PORT OF OAKLAND

February 27, 2007

Mr. Barney Chan
Hazardous Materials Specialist
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Subject: **UST Site, 801 Maritime Street**
Port of Oakland, Oakland, California
Fuel Leak Case RO0000019

Dear Mr. Chan:

The Port of Oakland (Port) herein submits a "*Work Plan for Additional Site Investigation at Underground Storage Tank Site, 801 Maritime Street, Port of Oakland, Oakland, California, Fuel Leak Case RO0000019*", prepared on the behalf of the Port by R&M Environmental and Infrastructure Engineering, Inc. This work plan was initially requested by Alameda County on December 20, 2006 which was followed by a time extension request by the Port on January 31, 2007. The Port is prepared to implement the work plan upon the approval of the plan by the County.

I declare under penalty of perjury, that the information and/or recommendations contained in this letter report and attachments are true and correct to the best of my knowledge. Please contact me at 627-1176 or the Port Project Manager, Mr. John Prall at 627-1373 or at jprall@portoakland.com regarding any questions or clarifications.

Sincerely,

Roberta Reinstein
Manager, Port Environmental Programs and Safety Department

Enclosure as noted in the text.

Cc: Jeffrey Jones
John Prall

WORK PLAN
For
ADDITIONAL SITE INVESTIGATION
At
Underground Storage Tank Site
801 Maritime Street
Port of Oakland, Oakland, California
Fuel Leak Case RO0000019

Prepared for

Port of Oakland
Environmental Health & Safety Compliance Department
530 Water Street
Oakland, CA 94607

Prepared by

R&M Environmental and Infrastructure Engineering, Inc.
7996 Capwell Drive
Oakland, CA 94621-2015

R&M Project No. 4009

James E. Gribi. P.G.
Rafael Carranza and Cameron Adams

Masood Ghassemi, Ph.D., P.E., Project Manager

February 26, 2007

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ACRONYMS

ACHCSA	Alameda County Health Care Services Agency
BTEX	Benzene, toluene, ethylbenzene, and xylenes
EPA	Environmental Protection Agency
IDW	Investigative-derived Waste
MTBE	Methy tertiary-butylether
PID	Photoionization Detector
PPE	Personal Protection Equipment
QA	Quality Assurance
QC	Quality Control
TPH-D	Total Petroleum Hydrocarbons as Diesel
TPH-G	Total Petroleum Hydrocarbons as Gasoline
USA	Underground Service Alert
UST	Underground Storage Tank

1.0 INTRODUCTION

This work plan is for additional site characterization and installation and sampling of groundwater monitoring wells at a Port of Oakland's property that formerly contained three underground storage tanks (UST) which were removed in February 1989. Removal of the USTs and subsequent sampling of an on-site monitoring well revealed evidence of fuel releases to the soil and groundwater[1]. The Alameda County Health Care Services Agency (ACHCSA) has requested the Port to undertake additional site characterization and groundwater monitoring to generate supplementary data needed for site closure consideration[2]. This work plan describes the additional site investigation and monitoring that is herein proposed.

2.0 SITE DESCRIPTION AND OPERATION HISTORY[3]

2.1 LOCATION

Figure 1 is a vicinity map for the project site. Even though the site is identified as 801 Maritime Street, such an address no longer exists. Prior to 1989, the USTs at this site lay adjacent to a large warehouse used by a tenant for temporary storage of bailed cotton. The warehouse and yard were separate from the nearby Berth 24 maritime shipping terminal, see Figure 2. Since 1989, the warehouse has been demolished, fences have been removed, and the local streets have been abandoned or reconfigured until the earlier land usage has been completely obliterated. Today, the 801 Maritime Street site is part of an expanded Berth 24 container terminal and the only trace of the former land use is in reports and old aerial photographs. The current street address of the Berth 24 terminal is 909 Maritime Street. Photograph #1 shows the general site location as it appears today.

The site does not have a unique Assessor Parcel Number (APN). It is part of a much larger assessor tax parcel (APN 000-0320-001-00) that includes 445 acres of land about evenly split between dry land and submerged land.

2.2 OPERATION HISTORY

801 Maritime Street was the site of a warehouse and a fueling dispenser. Three USTs that supplied the dispenser were installed circa 1959 and were designated by the Port as CF-06, CF-07, and CF-35. All three USTs were of single wall steel construction and each was strapped to a concrete slab (due to shallow groundwater conditions). CF-06 had a capacity of 10,000 gallons and was used to store diesel fuel. Tanks CF-07 and CF-35 had capacities of 20,000 and 10,000 gallons, respectively, and were used to store diesel fuel although both tanks had been configured to also store gasoline. All three tanks were removed from the ground on February 16, 1989. All of the tank removal and related field activities at the time were conducted under the lead of

[1] "Report on Tank Removal and Remediation Activities, 801 Maritime Street", prepared for the Port of Oakland by Baseline Environmental Consulting, April 1989.
[2] Letter from Mr. Barney M. Chen of Alameda County Health Care Services Agency to Mr. John Prall of Port of Oakland, December 20, 2006.
[3] Much of the information in this section has been excerpted from a 31 May 2006 letter from Ms. Roberta Reinstein, Manager, Port Environmental and Safety Department, to Mr. Barney Chan of Alameda County Health Care Services Agency.

ACHCSA. Originally this site was assigned a site identification number STID #3780 and is now assigned a new identification as RO0000019.

3.0 PREVIOUS SITE CHARACTERIZATION AND REMEDIATION[4]

3.1 FIELD OBSERVATIONS AND ANALYTICAL RESULTS FOR SAMPLES COLLECTED IN CONNECTION WITH TANK REMOVAL

Visual examination of the tanks after removal from the ground did not yield any evidence of corrosion, punctures or leaks. During tank removal, however, discolored soils and petroleum odors were noted. Groundwater accumulated in the excavation contained oil and exhibited sheen. Floating product was not present. The impacted groundwater was pumped out of the pit and hauled away for proper disposal. Soil excavation then continued until a final pit dimension of approximately 52 by 64 by 12 feet deep was achieved. The impacted soils (approximately 1,500 cubic yards) were stockpiled near the excavation and bioremediated on site.

Immediately after removal of the three USTs, 10 soil samples and one water sample were collected in the former tank area (See Figure 3 for soil sampling locations); after completion of excavation, six soil samples were collected in the former product line trenches. Analytical results for soil and water samples taken from the former tank area are presented in Table 1. These data indicated that a) release of petroleum hydrocarbons had occurred; b) primarily diesel hydrocarbons had been released; c) the soil under the fill ends for two of the tanks contained the highest diesel hydrocarbon concentrations (1,600 and 3,600 mg/kg); and d) volatile hydrocarbons (gasoline, and BTEX were present in two of the ten soil samples in low concentrations. Petroleum hydrocarbons were detected in soil samples collected from product line trenches at depths of less than 1.5 ft. The concentrations ranged from non-detected to 17.8 mg/kg and aromatic hydrocarbons at concentrations not exceeding 0.02 mg/kg.

The soils containing concentrations of hydrocarbons in excess of 1,000 mg/kg were subsequently removed and stockpiled for on-site bioremediation. Analysis of samples of excavated soil indicated the presence of diesel hydrocarbons ranging from 110 mg/kg to 920 mg/kg.

