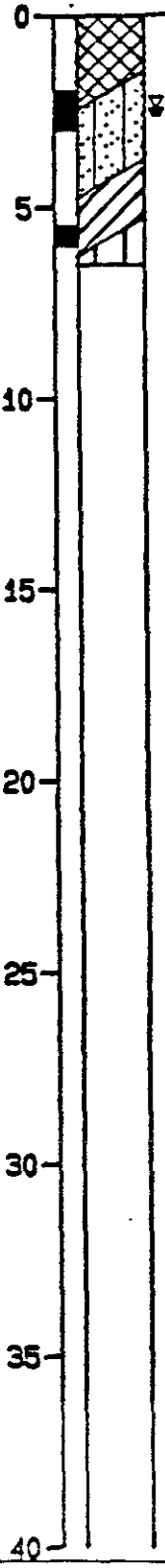
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	18247.001.02	J. Bland	6/87		

Laboratory Tests

Depth (ft) | Sample

Equipment CME 55

Elevation N/A Date 6/11/87



0 — CONCRETE RUBBLE AND GRAVEL (fill)

DARK GRAY SILTY SAND (SM) (5YR 4/1) soft, saturated, hydrocarbon odor (fill)

5 — VERY DARK GRAY FAT CLAY (CH) (2.5YR N3/0) soft, saturated, slight hydrocarbon odor (bay mud)

DARK OLIVE-GRAY PLASTIC SILT (MH) (5YR 3/2) soft, saturated, strong sulphide odor

10 — bottom of hole at 6.5 ft (bay mud)

15

20

25

30

35

40

Harding Lawson Associates
Engineers and Geoscientists

Log of Boring B-8
Environmental Assessment
Proposed Encinal Marina
Alameda, California

PLATE 6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
DM	18, 247, 001.02		6/87		

DISTRIBUTION

ENVIRONMENTAL ASSESSMENT
ENCINAL MARINA
ALAMEDA, CALIFORNIA
July 17, 1987

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1 copy:	Bound Report File	5

JCB/CAH/ljc/B0826-R

QUALITY CONTROL REVIEWER

Donald G. Gray
Civil Engineer

REGISTERED PROFESSIONAL ENGINEER
DONALD G. GRAY
25220
12-31-89
EXPIRES
CIVIL
STATE OF CALIFORNIA

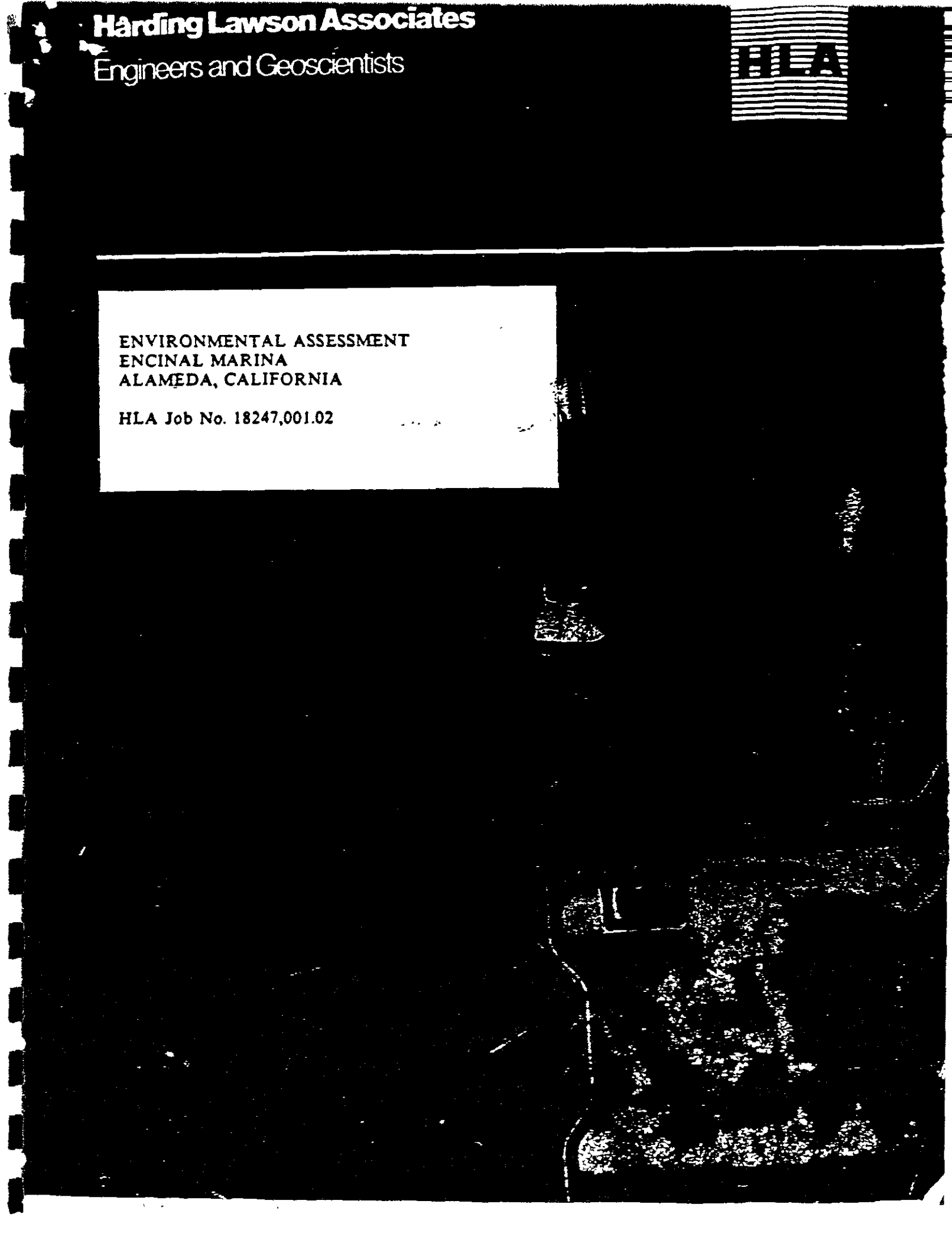
APPENDIX D
HARDING LAWSON ASSOCIATES
ENVIRONMENTAL ASSESSMENT
July 17, 1987

Harding Lawson Associates

Engineers and Geoscientists

ENVIRONMENTAL ASSESSMENT
ENCINAL MARINA
ALAMEDA, CALIFORNIA

HLA Job No. 18247,001.02



A Report Prepared for

Encinal Marina, Inc.
Foot of Grand Street
Alameda, California 94501

ENVIRONMENTAL ASSESSMENT
ENCINAL MARINA
ALAMEDA, CALIFORNIA

HLA Job No. 18247,001.02

by

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July 17, 1987

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1.0 INTRODUCTION

This report describes the environmental assessment conducted by Harding Lawson Associates (HLA) at the site of the proposed Encinal Marina at the foot of Grand Street in Alameda, California. The purpose of the assessment was to evaluate whether there are hazardous wastes or hazardous materials present at the site that could adversely affect construction of the marina. Our assessment consisted of the following components:

- Review of historical information
- Site reconnaissance
- Soil and ground-water investigation
- Separate investigation at the on-site Fuel Storage Facility

This investigation was conducted in accordance with HLA's proposal of June 4, 1987.

The site of the proposed marina is an irregularly shaped parcel, extending approximately 1,300 feet from east (Grand Street) to west (about Stanton Street) and approximately 1,225 feet from north to south (above Clement Avenue). The northern and western portions of the site are under water. The land portion was created through filling that took place in the late 19th and early 20th centuries, and has been used for waterfront-related industries for almost 90 years. The site location is shown on Plate 1.

Current uses of the property are listed below and shown on the Site Plan, Plate 2.

- Fuel storage facility and fueling dock, leased by Harbor Tug and Barge Company
- Boat storage facility
- Vacant area formerly used by the Healy-Tibbets Construction Company
- Marin Tug and Barge Company (equipment storage, maintenance, and docking)
- Warehouse currently used for automobile storage
- Encinal Marina, Inc., office.

Development of the proposed marina will include construction of a parking lot and restroom facilities on the vacant area formerly occupied by the Healy-Tibbets Company. Berthing facilities will be constructed north and west of this area. The existing fuel storage facility, boat storage facility, and warehouse will remain, with some modification and upgrading.

2.0 DESCRIPTION OF INVESTIGATION

2.1 Historical Review

To identify past uses of the project site that could have resulted in contamination with hazardous waste or hazardous materials, we reviewed the following report, prepared by Ms. Anne Bloomfield in March 1987.

"Site History of the Encinal Marina Project
2051 Grand Street, Alameda, California"

This report was prepared for Encinal Marina, Inc. and is presented as Appendix A. The locations of a number of structures associated with the activities described in this report are shown on Plate 2. Past site uses include the following:

- Shipyard operated by Alaska Packers Association
- Lumber yard operated by Taylor and Company
- City of Alameda Corporation Yard
- Healy-Tibbets Construction Company (storage of marine construction equipment).

Several air photos in the possession of Encinal Marina, Inc., including a 1986 A.L.T.A. Survey, were also reviewed.

2.2 Site Reconnaissance

Following review of the historical information, a site reconnaissance was conducted on May 28 and June 11, 1987, to identify visible evidence of hazardous materials contamination or activities that could result in such contamination. Observations made in each area of the site are summarized in the following sections.

2.2.1 Boat Storage Area

The boat storage area includes six buildings or sheds used for boat storag and repair and a number of large metal shipping containers now used for storag We observed that small quantities of various hazardous materials used in boat repair are stored inside a paved, fenced enclosure at one building.

An underground storage tank, reportedly used for gasoline storage when th property was the site of the City of Alameda Corporation Yard, was observed next to the building in the center of the facility. The size of the tank and history of operation are unknown. The tank contained approximately 6 inches of what appeared to be water with a strong gasoline odor. It is currently unused.

2.2.2 Vacant Area (former Healy-Tibbets Area)

The area most recently occupied by the Healy-Tibbets Construction Company is now vacant. Several buildings and all marine construction equipment visible in a 1986 aerial photo have been removed. Piles of fill dirt now cover the central portion of this area, and several piles of debris are located near the shoreline.

Several areas of oil-stained soil were observed, most of which appeared to be minor surface spills covering 1-2 square feet. However, two larger areas were observed as follows:

- Area of surface staining approximately 10' x 3' at east end of the area
- Area of surface staining and small wood fragments approximately 30' x 30' next to the Marin Tug and Barge area. A smaller area of heavier staining within this area was observed next to the chain link fence separating this area from the Marin Tug and Barge area.

A 55 gallon drum partially full of an unidentified solidified material was observed near the fence on the west side of this area.

2.2.3 Marin Tug and Barge Area

This area is used for vessel docking and equipment storage and repair. Five portable storage tanks and one tank trailer used for storage of oil, fuel-water mixtures, and solvents were observed at the southwest corner of this area near the fence separating it from the former Healy-Tibbets area. What appeared to be oil staining was observed on soil below the tanks.

2.2.4 Warehouse Area

The area around the warehouse is paved. No conditions indicative of hazardous materials contamination were observed. The interior of the warehouse was not inspected.

2.3 Soil and Ground-Water Investigation

2.3.1 Soils

2.3.1.1 Sampling Locations

Subsurface soil conditions were evaluated with six test trenches, one soil boring, and two surface soil samples. The soil boring was drilled on June 11, 1987; all other samples were collected on June 15, 1987. Sampling locations were selected based on a review of proposed development plans, the site reconnaissance, and the review of historical information. Sampling locations are shown on Plate 2. The rationale for selecting each sampling location is presented in the following table.

RATIONALE FOR SELECTING SAMPLING LOCATIONS

Location	Rationale for Selection
Boring B-8	Next to underground storage tank in boat storage area
Trench 1	Former location of Alaska Packers shipyard buildings
Trench 2	Former location of Alaska Packers yard area; proposed location of utility trench
Trench 3	Presence of oil staining and wood fragments on ground surface
Trench 4	Former storage area for creosoted piles at Healy-Tibbets area
Trench 5	Former location of Alaska Packers boat building shed and marine railway; proposed location of restroom facilities
Trench 6	Presence of oil staining on ground surface
Surface Samples 1 & 2	Staining under portable tanks at Marin Tug and Barge

2.3.1.2 Sampling Methodology

2.3.1.2.1 Soil Borings

Soil Boring B-8 was drilled next to the underground storage tank in the boat storage area to a depth of 6.5 feet using hollow-stem auger drilling equipment. Soil samples were collected at the water table (2.5 feet) and at a depth that appeared to correspond to the bottom of the underground tank (5.5 feet). This boring was drilled during the investigation at the Fuel Storage Facility on June 11, 1987, which is described in Section 2.4 and in Appendix B. A detailed description of drilling and sampling procedures may be found in Appendix B.

Test Trench 6 was excavated to a depth of approximately 1 foot to evaluate whether the surface soil discoloration, which appeared to be oil staining, extended below the ground surface. A sample was not collected for chemical analysis.

2.3.1.2.3 Surface Soil Samples

Two surface soil samples were collected under the two groups of tanks at the Marin Tug and Barge area using a shovel. Samples were placed in glass jars and were handled in the same manner as were the test trench samples. Samples were analyzed by Brown and Caldwell for total petroleum hydrocarbons and volatile organic priority pollutants.

2.3.2 Ground Water

Ground-water quality was evaluated by collecting a sample from Well B-7, installed during the Fuel Storage Area investigation, and from Test Trench 3, excavated to a depth sufficient to allow infiltration of ground water. Samples were analyzed by Curtis and Tompkins, Ltd., for the parameters shown below.

Sample	Parameter	Method
Trench 3	heavy metals	7000 series
	volatile organic priority pollutants	624
B-7	heavy metals	7000 series
	volatile halocarbons	601
	volatile aromatic priority pollutants*	602

2.4 Fuel Storage Area Investigation

A separate investigation of the Fuel Storage Area was conducted by HLA on June 11 and 12, 1987. This investigation is described in our report entitled

* analysis performed by Brown and Caldwell during Fuel Storage Area investigation

"Petroleum Hydrocarbons in Soils and Ground Water, Fuel Storage Area, Encinal Marina, Alameda, California," dated July 17, 1987. This report is presented in Appendix B.

3.0 RESULTS OF SOIL AND GROUND-WATER INVESTIGATION

3.1 Soil Conditions

Our test trenches and borings indicate that the area under investigation is blanketed by 3 to 5 feet of sandy fill which is underlain by native bay mud soils. Logs of the test trenches are presented as Plates 3 through 5, and the log of Boring B-8 is presented as Plate 6. Significant observations made during the soils investigation concerning the presence of hazardous materials are summarized below.

