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Coliseum Way Oakland

General Construction Gas Yard

Underground Tanks Investigation

4530 COLISEUM WAY
OAK.
7/88

Prepared by

Water Resources Unit/Ecological Services Group

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INTRODUCTION

SCOPE

This report describes a site investigation performed at PG&E's General Construction Gas Yard located at 4930 Coliseum Way in Oakland, California.

The objectives of this investigation were to:

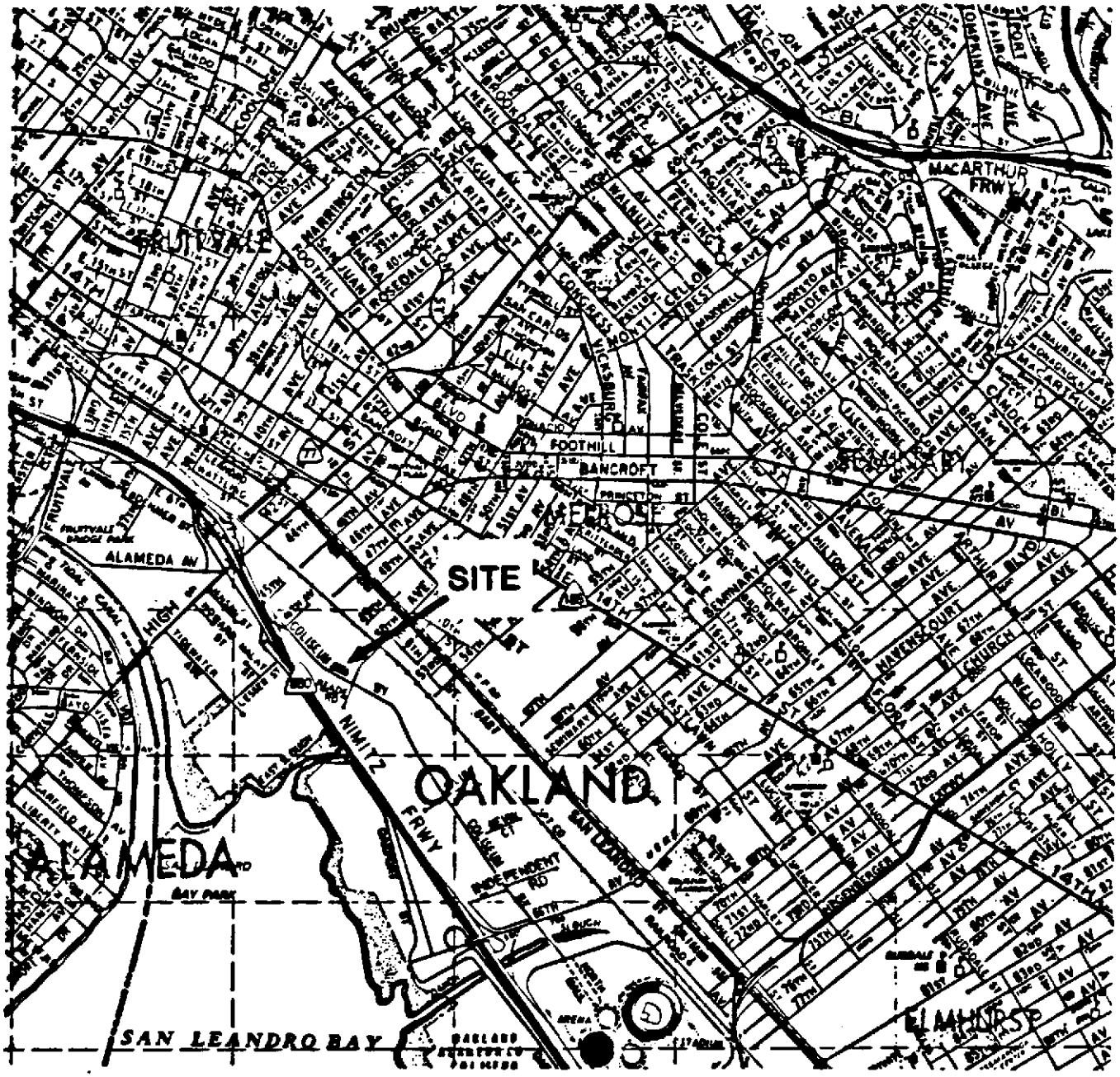
1. Determine if the petroleum hydrocarbons encountered in subsurface soil and groundwater during a 1987 field investigation and the subsequent tank removal process originated from a cluster of underground tanks formerly located near the north corner of the site.
2. Quantify the horizontal and vertical extent of elevated levels of petroleum hydrocarbons and volatile organic compounds in the subsurface soil and groundwater around the former tank cluster location.
3. Quantify the horizontal and vertical extent of elevated levels of petroleum hydrocarbons and volatile organic compounds (if any) in the subsurface soil and groundwater around the former underground diesel tank location near the west corner of the site.
4. Identify the type(s) of petroleum hydrocarbons and volatile organic compounds encountered during this investigation.

The methodology followed during this investigation was outlined in the Proposed Work Plan for the 4930 Coliseum Way, Oakland General Construction Gas Yard - Preliminary Underground Waste Oil and Diesel Tank Site Investigation prepared by Technical and Ecological Services' Water Resources Unit.

SITE DESCRIPTION

The Oakland General Construction Gas Yard is located at 4390 Coliseum Way in the city of Oakland (Figure 1). The site is wholly owned by PG&E and is used as a vehicle, materials, and equipment storage and distribution facility. Historically, the site was also used as a vehicle service center and aboveground natural gas storage facility.

Figure 2 shows the layout of the site and the former locations of the underground storage tanks. An office building, material storage warehouse,



SCALE

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LOCATION MAP

Oakland General Construction Yard
Underground Tank Investigation

Figure 1

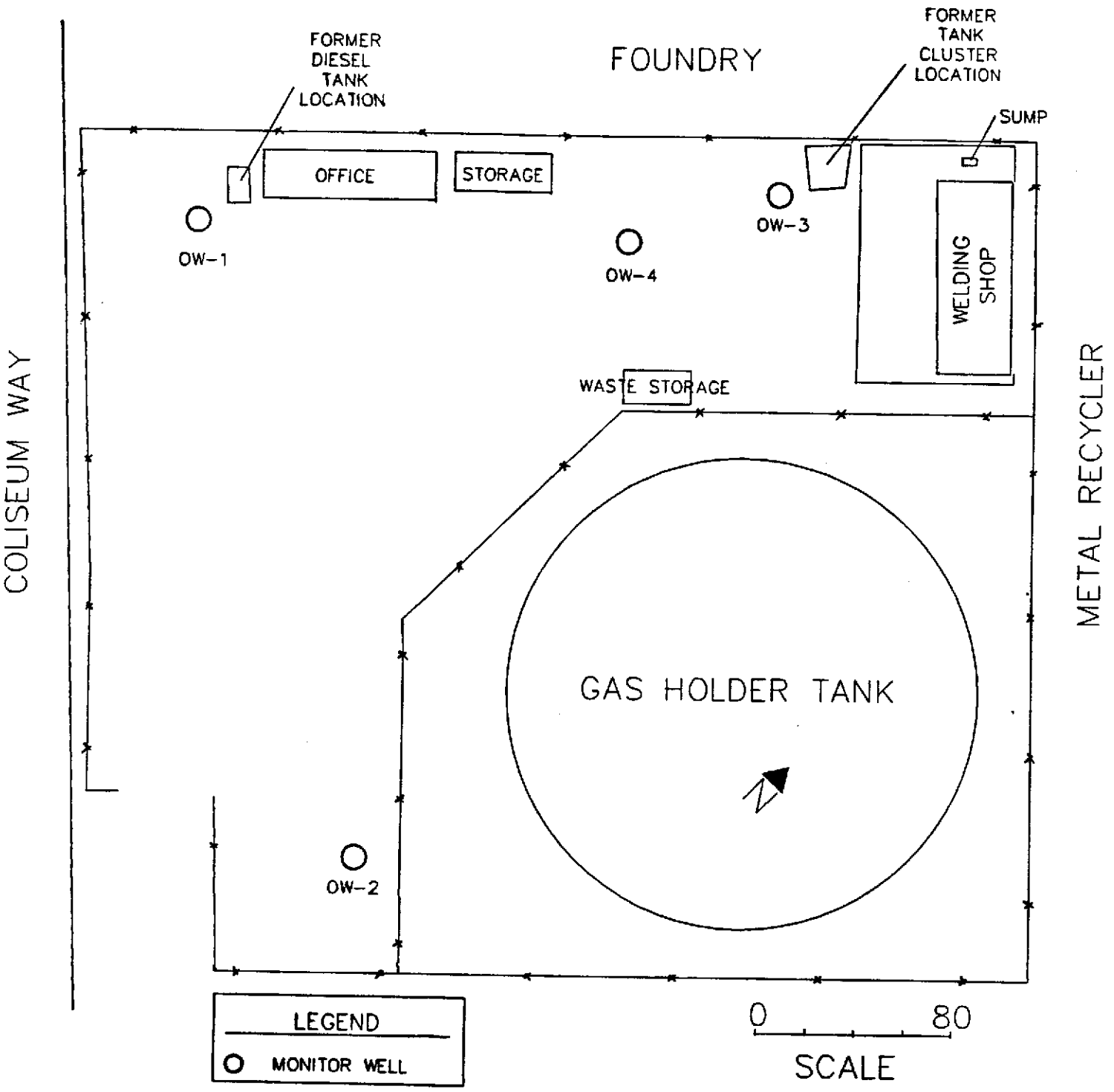

FIGURE 2. SITE PLAN AND MONITOR WELL LOCATIONS

welding shop, hazardous waste storage facility, and aboveground low-pressure gas holder tank (no longer in use) are located onsite. The welding shop was previously used as a vehicle repair garage. With the exception of a concrete pad located in front of the welding shop, the site is graveled.

Five underground tanks were formerly located onsite. Four of the tanks (three 500-gallon tanks and one 350-gallon tank) were located in a cluster near the north corner of the site by the welding shop ("tank cluster"). These tanks were thought to be used to store waste oils. A 1000-gallon tank was located near the west corner of the site by the office building ("diesel tank"). It was used to store diesel fuel. The bottom of each tank was approximately 7 feet below the ground surface.

On the north side of the welding shop, about 50 feet from the former tank cluster location, is a concrete sump. The underground layout of the sump and its associated plumbing is unknown.

The site is surrounded by industrial property. Immediately to the northeast of the site is a metal recycler; to the northwest is a metal foundry; to the west and southwest (across Coliseum Way) are two motels and a recreational vehicle sales facility; to the southeast (across 50th Street) is a trucking facility.

BACKGROUND

In February 1987, PG&E's Department of Engineering Research (Civil Unit) conducted a preliminary underground tank leakage study around the tank cluster and the diesel tank. Field work consisted of drilling three exploratory borings to approximately 9 feet below ground surface, and collecting soil samples for laboratory analysis (up to two samples per boring at 3- to 5- foot intervals). Two borings (B-1 and B-2) were located adjacent to the tank cluster, and one boring (B-3) was located next to the diesel tank. Figure 3 shows the location of borings B-1 and B-2. Figure 4 shows the location of boring B-3.