Analysis of the sample of water in the excavation pit indicated the presence of 0.48 mg/L of gasoline, 21 mg/L of diesel, 0.019 mg/L benzene, 0.026 mg/L of toluene, 0.078 mg/L of xylenes, and 0.017 mg/L of ethylbenzene.

3.2 INSTALLATION AND SAMPLING OF MONITORING WELL MW-1

In 1996, the Port installed a solitary monitoring well, MW-1(See Photographs #2 and #3 and Figure #5), at the site, located downgradient of former USTs. This well is one of the 54 wells located in Berth 23 and 24 area; the 53 other wells (See Photograph #4 for a typical well) are the groundwater monitoring network for the former Mobil Oil and Ashland Oil Bulk Fuel Facilities (i.e., tank farms). Both facilities are petroleum release sites that have a large and combined dissolved phase plume located in the shallow water-bearing unit (the same unit MW-1 is constructed in). Figure 4 shows the locations of the 54 wells in Berth 23 and 24, including MW-1. Based on water level measurements in these wells over several different time frames, the local groundwater flow has been estimated to be predominantly toward the west, with MW-1 being located downgradient of the former location of the three USTs.

[4] Based on information contained in documents cited in Footnotes 1 and 3.

Quarterly monitoring of MW-1 was performed until December 2001, with the results shown in Table 2. The data in Table 2 indicate detection of diesel and gasoline petroleum hydrocarbons (TPH-d ranging from <48 µg/L to 7,100 µg/L and TPH-g being in the 130-190 µg/L range) and BTEX (ranging from 31 µg/L to 79.2 µg/L). The data also suggest a gradual decrease in the contaminant concentrations

Table 1: Analytical Results for Soil and Groundwater Samples Collected in February 1989 in Conjunction with UST Removal (See Figure 3 for sampling locations)*

Sample ID	Depth, ft.	Total Volatile HC	Total Extractable HC	Benzene	Toluene	Ethylbenzene	Xylenes
Tank Area Soil Samples (mg/kg							
A-1	8	ND	27	ND	ND	ND	ND
A-2	8	ND	ND	ND	0.017	ND	0.029
A-3	8	ND	ND	ND	ND	ND	ND
B-1	9.5	ND	ND	ND	ND	ND	ND
B-2	9.5	ND	3,600	ND	ND	ND	ND
C-1	6	ND	ND	0.025	0.035	0.025	0.045
C-2	6	25	1,600	<0.5	<0.5	<0.5	<0.5
C-3	6	ND	ND	ND	ND	ND	ND
M-1	10	ND	ND	ND	0.1	ND	0.145
M-2	10	10	ND	ND	0.26	0.08	0.4
Tank Area Water Sample (mg/L)							
W-1,2,3		0.48	21	0.019	0.026	0.017	0.078
Product Line Trench Soil Samples							
T-1	1.5	ND	6.6	0.0063	ND	0.0051	ND
T-2	1	ND	17.8	0.0167	ND	ND	ND
T-3	1	ND	ND	ND	ND	ND	ND
T-4	0.25	ND	ND	ND	ND	ND	ND
T-5	0.5	ND	ND	ND	ND	ND	ND
T-6	0.5	2.6	ND	0.0165	0.0051	ND	ND
Detection Limits and EPA Method							
(mg/kg)	10	10	0.005	0.005	0.005	0.005	0.005
(mg/L)	0.05	500	0.001	0.001	0.001	0.001	0.001
Method	8015/5030	8015	8015	8020/602	8020/602	8020/602	8020/602

* Source: “Report on Tank Removal and Remediation Activities, 801 Maritime Street”, prepared for the Port of Oakland by Baseline Environmental Consulting, April 1989.

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TABLE 2: QUARTERLY MONITORING OF MW-1
(July 1996 – December 2001)

Sample Date	Groundwater Elevation (feet)	TPH-diesel (µg/L)	TPH-gasoline (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	BTEX (µg/L)	MTBE (µg/L)	TDS (mg/L)
07/10/1996	6.45	7,100	180	27	14	5.4	23	69.4	NA	NA
12/27/1996	6.26	670	180	30	15	5.8	26	76.8	NA	NA
03/25.1997	6.50	19	180	21	11	4	17	53.0	NA	1,840
06/23/1997	6.26	3,000	170	20	11	4.1	18	53.1	NA	1,320
09/30/1997	6.09	830	190	35	17	5.2	22	79.2	NA	2,020
12/31/1997	6.38	<48	130	26	14	4.3	18	62.3	NA	1,880
04/17/2001	6.59	59	160	11	6.2	2.6	11.2	31.0	<2.0	1,860
07/26/2001	6.53	<50	130	17	8.7	3.2	14.2	43.1	<2.0	1,880
12/21/2001	6.47	<100	160	14	6.9	2.6	11.5	35.0	<2.0	1,860

Notes:
- Groundwater elevation data are referenced to Port of Oakland Datum (Port Datum = Mean Sea Level – 3.20 feet)
- Laboratory analyses are by Curtis and Tompkins, Ltd., Berkeley, CA
- BTEX = Sum of benzene, toluene, ethylbenzene, and xylenes in preceding columns
- MTBE = Methyl tertiary-butylether
- TDS = Total dissolved solids
- NA = Not analyzed

4.0 DESCRIPTION OF PLANNED FIELD ACTIVITIES

4.1 BASIS FOR PROPOSED ACTIVITIES

ACHCSA has reviewed the available site information and has provided the following rationale for requesting additional site characterization and monitoring work that is to be performed to generate data needed for site closure consideration[5]

- Installation of monitoring wells – Although one monitoring well was installed downgradient of the former USTs, this lone well is insufficient to assess potential releases from the former tanks. Therefore, a minimum of two additional wells should be installed to determine site-specific gradient and for quarterly groundwater monitoring.

- The limit of soil contamination was not determined during the tank removal. TPH-d values of 3,600 ppm and 1,600 ppm were reported for soil samples from two locations. Additional borings should be advanced and soil samples collected and analyzed to delineate the extent of soil contamination.

4.2 TASKS TO BE PERFORMED

The implementation of the 8 tasks described below should generate the additional site characterization and monitoring data requested by ACHCS.

4.2.1 Task 1 – Work Plan Preparation

This task consists of preparation of this work plan and a job hazard analysis, included as an appendix to this document, for addressing the site-specific health and safety issues associated with working in marine terminals in general and at Berth 24 in Port of Oakland, in particular.

4.2.2 Task 2 – Site Characterization

This task will consist of advancing 10 borings and collecting and analyzing soil and grab groundwater samples from each boring. The following specific activities are contemplated:

- Using the drawings contained in the UST removal documents, locate Well MW-1 and the general boundary of the former UST area, including the sampling locations "B-2" and "C-2" where TPH-d values of 3,600 ppm and 1,600 ppm had been previously measured in soil samples.

- Based on the assumed westerly direction of groundwater flow, select a total of 10 locations to advance borings to collect soil and groundwater samples; mark the locations with spray paint for subsequent subsurface utility clearance. The selected locations to represent upgradient, downgradient, and transgradient locations. Figure 3 shows tentatively proposed boring locations, subject to adjustment in the field based on subsurface utility clearance and access logistics.

[5] Letter dated December 20, 2006, from Mr. Barney Chan of ACHCSA to Mr. john Prall of the Port of Oakland; Subject: "Fuel leak Case RO0000019, Port of Oakland, 801 Maritime Street, Oakland, CA 94607".