3.1.1 Trenches 1, 2, and 5

No evidence of hazardous materials was observed.

3.1.2 Trench 3

Heavy oil-like staining on the ground surface extends approximately 4 feet east of the fence, and penetrates to a depth of approximately 6 inches. Wood fragments are present at depth between 1.5 and 2 feet.

3.1.3 Trench 4

Creosoted poles or timbers lying horizontally were encountered beginning at approximately 6 inches to 1 foot below the ground surface. Soil overlying and between poles is discolored with strong creosote odor.

3.1.4 Trench 6

Discoloration was limited to the ground surface.

3.1.5 Surface Samples 1 and 2

Tanks along the fence at the south side of the Marin Tug and Barge area appear to be on asphalt pavement; tanks along the fence at the east side appear to rest on dirt. Leakage of liquid described by a Marin Tug and Barge employee as

Table 1. Test Trench Soil Chemistry - Organic Compounds

Parameters	T-2	T-3	T-4	T-5
Chloroform	0.4	0.3	--	--
Ethylbenzene	--	--	6	1.2
Toluene	--	--	130	0.6
Xylenes	--	--	20	6
*C_5 H_{12}	--	4	--	--
*C_6 H_{12}	--	--	2,000	--
*C_6 H_{14}	--	--	400	--
*C_7 H_{14}	--	--	100	--
*C_7 H_{16}	--	--	80	--
*C_8 H_{16}	--	--	--	0.7
*C_9 H_{16}	--	--	--	0.2
*C_9 H_{18}	--	--	--	2
Total Fuel Hydrocarbons (as diesel fuel)	--	--	31,000	--
*Unidentified Compound			5,000	

1. All results in mg/kg. = PPM
2. Only compounds actually detected are tabulated.
3. See Laboratory Reports (Appendix C) for detection limits and complete list of analytical parameters.

* Semi-quantified results

-- Not detected

Table 2. Test Trench Soil Chemistry - Heavy Metals

Parameters	T-1	T-2	T-3	T-4	T-5
Beryllium	<0.2	<0.2	<0.2	<0.2	<0.2
Cadmium	<0.2	<0.2	<0.2	<0.2	0.5
Chromium	26	22	21	32	21
Copper	11	4.6	62	73	100
Lead	21	8.9	840	140	190
Nickel	23	16	26	53	51
Silver	1.3	<1.0	<1.0	<1.0	<1.0
Thallium	<2	<2	<2	5.4	<2
Zinc	27	12	310	270	330
Antimony	21	20	<10	<10	<10
Arsenic	2.6	1.6	4.7	38	0.4
Selenium	<0.2	<0.2	<0.2	<0.2	<0.2
Mercury	0.07	0.03	0.13	0.26	0.17

1. All results in mg/kg

Table 3. Ground-Water Chemistry

	Well B-7	T-3
Lead	0.14	--
Zinc	--	2.7

1. All results in mg/l.
2. Only compounds actually detected are tabulated.
3. See Laboratory Reports for a complete list of parameters and detection limits.

-- Not detected

4.0 DISCUSSION OF RESULTS

4.1 Former Healy-Tibbets Area

Soils in Test Trench 4 were heavily discolored and contained elevated levels of fuel hydrocarbons (diesel fuel), benzene, toluene, and xylenes. The lateral and vertical extent of contaminated soil in this area has not been estimated. The source of this material is unknown.

The creosoted poles or timbers encountered in this area are of concern because differential settlement may occur as the poles decay. Although this area was the location of the Alaska Packers boat building shed and wharf, and later a marine railway, the purpose of the poles or timbers in unknown.

Elevated levels of lead were observed in soils from Test Trench 3, although the value did not exceed the Total Threshold Limit Concentration that characterizes a hazardous waste pursuant to Section 66699 of the California Administrative Code. The presence of abundant wood fragments at the ground surface and at a depth of 1.5 to 2 feet may have resulted from the dismantling of a tugboat in that area, which reportedly took place in 1986.

Low levels of fuel hydrocarbons, toluene, and xylene were detected in Trench 5. There was no visible evidence of contamination.

Although zinc was detected in the ground-water sample collected from Trench 3, the level was below the U.S. Environmental Protection Agency's proposed maximum contaminant level of 5 ppm.

4.2 Marin Tug and Barge Area

Field observations of discoloration, odor, and emission of volatile hydrocarbons would indicate that soil contamination has occurred around the

portable tanks; however, laboratory analysis of two surface soil samples from this area failed to detect significant concentrations of hydrocarbons. These laboratory results cannot be reconciled with field observations made during the soils investigation. Based on visible evidence of soil discoloration, contaminated soil appears to extend several feet east of the fence, into the former Healy-Tibbets area (near Test Trench 3).

4.3 Fuel Storage Area

As described in our July 17, 1987, report, soil and ground-water contamination has been detected around the Fuel Storage Area. Refer to Appendix B for a complete discussion of that area.

Although fuel constituents were not detected in Well B-7 during the Fuel Storage investigation, lead was detected during the environmental assessment at a level of 0.14 ppm, greater than the federal Drinking Water Standard of 0.05 ppm. Due to the absence of fuel constituents, the source of the lead is not believed to be leaded gasoline.

Given the shallow water table and sandy surface soils, infiltration of contaminated surface water may be suspected, although its origin is unknown.

4.4 Boat Storage Facility

Based on results of soil samples collected adjacent to the underground storage tank, soil contamination from fuel hydrocarbons has not occurred. The presence of water in the tank at a level approximately 3 feet below the water table may be the result of leakage past the cap on the fill pipe during periods of flooding.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Hazardous materials were encountered in several isolated areas at the site of the proposed Encinal Marina. Remedial action to remove these materials, however, is straightforward, and can readily be accomplished in a timely manner. Provided that the recommendations for remedial action described in the following sections are adhered to, the conditions encountered during our investigation should not prevent development of the proposed marina.

5.2 Recommendations

5.2.1 Fuel Storage Area

Recommendations for remedial action in this area are included in our July 17, 1987, report (see Appendix B).

5.2.2 Former Healy-Tibbets Area

Contaminated soil and creosoted timbers should be removed from this area around Trench 4. Contaminated soils should be transported to a permitted hazardous waste facility for disposal. A suitable disposal site for the creosoted timbers will have to be located.

Aeration of fuel-contaminated soils may be an alternative to disposal at a hazarodus waste site. A test aeration program could be conducted on these soils following the recommendations presented in Appendix B.

5.2.3 Marin Tug and Barge Area

Soils contaminated with hydrocarbons should be excavated and transported to a permitted hazardous waste disposal site. Based on visual observation, we estimate that a maximum of 10 cubic yards of soil will require excavation and disposal, including material extending into the former Healy-Tibbets area near Trench 3.

5.2.4 Boat Storage Facility

The underground tank should be abandoned in compliance with requirements of Section 25298 of the California Health and Safety Code, which requires:

- removal of tank contents and cleaning
- removal or abandonment in place of the tank
- demonstration that contamination does not exist around the tank.

Competent legal counsel should be consulted concerning the possible responsibility of the City of Alameda for removing this tank.

This environmental assessment is based on a limited number of samples whose locations were selected based on historical information prepared by others and on our observations concerning current site conditions. Due to the site's long history of industrial use and the lack of existing surface features associated with those uses, it is possible that other areas containing hazardous materials exist which have not been identified to date. Contingency plans for the identification and removal of such materials should be developed prior to the start of construction, so that removal can take place in a timely manner if such materials are encountered.

DATE: May 29, 1987

PROJECT NO.: 8622

DISTRIBUTION:
OWNER ☐ CONTRACTOR ☐ FIELD ☐
ARCHITECT ☐ CONSULTANT ☐ OTHER ☐

PROJECT: Encinal Marina
2099 Grand St.
Alameda, CA 94501

TO: Harding Lawson
7655 Readwood Blvd.
P. O. Box 578
Novato, CA 94948

SUBJECT: HISTORICAL REPORT

ATTN.: John C. Blasco

WE ARE SENDING YOU ☒ attached ☐ under seperate cover via _____ the following itiems:

copies	sheets	date	description
1		March 1987	SITE HISTORY FOR SUBJECT PROJECT BY ANNE BLOOMFIELD

REMARKS

CC: Mr. Dean Anderson, w/a

F ENCLOSURES ARE NOT AS NOTED, PLEASE INFORM US IMMEDIATELY.

SSUED

BY: ITALO A. CALPESTRI, III AIA

1C4 PARK ST. ALAMEDA, CA 94501 (415)522-6769 ITALO A. CALPESTRI III ARCHITECT AIA

SITE HISTORY

of the

ENCINAL MARINA PROJECT

2051 Grand Street, Alameda, California

by Anne Bloomfield

March 1987

CONTENTS

INTRODUCTION

The site of the 2051 Grand Street marina project is a large, irregularly shaped parcel, its outer dimensions approximately 1300 ft. from east (Grand Street) to west (about Stanton Street) and 1225 feet from north to south (above Clement Avenue). The north and west portions are water; the dry land portion is shaped like a lopsided pyramid with a broad leg extending south from the longer western part of its base. Three old piers remain, parallel with Grand and respectively about 75 feet, 280 feet and 900 feet west of it. The land is all fill and has always been used for waterfront-related industries, some of which may have left hazardous wastes behind. The following preliminary report traces most of the site's history and its major historical uses. Additional uses may have existed but have not been found in the limited time alloted for this report, nor has there yet been a search for historic photographs.

EARLY HISTORY

Originally the site was part salt marsh, part open water of the Estuary. Both the U.S. Coast Curvey of 1856 and G.F. Allardt's Marsh and Tide Lands Survey of 1871 show that Alameda's "high and dry" land extended only about ten feet north of the intersection of Grand Street and Clement Avenue. They show marshland extending beyond Clement at Grand in the outline of a mound or a cresting wave, or a crab's claw, open to the east. This marshland line is approximated today in the southern property lines of old lots 26, 27, 24, 21, 25, 28 and tract 9. See the enclosed map.

No Indian activity in the area has been recorded; Alameda's six Indian Mounds were all located east of Chestnut Street, four of them east of Park. Indians probably did gather food in the marshes off Grand Street, but remains from such passages are highly improbable.

The first development in the area was Hibbard's Wharf, which extended roughly from Grand and Clement in a northwesterly direction some 3000 feet to the open water. Named for Dr. B.F. Hibbard who in 1851 bought the middle third of Alameda from founders Chipman and Aughinbaugh, who had just bought the whole future city from the Spanish grantee's son Antonio Maria Peralta, Hibbard's Wharf was probably constructed by Hibbard's associate Charles Minturn, who launched a steam ferry called the Clinton there in October 1853. Hibbard's Wharf served ferries and an occasional ocean-going vessel. Imelda Merlin (see bibliography) says it "became the Encinal's focal point for shipping activities and has remained so to the present" (p. 35). A nearby tannery and the wharfing were the first industries in all of Alameda. Hibbard's Wharf is shown on maps of 1856, 1871, 1875 and 1878, by which time it was probably in a very dilapidated condition. Rival wharves had been erected on the east, west and south shores of Alameda. In 1864 A.A. Choen opened a broad-gauge railroad along Lincoln Avenue to his own wharf at the peninsula's west end, and this superior transportation link soon rendered Hibbard's Wharf obsolete.

The marshland was filled at a date and with material undiscovered in this study, but an 1895 map indicates the wavecrest shape as dry land from Paru Street to Union by that date. As the Sanborn fire insurance map of 1897 shows the only nearby structure north of Clement to be the Oakland Gas Light and Heat Company's gas holder and associated buildings (between Union and Minturn), the landfill may have been done by or for that company, which was founded in 1866 and in the late 1870s was extending its gas mains to Alameda and Berkeley. The gas storage holder may have been erected some time in the early 1880s. The fill shown on the 1895 map extends north and three blocks west of the gasholder compound; perhaps some of it came from the 1892 commencement of dredging the tidal canal east of Park Street. Merlin (p. 88) reports that the products of canal dredging/digging were used to fill the marshlands on the Estuary; but Vigness (1939: p. 78, 80) says that "the earth was taken in flatcars to the Oakland Mole for the Southern Pacific Company, where it was used to fill [land]." Whatever the source of the marshland fill, surveyors for the 1897 Sanborn fire insurance map did not find enough development even to map the area north of Clement Street; one concludes that by 1897 landfill in the subject area was incomplete or still awaiting development of any kind at all.

THE FIRST LASTING INDUSTRY: ALASKA PACKERS ASSOCIATION

"When the Alaska Packers Association was formed in 1893, there was little development on the Estuary. But Mr. H.F. Fortmann, its first president, and A.K. Tichenor [third president] saw its possibilities as a harbor for the fishing fleet. So several acres of waterfront were acquired by the Association. In 1901 the Association started construction of a shipyard which it completed in 1907. Here the famous 'Star' fleet of fishing vessels was equipped, repaired and condi- Here the famous 'Star' fleet of fishing vessels was equipped, repaired and conditioned for its annual run to Alaska. Thousands of skilled laborers were bought to Alameda to work in these yards. Ultimately Alaska Packers had acquired 86 acres of waterfront on the Estuary, and for many years was a major fishing company" (Vigness, 1952: p. 112).

The address of Alaska Packers was always the foot of Paru Street, and their shipyards originally extended only west of that street. The company's first construction in 1901 must have been to fill in the marsh. By 1910 the Sanborn fire insurance map showed a complex of fifteen Alaska Packers Association buildings, all of frame construction, many clad in corrugated iron. Building functions were (in the alphabetical order indicated on the map): ship supply and boat storage, tin shop and storage, planing and carpenter shop, office and drafting, oil and paint storage, large open shed, changing and lunch room, large fresh water tower and tanks, machine shop, smaller water tower and tank, blacksmith and generators/ steam boilers, boat storage and supplies, kettles, burner, and a 525-foot-long wharf in approximately the location of the later marine railway. There were two wells.

The only possible remainder of these fifteen structures--unless some have been moved--is the south and east walls of Building A, a two-story storage structure about 60x300 feet in the same position as the south and east walls of the present Unit D warehouse, which is about 94x243 feet. The Sanborn maps do not cover the westernmost pier and thus are silent on the history of the old corrugated iron building there; a search for historic photographs might shed some light on this subject.