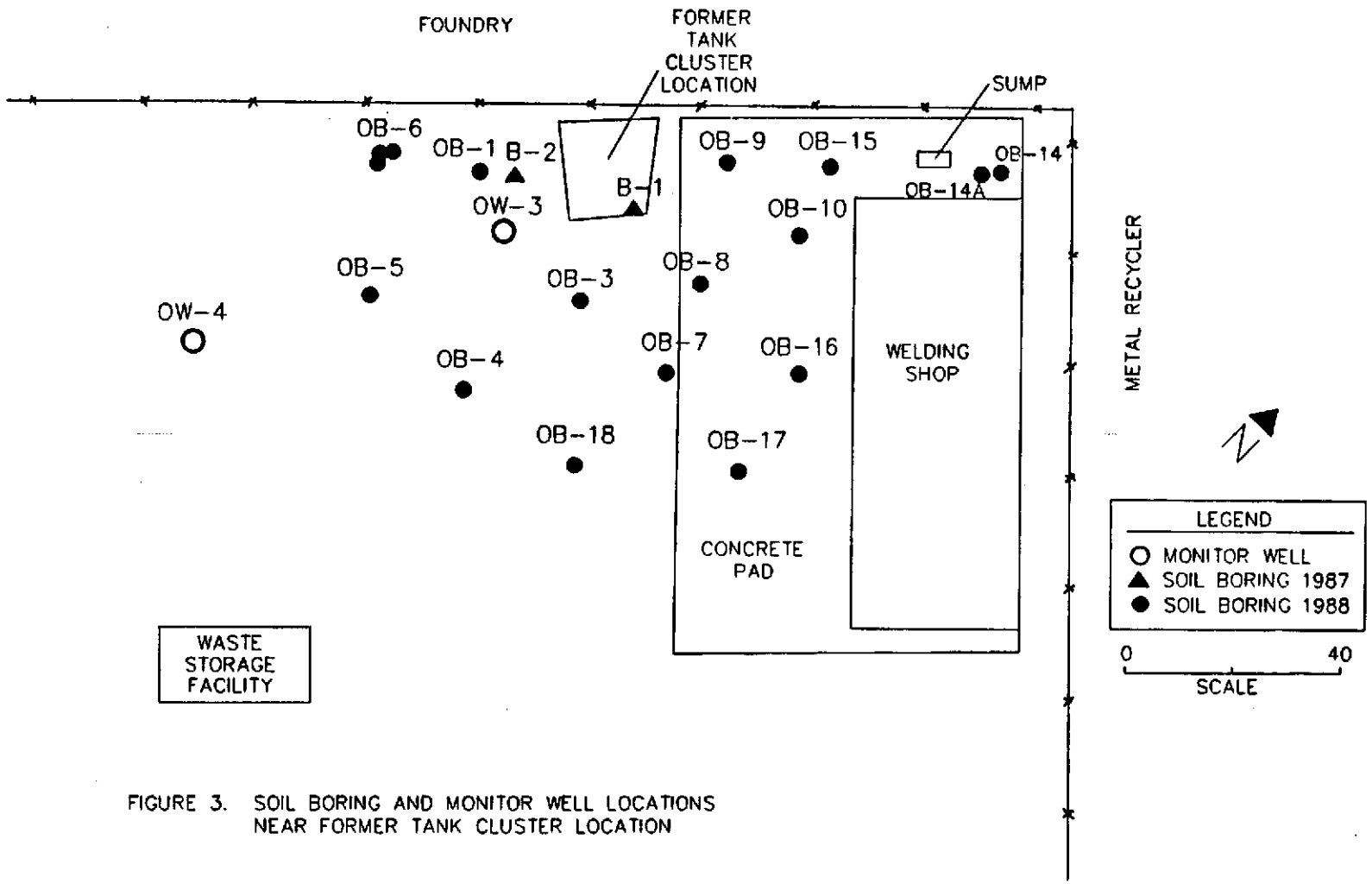

FIGURE 3. SOIL BORING AND MONITOR WELL LOCATIONS NEAR FORMER TANK CLUSTER LOCATION

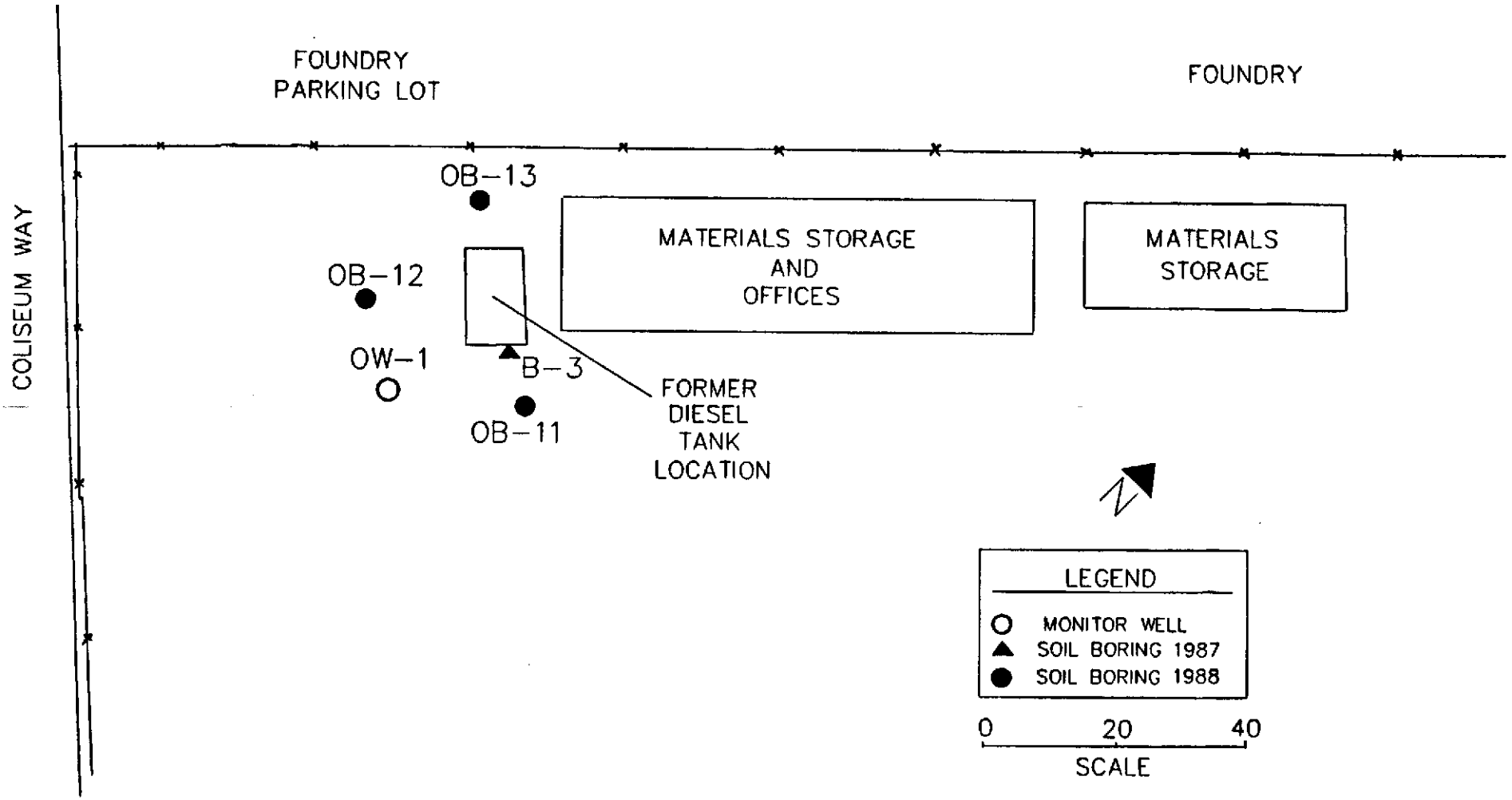

FIGURE 4. SOIL BORING AND MONITOR WELL LOCATIONS NEAR FORMER DIESEL TANK LOCATION

Five soil samples (two samples from borings B-1 and B-2 and one sample from boring B-3) and three water samples (one sample from each boring) were submitted to Clayton Environmental Laboratory for chemical analysis. The soil samples obtained from borings B-1 and B-2 (near the tank cluster) were analyzed for total petroleum hydrocarbons as gasoline, kerosene, diesel, and oil (EPA method 8100/8015); polychlorinated biphenyls (PCBs)(EPA method 8080); and purgeable aromatics including benzene, toluene, ethylbenzene, and xylenes (BTEX)(EPA method 8020). The soil sample collected from boring B-3 (near the diesel tank) was analyzed for total petroleum hydrocarbons (EPA method 8100/8015). The water samples collected from the three borings were analyzed for BTEX only.

Table 1 provides a summary of the sample results from the February 1987 investigation. Elevated levels of oil and trace amounts of BTEX and PCBs were found in soil samples collected from both borings drilled near the tank cluster. Water samples collected from these borings also showed trace amounts of BTEX. Soil and water samples collected from the boring drilled near the diesel tank were nondetectable for all constituents analyzed.

In December 1987, the contents of the five tanks were analyzed by PG&E's Department of Engineering Research chemical laboratory prior to tank removal and disposal. Table 2 provides a summary of the results of these analyses. Two of the tanks in the cluster were found to contain mineral spirits (paint thinner) and water. The other two tanks in the cluster were found to contain heavy oil (diesel and/or hydraulic oil). The fifth tank, located near the west corner of the property, contained diesel oil. PCBs were not detected in any of the tanks.

The five tanks were removed on January 13, 1988 by Universal Engineering, Inc. Soil and water samples were collected from the tank cluster excavation hole and analyzed by IT Analytical Services for high boiling point petroleum hydrocarbons (modified EPA method 8015), oil and grease (Standard Method 503E), and volatile organic compounds (EPA method 8240). Soil and water

Table 1. Analytical results of soil and water samples collected during February 1987 Field Investigation.

SOIL (ppm)

Sample No	Depth (feet)	Gasoline	Kerosene	Diesel	Oil	Benzene	Toluene	Ethyl-benzene	Xylenes	PCBs
B1-1-1	3	ND	ND	ND	2000	ND	ND	ND	ND	0.02
B1-2-1	5.5	ND	ND	ND	180	ND	ND	0.056	0.15	ND
B2-1-1	5	0.73	ND	ND	3500	ND	ND	1.2	1.9	0.06
B2-2-1	8.5	ND	ND	ND	1200	ND	ND	0.12	0.09	0.03
B3-1-1	5.5	ND	ND	ND	ND	--	--	--	--	--
EPA Method		8015	8100	8100	8100	8020	8020	8020	8020	8080
Method Detection Limit (ppm)		0.1	10	20	100	0.04	0.03	0.02	0.04	0.01

WATER (ppb)

Sample No.	Benzene	Toluene	Ethylbenzene	Xylenes
B1	0.84	ND	1.7	3.7
B2	12	1.6	3.5	24
B3	ND	ND	ND	ND
EPA Method	602	602	602	602
Method Detection Limit	0.4	0.3	0.3	0.4

Notes: All samples were collected on February 13, 1987.