- Secure permit from Alameda County Public Works Agency (ACPWA) for advancing soil borings.

- Review site utility plan drawings and perform subsurface utility clearance at each location marked for advancing borings. The utility clearance for each location to include an area of approximately 10 ft by 10 ft to allow adjustments of boring locations based on field observations during hand augering of the first 5 feet. (Note: Some of the utilities, such as Transite or plastic pipes, may be hard to detect instrumentally).

- Use direct push technology ("Geoprobe") to advance ~ 2-inch diameter borings to a maximum depth of approximately 12 ft. The drilling and collection of samples to follow the following protocol:

    - Hand auger all boreholes to a depth of 5 ft before employing the "direct push" method.

    - Examine the initial opening in the pavement for presence of methane gas using a field instrument.

    - Geologist to log the borehole that is hand augered (as well as the remainder of the borehole which will be subsequently advanced via Geoprobe).

    - Collect soil samples at depth intervals of approximately 5 ft; use butyrate tubes measuring approximately 2 inches in diameter by 4 feet in length to retrieve the samples; later, cut these tubes into 6-inch long sections, with the sections selected for analysis capped, labeled, and placed in a sampling cooler with ice for shipment to laboratory for analysis under proper chain-of-custody protocol.

    - Visually inspect and describe soil samples according to Unified Soil Classification System (USCS), note any distinct petroleum or gasoline odor or coloration; collect a portion of the soil samples in Ziploc bags, seal the bags, and place them in the sun for release of hydrocarbons, if any; at the end of the day obtain PID readings for each bagged sample and note them on the boring logs.

    - Install temporary piezometers with 3/4-inch diameter PVC screen and riser pipes in each borehole. Close each well screen at the bottom with PVC plugs (bottom caps). Use a peristaltic pump to purge 1-2 gallons of water from each piezometer, if the yield is adequate. Collect a single water sample from each piezometer for analysis. Collect the water samples in glass containers for volatile organic analysis (VOA). After sample collection, allow some time for water recovery and then measure and record depth-to-water.

    - Backfill the boreholes from total depth to surface with cement grout. Top off any settlement with cement slurry or asphalt patch to match the surrounding surface.

    - Label sample containers with borehole number, sample depth (for soil samples), project number, and date and time of sample collection, and place in a cooler with ice. Deliver samples to a state-certified laboratory for analysis under proper chain-of-custody protocol.

- Use a steam cleaner to decontaminate the drilling and sampling equipment before use and between each borehole location.

- Place the soil cuttings and decontamination water in 55-gallon containers and leave them on site for subsequent profiling and disposal by Port of Oakland.

4.2.3 Task 3 – Analysis of Soil and Grab Water Samples from Borings

The soil and grab groundwater samples collected in Task 2 will be analyzed for the following analytes via indicated methods:

- Total petroleum hydrocarbons as gasoline (TPH-g) and as diesel (TPH-d); EPA Method 8015M with preliminary silica gel cleanup for TPH-d.

- Benzene, toluene, ethylbenzene, and xylenes (BTEX) and methyl tertiary-butylether (MTBE); EPA Method 8020.

4.2.4 Task 4 - Installation of Two Monitoring Wells

This task would involve selection of locations for and installation of two additional monitoring wells to supplement the one currently existing at the site (MW-1). Specifically, the following activities are entailed:

- Review the site characterization results and, based on the results and the existing location of MW-1, select two locations for installation of monitoring wells, taking into account the following access consideration: if wells are placed in the container or trailer slots, it is likely that the locations will always be difficult to get into; the isleways seem to be best as long as proper safety precautions are taken when wells are being accessed for work.

- Perform subsurface utility clearance at selected well locations; adjust locations as necessary.

- Complete well drilling permit application and secure such permits from ACPWA; wells to be constructed with 2-inch PVC casing, to a total depth of 15 ft, with a screen interval extending from 5 to 15 feet from top of the casing. The well construction will follow the following protocol:

    - After coring to penetrate the pavement, hand auger the first 5 feet of the boring before employing the hollow-stem auger method.

    - Examine the initial opening in the pavement for presence of methane gas using a field instrument.

    - Geologist to log the borehole that is hand augered (as well as the remainder of the borehole which will be subsequently advanced via hollow-stem augering).

    - Use a hollow-stem auger, with 8-inch O.D. auger to drill the boreholes.

    - Geologist to collect soil samples for examination and subsequent analysis.

- Construct wells with 2-inch inside diameter flush joint-threaded, Schedule 40 PVC casing with 0.010-inch machine-slotted screens 10 feet in length. Total well depth will be approximately 15 ft.

- Place a filter pack of #12 sized sand from the bottom of the boring to approximately 1 to 2 feet above the slotted screen section.

- Place 1 to 2 feet of bentonite pellets atop the sand packs and hydrate with water to act as seals

- Seal the remaining portion of the annular space with neat Portland Type I/II cement to approximately 1 foot below the ground surface.

- Complete well tops with expandable caps and a heavy-duty flush well box, per the following specifications:

    - Heavy-duty well box set in reinforced concrete collars, with top of box flush with the pavement surface

    - Steel lids and collars

    - Annular space to be wide enough to allow insertion of a simple cage of number 4 rebars.

    - The annular space containing the rebar to be filled with concrete

4.2.5 Task 5 – Analysis of Soil Samples Collected During Well Installation

The soil samples collected in Task 4 will be analyzed for the following analytes via indicated methods:

- Total petroleum hydrocarbons as gasoline (TPH-g) and as diesel (TPH-d); EPA Method 8015M with preliminary silica gel cleanup for TPH-d.

- Benzene, toluene, ethylbenzene, and xylenes (BTEX) and methyl tertiary-butylether (MTBE); EPA Method 8020.

4.2.6 Task 6 – Monitoring Well Development

This task involves the development of the two newly installed monitoring wells and re-development/rehabilitation of the one existing monitoring well (MW-1). Development and redevelopment of wells will follow the following protocol:

- Before development, measure depths to water and depths to bottom from top of casings; based on these measured values, calculate the approximate wet well volumes (i.e., volume of water standing in well casing)

- Develop the wells by surging and pumping using a 1-inch diameter PVC pipe with a plunger on the end and a purge pump; purge several wetted well casing volumes while collecting water quality data (temperature, pH, conductivity, turbidity, D.O. and

oxidation-reduction potential). Continue development until water appears clean and clear of entrained sediment and water quality parameters are stabilized.

- Collect extracted water and soil cuttings in 55-gallon drums and leave them on site for subsequent profiling and disposal by Port of Oakland.

4.2.7 Task 7 – Surveying of Boring and Monitoring Well Locations

Using the services of a licensed land surveyor, all soil boring and monitoring well locations will be surveyed to determine horizontal coordinates for all locations as well as elevation data for the top of the casings for the monitoring wells. Surveyor to provide X-Y coordinates in NAD83 and Z coordinates in NAVD88 system for uploading to GeoTracker. Elevation data will also be provided in Port Datum (which is 3.20 ft below mean sea level).

4.2.8 Task 8 – Quarterly Groundwater Monitoring

Following well installation and development, a program of quarterly groundwater monitoring will be implemented. The three monitoring wells will be sampled once every three months for one year. Each monitoring event will follow the standard protocol (i.e., measurements of depth to water and depth to bottom in each well, purging of wells, field measurement of certain water quality parameters, such as temperature, D.O., conductivity, pH, and oxidation-reduction potential, and collection of water samples for analysis by a state-certified laboratory.