About 1920 the Association acquired the adjacent property of the defunct Taylor & Company Mill and Lumber Yard (see below), bringing their land up to Grand Street. It also acquired additional waterfront property to the west. In 1923 it announced a two million dollar expansion involving "excavation of eleven acres for an additional basin and the building of seven great piers and fourteen warehouses." The Chamber of Commerce publication predicted "a combined floor space of 1,170,700 square feet . . . for the numerous packing plants operated in connection with the California Packing Corporation and the Alaska Packers Association." This was probably the construction of Fortmann Basin, for the Sanborn maps show very few structural changes between 1910 and 1932 on the subject part of the Packers' property. However during this period, huge warehouses were constructed to the south and west along the undedicated line of Clement Avenue west of Grand, constructed for Encinal Terminals, a 1922 creation of the cooperation between Alaska Packers and Calpak, which Vigness (1952: p. 112) says was seeking its own cargo facilities. Later Encinal Terminals was to lease large parts of the subject property.

Alaska Packers Association also had much to gain from the new expansion and agreement. Its operation on the Estuary was entirely seasonal. Its Star-named fleet of iron-sided square-rigged ships (the San Francisco-berthed museum ship Balclutha spent 28 years as the Star of Alaska) departed for the Alaska fishing grounds and canneries early in April and didn't return until October. Jones described the procedures (p. 88-90): at the discharging dock "creaking slingfuls of canned salmon were swung aloft and ashore from a cock-billed main or cro-jack yard, pinch-hitting as a cargo boom accomplished to the tune of chattering winches and shouting stevedores. Her holds emptied and dunnage cleared out, . . . [she was eased] into the Packers' yard where she was warped into placed and tied up for another winter. They lay moored in long double files, separated by narrow quats, their slender bow-sprits reaching well over the stern of the vessel just ahead.

"Getting a fleet of ships ready for sea and assembling a force of some three thousand men was merely the preliminary skirmish in the annual campaign against the salmon. Preparations . . . were started in the very early springtime when the Packers' yards on the Oakland estuary, its shops and sail lofts and the eager ships themselves, took on an entirely new lease of life to a throbbing obligato of grinding gears and pounding hammars, the whining of circular saws and the tramp of hurrying feet.

"On deck countless fathoms of standing gear and running gear were overhauled, sails sent aloft and bent. In due time the ships were moved to shipyards to take their turn in drydock and on marine railway, to reappear resplendent in glistening black, with a dash of vivid carmine along the waterline, and with mast, spars and deckhouses glorified in a smart, becoming buff color.

"Thence to their loading docks to take on cannery supplies and at the last moment" the fishermen-sailors and the cannery crews.

In 1928 the Association sent only five sailing ships to Alaska, in 1929 only two, and then none. They had been replaced by steamships, the first bought in 1925, which revolutionized the time spent and the use of the yards. The Association property on the Estuary turned more and more into warehousing space, with some uses for lumber (see below) and with long-term leasing to Encinal Terminals. During World War II the U.S. Navy used the Encinal Terminals facilities. Eventually APA itself became a subsidiary of the Del Monte Corporation (formerly Calpak), but the waterfront land continued nominally under APA ownership.

LUMBER FACILITIES

Whatever the reason for filling the marshland west of Grand Street, no occupant is known there before Taylor & Company's Mill and Lumber Yard, which moved in after the 1906 earthquake. Taylor & Co. had been in Oakland at First and Washington at least by 1887, and it has been described as Oakland's third lumber company, "a minor concern [that] catered almost exclusively to the local building trade and planing mills" (Hinkel: p. 851). In Alameda its property at the northwest corner of Grand and Clement extended north on Grand to the water and west about 500 feet. Sanborn maps show this area as more open space than buildings, as would be typical for a lumber storage yard. In 1910 the only buildings on the subject land, all of frame construction, were the north fifteen feet of two open lumber sheds and an adjoining closed "Steam Dry House," plus a 25x100-foot closed wagon shed along the subject property's southern boundary at Grand. The generators, glue room and 100x30x22-foot planing mill were all farther south, closer to Clement Ave. From 1908 through 1917 Oakland directories listed Taylor & Co. here, the address given either as 2001 Grand or the northwest corner of Grand and Clement. Then the company disappeared. The buildings lasted a little longer.

Subsequently the City of Alameda acquired some of the land (see below), and Alaska Packers Association the rest. The latter converted the open lumber sheds to boat storage, and the steam dry house to a carton and box warehouse, but it continued its own smaller planing and carpenter shop and its lumber shed farther west.

In 1960 the Assocation constructed new lumber facilities: a dry kiln for $25,750, a cooling shed for $3,000, a sawdust storage bin for $4,400 and in 1962 a kiln addition for $7500. Most of these buildings appear to have been just south of the subject property; doubtless open-air lumber storage occurred on the subject property. In 1963 these facilities were leased to a never-achieved venture called Jones Veneer and Plywood. From 1966 through 1979 they were leased by Western Dry Kiln, listed in telephone books as 2029 Grand, originally a subsidiary of Peerless Lumber Company at 8261 San Leandro.

CITY PROPERTY, 2041-43 GRAND

At the time of Taylor & Company's demise, their old wagon shed came to be owned by the City of Alameda and the south boundary of a parcel 175 feet on Grand by about 235 feet deep. They City may have retained title north to the water, but it used only the 175-foot frontage.

The City Dog Pound was listed here at 2043 Grand 1916-1983. Originally a setback building, its street frontage was added in 1940. Building permits show other repairs and additions 1959-79. The pound was contained within a fence.

The rest of the City's parcel was occupied by the "Corporation Yard" 1917-43 or longer, and by the "Street Department" 1974-83 or longer. Asphalt, concrete and various petroleum products would have been stored and perhaps used on the site. Of buildings, by 1932 the old wagon shed became a place for "Autos and Equipment" and there were two small frame garages. In 1937 and 1939 $18,000 brought more garages and a work shop. The 1948 Sanborn shows separate shops for carpentry, auto repair and blacksmith; Taylor & Company's old wagon shed had vanished. There were four more building permits for minor construction in the 1950s, and the 1970 Sanborn shows seven buildings in the City Corporation Yard, plus the Dog Pound. The 1984 telephone book gave Fortmann Way addresses for both City functions (#1590 and 1616).

UNION OIL COMPANY, 2047 GRAND

Just north of the dog pound, on a roughly 110x250-foot parcel not even mapped by the Sanborn Company in 1910 (and therefore probably not occupied or not even completely filled), stood a substation of the Union Oil Company of California. Their main plant was in Emeryville, but telephone books record this property as their "Marketing Station" 1930-38 and their "Alameda Sales Office" 1941-52. The 1932 Sanborn shows the six-unit tank farm already in place (one small tank has been added since 1970) surrounded by a seven-inch concrete wall twelve feet high. Between it and Grand were a garage and an office; north of the tank farm were pump-house, garage, oil warehouse and equipment storage. An open "filling rack" stood near Grand. These building outlines (except the filling rack) remained through the the 1951 Sanborn, with only an added lean-to east of the oil warehouse. About that time Union Oil sold the facility to Bay Cities Fuel, which in turn sold it to Harbor Tug and Barge (see below) about 1958. The structures all remain today except for disappearance of the equipment storage and small garage buildings.

HARBOR TUG AND BARGE COMPANY, 2051 GRAND

Between Union Oil and the water was Harbor Tug and Barge Company. Product of a 1924 merger between Oakland Launch & Tugboat Company and Henry C. Peterson Inc. (of San Francisco), Harbor Tug and Barge built its Alameda facility in 1928 and was listed there in directories through 1938. Sanborn maps show it on the site through at least 1970. Its main structure was a 40x110-foot floating dry dock, built in 1928, of which the western service wharf remains today. It's just beyond the waterside carpenter shop or boatworks, which also still exists. A two-story frame office building was moved off the site in the early 1930s. The floating dry dock remained through 1948. Retired manager Lester Bedient says the company leased part of its land from the City of Alameda, part from Alaska Packers. On the latter they built a new (or used the pre-existing) marine railway. After Union Oil's departure about 1952, Harbor Tug and Barge took over that property as well. Though no longer listed separately in directories, the company has for some years been a subsidiary of Crowley Maritime (The Red & White Fleet) and in 1986 is listed as operating out of San Francisco's Pier 9.

NEARBY USES

In outline of a bite taken out of the "leg" of the subject land's "pyramid" there are four large edible oils storage tanks. Sanborn maps indicate they were built between 1951 and 1970. Building permits in this time frame have been found for a number of storage tanks at the foot of Paru, the old Alaska Packers address, which covers some 86 acres. The Association built "4 steel tanks and retaining wall" for $34,000 in 1959, and again "4 steel tanks" for $33,000 in 1961. More probable are the Fore Terminals' permits: "2 Storage Tanks for Vegetable Oil Storage" for $21,000 in 1962, or the "4 Tanks" for $53,500 in 1967. Possibly the relevant permit is listed under Encinal Terminals, whose 1521 Buena Vista Avenue address has not been researched. The Alaska Packers and Encinal Terminals operations are described above; Fore Terminals were listed in telephone books at the foot of Paru 1955-84, most of those years with Fore Trucking at the same address. Earlier, Fore Trucking without the Terminals had been in Richmond. They are thought to be another division of Del Monte, and local residents remember the tanks as always operated by Fore Terminals and used to store edible oils such as tallow, molasses and vegetable oils.

Also near the subject property are some East Bay Municipal Utility District uses. A major sewage interceptor (48" diameter) runs underground from the east along Clement, south along Grand and west again on Buena Vista Avenue. At the northeast corner of Grand and Clement, under the sidewalk, there is a small pumping station, constructed in 1952 for $20,000, that lifts waste water from the community into the interceptor.

The City of Alameda has a storm drain for street water runoff that empties into the Estuary at the north end of Grand Street. It is pumpless and gravity-fed. The City also has a public boat-launching dock just east of Grand opposite the subject property. A building permit indicates it was constructed, with toilet facilities, in 1982 for $90,000.

The nearby railroad tracks are part of the Alameda Belt Line, "owned in equal shares by the Santa Fe and Western Pacific Railroads. It was formed in 1928 to handle freight for a dozen industries along the Estuary. This line is short in extent, running only between Fruitvale Bridge and the west end of the island. Spurs run alongside berths in Encinal Terminals so that freight can be loaded directly onto railroad cars. These cars then travel to Versailles Avenue where they are switched to the Southern Pacific tracks and engines to continue into Oakland. Or, they are barged from the slip at Sherman Street in Alameda. . . The Southern Pacific also makes a daily run on the rails of the Alameda Belt Line, until it meets its own lines which intersect with it a block east of Webster Street" (Merlin, 1964: p. 44).

MISCELLANEOUS ON-SITE USES

Healy-Tibbets Construction Company, in association with Marin Tug, was a tenant of Encinal Terminals 1980-86. On the area between Fortmann Way and the water, they used approximately 100,000 square feet of warehouse space to store their heavy marine construction equipment for building docks and wharves, pile driving and dredging (Anderson).

Lester Bedient remembers a seaplane operating in the subject area, and two small building permits of 1956 confirm that Marina Seaplane Service was adapting the old Alaska Packers welding building for use as an "aircraft maintenance hangar." However no telephone book listing for Marina or any other seaplane has been found, 1943-70.

At the old vanished 525-foot pier (or the marine railway), the 1948 Sanborn map shows "Marine Ship Repairs," and the 1948 and 1949 telephone books confirm this. The company must have been short-lived, as no other listings have been found and the 1951 Sanborn shows the ship repair yard was "not in operation."

CONCLUSIONS

This limited survey has shown the land of the Encinal Marina project to be filled marshland, with open water on more than half of the parcel. Content of the landfill is unknown. Major uses have always been maritime industry: shipyards, lumber yards, wharehousing, oil distribution, and vegetable oil storage. Minor uses have included the City of Alameda's dog pound and street maintenance yard, and a seaplane service. Most of these uses have handled or produced materials which might have left hazardous wastes behind. Additional land uses may still be discovered, and clarifying historic photographs might be found. The succession of buildings as shown on the enclosed rough tracings of historic Sanborn maps.

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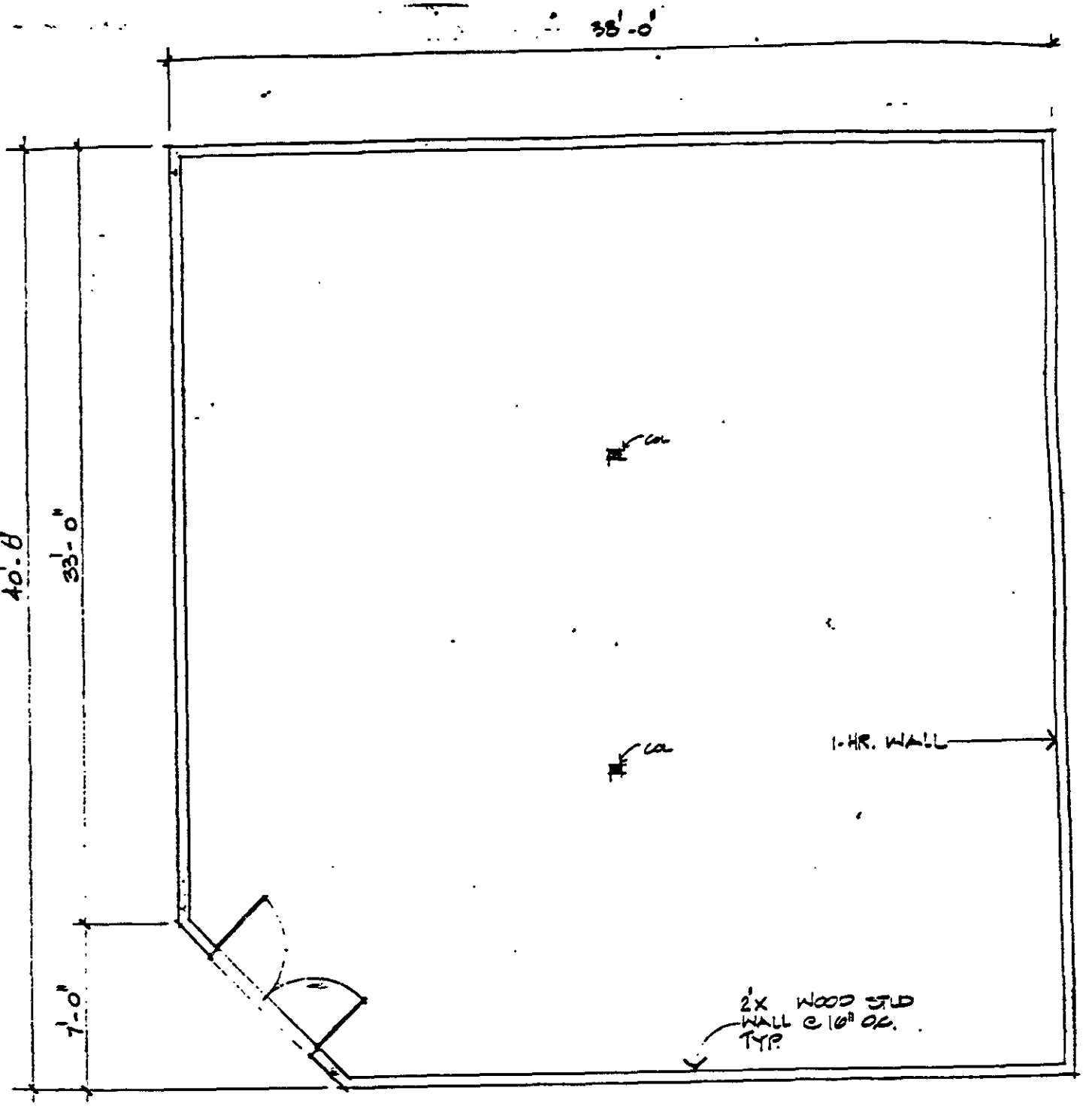

2 FLOOR PLAN

0 1 2 3 4 5 6 7 8 9 10

1/4" = 1'-0"

APPENDIX E VERSAR REPORT
ENVIRONMENTAL RISK ASSESSMENT
THE HABOR TUG AND BARGE COMPANY
GRAND STREET FUEL TERMINAL
June 6, 1990

Versar INC. SACRAMENTO

ENVIRONMENTAL RISK ASSESSMENT
THE HARBOR TUG AND BARGE COMPANY
GRAND STREET FUEL TERMINAL
ALAMEDA, CALIFORNIA

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Versar Job No. 6721.4

June 6, 1990

Versar INC. SACRAMENTO

FOREWORD

This report was prepared by Versar Inc. of Sacramento, California. Mr. Dennis Ryan, Environmental Toxicologist, and Mr. Kayo Dokken, Geohydrologist, conducted the site survey and prepared this report. The report was reviewed by Ms. Anita Trafficante, Manager, Environmental Assessment Programs, Mr. Clarence Johnson, Manager, Regional Development, and Mr. Michael Sellens, Senior Geohydrologist. This final report incorporates comments received by Versar on April 6 and May 14, 1990.

