**Pacific Gas and Electric Company**

Hunters Point/Potrero/
Oakland Power Plants
Steam Generation
1000 Evans Avenue
San Francisco, CA 94124
415/695-2200

Jack A. Fusco
Manager

93 JUL 28 PM 2:14

July 27, 1993

Ms. Jennifer Eberle
Hazardous Materials Specialist
Alameda County Department of Environmental Health
UST Local Oversight Program
80 Swan Way, Room 200
Oakland, CA 94621

RE: **Oakland Power Plant Subsurface Investigation Report**

Dear Ms. Eberle:

Please find attached herewith a copy of *Subsurface Investigation Report for the Pacific Gas and Electric Company Oakland Power Plant at 50 Martin Luther King Jr. Way, Oakland, California, 94621.* This report is submitted to your office as requested in your letter dated April 23, 1993.

We will continue monitoring the wells identified in this report and submit a report to your office on a quarterly basis.

Should you have any questions regarding this matter, please call [redacted] or my staff at (415) 695-2205.

new Sr. Env. Coordinator

Sincerely,

J.A. Fusco by RJD

Jack Fusco
Plant Manager

APJ:apj

Attachment

cc w/attachment : Mr. Rich Hiett
San Francisco Bay Region
Regional Water Quality Control Board
2101 Webster Street, Suite 500
Oakland, CA 94612

bcc w/attachment : GTSanders/RBell

**Weiss Associates** *Environmental and Geologic Services*

*5500 Shellmound Street, Emeryville, CA 94608-2411* *Fax: 510-547-5043 Phone:* ***510-450-6000***

# SUBSURFACE INVESTIGATION

*for the*

## Pacific Gas and Electric
## Oakland Power Plant
## 50 Martin Luther King Jr. Way
## Oakland, California

*prepared for*

Pacific Gas and Electric
3400 Crow Canyon Road
San Ramon, California 94583

July 21, 1993

Weiss Associates

# SUBSURFACE INVESTIGATION

*for the*

## Pacific Gas and Electric
## Oakland Power Plant
## 50 Martin Luther King Jr. Way
## Oakland, California

*prepared for*

**Pacific Gas and Electric**
**3400 Crow Canyon Road**
**San Ramon, California 94583**

*prepared by*

**Weiss Associates**
5500 Shellmound Street
Emeryville, CA 94608

WA Job #47-725-01

James D. Ponton
Project Geologist

Weiss Associates work for the Pacific Gas and Electric Oakland Power Plant, located 50 Martin Luther King Jr. Way, Oakland, California was conducted under my supervision. To the best of my knowledge, the data contained herein are true and accurate and satisfy the scope of work prescribed by the client for this project. The data, findings, recommendations, specifications or professional opinions were prepared solely for the use of Pacific Gas and Electric in accordance with generally accepted professional engineering and geologic practice. We make no other warranty, either expressed or implied, and are not responsible for the interpretation by others of this data.

REGISTERED GEOLOGIST
JOSEPH P. THEISEN
No. EG-1645
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

7/21/93

Joseph P. Theisen
Senior Hydrogeologist

Date
CEG No. 1645

## CONTENTS



### FIGURES



### TABLES



### APPENDICES

# 1. INTRODUCTION

This report presents the results of Weiss Associates' (WA) subsurface investigation of the Pacific Gas and Electric facility referenced above (Figure 1). As outlined in Pacific Gas and Electric's April, 1993 work plan,[1] the investigation objectives were to further delineate the extent of diesel hydrocarbons in the soil and in the shallow ground water beneath the site and to accurately determine the shallow ground water flow direction and hydraulic gradient by installing permanent monitoring wells. To achieve these objectives, WA installed three monitoring wells at the site and sampled and analyzed soil and ground water samples. Our scope of work and summaries of this and previous investigations are presented below.

## 1.1 SCOPE OF WORK

WA's scope of work for this investigation was to:

- Survey the approximate top-of-casing elevations of the five temporary well points located onsite, measure depth to water in each well point and determine the shallow ground water flow direction;
- Obtain permits from the Alameda County Flood Control and Water Conservation District and destroy two temporary monitoring wells, overdrill three of the temporary monitoring wells (to install deeper permanent wells), drill two new borings and collect soil samples for hydrogeologic description and for chemical analysis;
- Construct three new permanent 4-in diameter wells and complete the wells with traffic rated vaults;
- Develop the wells and collect ground water samples for hydrocarbon analyses;

[1] PG&E Technical and Ecological Services, April 7, 1993, Work Plan for Additional Ground Water Assessment Surrounding the Diesel Dump Tanks at PG&E's Oakland Power Plant, Alameda County, California.

- Survey the top-of-casing elevations of each well, determine shallow ground water flow direction, and calculate the hydraulic gradient, and
- Report the results.

## 1.2 PREVIOUS INVESTIGATIONS

***1990 Preliminary Site Investigation:*** In September 1990, a soil investigation was conducted near the three diesel dump tanks that consisted of drilling and sampling several soil borings in the immediate vicinity of each tank. Variable concentrations of total petroleum hydrocarbons as diesel (TPH-D) were detected in the soils near all three diesel dump tanks. The results of this investigation are presented in PG&E Report No. 402.331-90.55, dated December 1990.

***1991 Tank Excavation and Replacement:*** In November 1991, the three 75-gallon diesel dump tanks were excavated and replaced. Soil samples collected from each excavation were analyzed for TPH-D and benzene, toluene, ethylbenzene and xylene (BTEX). No TPH-D or BTEX were detected in samples collected from the Tank #1 excavation (figure 2). Elevated concentrations of TPH-D and BTEX, however, were detected in samples collected from the bottoms of the Tank #2 and Tank #3 excavations. New tanks were installed and backfilled with clean fill in each excavation. Tank excavation analytic results are presented in PG&E's Work Plan for Soil and Ground Water Investigation, dated August 1992.

***1992 Confirmation Soil Sampling***: In June 1992, PG&E conducted confirmation soil sampling immediately adjacent to diesel Tank #2 and Tank #3. Soil samples collected from four borings were analyzed for TPH-D and BTEX. Elevated concentrations of TPH-D were detected in soil samples collected from near the base of the former tank excavations. The analytic results from this investigation are detailed in PG&E Report No. 402.331-92.35, dated June 1992.

***1992 Shallow Soil and Ground Water Survey:*** In October 1992, PG&E installed and sampled four temporary well points near the diesel dump tanks. TPH-D was detected in soil and ground water samples collected adjacent to diesel dump Tanks #2 and #3. The highest concentration of TPH-D in

soil, 4,100 ppm, was collected from a boring near Tank #3. The highest concentration of TPH-D detected in ground water, 160 ppm, was collected from a temporary monitoring point drilled near Tank #2. The results of this investigation are presented in PG&E TES Report No. 402.331-92.58.

# 2. CURRENT INVESTIGATION RESULTS

## 2.1 SITE SETTING

*Location:* The site is located on the southeast corner of Embarcadero Way and Martin Luther King Jr. Way in Oakland, California (Figure 1).

*Surroundings:* Industrial development adjacent to San Francisco Bay.

*Geology:* The site is covered by approximately six inches of asphalt. Shallow soils generally consist of artificial fill typified by clay, silt, fine sand, gravelly sand and red brick. Ground water was generally encountered between 4.73 ft and 5.26 ft below ground surface.

## 2.2 SOIL BORING/SAMPLING

*Drilling Dates:* June 14 and 15, 1993.

*Drilling Geologist:* WA Staff Geologist Jonathan Weingast under the supervision of California Certified Engineering Geologist Joseph P. Theisen (CEG 1645).

*Drilling Methods:* CME-45 and Access II drill rigs using nine-inch diameter hollow stem augers and two-inch diameter solid flight augers, respectively. (WA's standard field procedures are presented in Appendix A.)

*Number of Borings Drilled:* Five (BH1-2, BH1-3, BH2-3, BH-A and BH-B; Figure 2).