The water samples collected in each quarterly monitoring event will be analyzed for the following analytes via indicated methods:

- Total petroleum hydrocarbons as gasoline (TPH-g) and as diesel (TPH-d); EPA Method 8015M with preliminary silica gel cleanup for TPH-d.

- Benzene, toluene, ethylbenzene, and xylenes (BTEX) and methyl tertiary-butylether (MTBE); EPA Method 8020.

Collect purge water and equipment decontamination water in 55-gallon drums for subsequent profiling and disposal by Port of Oakland.

Because the monitoring wells are located in areas of heavy truck traffic and loading and unloading of large containers, the well surface structures are subject to enormous stress and wear and tear. Each visit to the site for quarterly groundwater monitoring will include inspection of the condition of well surface structure for evidence of damage, documentation of, and implantation of appropriate corrective action.

5.0 PROJECT REPORTS AND REPORTING

Field observations and data resulting from site characterization and monitoring well installation and quarterly groundwater monitoring will be presented and discussed in the following reports that will be submitted in electronic format to the County's "FTP" site and uploaded to the State's GeoTracker database:

- Site Characterization and Well Installation Report. This report will describe all field activities involving site characterization (advancing borings, sampling, etc.) and installation and development of monitoring wells. The report will discuss results, provide

conclusions regarding lateral and vertical extent of contamination, and offer recommendations for follow-up actions. As required, well construction forms will also be completed and submitted to the State Department of Water Resources.

- Quarterly Groundwater Monitoring Reports. These reports will include discussions of analytical results, groundwater flow direction and gradient, water quality trends, and recommendations for follow-up actions.

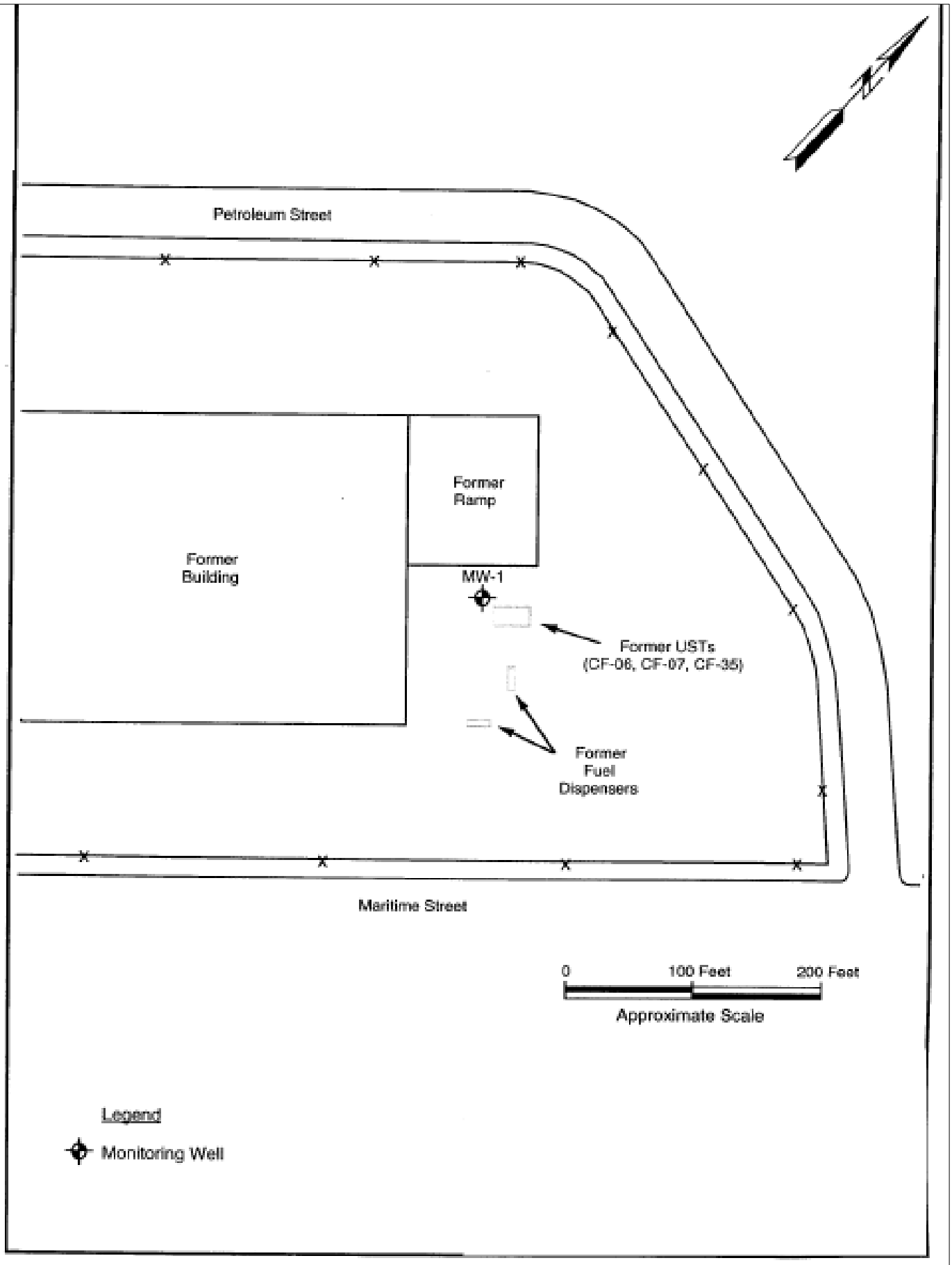
6.0 PROJECT SCHEDULE

Site characterization and installation and development of monitoring wells are expected to be completed within 3 months of work plan approval. Quarterly groundwater monitoring and submittal of associated reports should span a period of 13 months thereafter.