ND = Not detected at or above method detection limit.

Table 2. Analytical results of liquid samples collected from tanks in December 1987.

Tank	pH	Flash Point, deg. F	PCB (ppm)	Reactivity	GC/IR Analysis Identification
Northwest Cluster	6.9	--	<1	NR	Mineral Spirits
Northeast Cluster	5.4	--	<1	NR	Mineral Spirits
Southwest Cluster	7.1	--	<1	NR	Lube Oil
Southeast Cluster	6.1	>270	<1	NR	Heavy Oil
Diesel	6.8	153	<1	NR	Diesel

NR = Non-reactive

samples were collected from the diesel tank excavation hole and analyzed by IT for high boiling point petroleum hydrocarbons.

Results of these analyses are summarized in Table 3. Elevated levels of high boiling point petroleum hydrocarbons were detected in soil (up to 1100 ppm) and water (30 ppm) samples collected from the tank cluster excavation hole, and in water samples (up to 150 ppm) collected from the diesel tank excavation hole. Elevated levels of oil and grease were detected in soil (up to 55,400 ppm) and water (8000 ppm) samples collected from the tank cluster excavation hole. Volatile organic compounds were not detected in soil or water samples collected from the tank cluster excavation hole during the tank removal process.

REGIONAL AND SITE GEOLOGY AND HYDROGEOLOGY

Geologic maps of the region constructed by the California Division of Mines and Geology (1961) and by Goldman (1969) show the site is underlain by Quaternary marine and marsh deposits. These sediments consist predominantly of highly plastic, blue-grey bay mud interbedded with grey, organic-rich silty sands and clayey marsh deposits. These deposits form the uppermost water-bearing unit beneath the site.

Shallow stratigraphy specific to the site can be described from boring logs obtained during this investigation (Appendix A). The subsurface material typically consists of 6- to 10- feet of silty clay overlying six to ten feet of sand or gravel, which overlies more clay. The extreme heterogeneity of the materials composing the shallow stratigraphy suggests that several feet of fill have been imported to the site.

The topography of the area in the vicinity of the site is relatively flat. Regional surface water flow is to the southwest (toward San Leandro Bay). Surface water bodies nearest the site include San Leandro Bay (located approximately one-third of a mile south of the site) and a canal that extends north from San Leandro Bay (located about one-half of a mile west of the site).

Table 3. Analytical Results of Soil Samples Collected During January 1988 Tank Removal Process.

Sample Location	Sample ID	TPH	Oil and Grease	Volatile Organics
Tank Cluster	West Sand	320	29,600	ND
Tank Cluster	West Wall	30	2,650	ND
Tank Cluster	North Sand	63	14,200	ND
Tank Cluster	North Soil	12	2,300	ND
Tank Cluster	North Wall	ND	26	ND
Tank Cluster	South Sand	88	55,400	ND
Tank Cluster	South Soil	310	7,000	ND
Tank Cluster	South Wall	19	3,850	ND
Tank Cluster	East Wall	1100	10,500	ND
Tank Cluster	East Liquid (below tank)	30	8,000	ND
Diesel Tank	Soil	ND	--	--
Diesel Tank	Liquid (below tank)	95	--	--
Diesel Tank	Liquid (below tank)	150	--	--
EPA Method		mod 8015	(SM) 503E	8240
Method Detection Limit (ppm)		10	10	0.2

TPH = High boiling point petroleum hydrocarbons
ND = Not detected at or above method detection limit
-- = Not analyzed

Note: All results are in parts per million.

The potentiometric surface of the uppermost aquifer beneath the site is estimated from monitor well water measurements recorded from March to July 1988 to be approximately 3 to 6 feet below the ground surface. Saturated soil was encountered while drilling soil borings and monitor wells in March 1988 at 7 to 10 feet below the ground surface. Water samples collected from four wells constructed onsite showed typical conductivity levels of 1000 to 1500 microsiemen per centimeter, indicating a relatively high concentration of dissolved salts in the uppermost groundwater.

PHASE 1 FIELD WORK

MONITOR WELL INSTALLATION, WELL DEVELOPMENT, AND HYDRAULIC GRADIENT DETERMINATION

To determine the groundwater flow direction and gradient, three monitor wells were installed (OW-1, OW-2, and OW-3) in March 1988. Figure 2 shows the locations of these wells. An attempt was made to position one well hydraulically downgradient of the former diesel tank location (OW-1) and one well hydraulically downgradient of the former tank cluster location (OW-3). Well OW-2 was positioned along the southern border of the site to serve as an additional water level measurement point. Well permits were obtained from the Alameda County Flood Control and Water Conservation District prior to installation.

Each monitor well was constructed of flush-threaded 2-inch schedule 40 polyvinyl chloride (PVC) casing, with 0.01-inch openings in the screened portion of the well. The screened interval of each well was placed approximately 5 feet above to 10 feet below the encountered water table (3 to 19 feet below the ground surface) to allow for seasonal water level fluctuations.

The filter pack material selected for all wells was Lone Star #2/12 sand. This sand was selected mainly for convenience, since the fine texture of some of the subsurface strata made a designed filter pack infeasible.

Stainless steel centralizers were used in each well to ensure an evenly distributed filter pack. Figure 5 shows the construction specifications for the monitor wells installed during this investigation.

The borehole for monitor well OW-2 was advanced with 8-inch outside diameter hollow stem augers. The augers were advanced to the desired depth and removed from the borehole. The borehole remained open, allowing a PVC well casing to be inserted and filter pack to be placed around the casing. A

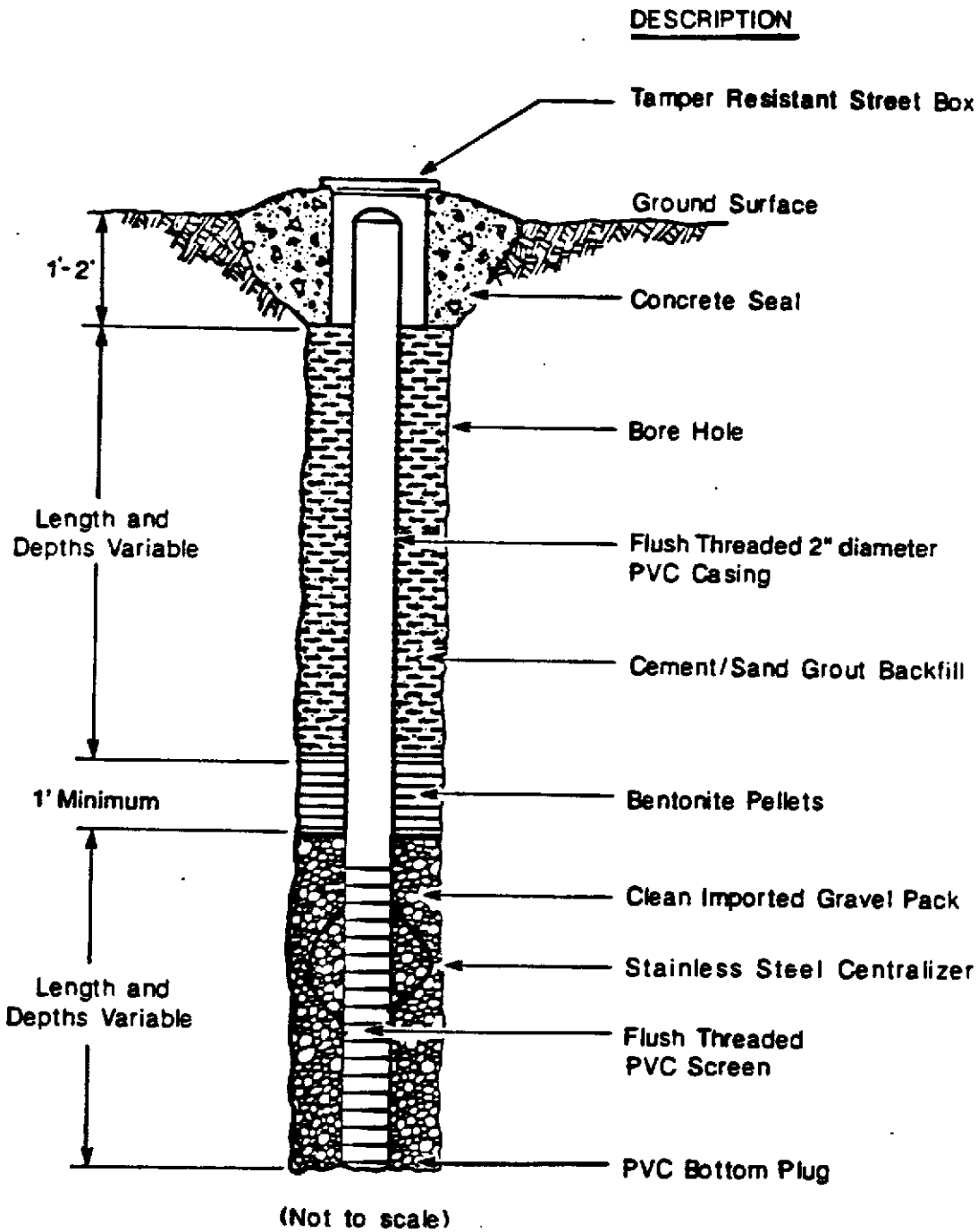

FIGURE 5. Typical Monitoring Well Installation

weighted tape was used to ensure that no material sloughed off the sides of the borehole during this process.

The boreholes for wells OW-1 and OW-3 were advanced with 12-inch augers. When the augers had been advanced to the desired depth (approximately 20 feet), the PVC well casing was lowered down the center of the augers and set to the appropriate depth. The annular space between the augers and the screened portion of the well was then backfilled with filter pack. As the filter pack was deposited, the augers were withdrawn from the hole so the sand would flow out of the augers and fill the annular space of the borehole. The filter pack for each well was deposited to approximately 0.5 foot above the top of the screen. A 1- to 2-foot layer of bentonite pellets was then placed in the annular space above the filter pack. Since the bentonite was above the water table, approximately 3 gallons of potable water were added to allow the pellets to swell. After sufficient time had passed for the bentonite to swell (at least one hour), the remaining annular space was backfilled to the ground surface with neat cement.

Each monitor well was finished with a tamper-resistant, watertight street box set into concrete. The street boxes were set slightly above the existing ground surface to provide additional protection against infiltration of surface water. A PVC cap was placed over the end of each well casing inside the street box.