*Number of Temporary Monitoring Points Destroyed:* Two (GWS-2E and GWS-2C; Figure 3).

| | |
|---|---|
| ***Boring Depths:*** | BH1-2: 14.0 ft,<br>BH1-3: 7.0 ft,<br>BH2-3: 14.0 ft,<br>BH-A: 9.5 ft, and<br>BH-B: 3.0 ft. |
| ***Temporary Monitoring Point Depths:*** | GWS-2E: 10.4 ft, and<br>GWS-2C: 8.0 ft. |
| ***Soil Sampling Method:*** | Samples were collected with clean 2.5 -in split-barrel drive samplers lined with stainless steel tubes. |
| ***Grab Ground Water Sampling Method:*** | One sample was collected with a clean 2.0-in polyethylene disposable bailer. |
| ***Temporary Monitoring Point Destruction Method:*** | Temporary 2-inch casings were pulled and the borings were overdrilled to remove the sand packs and annular seal. The final borings were sealed by tremying neat cement to the ground surface. |
| ***Sediments Encountered:*** | BH1-2: Sandy gravel, gravel and concrete fragments from about 0.5 to 7.5 ft, clayey silt to 9.5 ft and silty sand from about 9.5 ft to 14 ft depth.<br><br>BH1-3: Silty clay with chunks of concrete (fill) from about 0.5 to 7.0 ft depth.<br><br>BH2-3: Sand with some pebbles from about 0.5 to 6.0 ft and clayey sand with occasional iron oxide mottling and fine grained sand from about 6.0 ft to 14 ft depth.<br><br>BH-A: Silty sand with pieces of slag and red brick from about 0.5 to 5.0 ft depth and sandy silt with organic matter from about 5.0 ft to 9.5 ft depth (Appendix B).<br><br>BH-B: Silty sand with some pebbles from about 0.5 to 3.0 ft (auger refusal at 3.0 ft). |
| ***Analytical Laboratory:*** | Chromalab Inc., San Ramon, California. |
| ***Soil Analytical Methods:*** | One soil sample from BH1-2, BH-A and BH-B was analyzed for TPH-D by EPA Method 3550/8015 modified and BTEX by EPA Method 8020. A composite soil sample from BH1-3 and from BH2-3 was analyzed for TPH-D by EPA Methods 3550/8015 modified and BTEX by EPA Method 8020. |

***Soil Analytic Results:***

No BTEX was detected in the soil samples analyzed. Diesel range hydrocarbons were detected from the following samples:

4.3 mg/kg at 4.5 ft depth in BH1-2,
8.2 mg/kg at 4.5 ft depth in BH-A,
3.4 mg/kg at 3.0 ft in BH-B,
1.7 mg/kg in a composite sample collected from BH1-3, and
17.0 mg/kg in a composite sample collected from BH2-3 (Table 2, Appendix C).

***Grab Ground Water Analytic Results:***

A grab ground water sample collected from boring BH-A contained 580 µg/L TPH-D and no BTEX above analytic detection limits (Table 2, Appendix C).

***Soil Disposal:***

All drill cuttings from the borings were stored on-site in 55-gallon steel drums pending laboratory results. Appropriate disposal methods for the cuttings will be determined by PG&E based on the results of the chemical analyses.

## 2.3 WELL INSTALLATION

***Number of Wells Installed:***

Three (MW1-2, MW1-3 and MW2-3), installed in borings BH1-2, BH1-3, and BH2-3, respectively; (Figure 2).

***Well Materials:***

Four-inch diameter Schedule 40 PVC well casing with 0.010-inch slotted screen and Monterey #1/20 sand.

***Screened Interval:***

4.0 to 14.0 ft depth in MW1-2,
4.0 to 7.0 ft depth in MW1-3, and
4.0 to 14.0 ft depth in MW 2-3.

***Well Development Method:***

Surge block agitation and bailer evacuation until approximately 10 casing volumes of ground water were removed and the discharge water was relatively free of sediment. If the aquifer was slow to recharge, development was continued until recharge was too slow to practically continue.

*Well Yield:*

Average ground water yield in gallons per minute (gpm) during well development:

MW1-2: 0.87 gpm,
MW1-3: 0.57 gpm, and
MW2-3: 0.69 gpm.

*Water Sampling Method:*

Water samples were collected from wells MW1-2, MW1-3 and MW2-3 on June 22, 1993 using a steam-cleaned 2.0-in by 60-in Teflon bailer after four well-casing volumes of ground water were purged from each well.

*Well Elevation Survey:*

PLS Surveys of Alameda, California surveyed the well top-of-casing elevations (Table 1, Appendix D).

*Ground Water Depth:*

Depth to ground water as measured in temporary monitoring wells on May 27, 1993 was:

GWS-3J: 5.00 ft below top of casing (btoc),
GWS-3E: 5.03 ft btoc,
GWS-2E: 4.73 ft btoc,
GWS-2C: 5.17 ft btoc, and
GWS-2A: 5.26 ft btoc.

Depth to ground water as measured in permanent monitoring wells on June 22, 1993 was:

MW1-2: 5.05 ft below ground surface (bgs),
MW1-3: 5.15 ft bgs, and
MW2-3: 5.00 ft bgs.

*Ground Water Flow Direction:*

Based on the May 27, 1993 ground water data and the preliminary WA elevation survey of the five temporary monitoring wells referenced to an arbitrary onsite benchmark elevation of 100 ft, ground water flowed south to southwest beneath the site with a hydraulic gradient of .003 ft/ft (Figure 3). The ground water elevation contours suggest that wells MW1-2, MW 1-3 and MW 2-3, which replaced temporary monitoring points GWS-2A, GWS-3E and GWS-3J, respectively, are downgradient of the former and new diesel dump Tanks #2 and #3.

Based on the June 22, 1993 ground water data and the PLS elevation survey, ground water flows west to northwest beneath the site with a hydraulic gradient of .001 ft/ft (Figure 4).

*Ground Water Analytical Methods:*

EPA method 3510/8015 modified for TPH-D and EPA Method 602 for BTEX.

*Ground Water Analytic Results:*

Diesel range hydrocarbons were detected in the water samples collected from the three monitoring wells sampled (Table 2, Attachment E). Samples collected from MW1-2, MW1-3 and MW2-3 contained 1,500, 160 and 560 µg/L diesel range hydrocarbons quantified as diesel, respectively. In MW2-3, 2,100 ppb of motor oil was detected in this sample. Additionally, no BTEX was detected in the ground water samples analyzed except for 3.1 ppb benzene in MW2-3. The field blank reported nondetectable levels of TPH-D and BTEX.

*Waste Disposal:*

Steam cleaning rinseate and all well purge water was stored onsite in approved 55-gallon hazardous waste drums pending analytical results for proper disposal by PG&E.

## 3. CONCLUSIONS

The results of this investigation include:

- Destruction of two temporary monitoring well points (GWS-2C and GWS-2E), overdrilling and installation of three permanent monitoring wells (MW1-3, MW2-3 and MW1-3) and drilling two soil borings (BH-A and BH-B) and collecting a ground water sample from one of the borings (BH-A);
- No BTEX compounds and generally low concentrations of diesel-range hydrocarbons were detected in the soil samples collected in the vicinity of the former and new diesel dump tanks. The highest concentration of TPH-D detected in soil was 17.0 ppm in a composite soil sample collected from boring BH2-3;
- Ground water from wells MW1-2, MW1-3, and MW2-3 contained detectable concentrations of unknown hydrocarbons quantified as diesel. A sample analyzed from MW2-3 contained 3,100 $\mu$g/L of motor oil. Benzene was detected at a concentration of 3.1 ppb in MW2-3.
- Ground water beneath the PG&E Oakland Power Plant Facility site flowed west to northwest on June 22, 1993, and the hydraulic gradient ranged from .001 to .003 ft/ft.

Based on these results, soil and ground water beneath the former and new diesel dump tanks at the PG&E Oakland Power Plant at 50 Martin Luther King Jr. Way appears to have been impacted by hydrocarbon releases from the former diesel dump tanks. However, only a trace concentration of benzene (3.1 ppb) was detected in one well (MW2-3), and only low TPH-D concentrations (a maximum of 1,500 ppb in MW1-2) was detected in any of the permanent wells. The presence of diesel range hydrocarbons in the ground water will be re-evaluated during the 3rd quarter 1993 sampling event.