7.0 PROJECT ORGANIZATION

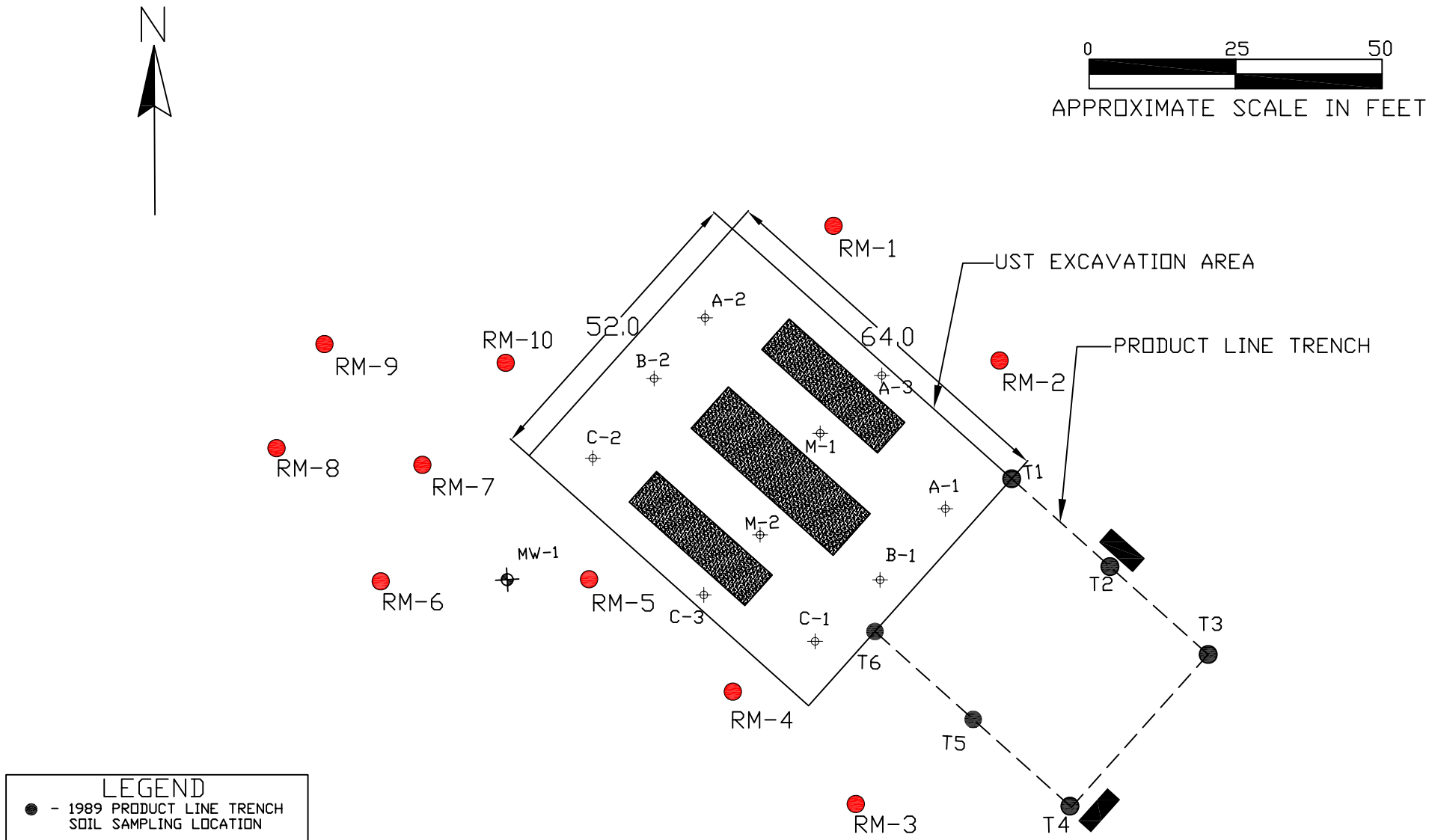
Mr. John Prall of the Port of Oakland will be the interface with and report to the ACHCSA on all aspects of the project. The work will be performed by R&M Environmental and Infrastructure Engineering, Inc. (R&M), which is one of the Port's environmental support contractors. Dr. Ghassemi will be the R&M's Project Manger and accountable to Mr. Prall for project performance.

DESIGNED BY:	CHECKED BY:	**VICINITY MAP** PORT OF OAKLAND 801 MARITIME STREET OAKLAND, CA	DATE: 02/21/2007	FIGURE: 1
DRAWN BY: CA	SCALE:		R&M Environmental and Infrastructure Engineering, Inc.	
PROJECT NO:				

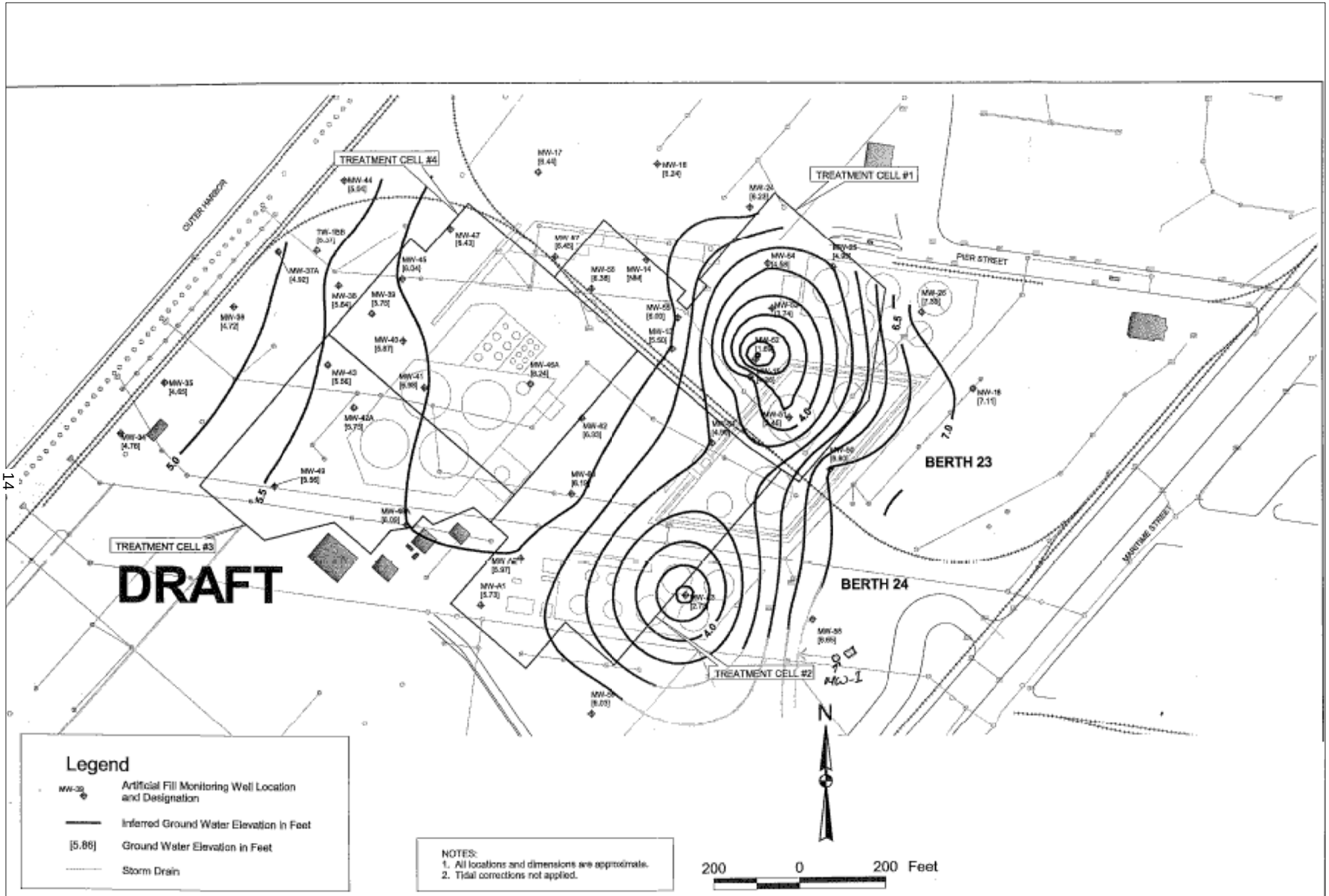


DESIGNED BY:	CHECKED BY:	**PROJECT SITE PLAN** PORT OF OAKLAND 801 MARITIME STREET OAKLAND, CA	DATE: 02/21/2007	FIGURE: 2
DRAWN BY: CA	SCALE:		R&M Environmental	
PROJECT NO:				