Each well was developed by pumping with a centrifugal pump. A new flexible hose was placed in each well, and water was pumped out of the well to the nearest excavation hole (except for well OW-2, where the development water was retained in labeled drums pending analysis). During the development process, each well was repeatedly pumped dry and allowed to recover. Due to the fine texture of some of the strata surrounding the wells, none of the wells produced clear water, even after extensive development.

The monitor wells were located a sufficient distance from each other to allow determination of the groundwater gradient and flow direction through

analysis of water level data collected from the wells. The top of each well casing was surveyed to the nearest 0.01 foot to allow comparison of water elevations in the wells. The depth to water from the top of the well casing was measured with an electronic immersion probe. The groundwater elevation at each well was computed by subtracting the depth to water from the elevation at the top of the well casing. Water level data were collected on March 29 and April 7, 1988, to observe any fluctuations in groundwater flow direction and gradient and to assess the influence of tidal action on groundwater flow.

GROUNDWATER SAMPLING AND ANALYSIS

Groundwater samples were collected from wells OW-1, OW-2, and OW-3 for chemical analysis. Prior to purging each well, the depth to water was measured and recorded. Approximately 5 to 13 well volumes of water were then purged with a centrifugal pump and new flexible hose. Because the recharge rate was slower than the purge rate, the wells were repeatedly purged dry during this process. Each well was allowed to recharge before samples were collected. Turbidity (qualitative only), conductivity, pH, and temperature were monitored during purging. These data are included in Appendix B.

After purging, water samples were collected with a clean teflon bailer. The samples were transferred from the bailer to appropriate sample bottles with as little agitation as possible. Sample containers for volatile constituents were visually inspected after filling to ensure that there were no air bubbles.

The sample containers were labeled with the following information: well number, site location, date and time of collection, type of analysis requested, and initials of person(s) collecting the sample. The samples were then placed on ice and transported to a certified analytical laboratory (Brown and Caldwell Laboratories). The samples were analyzed for total fuel hydrocarbons (modified EPA method 8015), oil and grease (EPA method 413.2), and volatile organics (EPA method 624) within the allowable holding times.

A chain-of-custody form accompanied the samples to serve as a record of sample possession from the time of collection to the time of arrival at the analytical laboratory.

SOIL SAMPLING AND ANALYSIS

Soil samples were collected at 2- to 3- foot intervals during the drilling of the monitor well borings. Soil samples were similarly collected from nine soil borings (OB-1, OB-3, OB-4, OB-5, OB-6, OB-7, OB-8, OB-9, and OB-10) drilled in the vicinity of the former tank cluster location and three soil borings (OB-11, OB-12, and OB-13) drilled near the former diesel tank location. Figures 3 and 4 show the locations of these soil borings. Soil samples were collected from all borings with a 2.5-inch inside diameter split-spoon sampler containing three brass tube liners. The sampler was driven 18 inches beyond the tip of the augers by a 140-pound hammer dropping 30 inches (except for boring OB-13, which was augured and sampled by hand because of the presence of overhead electrical wires). The number of blows was counted for each 6-inch interval the sampler was advanced. The brass sample tubes were then quickly extracted from the sampler. The ends of the samples in the two brass tubes closest to the shoe of the sampler were examined by a geologist and logged according to the Unified Soil Classification System prior to being labeled, capped, sealed with tape, and placed on ice. The soil collected in the brass tube farthest from the shoe was logged, placed in an airtight ziplock bag, and held for headspace analysis. To avoid cross contamination, the sampling equipment was cleaned with potable water and trisodium phosphate prior to collecting each sample.

After warming the ziplock bags containing soil samples from the borings, headspace vapors were analyzed with a Photovac TIP 1 air analyzer. The TIP 1 was periodically calibrated to measure all of the ionizable hydrocarbons as if they were benzene, using a standard gas. The results of these field analyses are noted on the drilling logs (Appendix A), and were used as an aid in the selection of soil samples for chemical analysis.

One to three soil samples were selected for chemical analysis from each boring according to the following criteria:

(1) The sample collected closest to the water table.
(2) The sample with the highest apparent hydrocarbon concentration.
(3) The deepest sample with apparent presence of hydrocarbons.

In soil borings where headspace analysis indicated no hydrocarbon presence, samples were chosen by criteria (1). The water table was estimated in the field as the depth where the first saturated soil sample was recovered (typically 7 to 10 feet below ground surface).

Soil samples were submitted to a certified analytical laboratory (Groundwater Technology Environmental Laboratories) for high boiling point petroleum hydrocarbons (kerosene, mineral spirits, and diesel)(modified EPA method 8015), volatile organics (EPA method 8010/8020), and oil and grease (EPA method 413.2). Chain-of-custody forms accompanied all soil samples to the laboratory.

Each soil boring was backfilled to the ground surface with a cement/ bentonite slurry. The slurry was tremied into each boring with a flexible hose.

PHASE 1 RESULTS

HYDRAULIC GRADIENT ANALYSIS

Figures 6 and 7 are potentiometric surface maps showing relative groundwater elevation contour (solid) lines interpolated from water level measurements taken on March 29 and April 7, 1988, respectively. Extrapolated water elevations are depicted with dashed contour line. Assuming groundwater flow is approximately perpendicular to the water table contour lines in the direction of decreasing elevation, groundwater flow beneath the site was estimated to be to the south southwest with an average gradient of approximately 0.009 foot/foot (1 foot of drop in hydraulic head per 114 feet of horizontal distance in the assumed direction of flow). Tidal action did not appear to influence hydraulic gradient or flow direction.

This analysis indicates that monitor well OW-1 is located hydraulically downgradient of the former diesel tank location, and that monitor well OW-3 is located hydraulically downgradient of the former tank cluster location.

GROUNDWATER ANALYSES

Results of chemical analyses performed on groundwater samples collected on April 11, 1988, from monitor wells OW-1 (located downgradient of the former diesel tank location), OW-2 (located near the southern boundary of the site), and OW-3 (located downgradient of the former tank cluster location) are summarized in Table 4. A blind duplicate sample was also collected from well OW-3 for quality control purposes. Laboratory data sheets for groundwater analyses performed as part of this investigation are included in Appendix B.

Total Fuel Hydrocarbons

Total fuel hydrocarbons were not detected in groundwater samples collected on April 11 from monitor wells OW-1, OW-2, or OW-3. The method detection limit for fuel hydrocarbons in groundwater was 1 ppm.

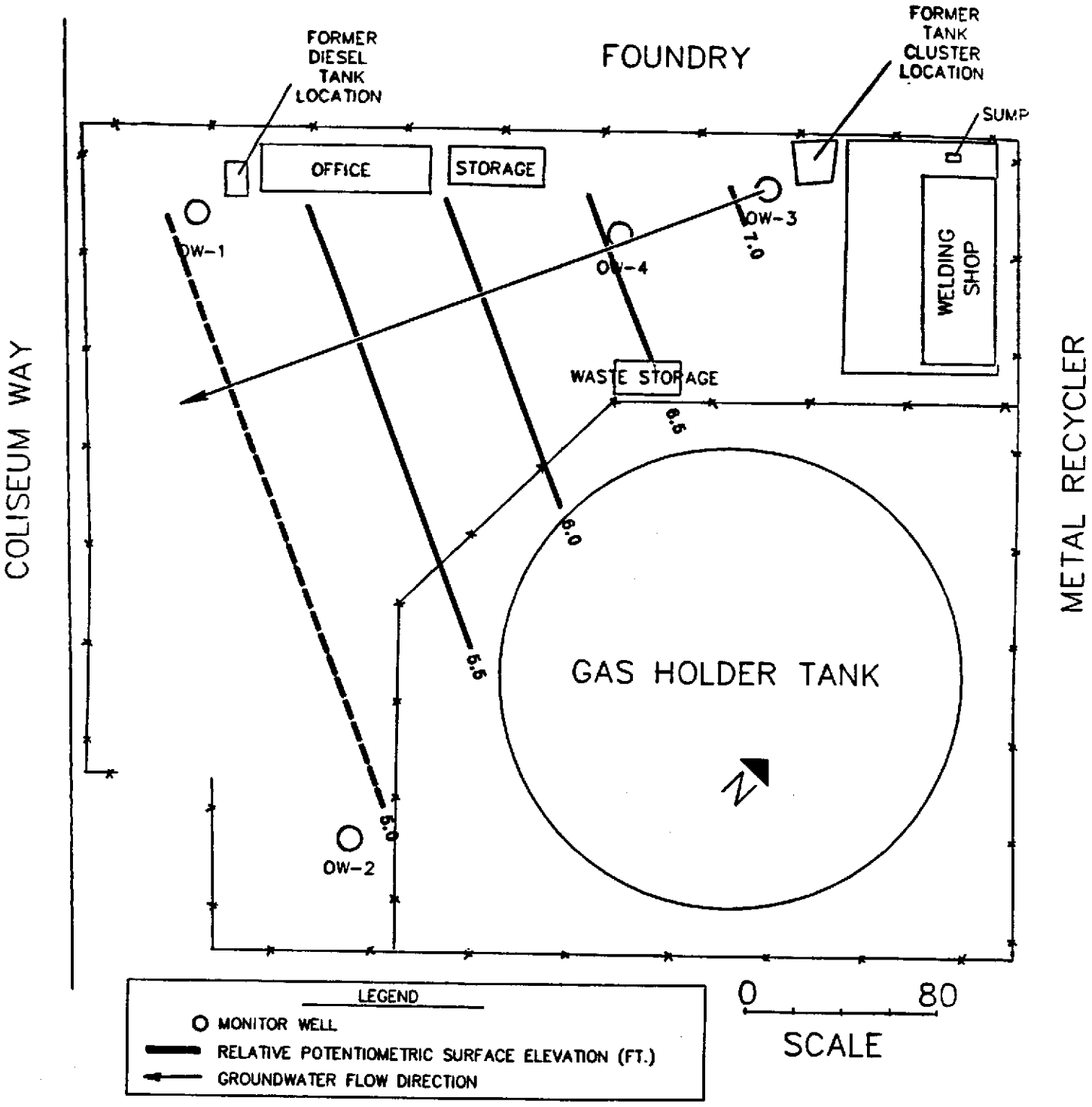

FIGURE 6. POTENTIOMETRIC CONTOUR MAP FOR MARCH 29, 1988.