# FIGURES

# FIGURES

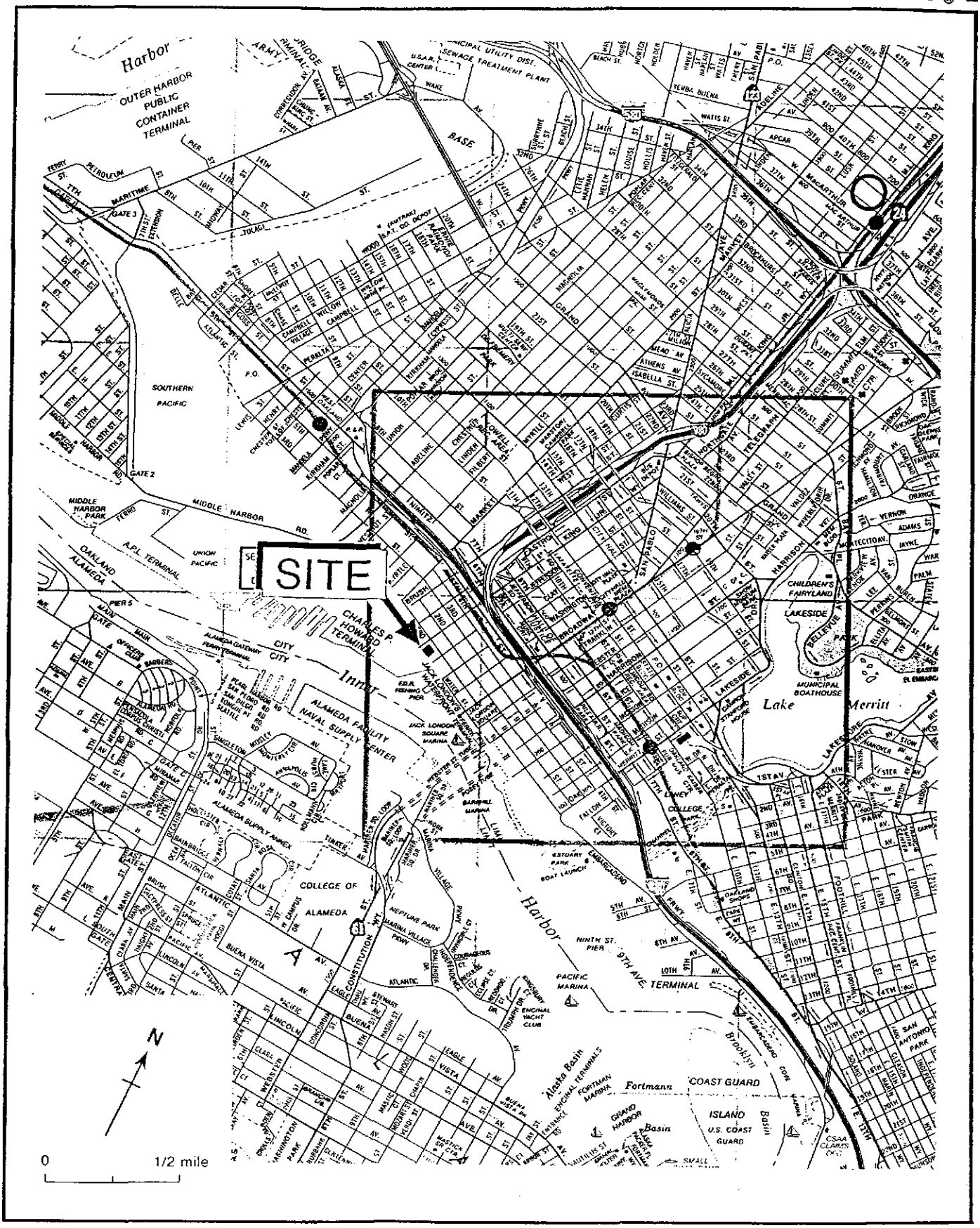



Figure 1. Site Location Map - PG&E Power Plant, 50 Martin Luther King Jr. Way, Oakland, California

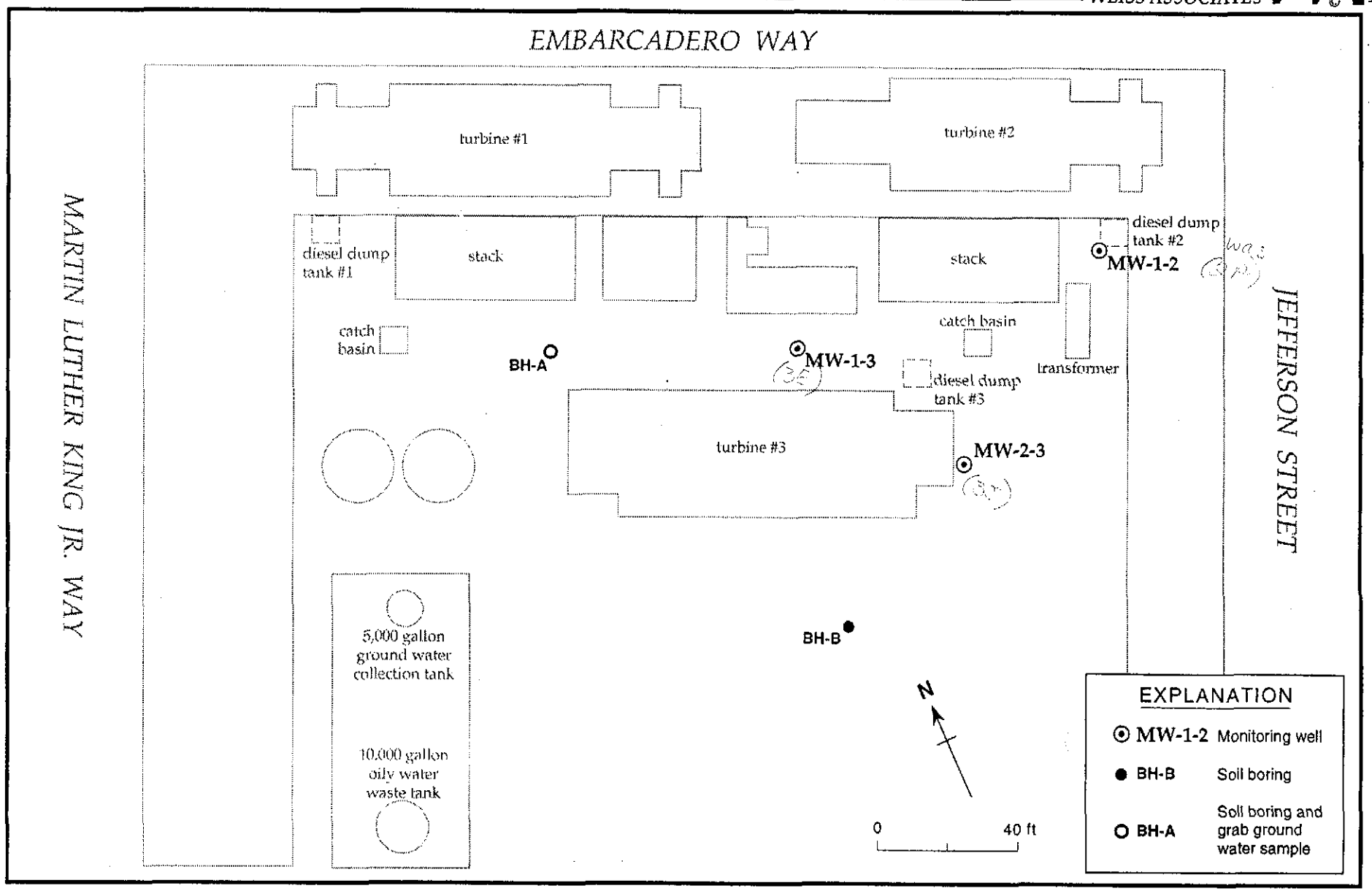



Figure 2. Monitoring Well and Soil Boring Locations - PG&E Oakland Power Plant, 50 Martin Luther King Jr. Way, Oakland, California

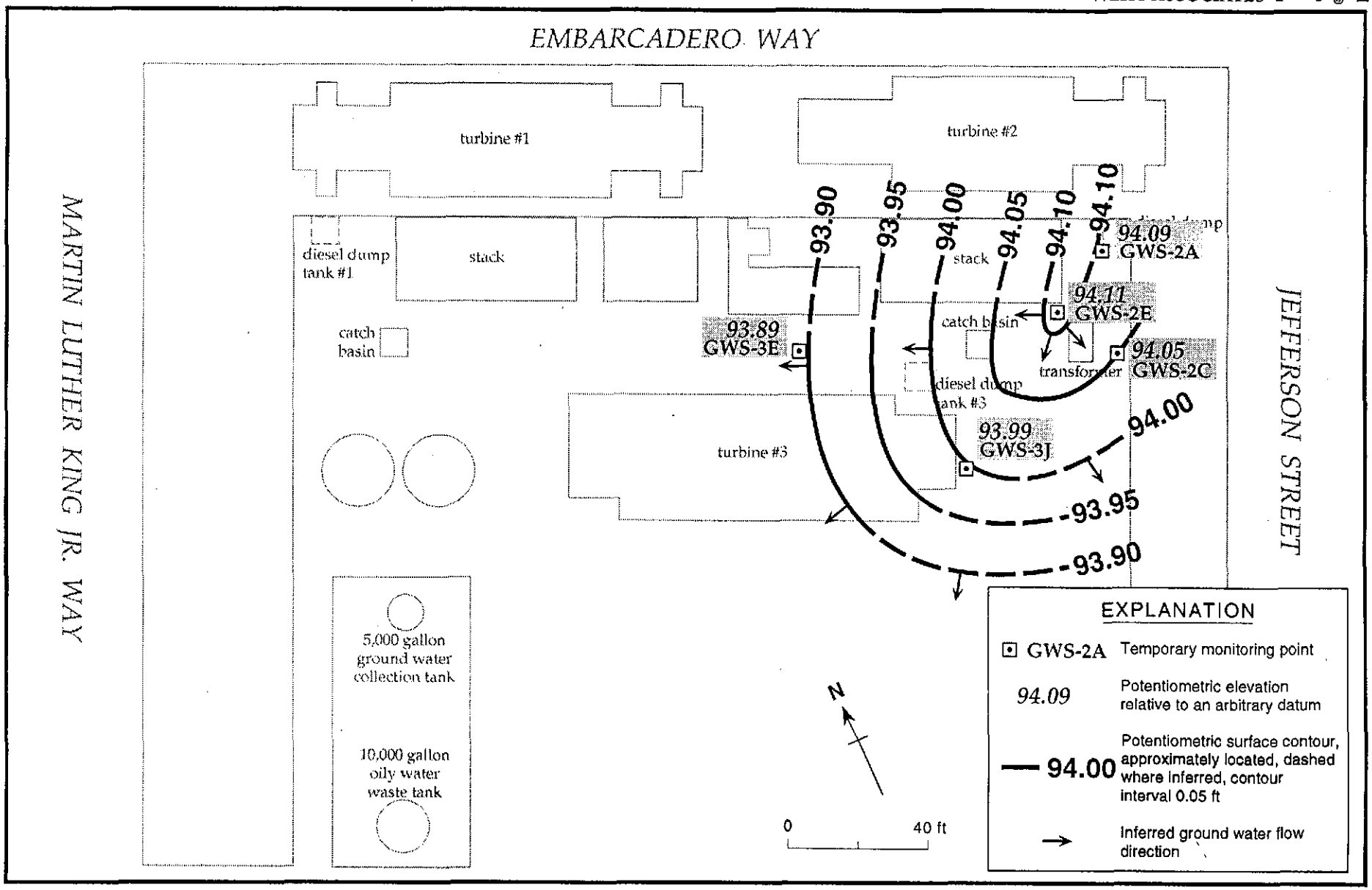



Figure 3. Approximate Potentiometric Surface Contours May 27, 1993 - PG&E Oakland Power Plant, 50 Martin Luther King Jr. Way, Oakland, California