Source: Adapted from, Figure 2, Site Plan, 801 Maritime, Alisto Engineering Group, 8/5/1996



DESIGNED BY:	CHECKED BY:	**PROPOSED BORING LOCATIONS**	DATE: 2/21/2007	FIGURE: 3
DRAWN BY: CA	SCALE:	Port of Oakland 801 Maritime Street Oakland, CA	R&M Environmental and Infrastructure Engineering, Inc.	
PROJECT NO:				



Source: Adapted from Figure 4, Groundwater Elevation Countor Map, 801 Maritime street, Acton Mickelson Environmental, Inc, March 21, 2005

DESIGNED BY:	CHECKED BY:	Locations of the 54 monitoring wells in Berth 23 and 24	DATE: 02/21/2007	FIGURE: 4
DRAWN BY: CA	SCALE:	PORT OF OAKLAND 801 MARITIME STREET OAKLAND, CA	R&M Environmental and Infrastructure Engineering, Inc.	
PROJECT NO:				

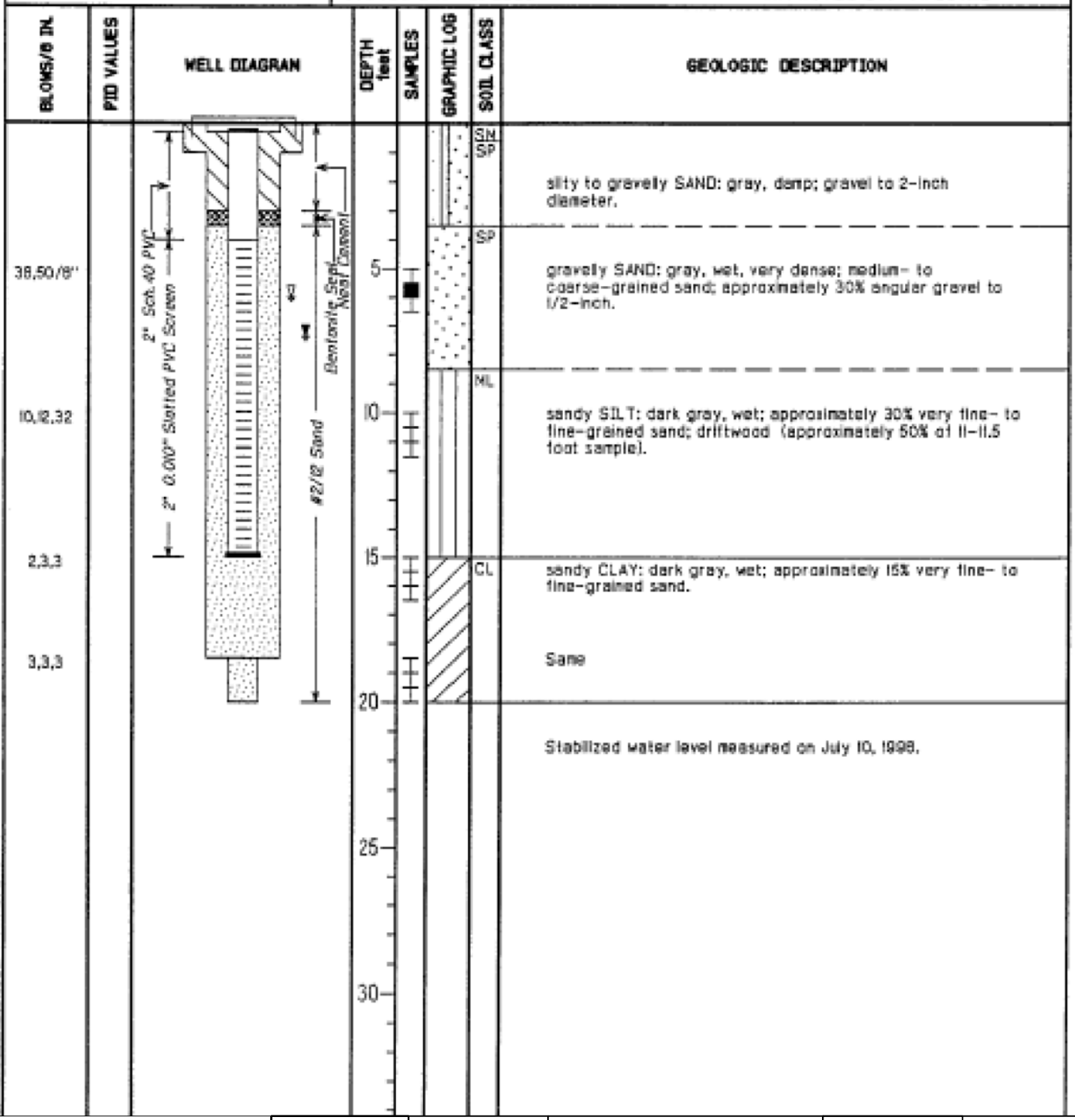
ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

LOG OF BORING MW-1

Page 1 of 1

SEE SITE PLAN

ALISTO PROJECT NO: 10-339-01 DATE DRILLED: 07/03/98
CLIENT: Port of Oakland
LOCATION: 801 Maritime Street, Oakland, California
DRILLING METHOD: Hollow-Stem Auger (8")
DRILLING COMPANY: V & W Drilling CASING ELEVATION: 10.81 MSL
LOGGED BY: C. Ladd APPROVED BY: Al Sevilla



DESIGNED BY:	CHECKED BY:	LOG OF BORING MW-1 PORT OF OAKLAND 801 MARITIME STREET OAKLAND, CA	DATE: 02/21/2007	FIGURE: 5
DRAWN BY: CA	SCALE:		R&M Environmental	
PROJECT NO:				

Source: Log of Boring MW-1, 801 Maritime Street, Port of Oakland, Alisto Engineering Group, 7/03/98.

Photograph #1: The general area where the USTs were located, as it appears today. View towards the Southwest, Berth 24 truck lanes on the left side of the photograph. (Photos taken on 02/15/07)

Photograph #2: Monitoring well MW-1, located within the parking stall marked as “28”, approximately 45 ft from the nearest pole marked as “803/804”; See Photograph #3 (Photo taken on 02/15/07))

Photograph #3: The pole nearest to well “MW-1” referenced in Photo #2 (Photo taken on 2/15/07)

Photograph #4: One of the wells (Monitoring Well MW-58, located north of “MW-1”) that comprise the 53-well groundwater monitoring network for the former Mobil Oil and Ashland Oil Bulk Fuel Facilities

APPENDIX

JOB HAZARD ANALYSIS

JOB HAZARD ANALYSIS

Project Location: Berth 24 Terminal, Port of Oakland (909 Maritime Street, Oakland, CA 94607)
Contract ("Resolution" No): 5135, On-call Environmental Compliance Consulting Services, Technical Service Order 9
Project Title: Additional Site Investigation at Underground Storage Tank Site, 801 Maritime Street
Activities: Advance borings and collect and analyze soil and grab groundwater samples; install and develop monitoring wells; and perform 4 rounds of quarterly groundwater monitoring
Prime Contractor: R&M Environmental and Infrastructure Engineering, Inc. (R&M); Oakland, CA 94621
Analysis by: Cameron Adams
Reviewed by: Masood Ghassemi, P.E.