Approved for Release:

for Michael P. Sellens
Clarence Johnson, Division Director
Western Region
Registered Professional Geologist
R.P.G. 4195

DISCLAIMER

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

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 on the dates of the site visits. Changes or modifications to procedures and/or facilities made after the site visits are not included.

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1.0 INTRODUCTION

The Harbor Tug and Barge Company (HTBC), previously leased the Grand Street Fuel Terminal, a fuel storage facility located at 2047 Grand Street, Alameda, California. HTBC, a wholly-owned subsidiary of Crowley Maritime Corporation, was the previous leasor. The site is owned by Encinal Marina, Inc. (Encinal), which operates the property under the name of Grand Marina. A map showing the location of the fuel storage facility is presented in Figure 1-1.

Versar Inc. was retained to perform an environmental risk assessment of the Grand Street Fuel Terminal to identify and evaluate any risks posed to human health and environment by the existing condition of the property. The risk assessment consisted of: (1) interviews with Mr. George Brooks, Manager, Environmental Control for Crowley, to plan and define the scope of the risk assessment; (2) an evaluation of existing information and data on the property and the surrounding area; (3) an evaluation of previous operations on site; (4) a site inspection; (5) the collection of ground water, surface water, and soil samples for analyses for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and xylene (BTEX), and total oil and grease (TOG); and (6) subsequent data analysis and report preparation.

During the site inspection, soil contaminated with petroleum hydrocarbons was found along the north side of the tank farm. The contaminated soil was removed prior to completion of the risk assessment. The results of the risk assessment and soil cleanup are presented in the following sections of this report. Supporting documents are included in the Appendix to this report.

2.0 SITE DESCRIPTION

2.1 Current Land Use

The subject property is currently zoned M-2 (General Industrial). HTBC discontinued fueling operations at the facility in 1989, and the

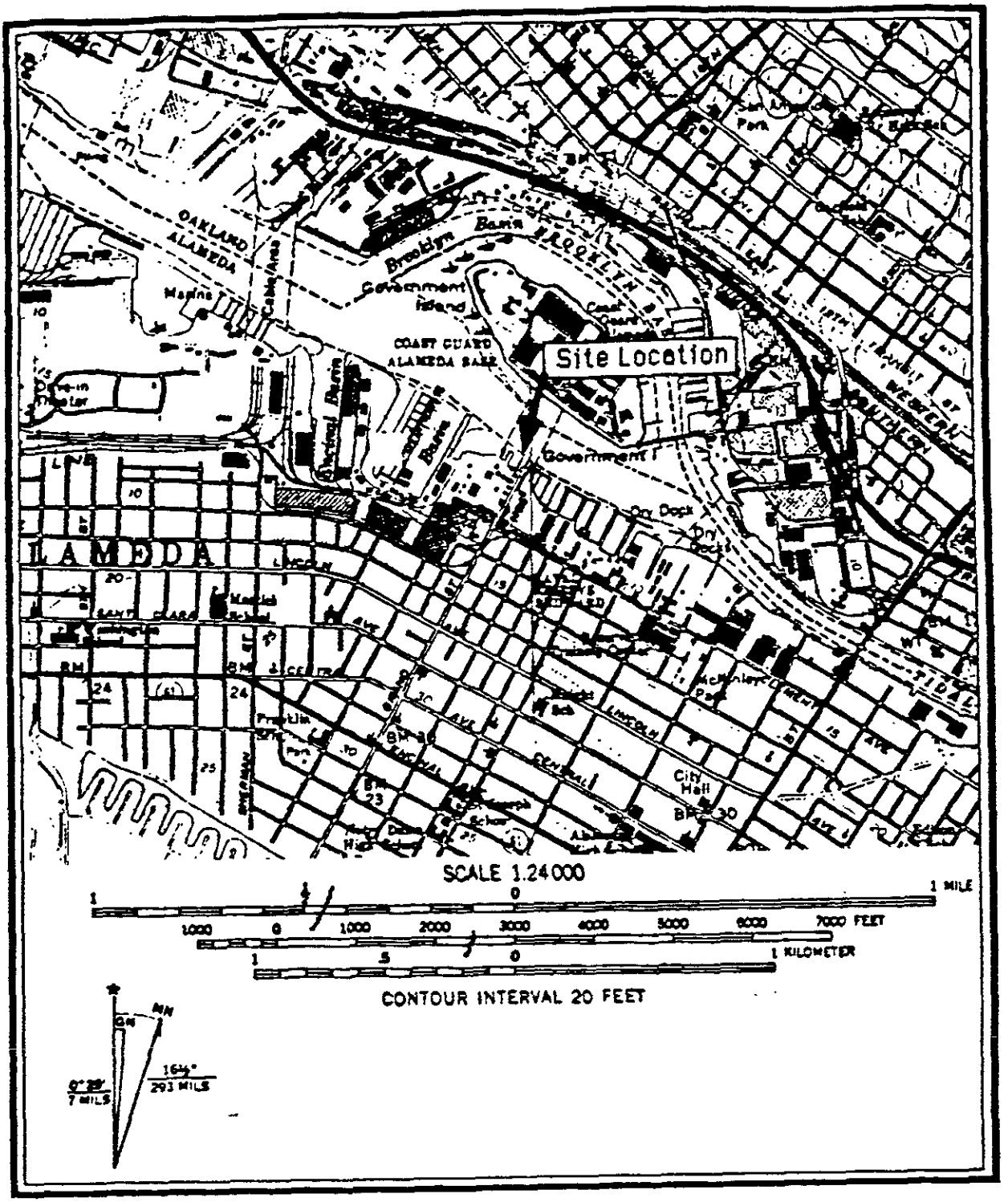

Figure 1-1. Facility Location

storage tanks are currently empty. The facility consists of six permanent above-ground tanks located within a concrete wall containment structure, one skid-mounted tank, one pump house, and an underground pipeline leading from the tanks to the pier where marine vessels were fueled. The six permanent tanks were used to store diesel fuel, and the horizontal skid-mounted tank was used for lube oil storage. An additional skid-mounted tank, used to store slop oil and bilge water from vessels, previously existed on site, but was no longer present at the time of the site visit. The containment wall is approximately six-inches thick and 11-feet tall. The tanks were built on individual concrete pads above the concrete foundation. A facility site plan is presented in Figure 2-1. Photographs of the property are included in Appendix A.

2.2 Surrounding Land Use

The facility is located within the Grand Marina. The Grand Marina office building is adjacent to the facility's eastern boundary, and several boat repair shops border the facility to the south. A fueling pass through system was installed on the southwest side of the office in the summer of 1989. The system is designed to pump fuel directly to the dock to fuel tug boats and is equipped with catchment basins and double-walled pipes. The system is not used or operated by HTBC. North and west of the tank farm is paved marina parking. Two underground storage tanks belonging to Encinal are also located in the parking area, just north of the HTBC site. The Grand Marina provides berthing facilities, a fueling station, and warehouse storage for recreational boats.

Surrounding the marina are commercial, industrial, and governmental operations. Across the harbor to the north is Government Island, the Alameda base of the United States Coast Guard. South of the marina is an above-ground tank farm for the storage of petroleum products. Beyond the marina, to the west and east, are various commercial, industrial, and warehousing operations.

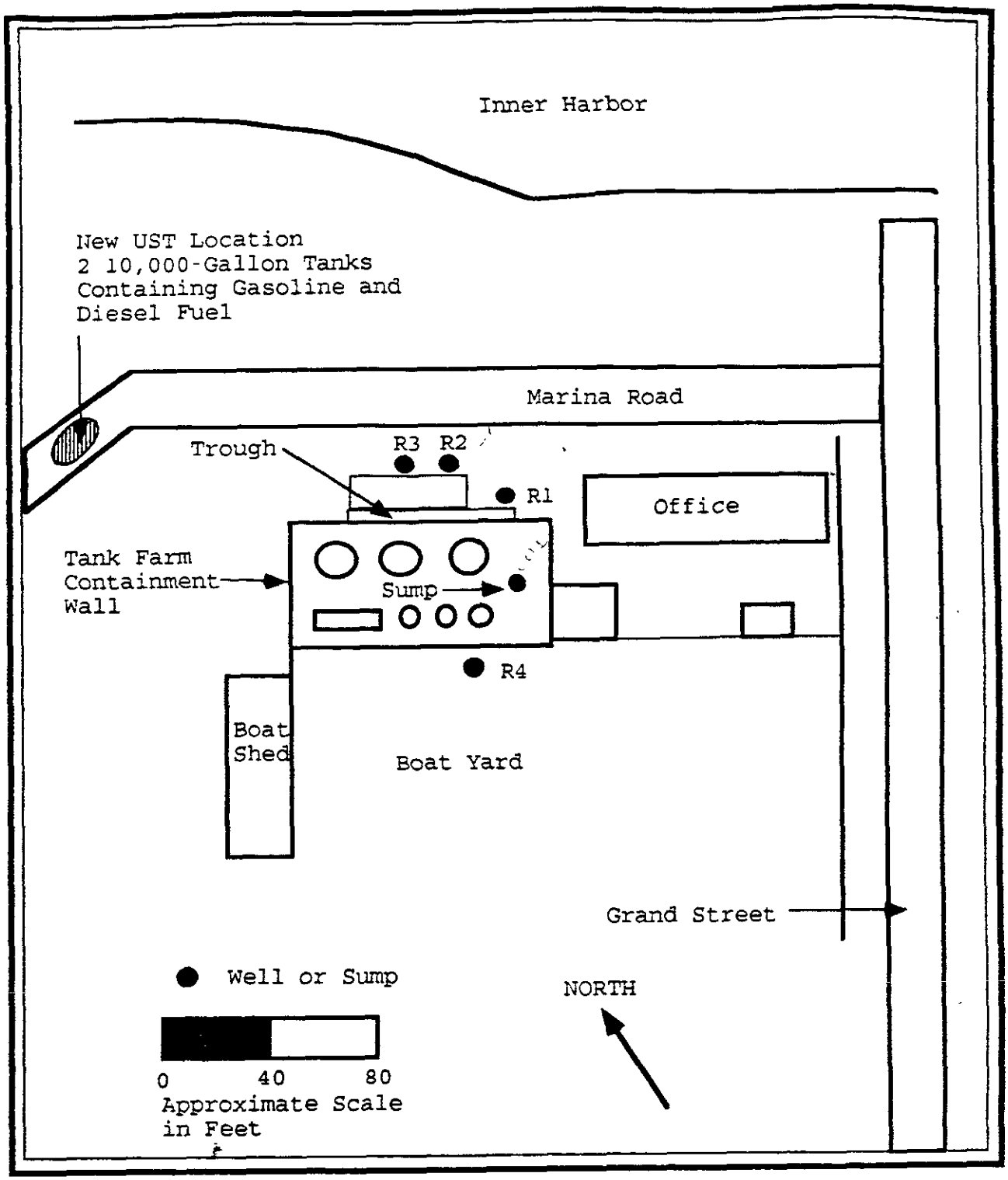

Figure 2-1. Facility Site Plan

2.3 Previous Land Use

The previous land use in the vicinity of the HTBC site was discussed in a report prepared for Encinal by Ms. Anne Bloomfield in March, 1987, and incorporated into the July 17, 1987, report prepared for Encinal by Harding Lawson Associates (see Appendix B). Site history was evaluated for the Encinal Marina project which includes a large area some of which is not part of the subject property. These uses are summarized below.

The Alaska Packers Association, founded in 1893, was one of the first maritime-related industries founded in the area. The Alaska Packers Association operated a shipyard for fishing vessels. The facilities included ship supply and boat storage, various shops, lumber warehouses, and office buildings.

In 1920, the Alaska Packers Association acquired part of the Taylor and Company Mill and Lumber Yard, which was operated at the northwest corner of Grand Street and Clement Avenue from about 1908 to 1917. The City of Alameda acquired the remaining land occupied by Taylor and Company. The City of Alameda used parts of this land for the city dog pound from 1916 to 1983, the corporation yard from 1917 to 1943, and the street department from 1974 to 1983. Asphalt, concrete, and various petroleum products were stored and used by city operations. There were also several shops for blacksmithing, auto repair, and carpentry on city property.

According to the Bloomfield report, Union Oil Company of California (Unocal) constructed a six-unit tank farm on the property by no later than 1932 (The seventh tank, it notes, was added "since 1970"). The report further states that Unocal sold the facility to Bay Cities Fuel in 1951, which in turn sold it to Harbor Tug and Barge Company in 1958 (we are informed that there is no documentation confirming that fact).