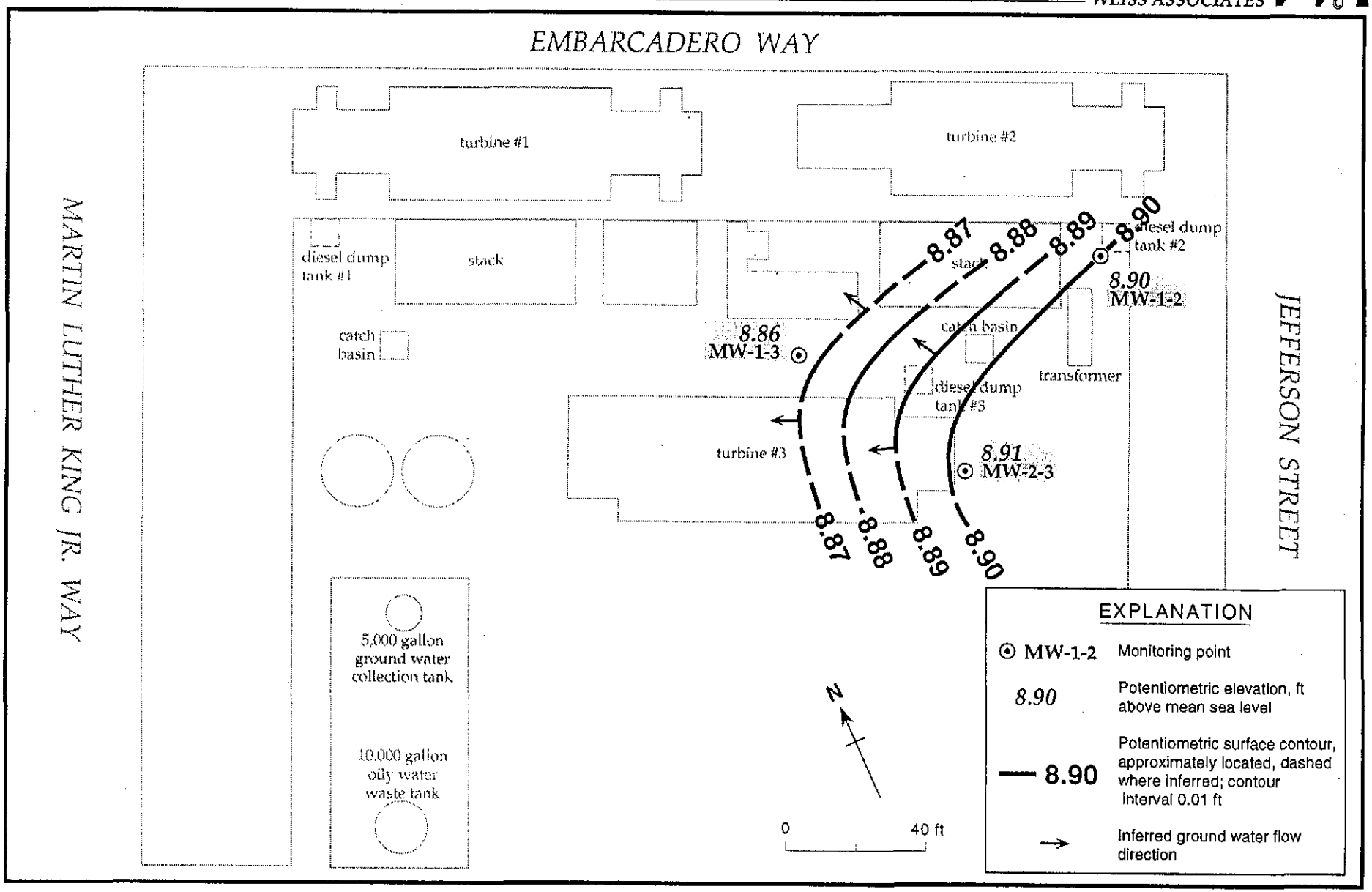



Figure 4. Potentiometric Surface Contours - June 22, 1993 - PG&E Oakland Power Plant, 50 Martin Luther King Jr. Way, Oakland, California

# TABLES

Table 1. Ground Water Elevation Measurements - PG&E Oakland Power Plant, 50 Martin Luther King Jr. Way, Oakland, California

| Well ID | Date | TOC Elevation[a] | Depth To Water (ft) | Water Level Elevation[a] |
|---|---|---|---|---|
| GWS-2A | 05/27/93 | 99.35 | 5.25 | 94.09 |
| GWS-2C | 05/27/93 | 99.22 | 5.17 | 94.05 |
| GWS-2E | 05/27/93 | 98.84 | 4.73 | 94.11 |
| GWS-3E | 05/27/93 | 98.92 | 5.03 | 93.89 |
| GWS-3J | 05/27/93 | 98.99 | 5.00 | 93.99 |
| MW-1-2 | 06/22/93 | 13.95 | 5.05 | 8.90 |
| MW-1-3 | 06/22/93 | 14.01 | 5.15 ✓ | 8.86 |
| MW-2-3 | 06/22/93 | 13.91 | 5.00 | 8.91 |

Notes:

a = May data surveyed to common datum. June data surveyed to mean sea level datum by PLS Surveys of Alameda.

Table 2. Analytic Results for Soil and Water - PG&E Power Plant, 50 Martin Luther King Jr. Way, Oakland, California

| Sample ID | Sampling Date | Approximate Depth (ft) | TPH-D[a] (mg/Kg) | Benzene | Ethylbenzene | Toluene | Xylenes |
|---|---|---|---|---|---|---|---|
| | | | | <----------(µg/Kg)----------> | | | |
| SOIL SAMPLES | | | | | | | |
| BH-A | 06/15/93 | 4.5 | 8.2 | <5.0 | <5.0 | <5.0 | <5.0 |
| BH-B | 06/15/93 | 3.0 | 3.4 | <5.0 | <5.0 | <5.0 | <5.0 |
| BH1-2 | 06/14/93 | 4.5 | 4.3 | <5.0 | <5.0 | <5.0 | <5.0 |
| CUTTINGS SAMPLES (composited) | | | | | | | |
| BH1-3 | 06/15/93 | b | 1.7 | <5.0 | <5.0 | <5.0 | <5.0 |
| BH2-3 | 06/15/93 | b | 17.0 | <5.0 | <5.0 | <5.0 | <5.0 |

| Sample ID | Sampling Date | | TPH-D | Benzene | Ethylbenzene | Toluene | Xylenes |
|---|---|---|---|---|---|---|---|
| | | | <----------(µg/1L)----------> | | | | |
| WATER SAMPLES | | TPH-mo/ppb | ppb | ppb | | | |
| BH-A | 06/15/93 | | 560 | <0.5 | <0.5 | <0.5 | <0.5 |
| MW1-2 | 06/22/93 | | 1,500 | <0.5 | <0.5 | <0.5 | <0.5 |
| MW1-3 | 06/22/93 | | 160 | <0.5 | <0.5 | <0.5 | <0.5 |
| MW2-3 | 06/22/93 | >3100 ✓ | 560 | 3.1 | <0.5 | <0.5 | <0.5 |
| Field Blank | 06/22/93 | | <50.0 | <0.5 | <0.5 | <0.5 | <0.5 |

Notes:

a = Unknown hydrocarbon found in diesel range quantified as diesel.
b = Composite sample collected from drill cuttings for soil disposal characterization.
c = 3.1 mg/L of motor oil found in this sample.
mg/Kg = Milligrams per kilogram
µg/L = Micrograms per liter
All samples analyzed by Chromalab, San Ramon, California.

# APPENDIX A

## SAMPLING PROCEDURES

# STANDARD FIELD PROCEDURES

WA has developed standard procedures for drilling and sampling soil borings and installing, developing and sampling ground water monitoring wells. These procedures comply with Federal, State and local regulatory guidelines. Specific procedures are summarized below.