Principal Step	Potential Safety/Health Hazards	Recommended Controls
1). General hazards and safety considerations associated with working in an active marine terminal (applied to all steps)	Worker/work vehicles being struck by large trucks carrying heavy containers and moving in an out of various cargo isles	Follow the Port of Oakland Contractor Safety Guidelines for working in active marine terminals (included at the end of this appendix), including the following pertaining to vehicles and site of operations: Vehicles - Vehicles brought into the terminal must be equipped with identifying signs on each side. - Limit on-terminal vehicles to those necessary to perform the work. Park others outside. - Minimize the need to drive around the terminal. Stage operations and remain there. Enter and exit the terminal only via company vehicle. - Obey terminal driving rules, including speed limits. Terminal equipment has the right-of-way. Site of Operations: - The area of operations shall encumber no more space than is required to perform the work safely. - Delineate the area of operation using traffic cones, K-rail, caution tape, or other high-visibility method. Park vehicles to form a protective barrier. - Workers must wear hard hats, hard-toed shoes, and high visibility clothing (with reflective elements at night). - Individuals must remain in the area of operations. - Use a "spotter" where workers are exposed to traffic.
	Exposure to dust via inhalation and ingestion through breathing, dermal contact, smoking, and eating	Use personal protection equipment (PPE). Prohibit eating, drinking, smoking, or chewing. Wear work gloves. Wash hands after work or when taking breaks away from the work site for refreshment.

	Injuries, mishaps, and trips, slips, and fall hazards when using or carrying tools and equipment to different locations	Use proper body mechanics when lifting or carrying tools. Obey sensible lifting limits (60 lb. maximum per person manual lifting). Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads. Obtain help when lifting heavy or bulky items. Avoid carrying heavy objects above shoulder level. Keep walkways clear of all obstacles and non-essential items that can pose trip and fall hazards. Use proper/safe tools (e.g., wire dykes instead of razors for cutting wire, tape, rope, etc.). Use appropriate PPEs.
	Working with and around heavy equipment (Geoprobe, hollow-stem auger, etc.)	Make sure all equipments are in good working condition and operated by trained personnel and in accordance with the manufacturers' specifications. A competent mechanic shall go over equipment to certify that it is in good and safe operating condition prior to being delivered to job site. Operator shall inspect equipment before each day's use. Equipment must be shut/turned off when not attended or during service. Always maintain eye and verbal contact with operator before approaching equipment; understand and review hand signals. All equipment should have backup alarms. Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period). All heavy equipment operations shall require use of hearing protection.
	Thermal Stress	Wear appropriate clothing for the weather conditions and keep hydrated. If weather conditions are dangerous, postpone fieldwork.
	Fire	Shut off all motors during any fuel transfer (e.g., refueling of the generator). No smoking should be allowed in the work area. An A-B-C fire extinguisher must be available in the work area. Fuel containers should not be stored within 10 feet of the drilling rig motor. Fuel should be stored in UL approved safety containers with contents clearly labeled.
2) Subsurface Utility Clearance	See Step 1	See Step 1
3) Saw cutting or pushing through and removing the surface pavement with Geoprobe	Hitting of underground utilities	Make sure target area has been cleared by an underground utility survey and that the Underground Service Alert (USA) has been notified.
	Hazardous atmospheres: possible subsurface methane gas build-up/explosion	Use water to cool the cutting edge and suppress spark generation; operate machine slowly; use a PID to check methane concentration.
4) Hand augering the first 5 feet below the pavement	Same as for Step 3	Same for Step 3
	Muscle strain if hard soil or rocky material	Seek assistance in operating the auger.

	is to be augered through	
	Exposure to elevated concentrations of hazardous constituents	Wear proper PPE (hard hats, steel toe boots, work clothes, safety glasses), observe all posted warning signs.
	Pinching of body part or dropping on body part during assembly /disassembly	Train personnel to assemble/disassemble equipment, wear leather gloves, and use wrench supplied for equipment assembly/disassembly. Do no use “cheaters” or other improper leverage devices. Wear proper PPE (Level D).
	Breakage of extensions (if used) at joints	Inspect extensions to ensure structural integrity before assembling, ensure proper and secure assembly of extensions.
5) Use of Geoprobe to collect soil and grab groundwater samples	Same as Step 3	Same as Step 3
	Cuts and injury while cutting butyrate tubes for soil examination and sample collection	Use work gloves and employ proper cutting tools
6) Cement grout preparation, transfer, and use	Inhalation of dust and skin irritation due to contact	Avoid dust generation; keep mixing away from breathing zone; use proper PPE (respiratory protection and work gloves).
7) Hollow-stem drilling and construction and development of monitoring wells	Same as Steps 3 and 6	Same as Steps 3 and 6
8) Groundwater monitoring	Hazardous Atmospheres: possible methane and other hazardous gases accumulated in the well	Use a PID to check for hazardous atmosphere when first opening the well; leave the well open for gases to escape before working on a well.
9) Preparing		Handle sample containers carefully; clean up any broken glass or spilled ice or water

packaging, shipping soil and water samples	Cuts and bruises and/or exposure to elevated concentrations of hazardous constituents or chemical preservatives (acids)	immediately; wear proper PPE (eye and skin protection).
EQUIPMENT TO BE USED: Hand auger, Geoprobe, saw cutter, hollow-stem auger drill, small tools, and field vehicles		
INSPECTION REQUIREMENTS: Inspecting all heavy equipment to ensure good operating condition prior to admitting them on to the site and on a daily basis. Equipment shall be operated, inspected, and maintained as specified in the manufacturer's operating manual. A copy of the manual will be available at the job site.		
TRAINING REQUIREMENTS: 40-hour Hazardous Waste Operation and Emergency Response (HAZWOPER) training, health and safety kickoff meeting, daily safety tailgate meeting. All individuals operating the Geoprobe or the hollow-stem auger shall be trained in (1) the operation, inspection, and maintenance of the equipment; (2) the safety features and procedures to be used during operation, inspection, and maintenance of the equipment; and (3) overhead electrical line and underground hazards.		
Personal Protective Equipment: Minimum: hard hat, steel toe boots, hearing protection, safety vests		

TABLE A-2
TOXICOLOGICAL PROPERTIES OF
REPRESENTATIVE CONTAMINANTS OF CONCERN

Compound/Class	Principle Routes of Entry	Acute Exposure Effects and Symptoms	Chronic Exposure Effects/Symptoms
Petroleum products such as: Unleaded gasoline Kerosene Naphthalene Xylenes Toluene Ethylbenzene Benzene Diesel fuel Petroleum distillates Motor Oil	Inhalation Ingestion Absorption	Depending on the compound and exposure level, symptoms/effects can include the following: Irritation of body tissues (particularly, eye, skin, and respiratory system); disturbance of the central nervous system	Depending on the compound, concentration, and duration of exposure, symptoms/effects can include the following: Blood disorders ranging from anemia to leukemia; redness and irritation of the eyes; blurred vision; irritation, defatting, and dermatitis of skin; nasal/respiratory gastrointestinal irritation; nausea, vomiting, and diarrhea if inhaled; and liver, kidney, and cardiac disorder. Some compounds or compound classes are listed carcinogens (e.g., unleaded gasoline) or classified as a suspected human carcinogen (e.g., benzene).
Lead (Example of Heavy Metals)	Inhalation Ingestion	Gastrointestinal distress, kidney failure	Memory and concentration problems, nerve disorders, sleep disturbances, mood changes, muscle or joint pain, high blood pressure, difficulties during pregnancy, and other reproductive problems (in both men and women)
Chromium (Example of Heavy Metals)	Inhalation Ingestion Absorption	Local irritation and skin lesion (direct contact); pulmonary edema or circulatory or respiratory failure; gastrointestinal symptoms	Pneumoconiosis, liver damage, gastrointestinal ulcers, heart disease
Methane Gas	Inhalation	Depending on the exposure level, symptoms/effects can include the following: Headache, lightheadedness, tiredness.	Depending on the exposure level, symptoms/effects can include the following: Fainting, asphyxiation, death