The Healy-Tibbets Construction Company was a tenant of the Encinal Marina from 1980 to 1986. Healy-Tibbets used approximately 100,000 square feet of warehouse space to store heavy marine construction equipment for building docks and wharves, pile driving, and dredging.

3.0 ENVIRONMENTAL SETTING

3.1 Geology and Soils

The Bay Area is divided into three physiogeographic regions. The subject property is located in the lowest of these regions, which extends from sea level to an elevation of 200 feet, and consists of nearly level deltas and flood plains. Soils at the site are designated by the U.S. Soil Conservation Service as "Urban Land." The lands included in this designation are areas covered by buildings, roads, parking lots, and other urban structures. The top soil materials consist mainly of heterogeneous fill. The property is underlain by Quaternary marine and nonmarine sedimentary rocks which range from unconsolidated to semi-consolidated.

3.2 Ground and Surface Water

Ground water at the site is encountered at a depth of approximately three feet below the ground surface. The direction of ground water flow at the site has not been determined; however, it would be expected to move from on shore towards the inner harbor. Both ground water flow direction and depth would be subject to tidal flucuations. The water is nonpotable, saline, and there are no known beneficial uses. The nearest surface water is the inner harbor channel located approximately 160 feet northeast of the tank farm site.

3.3 Climate

The site has a marine climate characterized by very little variation in temperature. The annual mean temperature is approximately 58 degrees Fahrenheit and produces 330 frost free days. Precipitation is most

common between October and April and typically ranges from 13 to 25 inches annually. Winds are mild with speeds of less than six miles per hour (mph) more than 50 percent of the time, while winds exceeding 12 mph occur only about 10 percent of the time.

4.0 PREVIOUS ENVIRONMENTAL SAMPLING AND ANALYSES

Two previous environmental investigations detected petroleum contamination in the soils and ground water at the site and adjacent property. In 1987, a report was prepared by Harding Lawson Associates for Encinal to investigate the distribution of petroleum hydrocarbons in soil and ground water at the fuel storage facility leased by HTBC (see Appendix C). The report concluded that soil and ground water on the northern and eastern sides of the tank farm were contaminated with petroleum hydrocarbons, including diesel. The report recommended that contaminated soils be removed and either remediated or disposed of, and the ground water be monitored for contamination. If the ground water contamination decreased over time, no further action was recommended. If contaminant levels did not decrease, it was recommended that extraction and treatment of the ground water should be performed. The contaminated soil identified in the 1987 report was excavated and disposed of at an EPA-approved disposal site in Idaho. Ground water monitoring wells were also installed. An oil-water separator system was not installed due to the lack of recoverable levels of petroleum hydrocarbons in the monitoring wells.

In 1988, a subsurface investigation was performed following the removal of a 1,000-gallon underground gasoline storage tank located at 2041 Grand Street within the marina (see Appendix D). The tank site was located approximately 300 feet south of the subject property at the northeast corner of the intersection of Grand Street and Forteman. The tank is not on the property leased by HTBC, nor was the tank operated by HTBC. Soil samples collected near each end of the tank were analyzed

for BTEX and TPH. The concentrations of petroleum hydrocarbons in the soil were 0.3 parts per million (ppm) of benzene, 0.3 ppm of toluene, 0.7 ppm of ethylbenzene, less than 0.1 ppm of xylene, and 730 ppm of total petroleum hydrocarbons at one end of the tank. No contamination was found in the soil at the other end of the tank. According to the San Francisco Regional Water Quality Control Board (SFRWQCB) guidelines for addressing fuel leaks, remedial action is required if there are any detectable quantities of BTEX, or TPH concentration exceeds 100 mg/kg in the soil. According to Mr. Curt Bolton, Project Manager for the Grand Marina, the tank belonged to the City of Alameda and no remedial efforts were undertaken. Two new underground storage tanks (USTs) were installed in the parking area just north of the HTBC site. The location of the new USTs is shown on Figure 2-1. The tanks are 10,000 gallons each and contain diesel and gasoline. The current tanks are reportedly double-walled, monitored, and permitted.

5.0 SITE INVESTIGATION

5.1 Site Inspection

An inspection of the subject property was conducted by Versar on November 15, 1989. The observations made during the site inspection are presented below.

The fuel storage facility consisted of six permanent above-ground storage tanks which were previously used to store diesel fuel (see Photo 1, Appendix A). Two of the permanent tanks are approximately 22 feet in diameter and 25-feet high, three permanent tanks are approximately 10 feet in diameter and 27-feet high, and one permanent tank is approximately 22 feet in diameter and 35-feet high. A seventh tank which is a horizontal, skid-mounted tank was previously used to store lube oil. An additional skid-mounted tank, used to store slop oil and bilge water from vessels, was previously located on site, but was no longer present at the time of the site inspection. The tanks are

surrounded by a containment wall approximately 11 feet high and six-inches thick. Several cracks were observed in the containment wall (see Photos 2 and 3, Appendix A). Some of the cracks were reportedly caused by an earthquake (Richter Magnitude 7.0) which occurred in the San Francisco Bay area on October 17, 1989. Cracks which were present before the earthquake were enlarged by the ground motion. Since the storage tanks were empty at the time of the earthquake, there is no concern that petroleum was released into the environment through the cracks in the wall. Several cracks were also observed in the tank farm foundation (see Photo 4, Appendix A). The cracks in the foundation did not appear to penetrate through to the underlying soil.

On March 30 and 31, 1989, ultrasonic testing was conducted by Underwater Resources to evaluate the integrity of six tanks at the facility. Because the tanks were completely empty, a visual inspection was made of the interiors of the tanks, as was an audio gauging of the tank floors and walls. There was no evidence of any holes penetrating the tank walls or floors. A letter from Underwater Resources describing the ultrasonic tank test results is included in Appendix E.

A sump located inside the tank farm was filled with ground water at the time of the inspection (see Photo 5, Appendix A). The level of water fluctuates within the sump as a result of tidal action. The sump was constructed to allow ground water to be pumped during extremely high tides to prevent structural damage to the tank farm foundation. Liquid from the sump was pumped during the collection of samples (see Photo 6, Appendix A). When evacuated, the sump was observed to have steel on the sides and bottom, and an opening two inches in diameter near the bottom which permitted ground water to flow into the sump. A sludge consisting of a mixture of sediment and oil was observed at the bottom of the sump (see Photo 7, Appendix A).

On the northeast side of the tank farm, outside the containment wall, is a concrete trough (see Photo 8, Appendix A). This may have been constructed to contain spills and leaks during filling and emptying operations. The concrete trough is broken near the southeast end (see Photo 9, Appendix A), and drain pipes penetrate the northwest end of the trough (see Photo 10, Appendix A).

Four ground water wells, constructed during an environmental investigation in 1987, were found at the property. Three ground water recovery wells, labeled R-1, R-2, and R-3, were located on the northeast side of the tank farm just beyond the concrete trough. The fourth well (R-4), a ground water monitoring well, was located on the southwest side of the tank farm in a paved area which is used for boat repairs. Based on data from previous studies, well R-4 is on the upgradient side of the facility, while wells R-1, R-2, and R-3 are downgradient.

5.2 Environmental Sampling

Four areas were selected for environmental sampling: (1) the water from the harbor; (2) the four on-site ground water wells; (3) the water from the sump in the floor of the tank farm; and (4) two areas of discolored soil. In each case, the samples were collected using decontaminated or dedicated sampling equipment, placed in precleaned sample containers, stored in an ice chest cooled with blue ice, and transported under chain of custody to a state-certified laboratory for chemical analysis. Sample locations are shown in Figure 5-1.

5.2.1 Harbor Water Samples

Three water samples were obtained from the harbor for analysis for TPH. Sample BWC was obtained from harbor water approximately 130 feet northeast of the tank farm, where the tank farm is closest to the harbor. A second harbor water sample, BWR, was obtained 300 feet east of the tank farm. The third harbor water sample, BWL, was obtained approximately 300 feet north-northwest of the tank farm.

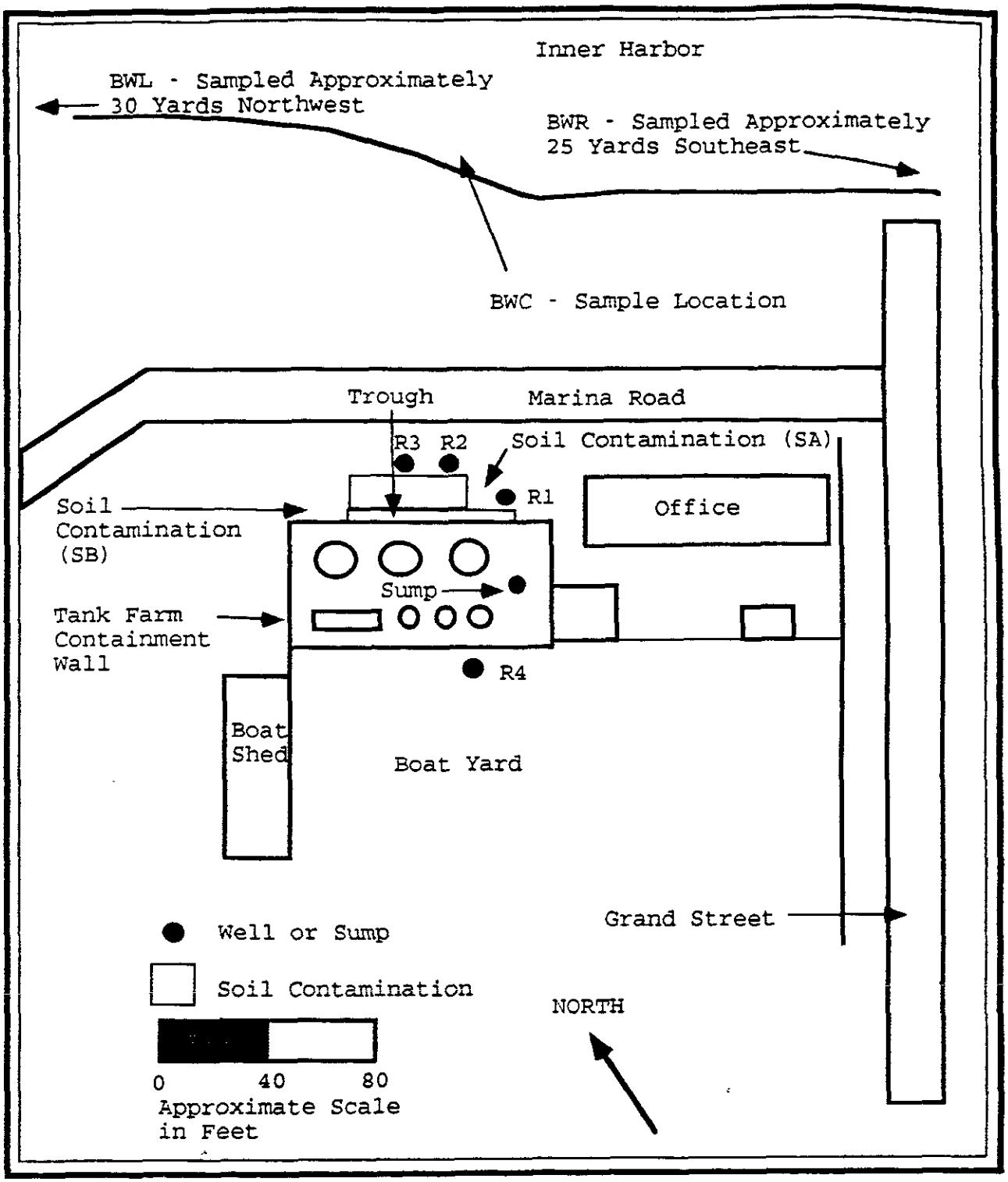

Figure 5-1. Sampling Locations

5.2.2 Ground Water Well Samples

Prior to sampling, a minimum of five casing volumes of water were purged from each of the four ground water wells located on site. The wells were allowed to recover and sampled using dedicated bailers. The water samples had a very slight surface sheen and a petroleum hydrocarbon odor. Measurements were made of the ground water temperature, pH, and conductivity, and the headspace above the ground water samples was tested for organic vapors during well purging and sampling. Ground water purge and sample collection data are included in the Well Purge Data Sheet and the Ground Water Sampling Data Sheet, both of which are included as Appendix F. A ground water sample was collected from each well for analysis for TPH, BTEX, and TOG.

5.2.3 Sump Sample

It was initially believed that the sump was unlined, and that soil samples could be collected through the sides and bottom. However, subsequent evacuation of the sump revealed that the sides and bottom were lined with steel, and that ground water flowed into and out of the sump through a two-inch diameter hole near the bottom in response to the pressure heads induced by tidal action. Therefore, only a ground water sample was obtained from the sump. Prior to collection of the sample, the sump was purged with a vacuum truck. Measurements of ground water pH, conductivity, and temperature, and the organic vapor content of the headspace above ground water samples were made prior to collection of a sample for analysis for TPH, BTEX, and TOG.

5.2.4 Soil Samples

Two soil samples (SA and SB) were obtained from areas with apparent soil contamination, located near the trough, outside the containment wall. A hand auger was used to penetrate to a depth of approximately one foot below the surface, and a drive sampler was employed to obtain a

sample. The samples were collected in decontaminated brass tubes and submitted for analysis for TPH.

5.3 Laboratory Analyses

The samples were analyzed by Chemtech Analytical Laboratories, Inc. The analytes selected for each sample were based upon field observations and sample collection locations. The results of the chemical analyses are summarized in Table 5-1, and the laboratory report of the analytical results is included in Appendix F.

All of the ground water and harbor water samples were analyzed for TPH using EPA Method 8015M. The results of the analyses for all samples were below the reporting limit (BRL) of 0.075 milligrams per liter (mg/l) for petroleum hydrocarbons, except for the sample obtained from the tank farm sump (SUMP), which contained 80 mg/l of diesel. The reporting limit is equivalent to the method detection limit except for those samples where matrix effects interfere with the instrument sensitivity. Four water samples, from wells R-1, R-3, R-4, and the sump, were selected for analyses for BTEX by EPA Method 602/8020. Well R-2 was not analyzed for BTEX due to its close proximity to monitoring well R-3. Sample R-3 was BRL for BTEX at reporting limits of 0.5 micrograms per liter (ug/l) for benzene, 1.0 ug/l for toluene and ethylbenzene, and 2.0 ug/l for xylene. Sample R-1 contained 5.2 ug/l of benzene, 2.2 ug/l of toluene, and 2.6 ug/l of xylene. Sample R-4 contained only benzene and xylene at 2.5 ug/l and 1.1 ug/l, respectively. The water sample from the sump contained 4.3 ug/l of benzene, 15 ug/l of toluene, 3.4 ug/l of ethylbenzene, and 27 ug/l of xylene. Samples R-4 and SUMP were also analyzed for TOG by Method 413.1, but no TOG was detected at the reporting limit of 10,000 ug/l.