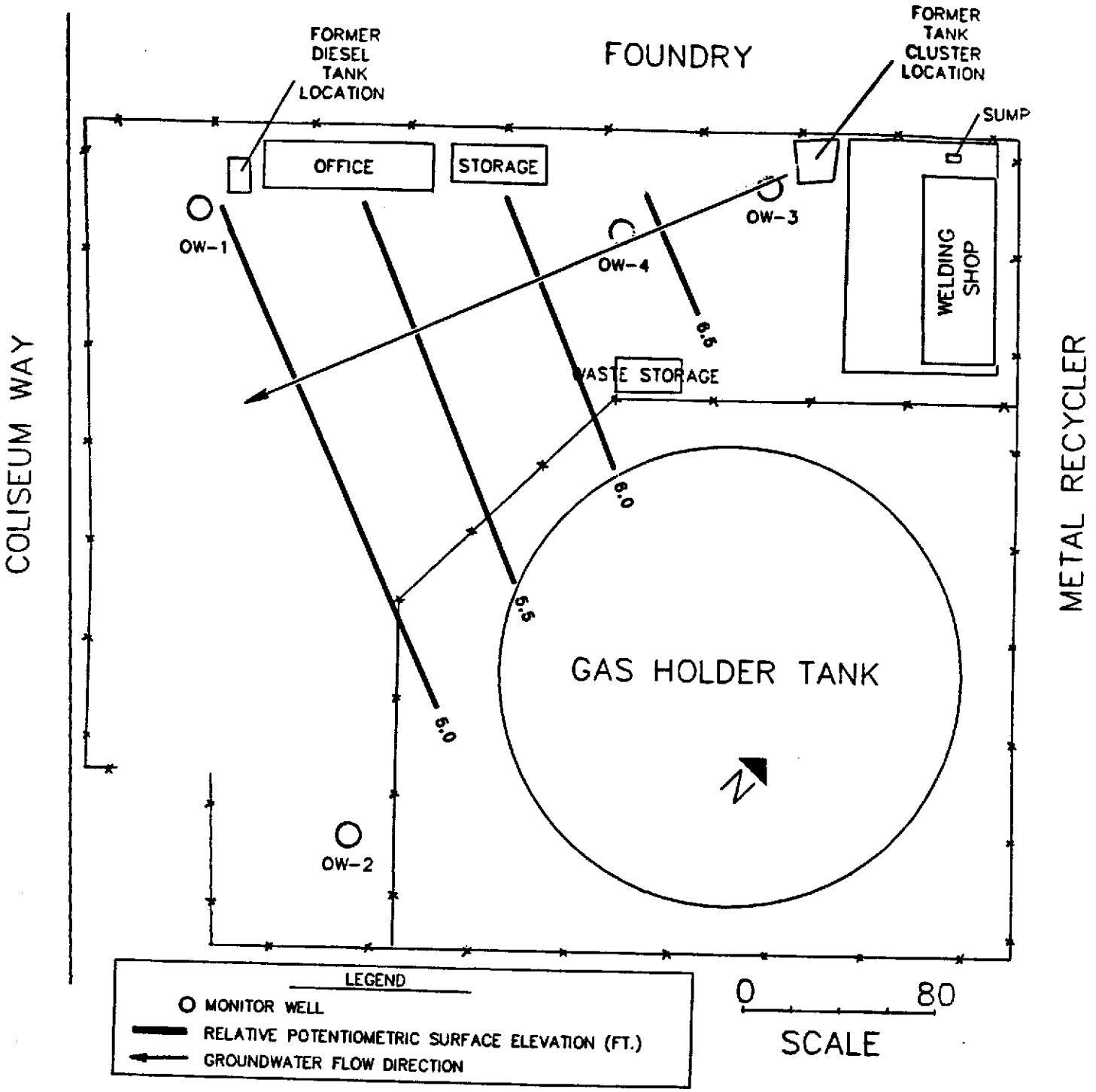

FIGURE 7. POTENTIOMETRIC CONTOUR MAP FOR APRIL 9, 1988.

Table 4. Laboratory Results of Groundwater Samples Collected Groundwater Sample Results.

Well	Date Sampled	Total fuel hydrocarbons (ppm)	Oil and Grease (ppm)	624 Volatile organics (ppb)
OW-1	4-11-88	ND	ND	5 $C_6H_{14}O$ (Ether) 4 Dichlorobenzene
OW-2	4-11-88	ND	ND	ND
OW-3	4-11-88	ND	ND	4 1,1-dichloroethane 2 Chloroform 10 $C_6H_{14}O$ (Ether)
OW-3 (replicate)	4-11-88	ND	ND	4 1,1-dichloroethane 1 Chloroform 20 $C_6H_{14}O$ (Ether)
OW-3	6-16-88	ND	ND	30 $C_6H_{14}O$ (Ether) 5 1,1-dichloroethane 2 trans 1,2-dichloroethylene 1 chlorobenzene
OW-4	6-16-88	ND	ND	7 $C_6H_{14}O$ (Ether)
EPA Method		modified 8015	413.2	624
Method Detection Limit (ppm)		1	5	Various

ND = not detected at or above method detection limit.

Note: For those compounds with DHS drinking water action limits and/or safe levels set by Safe Drinking Water Act Amendments of 1986, concentrations encountered during this investigation are below these limits/levels.

Oil and Grease

Oil and grease were not detected in groundwater samples collected on April 11 from monitor wells OW-1, OW-2, and OW-3. The method detection limit for oil and grease in groundwater was 5 ppm.

Volatile Organic Compounds (VOCs)

Laboratory analysis for VOCs detected dichlorobenzene (4 ppb) and an unidentifiable ($C_6H_{14}O$) ether compound (5 ppb) in the groundwater sample collected on April 11 from monitor well OW-1; nothing in the groundwater sample collected on April 11 from monitor well OW-2; and 1,1-dichloroethane (4 ppb), chloroform (2 ppb), and the ($C_6H_{16}O$) ether compound (10 ppb) in the groundwater sample collected on April 11 from monitor well OW-3.

Detection limits varied for each VOC. Refer to the laboratory data sheets in Appendix A for specific VOC detection limits.

SOIL ANALYSES

Results of chemical analyses performed on selected soil samples collected from borings drilled near the former tank cluster location and the former diesel tank location are summarized in Tables 5 and 6, respectively. Laboratory data sheets for soil sample analyses performed as part of this investigation are included in Appendix B.

High Boiling Point Petroleum Hydrocarbons

Laboratory analysis of selected soil samples collected near the former tank cluster location during Phase 1 of this investigation detected high boiling point petroleum hydrocarbons at concentrations above 1000 ppm in soil boring OB-9 (3900 ppm as diesel at a depth of five feet, 400 ppm as diesel at seven feet, nondetectable at 12.5 feet), above 100 ppm in the boring for monitor well OW-3 (210 ppm as diesel at a depth of 4.5 feet, nondetectable at 6.5 feet), and below 100 ppm in soil borings OB-1 (54 ppm as mineral spirits at a depth of 6.5 feet, nondetectable at 9 feet), OB-3 (30 ppm as mineral spirits at a depth of 6.5 feet, nondetectable at 8.5 feet), and OB-7 (59 ppm as mineral spirits at a depth of 8 feet, nondetectable at 9 feet). Laboratory

Table 5. Laboratory results of selected soil samples collected from borings located near former Tank Cluster location on March 16-17 and May 17-18, 1988.

Soil boring	TIP Sample Depth (feet)	TIP reading	Analytical Sample Depth (feet)	TPH (diesel)	TPH (mineral spirits)	TPH (kerosene)	Oil and Grease	Volatile Organics	Benzene	Toluene	Ethylbenzene	Xylenes	Misc. C4 - C12
OB-1	6-6.5	105	6.5-7	ND	54	ND	630	ND					
OB-1	8-8.5	115	9-9.5	ND	ND	ND	ND	ND					
OB-3	3.5-4	33	4-4.5	ND	ND	ND	27	ND					
OB-3	5.5-6	99	6.5-7	ND	30	ND	250	ND					
OB-3	7.5-8	128	8.5-9	ND	ND	ND	13	ND					
OB-4	7.5-8	2	8-8.5	ND	ND	ND	29	ND					
OB-5	7-7.5	2	7.5-8	ND	ND	ND	ND	ND					
OB-6	9.5-10	3	10-10.5	ND	ND	ND	21	ND					
OB-7	7.5-8	10	8-8.5	ND	59	ND	34	ND					
OB-8	8.5-9	2	9-9.5	ND	ND	ND	ND	33 (methylene chloride)					
OB-9	4-4.5	92	5-5.5	3900	ND	ND	52000	1.1 (ethylbenzene)					
OB-9	6-6.5	22	7-7.5	400	ND	ND	1000	ND					
OB-9	12-12.5	15	12.5-13	ND	ND	ND	ND	ND					
OB-10	11-11.5	2	11.5-12	ND	ND	ND	ND	ND					
OB-14A	7-7.5	55	7.5-8	ND	ND	260	1200	--	ND	ND	ND	ND	80
OB-14A	10.5-11	0	11-11.5	ND	ND	ND	ND	--	ND	ND	ND	ND	ND
OB-15	6-6.5	40	6.5-7	ND	ND	340	4800	--	ND	ND	ND	1	130
OB-15	9.5-10	3	10-10.5	ND	ND	ND	5	--	ND	ND	ND	ND	ND
OB-16	6.5-7	5	7-7.5	ND	ND	ND	100	--	ND	ND	ND	ND	ND
OB-16	8.5-9	4	9-9.5	ND	ND	ND	ND	--	ND	ND	ND	ND	ND
OB-17	6-6.5	3	6.5-7	ND	ND	ND	9	--	ND	ND	ND	ND	ND
OB-17	8.5-9	3	9-9.5	ND	ND	ND	ND	--	ND	ND	ND	ND	ND
OB-18	6.5-7	3	7-7.5	ND	ND	ND	ND	--	ND	ND	ND	ND	ND
OB-18	8.5-9	3	9-9.5	ND	ND	ND	ND	--	ND	ND	ND	ND	ND
OW-3	4-4.5	16	4.5-5	210	ND	ND	220	ND					
OW-3	6-6.5	96	6.5-7	ND	ND	ND	1100	ND					
OW-3	7.5-8	292	8.5-9	ND	ND	ND	ND	ND					
OW-4	7-7.5	2	7.5-8	ND	ND	ND	ND	--	ND	ND	ND	ND	ND
OW-4	10.5-11	3	11-11.5	ND	ND	ND	ND	--	ND	ND	ND	ND	ND
EPA Method				<------- modified 8015 ------->			413.2	8010/8020	<---------- 8015/8020 ---------->				
Method Detection Limit (ppm)				10	10	10	5	various	0.5	0.5	0.5	0.5	1.0

TPH = total petroleum hydrocarbons.

Note: All results are in parts per million.

Table 6. Laboratory results of selected soil samples collected from borings located near former Diesel Tank location on March 16-17, 1988.

Soil boring	TIP Sample Depth (feet)	TIP reading	Analytical Sample Depth (feet)	TPH (diesel)	TPH (mineral spirits)	TPH (kerosene)	Oil and Grease	Volatile Organics
OB-11	10-10.5	1	10.5-11	ND	ND	ND	ND	ND
OB-12	10-10.5	2	10.5-11	ND	ND	ND	ND	ND
OB-13	--	-	4-4.5	ND	ND	ND	ND	ND
OB-13	--	-	8.5-9	ND	ND	ND	ND	ND
OW-1	10-10.5	3	10.5-11	ND	ND	ND	ND	ND
EPA Method				<---- modified 8015 ---->			413.2	8010/8020
Method Detection Limit (ppm)				1	1	1	5	various

TPH = total petroleum hydrocarbons

ND = not detected at or above method detection limit.