## SOIL BORING AND SAMPLING

### Objectives/Supervision

Soil sampling objectives include characterizing subsurface lithology, assessing whether the soils exhibit obvious hydrocarbon or other compound vapor or staining, and collecting samples for analysis at a State-certified laboratory. All borings are logged using the Unified Soil Classification System by a trained geologist working under the supervision of a California Registered Geologist (RG) or a Certified Engineering Geologist (CEG).

### Soil Boring and Sampling

Deep soil borings or borings for well installation are typically drilled using hollow-stem augers. Split-barrel samplers lined with steam-cleaned brass or stainless steel tubes are driven through the hollow auger stem into undisturbed sediments at the bottom of the borehole using a 140 pound hammer dropped 30 inches. Soil samples can also be collected without using hollow-stem augers by progressively driving split-barrel soil samplers to depths of up to 30 ft.

Soil samples are collected at least every five ft to characterize the subsurface sediments and for possible chemical analysis. Near the water table and at lithologic changes, the sampling interval may be less than five ft.

Drilling and sampling equipment is steam-cleaned prior to drilling and between borings to prevent cross-contamination. Sampling equipment is washed between samples with trisodium phosphate or an equivalent EPA-approved detergent.

Sample Analysis

After noting the lithology at each end of the sampling tubes, the tube chosen for analysis is immediately trimmed of excess soil and capped with teflon tape and plastic end caps. The sample is labelled, stored at or below 4°C, and transported under chain-of-custody to a State-certified analytic laboratory.

Screening

One of the remaining tubes is partially emptied leaving about one-third of the soil in the tube. The tube is capped with plastic end caps and set aside to allow hydrocarbons to volatilize from the soil. After ten to fifteen minutes, a portable photoionization detector (PID) measures volatile hydrocarbon vapor concentrations in the tube headspace, extracting the vapor through a slit in the cap. PID measurements are used along with the stratigraphy and ground water depth to select soil samples for analysis.

Grouting

If the borings are not completed as wells, the borings are filled to the ground surface with cement grout poured or pumped through a tremie pipe. If wells are completed in the borings, the well installation, development and sampling procedures summarized below are followed.

# MONITORING WELL INSTALLATION, DEVELOPMENT AND SAMPLING

## Well Construction and Surveying

Wells are installed to monitor ground water quality and determine the ground water elevation, flow direction and gradient. Well depths and screen lengths are based on ground water depth, occurrence of hydrocarbons or other compounds in the borehole, stratigraphy and state and local regulatory guidelines. Well screens typically extend 15 ft below and 5 ft above the static water level at the time of drilling. However, the well screen will generally not extend into or through a clay layer that is at least three ft thick.

Well casing and screen are flush-threaded, Schedule 40 PVC. Screen slot size varies according to the sediments screened, but slots are generally 0.010 or 0.020 inches wide. A rinsed and graded sand occupies the annular space between the boring and the well screen to about one to two ft above the well screen. A two ft thick hydrated bentonite seal separates the sand from the overlying sanitary surface seal composed of cement with 3-5% bentonite.

Well-heads are secured by locking well-caps inside traffic-rated vaults finished flush with the ground surface. A stovepipe may be installed between the well-head and the vault cap for additional security.

The well top-of-casing elevation is surveyed with respect to mean sea level and the well is surveyed for horizontal location with respect to an onsite or nearby offsite landmark.

## Well Development

After 24 hours, the wells are developed using a combination of ground water surging and extraction. Surging agitates the ground water and dislodges fine sediments from the sand pack. After about ten minutes of surging, ground water is extracted from the well using bailing, pumping and/or reverse air-lifting through an eductor pipe to remove the sediments from the well. Surging and extraction continue until at least ten well-casing volumes of ground water are extracted and the sediment volume in the ground water is negligible. All equipment is steam-cleaned prior to use and

air used for air-lifting is filtered to prevent oil entrained in the compressed air from entering the well. Wells that are developed using air-lift evacuation are not sampled until at least 24 hours after they are developed.

Ground Water Sampling

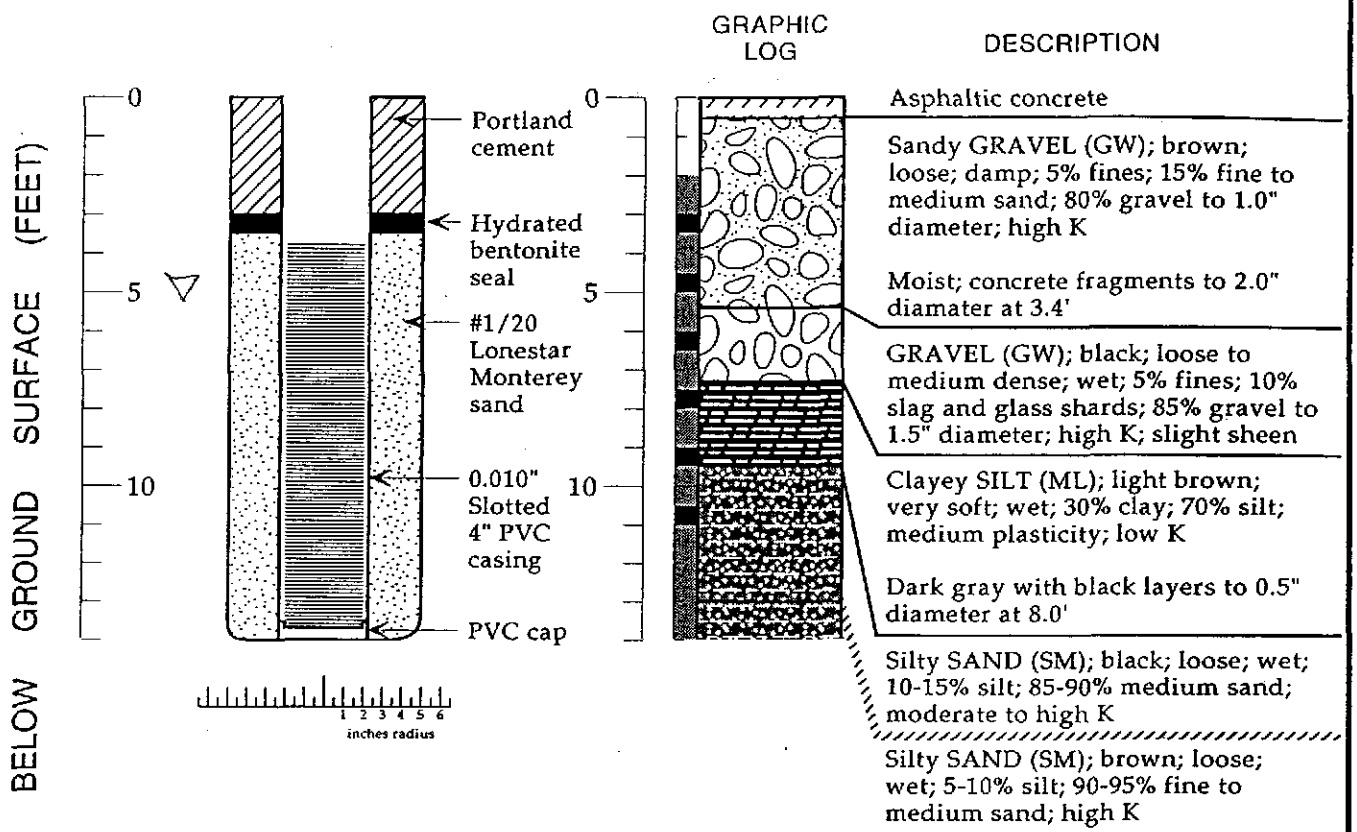
Depending on local regulatory guidelines, three to four well-casing volumes of ground water are purged prior to sampling. Purging continues until ground water pH, conductivity, and temperature have stabilized. Ground water samples are collected using bailers or pumps and are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labelled, placed in protective foam sleeves, stored at 4°C, and transported under chain-of-custody to the laboratory. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may be analyzed if non-dedicated sampling equipment is used.