Soil samples SA and SB were analyzed for TPH by EPA Method 8015M. Both samples were found to contain petroleum hydrocarbons identified as

Table 5-1. Results of Analyses of Soil and Water Samples

Sample I.D.	Total Oil and Grease EPA Method 413.1[1] ug/l[4]	EPA Method 602/8020[2] Benzene ug/l	Toluene ug/l	Ethylbenzene ug/l	Xylene ug/l	Total Petroleum Hydrocarbons EPA Method 8015M[3] TPH-d mg/l	Sample Type
Harbor Water							
BWR	NA[5]	NA	NA	NA	NA	BRL[6]	Water
BWC	NA	NA	NA	NA	NA	BRL	Water
BWL	NA	NA	NA	NA	NA	BRL	Water
Ground Water							
R-1	NA	5.2	2.2	BRL	2.6	BRL	Water
R-2	NA	NA	NA	NA	NA	BRL	Water
R-3	NA	BRL	BRL	BRL	BRL	BRL	Water
R-4	BRL	2.5	1.1	BRL	BRL	BRL	Water
Sump Water							
Sump	BRL	4.3	15	3.4	27	80	Water
Soil Samples							
SA	NA	NA	NA	NA	NA	19,000[7]	Soil
SB	NA	NA	NA	NA	NA	2,000[7]	Soil

[1]
[2]Reporting limit for TOG 10,000 ug/l
[3]Reporting limit for benzene 0.5 ug/l; toluene 1.0 ug/l; ethylbenzene 1.0 ug/l; and xylene 2.0 ug/l
[4]Reporting limit for TPH-D 0.075 mg/l in water; 10 mg/kg in soil
[5]ug/l = micrograms per liter
[6]NA: Not Analyzed
[7]Below Reporting Limits
Soil samples reported as milligrams per kilogram (mg/kg)

diesel at 19,000 milligrams per kilogram (mg/kg) for sample SA, and 2,000 mg/kg for sample SB.

6.0 SOIL REMEDIATION

The results of the soil analyses showed that two areas of surface soil contamination, the first approximately 21 square feet and the second approximately 48 square feet, were present on the north side of the tank farm. To decrease the possibility of exposure to the petroleum hydrocarbons, approximately nine cubic yards of contaminated soil were excavated and transported to the GSX Class II landfill at Taft, California. Copies of the Uniform Hazardous Waste Manifests are included in Appendix G. Following the excavation of the contaminated soil, clean imported fill was placed in the excavation. During excavation at the northwest end of the trough, the corner of a foundation was exposed. According to Mr. Bolton of Grand Marina, it belonged to a structure approximately half the size of the tank farm. The location of foundation is included in Figure 6-1.

Following the excavation of the contaminated soil, sampling was conducted following the procedures described in Section 5.2. Sample locations and results are presented in Figure 6-1. An examination of the excavation wall showed that the contaminated soil extended under the tank farm and the pump house, and that some residual contamination was present under clean soil in the zone of tidally-induced ground water fluctuation. The laboratory report indicated the following sample results. Samples collected from the clean soil above the zone of fluctuation (i.e., samples SA-2 and CMGS-1) contained no detectable concentrations of petroleum hydrocarbons. Soils within the zone (i.e., samples CMGS-2 and CMGS-4) contained between 100 mg/kg (i.e., parts per million or ppm) and 145 mg/kg of diesel. Soil sampled under the pump house (i.e., sample CMGS-6) contained 900 mg/kg of diesel. Soil sampled under the tank farm (i.e., sample SB-2-F) contained 1,600 mg/kg of

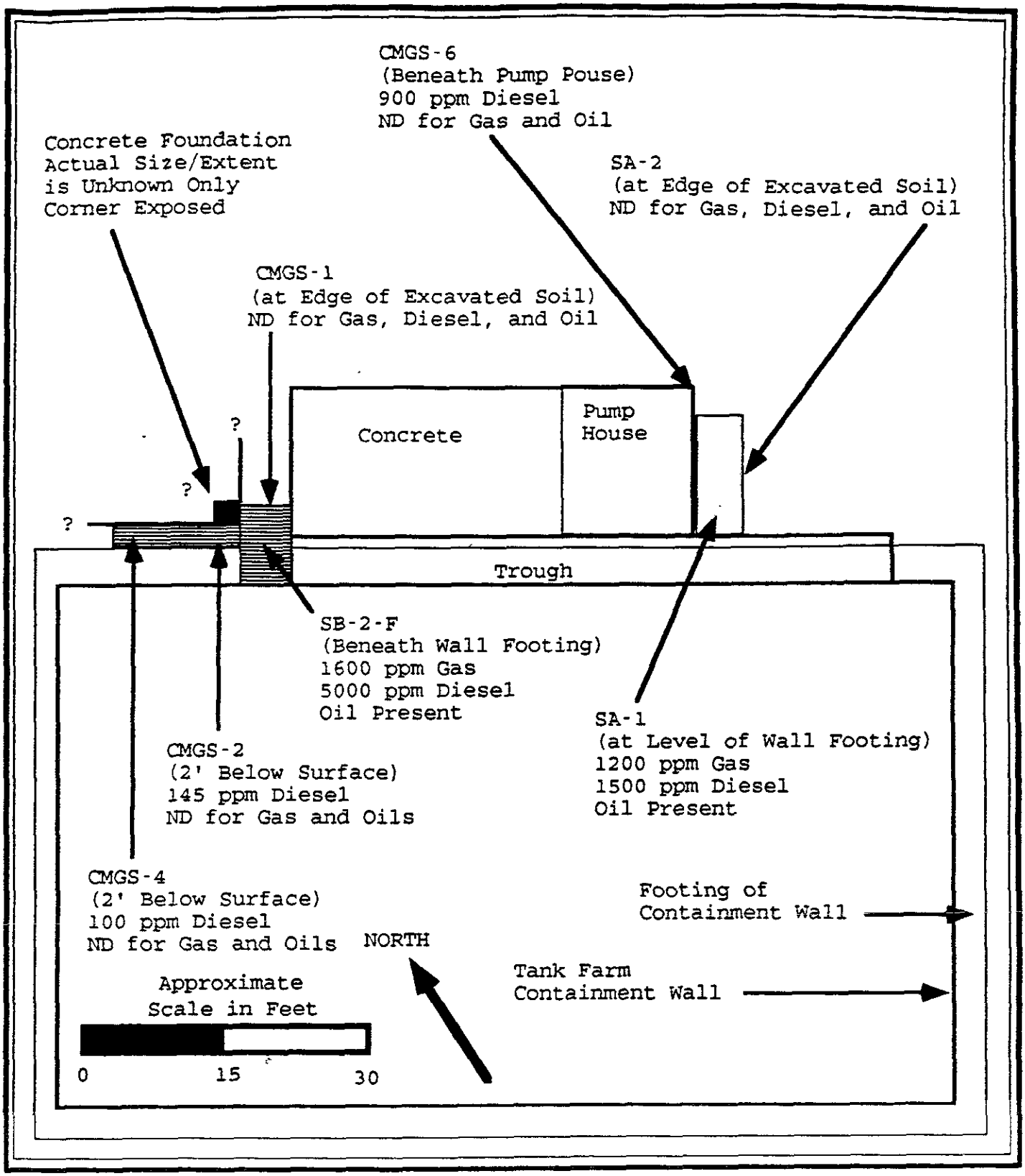

Figure 6-1. Sampling Locations and Analytical Results

gasoline and 5,000 mg/kg of diesel. Soil sampled at approximately the same horizon as the wall footing (i.e., sample SA-1) contained 1,200 ppm gasoline and 1,500 ppm diesel.

7.0 LOCATIONS AND SOURCES OF CONTAMINATION

Petroleum hydrocarbon contamination has been identified in the soil and ground water beneath and northeast of the tank farm. Two remedial actions, one undertaken in 1987 and a second as part of this study, have resulted in the removal of all contaminated soil from the surface to the water table, except for the soil directly under the tank farm and pump house. The soil under the tank farm has the highest concentration (up to 6,600 mg/kg) of petroleum hydrocarbons. A soil sample containing 900 mg/kg of diesel was collected under the pump house. The contaminated soil within the aquifer, including the zone of tidal fluctuation, has concentrations of petroleum hydrocarbons ranging up to 145 mg/kg of diesel of hydrocarbons. Because ground water samples from well R-I, R-2, and R-3 did not contain petroleum hydrocarbons at the reporting limit, and only wells R-1 and R-4 contained BTEX (at very low levels), hydrocarbons in this zone appear to be adsorbed onto the soil grains and relatively immobile.

The concentration of petroleum hydrocarbons in the ground water is highest in the area of the sump in the tank farm, and decreases rapidly away from that point. The ground water in the sump contains 80 mg/l of petroleum hydrocarbons, and low concentrations of BTEX. Although the ground water samples from the monitoring wells were not reported to contain petroleum hydrocarbons at a reporting limit of 0.075 mg/l, very low concentrations of BTEX were found in wells R-1 and R-4.

The possible on-site sources for the contamination include releases into ground water from the open sump inside the tank farm; spills into adjacent soil from the concrete containment trough outside the north wall of the tank farm; spills from tank truck lines after pumping into

tanks; previous users of the site; and illegal disposal of waste petroleum products by trespassers. Based on available information, it appears that most of the diesel contamination is a result of spills which entered the subsurface through the sump in the tank farm and spills outside the northeast wall of the tank farm during fueling operations or tank farm resupply. The source of the gasoline, which was not stored at the tank farm, is less certain. The gasoline contamination is restricted to a small area along the edge of the northeast wall. The gasoline has not percolated through the soils to the depth which diesel has, as demonstrated by sample SB-2F, which has 5,000 mg/kg of diesel and 1,600 mg/kg of gasoline at the surface, and sample MGS-2, which has 145 mg/kg of diesel but no gasoline present. It would appear, therefore, that the gasoline release may be a result of the leaking underground storage tank removed from a nearby property, located approximately 300 feet south of the site or from the illegal disposal by trespassers on the property. Crowley personnel have noted the presence of waste petroleum products left at the site since the termination of the HTBC operations. Further investigation would be required to define the source of the gasoline contamination.

The tanks within the tank farm do not appear to be a source of the released hydrocarbons, at least during HTBC's tenure, for three reasons: a recent ultrasonic test and visual inspection by Underwater Resources did not find any areas of structural weakness or holes which penetrated the tanks; no significant loss of product has ever been reported during the time Crowley has occupied the site; and the low concentrations and the distribution of hydrocarbons found in the ground water are not consistent with a large release of product.

Potential off-site sources of petroleum contamination include residual contamination from a leaking underground gasoline storage tank which, as previously mentioned, was removed in 1988 from a nearby property; residual contamination from previous commercial and industrial

operations in the area; and spills and leaks which may have occurred from a neighboring fuel storage facility. Further investigation would be required to define the potential off-site sources.

8.0 RISK ASSESSMENT

8.1 Toxicity of the Contaminants

Petroleum hydrocarbon fuels and oils are mixtures of hydrocarbon compounds, rather than discreet compounds. The toxicity of any petroleum hydrocarbon is, therefore, dependent on the concentration and toxicity of each of the compounds present. For diesel fuel and lubricating oils, which either do not have BTEX compounds or have them in very low concentrations, the inherent toxicity is comparatively low. Gasoline, which typically contains 14 to 18 percent of BTEX, has a higher toxicity. The compound of greatest concern in petroleum hydrocarbons is benzene, which is a carcinogen. Toxicity data for these compounds are given in Table 7-1. The California Department of Health Services Maximum Contaminant Level (MCL) for benzene in drinking water is given; however, this standard is not directly applicable to the ground water at the site because the aquifer is saline, nonpotable, and has no known beneficial uses in the area.

Petroleum hydrocarbons are not bioaccumulative, and, at low to moderate levels, prolonged exposure is necessary for symptoms to appear.

8.2 Pathways of Exposure and Receptor Populations

Potential pathways of environmental exposure are through soil, storm water run-off, air emissions, ground water, and surface water. Potential receptor populations include humans and aquatic life. Because only landscaping vegetation is present around the facility, the effect of the contamination on plants is not of concern.

The contaminated surface soil has been removed, and clean fill placed in the excavation. This effectively eliminates the threat of

Table 7-1. Toxicity Data for Benzene, Gasoline, and Diesel Fuel

Compound	TLV[1] (mg/m^3)	STEL[2] (mg/m^3)	Toxic Dose (g/kg)	MCL[3] (mg/l)	Aquatic Acute (ug/l)	Aquatic Chronic (ug/l)
Benzene	30	75	0.05 - 0.5	0.001	5.1	0.7
Gasoline	900	1,500	0.5 - 5	NE[4]	90	NE
Diesel fuel	NE	NE	5 - 15	NE	20 - 200	NE

[1]ACGIH threshold limit value

[2]ACGIH short term exposure level

[3]Maximum contaminant level for drinking water

[4]Not established

incidental human exposure through ingestion of soil, inhalation of wind-blown dust, and dermal contact. Similarly, concerns about migration of the contamination through storm water run-off are mitigated by the removal of the contaminated surface soil. If excavation of soil were undertaken for improvements on the lot, the open areas could lead to some exposure through dermal contact or inhalation of dust. However, the low levels of residual petroleum hydrocarbons measured in those areas (i.e., up to 145 mg/kg) would not result in significant exposure during the short time period of contact. The high moisture content of the soil in the zone of ground water fluctuation, where the residual contamination is found, would further serve to limit the dust and the release of hydrocarbon vapors.

Analysis of the ambient air above the contaminated soil with a portable organic vapor analyzer did not detect the presence of organic vapors, nor were petroleum hydrocarbon odors noticed. It is probable that the volatile components of diesel fuel and heavier petroleum hydrocarbons have vaporized, or are fixed through adsorption on soil grains. No health or environmental risks were detected with the contaminated soil exposed at the surface. Excavation of the soil and replacement with clean fill has ensured that air emissions will not create a problem in the ambient air at the marina.

During the excavation of the contaminated soil, organic vapors were detected at the face of the excavation in the area contaminated with gasoline at concentrations up to 45 ppm. Eighteen inches above the face, the concentration of vapors decreased to five ppm. Two hours after the soil had been exposed, the concentration had decreased to 10 ppm at the face, and less than one ppm 18 inches above the face. The concentration of organic vapors did not exceed two ppm at the face of the excavation away from the area of gasoline contamination.