Note: All results are in parts per millon.

analyses of soil samples collected from borings OB-4, OB-5, OB-6, OB-8, and OB-10 did not detect high boiling point petroleum hydrocarbons.

Laboratory analyses did not detect high boiling point petroleum hydrocarbons in any of the selected soil samples collected from borings drilled near the former diesel tank location (OB-11, OB-12, OB-13, and OW-1) during Phase 1 of this investigation.

The method detection limit for high boiling point petroleum hydrocarbons in soil was 10 ppm.

Oil and Grease

Laboratory analysis of selected soil samples collected near the former tank cluster location during Phase 1 of this investigation detected oil and grease at concentrations at or above 1000 ppm in soil boring OB-9 (52,000 ppm at a depth of 5 feet, 1000 ppm at 7 feet, and nondetectable at 12.5 feet) and the boring for well OW-3 (220 ppm at a depth of 4.5 feet, 1100 ppm at 6.5 feet, and nondetectable at 8.5 feet); above 100 ppm in soil borings OB-1 (630 ppm at a depth of 6.5 feet, nondetectable at 9 feet) and OB-3 (27 ppm at a depth of 4 feet, 250 ppm at 6.5 feet, and 13 ppm at 8.5 feet); and below 100 ppm in soil borings OB-4 (29 ppm at a depth of 8 feet), OB-5 (none detected), OB-6 (21 ppm at a depth of 10 feet), OB-7 (34 ppm at a depth of 8 feet), OB-8 (none detected), and OB-10 (none detected).

Laboratory analysis did not detect oil and grease in any of the selected soil samples collected from borings drilled near the former diesel tank location (OB-11, OB-12, OB-13, and OW-1) during Phase 1 of this investigation .

The method detection limit for oil and grease in soils was 5 ppm.

Volatile Organic Compounds (VOCs)

Laboratory analysis of selected soil samples collected near the former tank cluster location during Phase 1 of this investigation detected ethylbenzene

in one soil sample collected from boring OB-9 (1.1 ppm at a depth of 5 feet, nondetectable at 7 feet) and methylene chloride in one soil sample collected from boring OB-8 (33 ppm at a depth of 9 feet). Methylene chloride is a common laboratory solvent, and its detection in a single soil sample can most likely be attributed to laboratory contamination.

VOCs were not detected in any other soil samples collected from borings drilled near the former tank cluster and former diesel tank locations during Phase 1 of this investigation.

Detection limits varied for each VOC. Refer to the laboratory data sheets in Appendix B for specific detection limits.

PHASE 2 FIELD WORK

ADDITIONAL MONITOR WELL INSTALLATION, WELL DEVELOPMENT, AND HYDRAULIC GRADIENT DETERMINATION

To further investigate the water quality of the uppermost aquifer near the former tank cluster location, monitor well OW-4 was installed on May 18, 1988. Figure 2 shows the location of this well, positioned hydraulically downgradient of the former tank cluster location and monitor well OW-3. Well OW-4 was constructed similarly to wells OW-1 and OW-3. Alameda County Flood Control and Water Conservation District representatives were notified prior to well installation. The well was developed in the same manner as the previously installed monitor wells. Monitor well OW-3 was also redeveloped at this time, following the same development procedure.

Water level measurements were obtained on June 9 and July 21, 1988, to observe any fluctuations in groundwater flow direction and gradient.

GROUNDWATER SAMPLING AND ANALYSIS

On June 16, 1988, groundwater samples were collected for chemical analysis from wells OW-3 and OW-4. Prior to purging each well, the depth to water was measured and recorded. Approximately five to seven well volumes of water were then purged with a centrifugal pump and new flexible hose. Both wells were repeatedly purged dry during this process. Each well was allowed to recharge overnight before samples were collected with a clean teflon bailer. Sampling and analyses were performed according to procedures outlined in the Phase 1 investigation discussion.

SOIL SAMPLING AND ANALYSIS

To further define the distribution of petroleum hydrocarbons in the soil surrounding the former tank cluster location, five additional soil borings were drilled (OB-14A through OB-18). Figure 3 shows the locations of these soil borings. Drilling, sampling, and laboratory analyses were performed according to procedures outlined in the Phase 1 investigation discussion, with the exception of the volatile organics analyses. Soil samples selected

from borings drilled during Phase 2 of this investigation were analyzed for volatiles using EPA methods 8015/8020 (aromatic hydrocarbons including BTEX) instead of EPA methods 8010/8020.

PHASE 2 RESULTS

HYDRAULIC GRADIENT ANALYSIS

Figures 8 and 9 are potentiometric surface maps showing relative groundwater elevation contour lines interpolated from water level measurements taken on June 9 and July 21, 1988, respectively. Assuming groundwater flow is approximately perpendicular to the water table contour lines in the direction of decreasing elevation, the flow direction beneath the site was estimated to be south southwest, with an average gradient of approximately 0.009 foot/foot (1 foot of drop in hydraulic head per 110 feet of horizontal distance in the assumed direction of flow). Tidal action did not appear to influence hydraulic gradient or flow direction.

GROUNDWATER ANALYSES

Results of chemical analyses performed on groundwater samples collected from monitor wells OW-3 and OW-4 (located downgradient of the former tank cluster location) on June 16, 1988 are summarized in Table 3. Laboratory data sheets for groundwater analyses performed as part of this investigation are included in Appendix B.

Total fuel hydrocarbons

Total fuel hydrocarbons were not detected in groundwater samples collected on June 16 from monitor wells OW-3 or OW-4. The method detection limit for total fuel hydrocarbons in groundwater was 1 ppm.

Oil and grease

Oil and grease were not detected in groundwater samples collected on June 16 from monitor wells OW-3 and OW-4. The method detection limit for oil and grease in groundwater was 5 ppm.

VOCs

Laboratory analysis for VOCs detected chlorobenzene (1 ppb), 1,1-dichloroethane (5 ppb), trans 1,2-dichloroethylene (1 ppb), and the previously encountered $C_6H_{14}O$ ether compound (30 ppb) in the groundwater

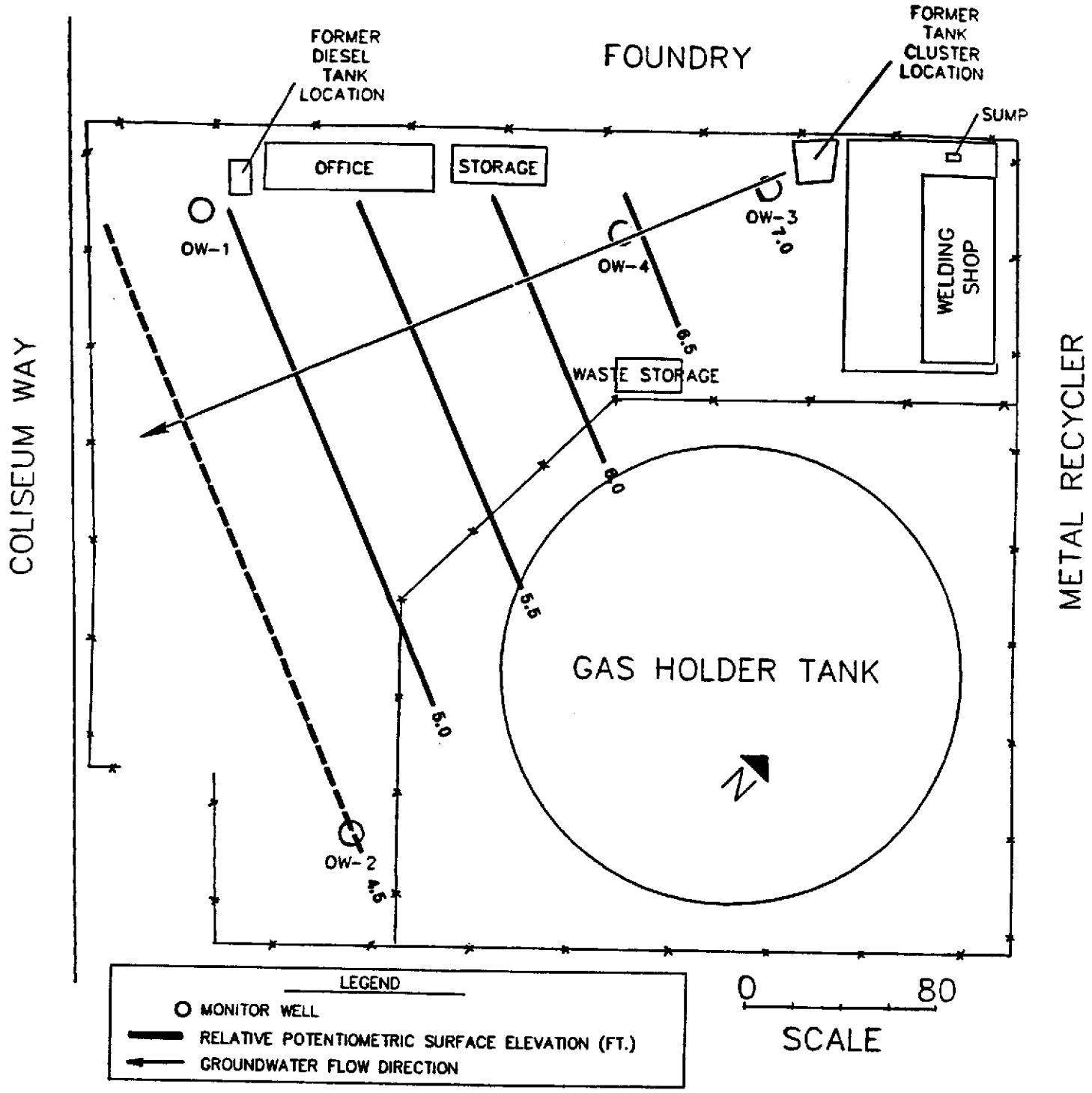

FIGURE 8. POTENTIOMETRIC CONTOUR MAP FOR JUNE 9, 1988.