# APPENDIX B

# APPENDIX B

BORING LOGS

# WELL MW-1-2



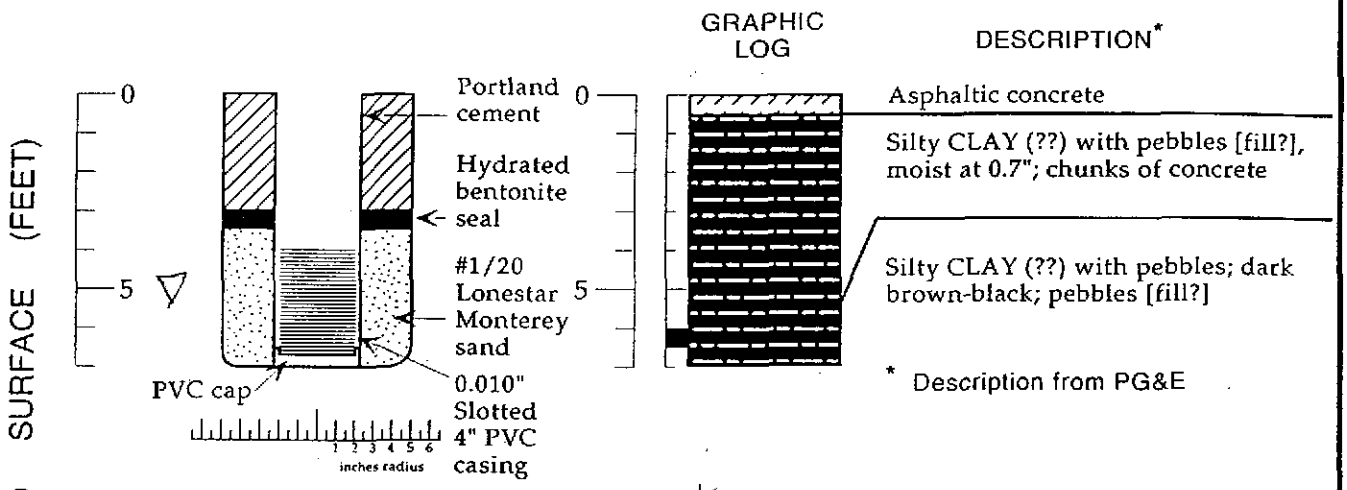

## EXPLANATION

- Water level during drilling (date)
- Water level (date)
- Contact (dotted where approximate)
- Uncertain contact
- Gradational contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample
- K = Estimated hydraulic conductivity

Logged By: Jonathan Weingast
Supervisor: Joseph P. Theisen; CEG 1645
Drilling Company: Soils Exploration Services, Vacaville, CA
License Number: C57-582696
Driller: Scott Fitchie
Drilling Method: Hollow-stem auger
Date Drilled: June 14-15, 1993
Well Head Completion: 4" locking well-plug, traffic-rated vault
Type of Sampler: Split barrel (1.5", 2.5" ID)
Ground Surface Elevation: feet above mean sea level

Boring Log and Well Construction Details - Well MW-1-2 - PG&E Power Plant, 50 Martin Luther King Jr. Way, Oakland, California

# WELL MW-1-3




gw at 5.15'

why so short a casing? Gary Nulty - there's concrete + rubble + difficult to auger thru it 8-23-93

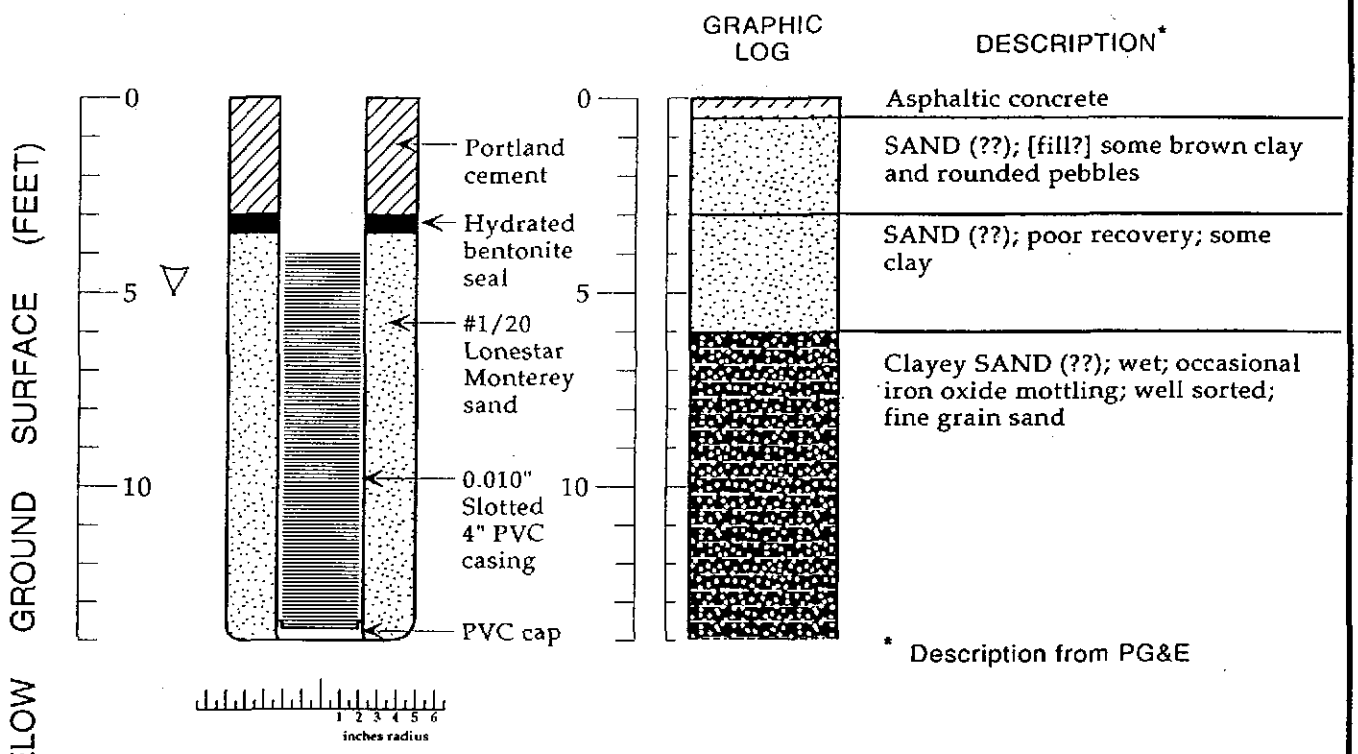
## EXPLANATION

- ▼ Water level during drilling (date)
- ▽ Water level (date)
- ——····—— Contact (dotted where approximate)
- —?—?— Uncertain contact
- ////////// Gradational contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample
- K = Estimated hydraulic conductivity

Logged By: Jonathan Weingast
Supervisor: Joseph P. Theisen; CEG 1645
Drilling Company: Soils Exploration Services, Vacaville, CA
License Number: C57-582696
Driller: Gene Bernard
Drilling Method: Hollow-stem auger
Date Drilled: June 15, 1993
Well Head Completion: 4" locking well-plug, traffic-rated vault
Type of Sampler: Split barrel
Ground Surface Elevation: feet above mean sea level

Boring Log and Well Construction Details - Well MW-1-3 - PG&E Power Plant, 50 Martin Luther King Jr. Way, Oakland, California

# WELL MW-2-3



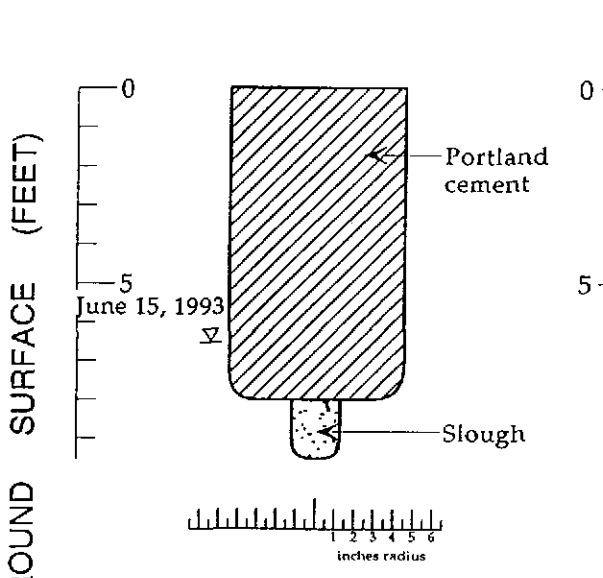

## EXPLANATION

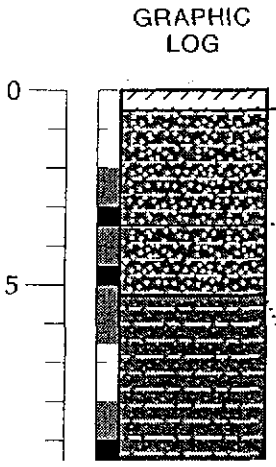
- Water level during drilling (date)
- Water level (date)
- Contact (dotted where approximate)
- Uncertain contact
- Gradational contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample
- K = Estimated hydraulic conductivity

Logged By: Jonathan Weingast
Supervisor: Joseph P. Theisen; CEG 1645
Drilling Company: Soils Exploration Services, Vacaville, CA
License Number: C57-582696
Driller: Scott Fitchie
Drilling Method: Hollow-stem auger
Date Drilled: June 14-15, 1993
Well Head Completion: 4" locking well-plug, traffic-rated vault
Type of Sampler: None
Ground Surface Elevation: feet above mean sea level

Boring Log and Well Construction Details - Well MW-2-3 - PG&E Power Plant, 50 Martin Luther King Jr. Way, Oakland, California

# BORING BH-A




DESCRIPTION

Asphaltic concrete

Silty SAND (SM); brown; medium dense; dry; 15% silt; 85% very fine to medium sand; moderate K

Silty SAND (SM); brown-black; medium dense; dry; 10% silt; 70% very fine to medium sand; 20% chunks of slag and red brick to 2.5" diameter

Sandy SILT (ML); black; loose; wet; 80% silt; 20% very fine to fine sand; some plant parts; nonplastic; moderate K