Excavation represents the worst case for exposure to air emissions at the site. This worst case did not exceed the Threshold Limit Value (TLV) for gasoline of 900 milligrams per cubic meter (mg/m^3) which is equivalent to 300 ppm. Because exposure during excavation would be short in duration, and the vapor concentration is low, no significant health risk as a result of exposure to air emissions is present at the site.

The ground water contamination appears to be confined to the immediate area of the tank farm by the low transmissivity of the aquifer. From a high of 80 mg/l of TPH in the tank farm sump, the level of petroleum hydrocarbons drops to BRL for TPH in the monitoring wells. However, total BTEX of 10 ug/l was detected in monitoring well R-1. Given the length of time the contamination has been in the subsurface, if significant migration of the contamination were occurring, the concentration of hydrocarbons in the ground water would be more evenly distributed.

The only chemical for which the MCL for drinking water is exceeded is benzene. The MCL is 1.0 ug/l. Benzene is found in concentrations up to 5.2 ug/l in R-1. However, the MCL is for drinking water, and the contaminated aquifer is saline, nonpotable, and has no known beneficial uses. In the absence of use of the water in the aquifer, there is no identified environmental risk posed by the petroleum hydrocarbons in the ground water.

Although the flow of ground water to the harbor is very slow, a small amount is discharged to the bay annually. Chemical analyses of samples of harbor water did not detect the presence of petroleum hydrocarbons. If petroleum hydrocarbons were entering the harbor at concentrations below the detection limit of the TPH analysis, the effect on aquatic life would be negligible. In the worst case, the highest concentrations found in the monitoring wells are a minimum of two orders

of magnitude lower than the reported acute and chronic toxicity levels for saltwater species (see Table 7-1). Rapid dilution would further lower the concentrations in the harbor. Because there is no swimming or fishing in the harbor, no human exposure to petroleum hydrocarbons through direct contact or ingestion of aquatic organisms would be expected. Further, petroleum hydrocarbons are not bioaccumulative; even if extremely low concentrations of hydrocarbons were released to the harbor, no cumulative effects would be passed through the food chain to higher aquatic life or humans.

9.0 CONCLUSIONS

Petroleum hydrocarbons have been found in the soil and ground water at the HTBC tank farm at 2047 Grand Street. Two remedial actions have removed the contaminated soil exposed at the surface. As a result, exposure through ingestion, dermal contact, inhalation of dust, and respiration of vapors has effectively been eliminated. Even the worst case exposure, which would occur during excavation of the soil, would not adversely impact human health or the environment.

Although benzene is present in the ground water slightly above the MCL for drinking water, the aquifer is saline, nonpotable, and has no known beneficial uses. Further, the low transmissivity of the aquifer has limited the migration of the contamination to a small area around the tank farm. Because there is no reason to expect that the aquifer will be developed as a source of water, there are no health or environmental risks associated with the presence of the petroleum hydrocarbons in the ground water.

Based on the levels of hydrocarbons present in the downgradient monitoring wells, the maximum concentration of contaminants entering the harbor through ground water discharge would be at least two orders of magnitude below the acute and toxic concentrations for salt water aquatic life. Because of the low rate of flow of ground water into the

harbor, dilution would rapidly decrease the concentration of any petroleum hydrocarbons. There is no fishing or swimming in the harbor, and human contact would be very limited. Finally, petroleum hydrocarbons are not bioaccumulative and increased exposure as a result of concentrating the hydrocarbons through the food chain is not a concern.

Based on the inherent toxicity, pathways of exposure, receptor populations, and concentration and distribution of the petroleum hydrocarbons, the contamination in the soil and ground water do not present a risk to human health or the environment, nor will it impact any operations at the tank farm or activities at the surrounding sites.

10.0 APPENDIX

Appendices A through G comprise the technical Appendix to this report. The contents of the Appendix are listed below.

Appendix A. Photographs Taken During the Site Visit to HTBC

Appendix B. Environmental Assessment, Encinal Marina, Alameda, California, July 17, 1987

Appendix C. Petroleum Hydrocarbons in Soils and Ground Water, Fuel Storage Area, Encinal Marina, Alameda, California, July 17, 1987

Appendix D. Subsurface Investigation at 2041 Grand Street, Encinal Marina

Appendix E. Results of the Ultrasonic Tank Tests

Appendix F. Ground Water Sampling Data and Laboratory Analytical Results

Appendix G. Hazardous Waste Manifests

VERSAR
GROUNDWATER SAMPLING DATA
AND LABORATORY ANALYTICAL RESULTS

Versar INC. SACRAMENTO

APPENDIX F

Ground Water Sampling Data and Laboratory Analytical Results

CHEMTECH

ANALYTICAL LABORATORIES

DATE REPORTED:

November 28, 1989

LABORATORY FILE CODE:

1099CT

REPORTED TO:

CLIENT PROJECT NAME/CODE:

6721.4

VERSAR INC.
5330 Primrose Drive
Suite #228
Fair Oaks, CA 95628

The Environmental Service Division of, *CHEMTECH Analytical Laboratories, Inc.*, has completed analyses requested for the project listed above.

If you have any question concerning this report please contact *CHEMTECH's* Client Services Division at (916) 635-3962.

Thank you for using the environmental services of *CHEMTECH Analytical Laboratories, Inc.*

Sincerely,

MARK MASINO
Executive Vice President
Environmental Division

CHEMTECH ANALYTICAL LABORATORIES, INC.
ENVIRONMENTAL SERVICES

ANALYTICAL DATA RESULTS

ANALYSIS: Petroleum Hydrocarbons
(METHOD 8015M)

CLIENT PROJECT NAME/CODE: 6721.4

LABORATORY FILE CODE: 1099CT

Sampled: 11-15-89

Received: 11-16-89

Unless noted in the cover letter: samples received by CHEMTECH ANALYTICAL LABORATORIES, INC. met EPA/DOHS sampling containers/shipping guidelines and were extracted/analyzed within the specified holding period.

CHEMTECH ID CODE:	SAMPLE DESCRIPTION	MATRIX TYPE	DATA RESULTS CALCULATED/REPORTED PER PETROLEUM HYDROCARBON FRACTION Gasoline C1 - C12	Kerosene C10-C18	Diesel C12-C20	Oils C22++
891448	BWR	W	ND	ND	ND	ND
453	BWC	W	ND	ND	ND	ND
458	BWL	W	ND	ND	ND	ND
463	R1	W	ND	ND	ND	ND
469	SUMP	W	ND	ND	80	ND
473	R2	W	ND	ND	ND	ND
478	R3	W	ND	ND	ND	ND
484	R4	W	ND	ND	ND	ND
488	SA	S	ND	ND	19000	ND
489	SB	S	ND	ND	2000	ND

REPORTING LIMITS/UNITS: Water - 0.075 mg/L,ppm Soil - 10 mg/Kg,ppm

ND = NOT DETECTED AT OR ABOVE THE REPORTING LIMIT

S = Soil SC = Soil Composite
W = Water HZ = Waste

DATA RESULTS APPROVED BY: [signature] DATE: 11-29-89

3017 - GORE ROAD #110 • RANCHO CORDOVA CA 95742 PHONE (916) 635-3962 • FAX (916) 635-9334

CHEMTECH ANALYTICAL LABORATORIES, INC
ENVIRONMENTAL SERVICES

A N A L Y T I C A L D A T A R E S U L T S

ANALYSIS: *Benzene, Toluene, Ethylbenzene, Total Xylenes (BTEX)*
(EPA METHOD: 602/8020)

CLIENT PROJECT NAME/CODE: 6721.4

LABORATORY FILE CODE: 1099CT

Sampled: 11-15-89

Received: 11-16-89

Unless noted in the cover letter: samples received by CHEMTECH ANALYTICAL LABORATORIES, INC. met EPA/DOHS sampling containers/shipping guidelines and were extracted/analyzed within the specified holding period.

CHEMTECH ID CODE:	*SAMPLE DESCRIPTION:*	*MATRIX TYPE*	*AMOUNT DETECTED OF EACH COMPOUND* Benzene	Toluene	E. Benzene	Xylenes
891465	R-1	W	5.2	2.2	ND	2.6
891470	SUMP	W	4.3	15	3.4	27
891480	R-3	W	ND	ND	ND	ND
891485	R-4	W	2.5	1.1	ND	ND

REPORTING LIMITS/UNITS:

	Benzene	Toluene	E.Benzene	Xylenes	
Water -	0.5	1.0	1.0	2.0	ug/L, ppb
Soil -	0.005	0.01	0.01	0.01	mg/Kg, ppm

ND = NOT DETECTED AT OR ABOVE THE REPORTING LIMIT

S = Soil *SC = Soil Composite*
W = Water *HZ = Waste*

DATA RESULTS APPROVED BY: Mark Valenti DATE: 11-29-89

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CHEMTECH ANALYTICAL LABORATORIES, INC.
ENVIRONMENTAL SERVICES

ANALYTICAL DATA RESULTS

ANALYSIS: Oil & Grease
(EPA METHOD 413.1, 9070)

CLIENT PROJECT NAME/CODE:	LABORATORY FILE CODE:
6721.4	1099CT

Sampled: 11-15-89 Received: 11-16-89

Unless noted in the cover letter; samples received by CHEMTECH ANALYTICAL LABORATORIES, INC. met EPA/DOHS sampling containers/shipping guidelines and were extracted/analyzed within the specified holding period.

CHEMTECH ID CODE:	SAMPLE DESCRIPTION	MATRIX TYPE	AMOUNT DETECTED OIL & GREASE
891468	SUMP	W	ND
891483	R-4	W	ND

REPORTING LIMITS/UNITS: Water - 10 mg/L,ppm Soil - 10 mg/Kg,ppm

ND = NOT DETECTED AT OR ABOVE THE REPORTING LIMIT

S = Soil SC = Soil Composite

W = Water HZ = Waste

DATA RESULTS APPROVED BY: Mark Mason DATE: 11-29-89

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CHEMTECH ANALYTICAL LABORATORIES, INC.

Q U A L I T Y A S S U R A N C E R E P O R T

The "*Quality Assurance Report*" is an integral part of *CHEMTECH's "Analytical Data Report"*. The *QRA* combines the *industry-standard* QC requirements with *CHEMTECH's routine* and *client specific* QC results which are critical for evaluating the "*Data Results*".

Quality assurance protocols may vary depending upon the analysis, sample matrix and regulatory agencies/project specific requirements. *CHEMTECH* has available, upon request, a technical bulletin which summarizes/defines technical terms and protocols.

- Tech Bulletin Number 2- "*TECHNICAL REFERENCE GUIDE*"

Since *CHEMTECH's* Quality Assurance Reports are "*CUSTOMIZED*" for each project, only the items with an asterisk (*) are contained in this QA/QC report.

(**) PETROLEUM & FUEL HYDROCARBONS ANALYSIS

(*) Method Blank Results
(*) Calibration Verification Results
(*) Laboratory Control Sample Results/Control Chart
( ) Surrogate/Peak Indexing Compound Results/Control Chart
( ) Duplicate Sample Results/Control Chart
( ) Spike Sample Results/Control Chart
( ) Modification/Clients Specific QC Results

(**) VOLATILES by GC & GC/MS (8010/20, 601/2, BTEX, 8240/624)

(*) Method Blank Results
(*) Calibration Verification Results
(*) Laboratory Control Sample Results/Control Chart
( ) Surrogate/Recovery Results/Control Chart
( ) Duplicate Sample Results/Control Chart
( ) Spike Sample Results/Control Chart
( ) Modification/Clients Specific QC Results

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CHEMTECH ANALYTICAL LABORATORIES, INC.

QUALITY ASSURANCE REPORT

(**) *PETROLEUM & FUEL HYDROCARBON ANALYSIS*
(**) *VOLATILES (BTEX, 602/8020)*

Method Blank Results: The method blank which was extracted and/or analyze with the samples received contained *NO DETECTABLE* compounds at or above one-half (50%) of the "Reporting Limit" listed on each analytical data sheet for this method.

Calibration Verification Results: All compounds listed on the analytical data sheets were within the "Control Limits" outlined in the Tech Bulleti #989-TRG.

Laboratory Control Sample (LCS) Results

Every analytical sample result is associated with an LCS sample/batch anlysis. Unless noted below, the results of the LCS were within EPA/DOHS QA/QC guidelines.

APPROVED BY: _____ DATE: 11-29-89

3017 KILGORE ROAD #110 • RANCHO CORDOVA CA 95742 PHONE (916) 635-3962 • FAX (916) 635-9331

COUNTY OF ORANGE, HEALTH CARE AGENCY
ENVIRONMENTAL HEALTH (714) 834-8020
1725 WEST 17TH STREET, P.O. BOX 355
SANTA ANA, CA 92702
WASTE MANAGEMENT SECTION

CHAIN OF CUSTODY

E TO BE HANDLED AS COURT EVIDENCE, AND ARE TO BE PROPERLY STORED IN A
N.

EGIBLY.

RM TO THE ORIGINAL REPORT OF THE ANALYTICAL RESULTS AND RETURN THEM TO THIS
ATORY RESULTS RECEIVED WITHOUT PROPER CHAIN OF CUSTODY DOCUMENTATION WILL
D.