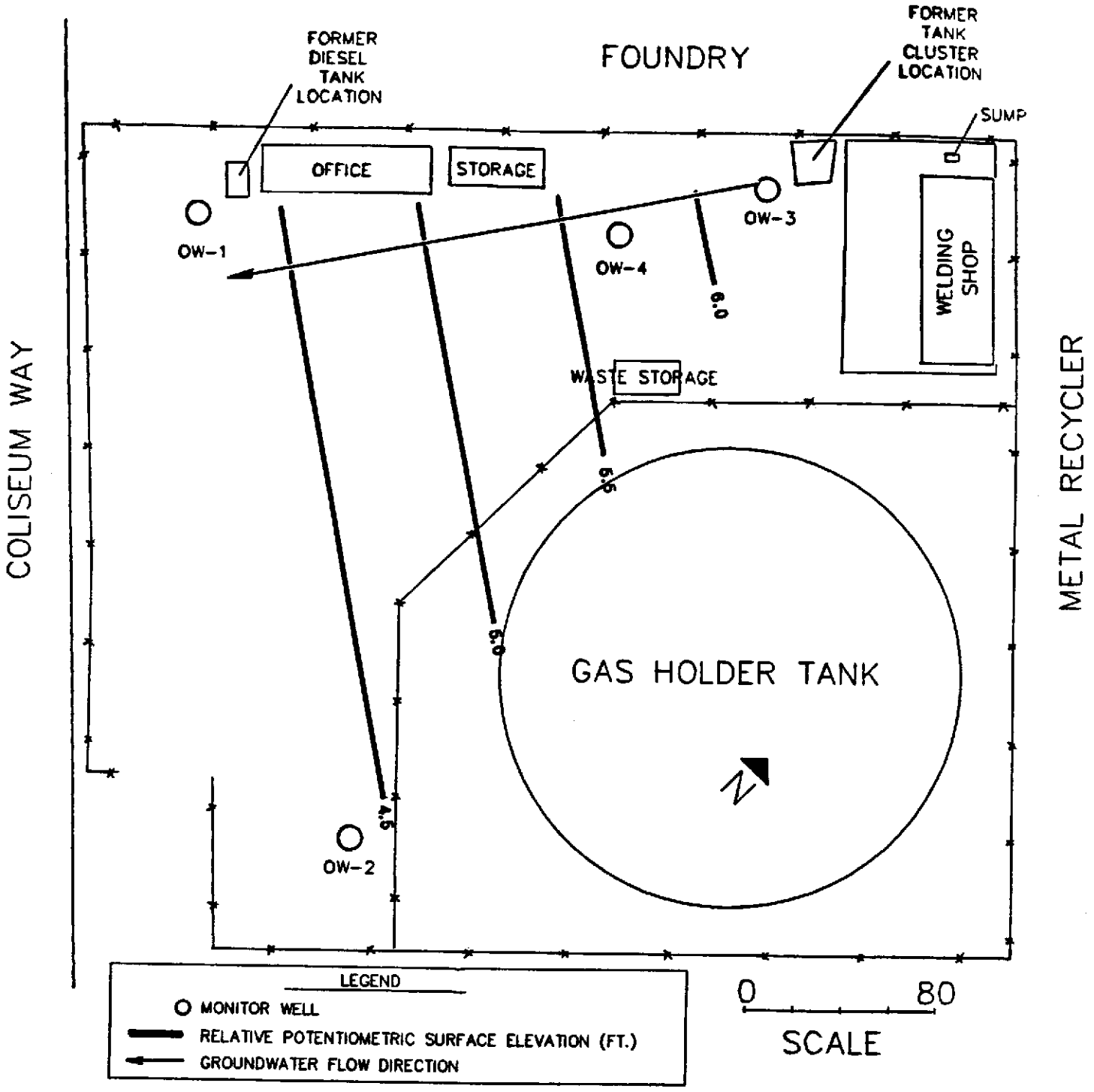

FIGURE 9. POTENTIOMETRIC CONTOUR MAP FOR JULY 21, 1988.

sample collected on June 16 from monitor well OW-3; and nothing in the groundwater sample collected on June 16 from monitor well OW-4. Detection limits varied for each VOC. Refer to the laboratory data sheets in Appendix B for specific detection limits.

SOIL ANALYSES

Results of chemical analyses performed on selected soil samples collected from soil borings OB-14A, OB-15, OB-16, OB-17, and OB-18 and the boring for monitor well OW-4 are summarized in Table 4. Laboratory data sheets for these analyses are included in Appendix B.

High Boiling Point Petroleum Hydrocarbons

Laboratory analysis of selected soil samples collected from borings drilled near the former tank cluster location during Phase 2 of this investigation detected high boiling point petroleum hydrocarbons at concentrations above 100 ppm in soil borings OB-14A (260 ppm as kerosene at a depth of 7.5 feet, nondetectable at 11 feet) and OB-15 (340 ppm at a depth of 6.5 feet, nondetectable at 10 feet); and below 100 ppm in soil borings OB-16 (nondetectable), OB-17 (nondetectable), and OB-18 (nondetectable).

Oil and Grease

Laboratory analysis of selected soil samples collected from borings drilled near the former tank cluster location during Phase 2 of this investigation detected oil and grease at concentrations above 1000 ppm in soil borings OB-14A (1200 ppm at a depth of 7.5 feet, nondetectable at 11 feet) and OB-15 (4800 ppm at a depth of 6.5 feet, 5 ppm at 10 feet); at or above 100 ppm in soil boring OB-16 (100 ppm at a depth of 7 feet, nondetectable at 9 feet); and below 100 ppm in soil borings OB-17 (9 ppm at a depth of 6.5 feet, nondetectable at 9 feet) and OB-18 (nondetectable), and the boring for monitor well OW-4 (nondetectable).

Aromatic Hydrocarbons (including BTEX)

Laboratory analysis of selected soil samples collected from borings drilled near the former tank cluster location during Phase 2 of this investigation

detected miscellaneous C_4 to C_{12} hydrocarbons in soil borings OB-14A (80 ppm at a depth of 7.5 feet, nondetectable at 11 feet) and OB-15 (130 ppm at a depth of 6.5 feet, nondetectable at 10 feet); and xylenes in soil boring OB-15 (1 ppm at a depth of 6.5 feet, nondetectable at 10 feet). Aromatic hydrocarbons (including BTEX) were not detected in any other soil samples collected from borings drilled near the former tank cluster location during Phase 2 of this investigation.

Detection limits for aromatic hydrocarbons in soil were 0.5 ppm for individual constituents and 1 ppm for miscellaneous constituents.

SUMMARY OF RESULTS

1. An analysis of water level data collected from three wells located onsite from March to July 1988 indicated that groundwater flow in the uppermost water-bearing zone beneath the site was consistently in a south southwesterly direction, the hydraulic gradient was consistently 0.009 foot per foot, monitor well OW-1 was hydraulically downgradient of the former diesel tank location, and wells OW-3 and OW-4 were hydraulically downgradient of the former tank cluster location.

2. Total fuel hydrocarbons and oil and grease were not detected in groundwater samples collected from monitor well OW-1 (located hydraulically downgradient of the former diesel tank location), monitor well OW-2 (located near the southern boundary of the site), or monitor wells OW-3 and OW-4 (located hydraulically downgradient of the former tank cluster location).

3. An unidentifiable $C_6H_{14}O$ ether was detected in groundwater samples collected from wells OW-1 (5 ppb), OW-3 (up to 30 ppb), and OW-4 (7 ppb). Other volatile organic compounds including dichlorobenzene (4 ppb) in well OW-1 and 1,1-dichloroethane (up to 5 ppb), trans 1,2-dichloroethylene (2 ppb), chloroform (2 ppb), and chlorobenzene (1 ppb) in well OW-3 were detected during this investigation. None of these concentrations exceed state or federal drinking water standards.

4. Laboratory analyses of selected soil samples collected from borings drilled near the former diesel tank location did not detect high boiling point petroleum hydrocarbons, oil and grease, or VOCs in any of the samples.

5. Laboratory analyses of selected soil samples collected from borings drilled near the former tank cluster location detected high boiling point petroleum hydrocarbons (diesel, mineral spirits, and kerosene), oil and grease, and low levels of VOCs in some of the samples collected at depths of 5 to 8 feet. In a few of the soil samples, concentrations of petroleum hydrocarbons and/or oil and grease were found to be above 1000 ppm.

CONCLUSIONS

1. Results of laboratory analyses of groundwater and soil samples collected from a monitor well and borings drilled near the former diesel tank location indicate that the diesel tank did not substantially leak to the surrounding soil or groundwater.

2. Results of laboratory analyses of soil samples collected from borings drilled near the former tank cluster location indicate that the tank cluster leaked mineral spirits, oil and grease, and possibly diesel to the surrounding soil; and the sump located approximately 50 feet to the northeast of the tank cluster (and/or piping connecting the sump to the tank cluster) leaked kerosene, oil and grease, and possibly diesel to the surrounding soil. The affected soil appears to be restricted to a band located approximately 5 to 8 feet below ground surface.

3. Although water level measurements in the monitor wells indicate the potentiometric water elevation of the uppermost water-bearing zone is 3 to 5 feet below the ground surface, soil borings were drilled 7 to 10 feet deep before saturated samples were obtained. This suggests that the uppermost water-bearing zone is confined below the soil material containing elevated levels of petroleum hydrocarbons near the former tank cluster location.

4. Results of laboratory analyses of groundwater samples collected from monitor wells located hydraulically downgradient of the former tank cluster location indicate that the groundwater has not been substantially affected by the hydrocarbon leak.

REFERENCES

California Division of Mines and Geology, 1971. Geologic Map of California - San Francisco Sheet. Scale 1:250,000.

Goldman, H.B., 1969. Geologic and Engineering aspects of San Francisco Bay Fill. California Division of Mines and Geology Special Report No. 97.

Pacific Gas and Electric Company, May 1987. Oakland General Construction Gas Yard Underground Tank Investigation. Department of Engineering Report No. 402.331-87.12.

Pacific Gas and Electric Company, December 1987. Analysis of Liquid Wastes Contained in Underground Storage Tank Located at Peralta Way, Oakland. Department of Engineering Report No. 402.331-87.56.

APPENDIX A

Boring Logs

FIELD SOIL BORING LOG

Project	Job No.	Boring No.	Sheet
Oakland GC Gas Yard		B1	1 of 1

Ground Elev.	Type & Diameter of Boring	Location
	8" Hollow Stem Augers	Oakland

Bottom of Hole Elev	Depth	Groundwater Elev.	Date	Date Started	Finished
	9.5'			2/12/87	2/13/87

Name of Driller	Name of Inspector	Boring Contractor
R. Hembree	L. Flora	PG&E

DESCRIPTION	SAMPLE SYMBOL	DEPTH (FT.)	SOIL SYMBOL	SAMPLE TYPE AND NUMBER	RECOVERY (INCHES)	BLOWS/6 IN.	NOTES ON GROUNDWATER LEVELS, WATER RETURN, CHARACTER OF DRILLING.
Surface – Asphalt Roadway							
			SP				Rapid Advance
Clayey Silt w/ Sand + Gravel – Dk Green, wet, M. plasticity, Stiff, Fill – Strong Petr. Oil Odor –		5	ML	MC 1-1	6	12	Lost 1' of sample ▽ 5'
Clayey Silt w/ Sand + gravel – (As Above – No Petrol Odor –)				MC 2-1,2	14		Pushed Sampler
Silt Sandy/gravel – Rd Brn, wet, F-M gr sand matrix, gravel to 1½" V. Rare – No Petrol Odor –		10	SM	MC 3-1	6	50	6in 5"
							BOH 9.5'