## EXPLANATION

- ▼ Water level during drilling (date)
- ▽ Water level (date)
- — ····· Contact (dotted where approximate)
- —?—?— Uncertain contact
- //////// Gradational contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample
- K = Estimated hydraulic conductivity

Logged By: Jonathan Weingast
Supervisor: Joseph P. Theisen; CEG 1645
Drilling Company: Soils Exploration Services, Vacaville, CA
License Number: C57-582696
Driller: Gene Bernard
Drilling Method: Hollow-stem auger
Date Drilled: June 15, 1993
Type of Sampler: Split barrel (2.5" ID)
Ground Surface Elevation: feet above mean sea level

Boring Log and Well Construction Details - Boring BH-A - PG&E Power Plant, 50 Martin Luther King Jr. Way, Oakland, California

# APPENDIX C

ANALYTIC REPORT FOR SOIL AND BAILED GROUND WATER

# CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

June 23, 1993 ChromaLab File No.: 9306199

P.G.& E. WATER QUAL GP S RAMON

Attn: Gary Nulty

RE: Five soil samples for Diesel analysis

Project Name: OAKLAND POWER PLANT,DUMP
Project Number: 0530 SUB OF #EB
Date Sampled: June 14, 1993 Date Submitted: June 16, 1993
Date Extracted: June 21, 1993 Date Analyzed: June 21, 1993

RESULTS:

| Sample I.D. | Diesel (mg/Kg) |
|---|---|
| BH-1-2, 4.5 | 4.3 |
| BH-1-3 | 1.7 |
| BH-2-3 | 17 |
| BH-A, 4.5 | 8.2 |
| BH-B, 3.0 | 3.4 |
| BLANK | N.D. |
| SPIKE RECOVERY | 90% |
| DUP SPIKE RECOVERY | 101% |
| DETECTION LIMIT | 1.0 |
| METHOD OF ANALYSIS | 3550/8015 |

ChromaLab, Inc.

Alex Tam
Analytical Chemist

Eric Tam
Laboratory Director

cc

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

# CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

June 22, 1993 ChromaLab File No.: 9306199

P.G.& E. WATER QUAL GP S RAMON

Attn: Gary Nulty

RE: Five soil samples for BTEX analysis

Project Name: OAKLAND POWER PLANT,DUMP
Project Number: 0530 SUB OF #EB
Date Sampled: June 14, 1993 Date Submitted: June 16, 1993
Date Analyzed: June 21, 1993

RESULTS:

| Sample I.D. | Benzene (µg/Kg) | Toluene (µg/Kg) | Ethyl Benzene (µg/Kg) | Total Xylenes (µg/Kg) |
|---|---|---|---|---|
| BH-1-2 4.5 | N.D. | N.D. | N.D. | N.D. |
| BH-1-3 | N.D. | N.D. | N.D. | N.D. |
| BH-2-3 | N.D. | N.D. | N.D. | N.D. |
| BH-A-4.5 | N.D. | N.D. | N.D. | N.D. |
| BH-B-3.0 | N.D. | N.D. | N.D. | N.D. |
| BLANK | N.D. | N.D. | N.D. | N.D. |
| SPIKE RECOVERY | 86% | 83% | 96% | 98% |
| DUP SPIKE RECOVERY | 94% | 90% | 104% | 102% |
| DETECTION LIMIT | 5.0 | 5.0 | 5.0 | 5.0 |
| METHOD OF ANALYSIS | 8020 | 8020 | 8020 | 8020 |

ChromaLab, Inc.

Billy Thach
Analytical Chemist

Eric Tam
Laboratory Director

cc

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

# CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

June 23, 1993 ChromaLab File No.: 9306199

P.G.& E. WATER QUAL GP S RAMON

Attn: Gary Nulty

RE: One water sample for Diesel analysis

Project Name: OAKLAND POWER PLANT,DUMP
Project Number: 0530 SUB OF #EB
Date Sampled: June 14, 1993 Date Submitted: June 16, 1993
Date Extracted: June 21, 1993 Date Analyzed: June 21, 1993

RESULTS:

| Sample I.D. | Diesel (µg/L) |
|---|---|
| BH-A WATER | 580 |
| BLANK | N.D. |
| SPIKE RECOVERY | 82% |
| DUP SPIKE RECOVERY | 77% |
| DETECTION LIMIT | 50 |
| METHOD OF ANALYSIS | 3510/8015 |

ChromaLab, Inc.

Alex Tam
Analytical Chemist

Eric Tam
Laboratory Director

cc

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

# CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

June 22, 1993 ChromaLab File No.: 9306199

P.G.& E. WATER QUAL GP S RAMON

Attn: Gary Nulty

RE: One water sample for BTEX analysis

Project Name: OAKLAND POWER PLANT,DUMP
Project Number: 0530 SUB OF #EB
Date Sampled: June 14, 1993 Date Submitted: June 16, 1993
Date Analyzed: June 22, 1993

RESULTS:

| Sample I.D. | Benzene (µg/L) | Toluene (µg/L) | Ethyl Benzene (µg/L) | Total Xylenes (µg/L) |
|---|---|---|---|---|
| BH-A WATER | N.D. | N.D. | N.D. | N.D. |
| BLANK | N.D. | N.D. | N.D. | N.D. |
| SPIKE RECOVERY | 99% | 99% | 103% | 102% |
| DUP SPIKE RECOVERY | 101% | 99% | 104% | 102% |
| DETECTION LIMIT | 0.5 | 0.5 | 0.5 | 0.5 |
| METHOD OF ANALYSIS | 602 | 602 | 602 | 602 |

ChromaLab, Inc.

Billy Thach
Analytical Chemist

Eric Tam
Laboratory Director

cc

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

# CHROMALAB, INC.

SUBM #: 9306000199
CLIENT: PGE-WAT
DUE: 06/22/93

199/8660 S6680 Rec'd 12/10

## Chain of Custody

DATE June 16, 1993 PAGE 1 OF 1

PROJ. MGR. Gary Nulty
COMPANY PG&E
ADDRESS 3400 Crow Canyon Road
San Ramon, CA 94583
SAMPLERS (SIGNATURE) Jonathan Weingart
(PHONE NO.) 510-450-6155

ANALYSIS REPORT

| SAMPLE ID. | DATE | TIME | MATRIX | LAB ID. | TPH - Gasoline (EPA 5030, 8015) | TPH - Gasoline (5030, 8015) w/BTeX (EPA 602,8020) | TPH - Diesel (EPA 3510/3550, 8015) | PURGEABLE AROMATICS BTEX (EPA 602, 8020) | PURGEABLE HALOCARBONS (EPA 601, 8010) | VOLATILE ORGANICS (EPA 624, 8240, 524.2) | BASE/NEUTRALS, ACIDS (EPA 625/627, 8270, 525) | TOTAL OIL & GREASE (EPA 5520 E&F) | PESTICIDES/PCB (EPA 608, 8080) | PHENOLS (EPA 604, 8040) | TOTAL RECOVERABLE HYDROCARBONS (EPA 418.1) | | METALS: Cd, Cr, Pb, Zn, Ni | CAM METALS (17) | PRIORITY POLLUTANT METALS (13) | EXTRACTION (TCLP, STLC) | | COMPOSITE INTO ONE SAMPLE | | | NUMBER OF CONTAINERS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BH-1-2 4.5 | 6/14/93 | 10:10 | Soil | | X | | X | X | | | | | | | | | | | | | | | | 1 |
| BH-1-3 | 6/15/93 | 16:30 | Soil | | X | | X | X | | | COMPOSITE INTO ONE SAMPLE | | | | | | | | | | | X | | 4 |
| BH-2-3 | 6/15/93 | 17:00 | Soil | | X | | X | X | | | COMPOSITE INTO ONE SAMPLE | | | | | | | | | | | X | | 4 |
| BH-A 4.5 | 6/15/93 | 14:51 | Soil | | X | | X | X | | | | | | | | | | | | | | | | 1 |
| BH-B 3.0 | 6/15/93 | 08:15 | Soil | | X | | X | X | | | | | | | | | | | | | | | | 1 |
| BH-A WATER | 6/15/93 | 16:15 | WATER | | X | | X | | | | | | | | | | | | | | | | | 1 |
| BH-A WATER | 6/15/93 | 16:15 | WATER | | | | | X | | | | | | | | | | | | | | | | 4 |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |

**PROJECT INFORMATION**

PROJECT NAME: OAKLAND POWER PLANT, Diesel Dump Tanks
PROJECT NUMBER: 0530 Subjob # EB
SHIPPING ID. NO.
VIA:

**SAMPLE RECEIPT**

| | |
|---|---|
| TOTAL NO. OF CONTAINERS | 16 |
| CHAIN OF CUSTODY SEALS | |
| REC'D GOOD CONDITION/COLD | |
| CONFORMS TO RECORD | |
| LAB NO. | |