LETED BY LABORATORY ANALYST

:

DITION (PLEASE CHECK):

COUNTY SEAL(S) INTACT: ___

GOOD CONDITION: ___

COMPLETED: ___

5. TO BE COMPLETED BY SAMPLE COLLECTOR

SAMPLE LOCATION: [illegible]

DATE OF COLLECTION: [illegible]

SAMPLE COLLECTOR: [illegible]

TELEPHONE NO.: [illegible]

SAMPLE INFORMATION

RMINATION QUESTED	SAMPLE DESCRIPTION/COMMENTS
[illegible]	[illegible]
"	" " " " " " "
"	" " " " " " "
"	" " " " " " "
"	" " " " " " "

CHAIN OF CUSTODY

SIGNATURE	TITLE	INCLUSIVE DATES
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible] - 11/20/[illegible]
[illegible]	Geon. Geologist	11-20-89 - 11-20-89
[illegible]	LAB TECH	11-20-89 - 11-20-89

HITE-RETURN THIS COPY TO ENVIRONMENTAL HEALTH, CANARY-LABORATORY COPY
INK-CONTRACTOR/CONSULTANT COPY, GOLDENROD-OFFICE COPY

Remarks

(Signature) (Printed)

(Printed)

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

		Depth	Depth to Water (ft)			Time			Purge	
WELL	Date(M/D)	of Well	BP	AP	BS	SP	EP	SS	Vol(gal)	Notes
R-1	11/15/89	5.8'	1.40	1.55	1.35	1050	1110	1400	20	
	↓	↑								
R-2		7.50'	1.85	2.75'	1.65	1205	1235	1440	16	
R-3		8.95'	4.38	4.45	4.15	1125	1145	1500	16	
R-4		10.45'	1.45'	2.70'	1.50'	1345	1530	1520	18	

Versar INC. **GROUND WATER MONITORING DATA SHEET**

DATE 11-15-93 LOCATION Crowley - Grand ST

Well Name	Depth (ft)	Temp (°C)	pH (SU)	Cond (mho/cm)	OVA (ppm)	Sheen	Odor	Free Product	Turbid	Notes
R-1	5.8'	15.2	7.42	6642		present	present	none	low	Development
		14.2	7.47	3660		↓	↓	↓	↓	↓
		14.3	7.57	5060						
		14.3	7.44	5938	N.S. >150	↓	↓	↓	↓	sample
R-2	7.50'	16.3	7.51	4320		present	present	none	low	Development
		16.3	7.49	7210		↓	↓	↓	↓	↓
		16.0	7.48	7120						
		16.0	7.58	8150	N.S. >100	↓	↓	↓	↓	sample
R-3	8.95'	16.3	7.31	10195		present	present	none	low	Development
		16.1	7.34	11010		↓	↓	↓	↓	↓
		15.8	7.38	10525						
		16.4	7.46	9610	N.S >100	↓	↓	↓	↓	sample

Versar INC. GROUND WATER MONITORING DATA SHEET

DATE 11-15 91 LOCATION Crowley - Gould St

Well Name	Depth (ft)	Temp (°C)	pH (SU)	Cond (mho/cm)	OVA (ppm)	Sheen	Odor	Free Product	Turbid	Notes
R-4	10.45'	19.3	7.31	6910		present	present	none	low	Development
		19.3	7.70	9480		↓	↓	↓	↓	↓
		18.5	7.40	7940	H.S. >150	↓	↓	↓	↓	Sample

CHEMTECH
ANALYTICAL LABORATORIES

Versar INC.
5330 Primrose Drive #228
Fair Oaks, CA 95628

Attn: S. Wilson

Re: Project: 6695.013
Lab Reference No.1220

Date Samples Received:01-23-90
No. Samples Received:12

The samples were received by CTAL intact and accompanied by required documentation.

Please call if we can be of further assistance.

Sincerely,

C.R. Todd

C.R. Todd
Laboratory Director

3017 KILGORE ROAD #110 • RANCHO CORDOVA CA 95742 PHONE (916) 635-3962 • FAX (916) 635-9331

CHEMTECH ANALYTICAL LABORATORIES
ANALYSIS REPORT:TPH, EPA MOD/8015
CLIENT: Versar
Date Samples Received:01-23-90
Date Samples Completed:01-28-90
Sample ID:SB-2-F
Lab ID:892435
Matrix:Soil

Contact: S. Wilson
P.O. #:
CT ID:1220

COMPOUND	mg/kg (ppm)	REPORTING LIMIT mg/kg (ppm)
GASOLINE	1600	10
KEROSENE	ND	10
DIESEL	5000	10
FUEL OIL	ND	10

NOTE: (ND) NOT DETECTED AT OR ABOVE THE REPORTING LIMITS.

CHEMTECH ANALYTICAL LABORATORIES
ANALYSIS REPORT:TPH, EPA MOD/8015
CLIENT: Versar
Date Samples Received:01-23-90
Date Samples Completed:01-28-90
Sample ID:SA-2
Lab ID:892433
Matrix:Soil

Contact: S. Wilson
P.O. #:
CT ID:1220

COMPOUND	mg/kg (ppm)	REPORTING LIMIT mg/kg (ppm)
GASOLINE	ND	10
KEROSENE	ND	10
DIESEL	ND	10
FUEL OIL	ND	10

NOTE: (ND) NOT DETECTED AT OR ABOVE THE REPORTING LIMITS.

CHEMTECH ANALYTICAL LABORATORIES
ANALYSIS REPORT:TPH, EPA MOD/8015
CLIENT: Versar
Date Samples Received:01-23-90
Date Samples Completed:01-28-90
Sample ID:SA-1
Lab ID:892432
Matrix:Soil

Contact: S. Wilson
P.O. #:
CT ID:1220

COMPOUND	mg/kg (ppm)	REPORTING LIMIT mg/kg (ppm)
GASOLINE	1200	10
KEROSENE	ND	10
DIESEL	1500	10
FUEL OIL	ND	10

NOTE: (ND) NOT DETECTED AT OR ABOVE THE REPORTING LIMITS.

3017 KILGORE ROAD #110 • RANCHO CORDOVA, CA 95742 PHONE (916) 635-3962 • FAX (916) 635-9331

CHEMTECH ANALYTICAL LABORATORIES
ANALYSIS REPORT:TPH, EPA MOD/8015
CLIENT: Versar
Date Samples Received:01-23-90
Date Samples Completed:01-28-90
Sample ID:CMGS-6
Lab ID:892431
Matrix:Soil

Contact: S. Wilson
P.O. #:
CT ID:1220

COMPOUND	mg/kg (ppm)	REPORTING LIMIT mg/kg (ppm)
GASOLINE	ND	10
KEROSENE	ND	10
DIESEL	900	10
FUEL OIL	ND	10

NOTE: (ND) NOT DETECTED AT OR ABOVE THE REPORTING LIMITS.

CHEMTECH ANALYTICAL LABORATORIES
ANALYSIS REPORT:TPH, EPA MOD/8015
CLIENT: Versar
Date Samples Received:01-23-90
Date Samples Completed:01-28-90
Sample ID:CMGS-4
Lab ID:892429
Matrix:Soil

Contact: S. Wilson
P.O. #:
CT ID:1220

COMPOUND	mg/kg (ppm)	REPORTING LIMIT mg/kg (ppm)
GASOLINE	ND	10
KEROSENE	ND	10
DIESEL	100	10
FUEL OIL	ND	10

NOTE: (ND) NOT DETECTED AT OR ABOVE THE REPORTING LIMITS.

3017 KILGORE ROAD #110 • RANCHO CORDOVA, CA 95742 PHONE (916) 635-3962 • FAX (916) 635-9331

CHEMTECH ANALYTICAL LABORATORIES
ANALYSIS REPORT:TPH, EPA MOD/8015
CLIENT: Versar
Date Samples Received:01-23-90
Date Samples Completed:01-28-90
Sample ID:CMGS-2
Lab ID:892427
Matrix:Soil

Contact: S. Wilson
P.O. #:
CT ID:1220

COMPOUND	mg/kg (ppm)	REPORTING LIMIT mg/kg (ppm)
GASOLINE	ND	10
KEROSENE	ND	10
DIESEL	145	10
FUEL OIL	ND	10

NOTE: (ND) NOT DETECTED AT OR ABOVE THE REPORTING LIMITS.

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CHEMTECH ANALYTICAL LABORATORIES
ANALYSIS REPORT:TPH, EPA MOD/8015
CLIENT: Versar
Date Samples Received:01-23-90
Date Samples Completed:01-28-90
Sample ID:CMGS-1
Lab ID:892426
Matrix:Soil

Contact: S. Wilson
P.O. #:
CT ID:1220

COMPOUND	mg/kg (ppm)	REPORTING LIMIT mg/kg (ppm)
GASOLINE	ND	10
KEROSENE	ND	10
DIESEL	ND	10
FUEL OIL	ND	10

NOTE: (ND) NOT DETECTED AT OR ABOVE THE REPORTING LIMITS.

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J°. 001220CT

CHEMTECH ANALYTICAL LABORATORIES (916) 635-3962

CHAIN OF CUSTODY - LOG-IN

PROJECT NAME ~~VERSAR~~ VERSAR

CLIENT CHAIN OF CUSTODY # CM6S

ITEM #CH D. #	SAMPLE I.D.	DATE SAMPLED	TIME SAMPLED	MATRIX	NO OF CONTAINERS	ANALYSIS: TPH	DISPOSAL: FEE DISPOSAL	NO FEE	RETURNED TO CLIENT	VERBALS
2426	CM6S-1	1-6-90		SOIL	1	X				
2427	CM6S-2	"		"	1	X				
2428	CM6S-3	"		"	1	X HOLD				
2429	CM6S-4	"		"	1	X				
2430	CM6S-5	"		"	1	X HOLD				
2431	CM6S-6	"		"	1	X				
2432	SA-1	1-9-90		"	1	X				
2433	SA-2	"		"	1	X				
2434	SB-1-4	"		"	1	X HOLD				
2435	SB-2-F	"		"	1	X				
2436	SB-3-TH	"		"	1	X HOLD				
2437	SA-3	"		"	1	X HOLD				

RESULTS VERBAL: Yes ☐ No ☐

DATE _____ BY _____

TO WHOM: _____

PHONE _____

COMMENTS:

REPORT TO: _____

_____

_____ ZIP: _____

ATTN: _____

PHONE _____

SAMPLED BY: ☐ CLIENT ☐ CHEMTECH ☐ OTHER

RECEIVED VIA: ☐ FED-EX ☐ U.P.S. ☐ CLIENT ☐ OTHER

INVOICE TO: _____

_____

_____ ZIP: _____

ATTN: _____ P.O. # _____

nquished by: (Signature)	Date/Time	Received by: (Signature)
nquished by: (Signature)	Date/Time	Received by: (Signature)
nquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)
	1-23-90 1:15	

FIELD SERVICES ☐ NO ☐ YES ☐ ATTACHED FIELD REPORT

DISPOSAL OF SAMPLES ☐ NO ☐ YES

NO. OF SAMPLES _____ @RATE _____ $ TOTAL _____

CLIENT (SIGNATURE): _____

LPH 1220.

Versar Inc.

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
6695.013	CMGS

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

PARAMETERS: NO. OF CONTAINERS; TPH

INDUSTRIAL HYGIENE SAMPLE: Y / (N)

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	TPH	REMARKS
CMGS-1	1/16/90	11:30		X		1	X	
CMGS-2	"	11:35		"		1	X	
CMGS-3	"	11:40		"		1		
CMGS-4	"	11:45		"		1	X	
CMGS-5	"	11:50		"		1		
CMGS-6	"	11:55		"		1	X	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
R. Stephen Wilson	1-22-90 4:00	K L J. K K	K L J. K K	1/23/90 1315	
(Printed) R. STEPHEN WILSON		(Printed) K L J. K K	(Printed) K L J. K K		(Printed)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
	1-23-90 1315			EPA 8015 M hold on samples	
(Printed)		(Printed)			

LP # 1220

Versar INC.

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME
6695.013	CMGS

SAMPLERS: (Signature) K L DuKKen (Printed) K L DuKKen

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PARAMETERS: TPH	REMARKS
SA-1	1/9/90	1400				1	X	
SA-2	"	1430				1	X	
SA-3	"	1445				1		
SB-1-4		1500				1		
SB-2-E		1530				1	X	
SB-3-TE-4	↓	1545				1		

INDUSTRIAL HYGIENE SAMPLE: Y / N

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
K L DuKKen	1/23/90 1315				
(Printed) K L DuKKen		(Printed)	(Printed)		(Printed)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
	1-23-90 13:15			EPA 8015M Hold other samples	
(Printed)		(Printed)			

Distribution: Original Plus One Accompanies Shipment to Laboratory and returned Copy Regarding Final Disposition

APPENDIX F
SITE SAFETY PLAN

SITE HEALTH AND SAFETY PLAN

SITE: GRAND MARINA
ALAMEDA, CALIFORNIA

Site Safety Officer:
Gary Zaccor
Zaccor Corporation

Contractor:
Zaccor Corporation

Sub-contractor:
Environmental Technical Services

The site is located at 2407 Grand Street, Alameda, California.

The advancement of soil borings and four two-inch monitoring wells.

ASSOCIATED HAZARDS INCLUDE:

Flammable and Explosive Vapors

Open Soil Borings

Heavy Earth Moving Equipment

Tripping and Falling

Exposure to Total Petroleum Hydrocarbons
By Inhalation & Absorption

The TTV for gasoline has been established at 300 ppm. This may fluctuate with the gasoline octane content. The TTV for oil and diesel has not been established.

Site Safety

The following Site Safety Plan will be implemented prior to the commencement of work activities. All personnel involved in the investigation will be informed of the following safety requirements. It is the responsibility of Zaccor Corporation and Environmental Technical Services project managers to implement these procedures.

It is the responsibility of each individual to be aware of his own safety and to be alert to any safety hazard that may pose a threat, and to make a reasonable effort to remove the hazard. The project manager shall be made aware of the possible hazard.

The investigation may be stopped at any time safe working practices are not being observed and will not commence until the problem has been resolved.

The contractor is responsible for providing site security and safe conditions on site. Employees, customers, and pedestrians will be kept a safe distance from the working area during operations that may pose a health hazard.

Decontamination Procedures

All equipment in contact with hydrocarbon contaminated materials will be decontaminated prior to leaving the site. Water used for the decontamination process will be collected, then stored in Department of Transportation drums (DOT 17).

Safety Equipment

1. A minimum of one fire extinguisher on each piece of heavy equipment and service vehicle

2. A minimum of one first aid kit

3. A list of the nearest:

   urgent care clinic, hospital emergency room, fire department police department, and poison control center.

   This list with a map detailing the route to each emergency service will be given to each employee and will be present within the first aid kit. All personnel involved with the site investigation will be informed of this location.

4. GasTech Model 1314. Hydrocarbon Survey Instrument. Measures combustible vapor and oxygen concentrations.

Site Safety Meeting

A site safety meeting will be attended by all staff who will be working on the site including on-site business staff who may enter the work area.

Potential safety hazards, including the PEL/TLV of chemicals on site and measures to be taken to avoid such hazards will be reviewed.

The location of the fire extinguisher, first aid kit, site safety gear and list of emergency contacts will be given.

Safety Gear

The following gear will be used by each person working in the hazard area.

1. Hard Hats
2. Respirators or portable blowers should vapors within the working area exceed the TTV.
3. Steel toe boots

Alcohol or Drugs

Alcohol will not be consumed prior to commencing work or throughout the work day. The project manager will be made aware of any medications being used by personnel and informed of the possible side effects.

Smoking

Smoking will be prohibited within 50' of the work area.

A person who has spilled or otherwise acquired a flammable concentration of gasoline upon their clothing will not light a cigarette until all affected clothing has been removed.

Traffic

Vehicles, trailers, and earth moving equipment, will be parked in a courteous manner to not block fire hydrants, emergency vehicle pathways, walkways, building exits, or working areas unless prior arrangements have been made and no other working areas are available. Work is to be conducted in a manner to cause the least amount of disturbance to business.