EMERGENCY TELEPHONE NUMBERS

Fire Department	911
Ambulance	911

The following telephone numbers are in addition to 911:

Alta Bates Medical Center	(510) 204-4444
Regional Poison Control	(800) 346-5922
National Emergency Response Center	(800) 424-8802
California State Office of Emergency Services	(800) 852-7550

KEY PROJECT MANAGEMENT PERSONNEL

R&M Project Manager	Masood Ghassemi: (510) 553-2146 Cell Phone: (510) 364-2249
R&M Site Supervisor and Safety Officer	Rafael Carranza: (510) 553-2149 Cell Phone: (510) 364-4431
Site Owner	Port of Oakland
Port of Oakland Project Manager/Contact	John Prall: (510) 627-1373 Cell Phone: (510) 772-9398

DIRECTIONS TO HOSPITAL

Alta Bates Medical Center is located at 2450 Ashby Avenue in Berkeley. Directions and Map attached.

ACCIDENT REPORTING

In the event of an emergency, contact the following:

R&M Site Supervisor and Safety Officer	Rafael Carranza: (510) 553-2149 Cell Phone: (510) 364-4431
R&M Project Manager	Masood Ghassemi: (510) 553-2146 Cell Phone: (510) 364-2249
Port of Oakland Project Manager/Contact	John Prall: (510) 627-1373 Cell Phone: (510) 772-9398

If an exposure or injury occurs, work shall be temporary halted until the Site Health and Safety Officer decides it is safe to continue work

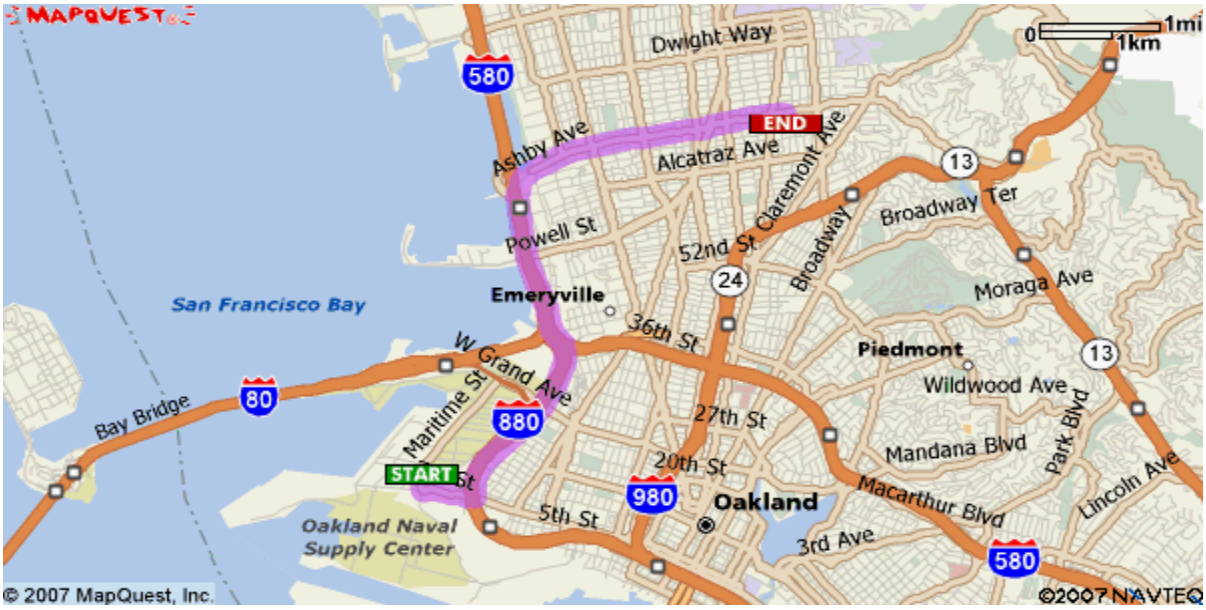
Directions

From: 801 Maritime St Oakland, CA 94607
To: Alta Bates Medical Center 2450 Ashby Ave Berkeley, CA 94705-2067

Total Est. Time: 14 minutes **Total Est. Distance:** 5.91 miles

START	**1:**	Start out going SOUTH on MARITIME ST toward 7TH ST.	<0.1 miles
	2:	Turn LEFT onto 7TH ST.	0.4 miles
	3:	Turn LEFT onto FRONTAGE RD.	1.0 miles
	4:	Stay STRAIGHT to go onto ramp.	0.2 miles
	5:	Merge onto I-880 N.	1.0 miles
	6:	I-880 N becomes I-580 W / I-80 E.	0.4 miles
EXIT	**7:**	Take the ASHBY AVE / CA-13 / SHELLMOUND ST exit.	0.1 miles
	8:	Merge onto ASHBY AVE / CA-13.	2.3 miles
END	**9:**	End at **2450 Ashby Ave** Berkeley, CA 94705-2067, US	

Total Est. Time: 14 minutes **Total Est. Distance:** 5.91 miles



http://www.mapquest.com/directions/main.adp?...0+Ashby+Ave&2c=Berkeley&2s=ca&2z=&panelbtn=2

http://www.mapquest.com/directions/main.adp?...0+Ashby+Ave&2c=Berkeley&2s=ca&2z=&panelbtn=2

PORT OF OAKLAND
CONTRACTOR SAFETY
WORKING IN ACTIVE MARINE TERMINALS

The Port Wharfinger Department coordinates Port-sponsored access to the marine terminals. Before entering terminals, contact the appropriate Wharfinger. Any deviation from established procedures or work schedules should be cleared at least 24 hours in advance (or as soon as feasible).

The primary issues when working in marine terminals are:

- The safety of contractor, terminal, trucking, terminal employees, and Port employees.
- Minimizing interference with terminal and vessel operations.
- Security: Vehicle inspection & personnel identification (valid California Driver's license or equal).

VEHICLES

Vehicles brought into the terminal must be equipped with identifying signs on each side. Vehicles not so equipped will not be admitted.

Limit on-terminal vehicles to those necessary to perform the work. Park others outside.

Minimize the need to drive around the terminal. Stage operations and remain there. Enter and exit the terminal only via company vehicle.

Obey terminal driving rules, including speed limits. Terminal equipment has the right-of-way.

SITE OF OPERATIONS

The area of operations shall encumber no more space than is required to perform the work safely.

Delineate the area of operation using traffic cones, K-rail, caution tape, or other high-visibility method. Park vehicles to form a protective barrier.

Workers must wear hard hats, hard-toed shoes, and high visibility clothing (with reflective elements at night).

Individuals must remain in the area of operations.

Use a "spotter" where workers are exposed to traffic.