SPECIAL INSTRUCTIONS/COMMENTS:
Job # 0530
SubJob# EB

| | 1. | 2. | 3. |
|---|---|---|---|
| RELINQUISHED BY | Jonathan Weingart 13:02 | Herb Toor 16:29 | |
| (SIGNATURE) (TIME) | | | |
| (PRINTED NAME) (DATE) | Jonathan Weingart 6/16/93 | Herb Toor 6/16/93 | |
| (COMPANY) | Weiss Assoc. | Weiss Assoc. | |
| RECEIVED BY | Herb Toor 13:02 | Gary Cook 16:29 | |
| (SIGNATURE) (TIME) | | | |
| (PRINTED NAME) (DATE) | Herb Toor 6/16/93 | Gary Cook 6/16/93 | |
| (COMPANY) | Weiss Assoc. | Chromalab | |
| RECEIVED BY (LABORATORY) | | | |
| (SIGNATURE) (TIME) | | | |
| (PRINTED NAME) (DATE) | | | |
| (LAB) | | | |

# APPENDIX D

MONITORING WELL SURVEY REPORT

PLS SURVEYS

July 1, 1993

Mr. Jonathan Weingast
Weiss Associates
5500 Shellmound Street
Emeryville, CA 94608-2411

Re: Job #93032
PG&E Oakland Power Plant
Oakland, CA

Dear Mr. Weingast:

Jonathan, per your request of yesterday, we have revisited the site, and tied the previous information used to Mean Sea Level (MSL). The following is a compilation of the elevations of the wells as found based on this new datum. The Benchmark used is a PK nail and shiner, marked Port of Oakland at the intersection of Clay Street and Embarcadero Way, having an elevation of 12.384, Port of Oakland datum which is 3.2 feet lower than Mean Sea Level.

| Structure Number | | Elevation 7-01-93 |
|---|---|---|
| MW-1-2, | Casing | 13.95 |
| | Vault | 14.43 |
| MW-1-3, | Casing | 14.01 |
| | Vault | 14.39 |
| MW-2-3, | Casing | 13.91 |
| | Vault | 14.36 |

None of the casings had a notch or mark yet, so I marked the north side of the PVC on all three for future reference. As noted in the June 22 letter, we left a temporary Benchmark (TBM) on the NW bolt of an overhead wire pole inside the yard. This can be used in the future as well, however it's adjusted elevation based on MSL is 16.211. Please note that the elevation marked inside the site on this TBM is not on MSL.

If you have any questions, please call.

Sincerely,

Julia E. Terry

Julia E. Terry, LS
President

714 Grand Street Alameda, CA 94501 (510) 522-1790 Fax (510) 522-6207

# APPENDIX E

**APPENDIX E**

ANALYTIC REPORT FOR GROUND WATER

# CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

June 30, 1993

ChromaLab File No.: 9306279
Submission #: 9306000279

WEISS ASSOCIATES

Attn: J.P.T./J.D.P.

RE: Three water samples for Diesel analysis

Project Name: P.G.E. OAKLAND POWER PLAN
Project Number: 47-725-01
Date Sampled: June 22, 1993 Date Submitted: June 23, 1993
Date Extracted: June 29, 1993 Date Analyzed: June 29, 1993

RESULTS:

| Sample I.D. | Diesel* (µg/L) |
|---|---|
| MW1-2 | 1500 |
| MW1-3 | 160 |
| MW2-3 | 560** |
| BLANK | N.D. |
| SPIKE RECOVERY | 90% |
| DUP SPIKE RECOVERY | 91% |
| DETECTION LIMIT | 50 |
| METHOD OF ANALYSIS | 3510/8015 |

* Unknown hydrocarbon found in diesel range quantified as diesel.
** 3.1 mg/L of motor oil found in this sample.

ChromaLab, Inc.

Alex Tam
Analytical Chemist

Eric Tam
Laboratory Director

do

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

# CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

June 30, 1993

ChromaLab File No.: 9306279
Submission #: 9306000279

WEISS ASSOCIATES

Attn: J.P.T./J.D.P.

RE: Four water samples for BTEX analysis

Project Name: P.G.E. OAKLAND POWER PLAN
Project Number:47-725-01
Date Sampled: June 22, 1993 Date Submitted: June 23, 1993
Date Analyzed: June 28, 1993

RESULTS:

| Sample I.D. | Benzene (µg/L) | Toluene (µg/L) | Ethyl Benzene (µg/L) | Total Xylenes (µg/L) |
|---|---|---|---|---|
| MW1-2 | N.D. | N.D. | N.D. | N.D. |
| MW1-3 | N.D. | N.D. | N.D. | N.D. |
| MW2-3 | 3.1 | N.D. | N.D. | N.D. |
| FIELD BLANK | N.D. | N.D. | N.D. | N.D. |
| BLANK | N.D. | N.D. | N.D. | N.D. |
| SPIKE RECOVERY | 105% | 104% | 107% | 107% |
| DUP SPIKE RECOVERY | 102% | 102% | 107% | 106% |
| DETECTION LIMIT | 0.5 | 0.5 | 0.5 | 0.5 |
| METHOD OF ANALYSIS | 602 | 602 | 602 | 602 |

ChromaLab, Inc.

Jack Kelly
Analytical Chemist

Eric Tam
Laboratory Director

do

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

#12208 279918

# CHROMALAB, INC.

SUBM #: 9306000279
CLIENT: WEISS
DUE: 06/30/93
REF: 12204

3

## Chain of Custody

DATE 6/22/93 PAGE 1 OF 1

PROJ. MGR. J.P.T./J.D.P.
COMPANY WEISS ASSOCIATES
ADDRESS 5500 SHELL MOUND
EMERYVILLE, CA. 94608
(PHONE NO.) 510 450-6000
SAMPLERS (SIGNATURE) Rudy R. Marquez

REPORT

| SAMPLE ID. | DATE | TIME | MATRIX | LAB ID | TPH - Gasoline (EPA 5030, 8015) | TPH - Gasoline (5030, 8015) w/BTeX (EPA 602,8020) | TPH - Diesel (EPA 3510/3550, 8015) | PURGEABLE AROMATICS BTEX (EPA 602, 8020) | PURGEABLE HALOCARBONS (EPA 601, 8010) | VOLATILE ORGANICS (EPA 624, 8240, 524.2) | BASE/NEUTRALS, ACIDS (EPA 625/627, 8270, 525) | TOTAL OIL & GREASE (EPA 5520 E&F) | PESTICIDES/PCB (EPA 608, 8080) | PHENOLS (EPA 604, 8040) | TOTAL RECOVERABLE HYDROCARBONS (EPA 418.1) | | METALS: Cd, Cr, Pb, Zn, Ni | CAM METALS (17) | PRIORITY POLLUTANT METALS (13) | EXTRACTION (TCLP, STLC) | | | | | NUMBER OF CONTAINERS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MW1-2 | 6/22 | 15:30 | WATER | | | | | X | | | | | | | | | | | | | | | | | 3 |
| MW 1-3 | | 15:15 | | | | | | | | | | | | | | | | | | | | | | | |
| MW 2-3 | | 16:00 | | | | | | | | | | | | | | | | | | | | | | | |
| FIELD BLANK | | 15:00 | | | | | | | | | | | | | | | | | | | | | | | 1 |
| MW 1-2 | | 15:30 | | | | | X | | | | | | | | | | | | | | | | | | 2 |
| MW 1-3 | | 15:15 | | | | | | | | | | | | | | | | | | | | | | | 2 |
| MW 2-3 | | 16:00 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |

**PROJECT INFORMATION**

PROJECT NAME: PG&E, OAKLAND POWER PLANT
PROJECT NUMBER: 47-725-01
SHIPPING ID. NO.
VIA:

**SAMPLE RECEIPT**

| | |
|---|---|
| TOTAL NO. OF CONTAINERS | 8 |
| CHAIN OF CUSTODY SEALS | No |
| REC'D GOOD CONDITION/COLD | Y |
| CONFORMS TO RECORD | Y |
| LAB NO. | |

SPECIAL INSTRUCTIONS/COMMENTS:
W.A. CONTACT J.C.W. PH. 510 450-6155

JOB NO.: 0530, / SUB JOB NO.: EB

| RELINQUISHED BY 1. | RELINQUISHED BY 2. | RELINQUISHED BY 3. |
|---|---|---|
| Rudy R. Marquez 13:40 (SIGNATURE) (TIME) | (SIGNATURE) (TIME) | (SIGNATURE) (TIME) |
| RUDY R. MARQUEZ 6/23/93 (PRINTED NAME) (DATE) | (PRINTED NAME) (DATE) | (PRINTED NAME) (DATE) |
| WEISS ASSOCIATES (COMPANY) | (COMPANY) | (COMPANY) |
| **RECEIVED BY 1.** | **RECEIVED BY 2.** | **RECEIVED BY (LABORATORY) 3.** |
| (SIGNATURE) (TIME) | (SIGNATURE) (TIME) | (SIGNATURE) (TIME) |
| (PRINTED NAME) (DATE) | (PRINTED NAME) (DATE) | SEAN WALSEY 1340 (PRINTED NAME) (DATE) |
| (COMPANY) | (COMPANY) | C.L. 6/23/93 (LAB) |