FIELD SOIL BORING LOG

Project: Oakland GE Gas Yard	Job No.	Boring No. B2	Sheet 1 of 1
Ground Elev.	Type & Diameter of Boring	Location: Oakland	
Bottom of Hole Elev.	Depth 8.5'	Groundwater Elev.	Date
Date Started 2/13/87	Finished 2/13/87		
Name of Driller R. Henderson	Name of Inspector L. Flora	Boring Contractor PGE	

DESCRIPTION	SAMPLE SYMBOL	DEPTH (FT.)	SOIL SYMBOL	SAMPLE TYPE AND NUMBER	RECOVERY (INCHES)	BLOWS/6 IN.	NOTES ON GROUNDWATER LEVELS, WATER RETURN, CHARACTER OF DRILLING.
Asphalt Roadway							
CLAYEY SILT w/ gravel - Dk Gray, WET, M. Plasticity, Med. STIFF, Fill? - Strong oil odor -		5	ML	H H-2	12	36	Rapid Advance ▽ 5' NOTE: Oil on Auger plug
SILTY SAND w/ gravel - Rd Brn, WET, F-M gr. w/ subang gravels to 1½" - Mod. Product odor -		10	SM	H.C H-1	18	57	BOH 8.5'

FIELD SOIL BORING LOG

Project: Oakland GC Gas Mgt	Job No.	Boring No.: B3	Sheet: 1 of 1
Ground Elev.	Type & Diameter of Boring: 8" Hollow Stem Augers	Location: Oakland	
Bottom of Hole Elev.	Depth: 9.5'	Groundwater Elev. / Date	Date Started: 2/13/87 — Finished: 2/13/87
Name of Driller: R. Hardesty	Name of Inspector: L. Flora	Boring Contractor: PG&E	

DESCRIPTION	Sample Symbol	Depth (ft.)	Soil Symbol	Sample Type and Number	Recovery (inches)	Blows/6 in.	NOTES ON GROUNDWATER LEVELS, WATER RETURN, CHARACTER OF DRILLING.
Surface - Asphalt							
Silty Clay w/ Sand - Dk Gray, Moist — Heavy Product Odor —		5	CL	MC 1-32	E	44	Rapid & Steady Advance ▽ 6.5'
Silty Clay - Gray/Green, Hard, Moist, Low plasticity w/ Sporadic scattered gravels To ¼" + blebs of Black organics — No Product Odor —							
Silty Sand w/ gravel - Rd Brn, wet, F-M gr; some subang gravels To 1" — No Product Odor		10	SM	MC 2-1	10"		BOH 9.5

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Soil Boring OB-1

Drilling Log

Project PG&E/Oakland Owner Pacific Gas & Electric Co.

Location Oakland Project Number 203 799 2727

Date Drilled 3/16/88 Total Depth of Hole 15.5 ft Diameter 8 in

Surface Elevation ____ Water Level Initial 7 ft 24-hrs. ____

Screen: Dia. ____ Length ____ Slot Size ____

Casing: Dia. ____ Length ____ Type ____

Drilling Company Pacific Gas & Electric Drilling Method Hollow Stem Auger

Driller R. Hendren Log by D. Higgins

Sketch Map

Notes

Depth (Feet)	Well Construction	TIP (ppm)	Sample Number	Graphic Log	Description/Soil Classification
0					Base course, ± 12 inches
2		186	A 17 17 12 16	ML	Black sandy silt with clay and some gravel (very stiff, moist, moderate oil odor)
4		3.7	B 5 7 13 21		Dark grey silty clay (hard, moist, slight oil odor)
6		105	C 10 21 36	CL	(grades some sand and gravel)
8		115	D 31 10 17 E 35 F 50		▼ Encountered water 3/16/88 (0830 hrs.) (grades black, wet, strong oil odor, sheen)
10		1.4	G 11 H 26 26 30	SW	Brown gravelly sand (very dense, wet, no product odor)
12					
14			21 26 24 25		
16					End of boring
18					
20					
22					
24					

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Soil Boring OB-3

Drilling Log

Project PG&E/Oakland Owner Pacific Gas & Electric Co.

Location Oakland Project Number 203 799 2727

Date Drilled 3/16/88 Total Depth of Hole 15 ft Diameter 8 in

Surface Elevation ____ Water Level, Initial 7 ft 24-hrs. ____

Screen: Dia. ____ Length ____ Slot Size ____

Casing: Dia. ____ Length ____ Type ____

Drilling Company Pacific Gas & Electric Drilling Method Hollow Stem Auger

Driller R. Hendren Log by D. Higgins

Sketch Map

Notes

Depth (Feet)	Well Construction	TIP (ppm)	Sample Number	Graphic Log	Description/Soil Classification
0					Base course, ± 18 inches
2		7.1	A 26 B 32 50		Black sandy silt (hard, slightly moist, no product odor)
4		33.3	8 C 10 6 D 9 5	ML	(grades very stiff, moderate oil odor, some organics)
6		99	17 E 18 F 26		(grades hard) (sheen on samples)
8		128	18 15 G 17 H 24	SC	▼ Encountered water 3/16/88 (1045 hrs.) Greenish-grey clayey sand with silt and some gravels (dense, wet, strong oil odor, sheen)
10			20 27		(grades brown, no product odor)
12		7.5	I 30 J	SM	Brown silty sand (very dense, wet, no product odor)
14		3.5	20 25 K 18 L 17		(grades some gravel) End of boring
16					
18					
20					
22					
24					

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Soil Boring OB-4

Drilling Log

Project PG&E/Oakland Owner Pacific Gas & Electric Co.

Location Oakland Project Number 203 799 2727

Date Drilled 3/16/88 Total Depth of Hole 14 ft Diameter 8 in

Surface Elevation ____ Water Level Initial 7 ft 24-hrs. ____

Screen: Dia. ____ Length ____ Slot Size ____

Casing: Dia. ____ Length ____ Type ____

Drilling Company Pacific Gas & Electric Co. Drilling Method Hollow Stem Auger

Driller R. Hendren Log by D. Higgins

Sketch Map

Notes

Depth (Feet)	Well Construction	TIP (ppm)	Sample Number	Graphic Log	Description/Soil Classification
0					Base course, ± 12 inches
2		2.4	A 16 20 / B 17 17	ML	Black sandy silt (hard, slightly moist, no product odor)
4		2.5	C 4 5 / D 6 14	ML	Black clayey silt (very stiff, moist, no product odor)
6		2.4	E 11 21 / F 25 28	ML	Dark grey, orange mottled, sandy silt with some clay (hard, slightly moist, no product odor)
					▼ Encountered water 3/16/88 (1200 hrs.)
8		2.2	G 13 23 / H 26 31	GM	Brownish-grey, greenish-grey mottled, sandy gravel with clay and silt (very dense, wet, no product odor)
10		29	I 20 29 / J 50		
12					
14		2.4	L 29 50		End of boring
16					
18					
20					
22					
24					

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Geologist / Engineer A B Shum License No. 4394

Soil Boring OB-5

Drilling Log

Project PG&E/Oakland Owner Pacific Gas & Electric Co.

Location Oakland Project Number 203 799 2727

Date Drilled 3/16/88 Total Depth of Hole 15 ft Diameter 8 in

Surface Elevation ____ Water Level, Initial 7 ft 24-hrs. ____

Screen: Dia. ____ Length ____ Slot Size ____

Casing: Dia. ____ Length ____ Type ____

Drilling Company Pacific Gas & Electric Co. Drilling Method Hollow Stem Auger

Driller R. Hendren Log by D. Higgins

Sketch Map

Notes

Depth (Feet)	Well Construction	TIP (ppm)	Sample Number	Graphic Log	Description/Soil Classification
0					Base course, ± 12 inches
2		3.7	A 20 27 39 17	GM	Black gravelly silt with clay (hard, moist, no product odor)
4		2.5	B 5 5 16 28	CL	Black silty clay with some gravel (hard, moist, no product odor)
6		2.6	C 16 16 28 30	CL	(grades orange mottled, some sand)
8		6.0	D 28 40 50	GM	▼ Encountered water 3/16/88 (1350 hrs.) Brown sandy gravel with silt and clay (very dense, wet, no product odor)
10			38	GM	
12		2.8	E 49 37 38	CL	Brown gravelly clay with silt (hard, wet, no product odor)
14			24 27 19 12	CL	
16					End of boring
18					
20					
22					
24					

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Geologist / Engineer R.B. Stam License No. 4394

Soil Boring OB-6

Drilling Log

Project PG&E/Oakland Owner Pacific Gas & Electric Co.

Location Oakland Project Number 203 799 2727.

Date Drilled 3/16/88 Total Depth of Hole 15 ft Diameter 8 in

Surface Elevation ____ Water Level Initial 7 ft 24-hrs. ____.

Screen: Dia. ____ Length ____ Slot Size ____

Casing: Dia. ____ Length ____ Type ____.

Drilling Company Pacific Gas & Electric Co. Drilling Method Hollow Stem Auger.

Driller R. Hendren Log by D. Higgins

Sketch Map

Notes

Depth (Feet)	Well Construction	TIP (ppm)	Sample Number	Graphic Log	Description/Soil Classification
0					Base course, ± 6 inches
2		2.6	A 22 26 28 35	GP	Black gravelly silt with sand (hard, moist, no product odor)
4		1.8	B 12 2 4 7		Black silty clay (stiff, moist, no product odor)
6		3.8	C 3 8 11 23	CL	(grades some fine gravel) (grades very stiff)
8			6 28 35 50		▼ Encountered water 3/16/88 (1450 hrs.) (grades hard)
10		2.8	D 26 12 18 20		Brown sandy gravel with silt and clay (dense, wet, no product odor)
12				GM	(grades very dense)
14		2.7	21 36 36 26		End of boring
16					
18					
20					
22					
24					

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OIL RECOVERY SYSTEMS

Geologist / Engineer HBSam License No. 4394

Soil Boring OB-7

Drilling Log

Project PG&E/Oakland Owner Pacific Gas & Electric Co.

Location Oakland Project Number 203-799-2727

Date Drilled 3/16/88 Total Depth of Hole 15 ft. Diameter 8 in.

Surface Elevation ____ Water Level Initial 7 ft. 24-hrs. ____

Screen: Dia. ____ Length ____ Slot Size ____

Casing: Dia. ____ Length ____ Type ____

Drilling Company Pacific Gas & Electric Co. Drilling Method Hollow stem auger

Driller R. Hendren Log by D. Higgins

Sketch Map

Notes

Depth (Feet)	Well Construction	TIP (ppm)	Sample Number	Graphic Log	Description/Soil Classification
0					Base course, ± 12 inches
2		2.4	A 26 28 40 50	CL	Black silty clay (hard, moist, no product odor)
					(Grades some fine gravel)
4		3.3	B 26 3 4 5	SP	Dark brown gravelly sand with silt (loose, dry, no product odor)
6		2.6	C 10 16 22 28	CL	Dark grey silty clay (stiff, moist, no product odor)
					(Grades some fine gravel, very stiff)
					(Grades hard)
					▼ Encountered water 3/16/88 (1555 hrs)
8		10.4	D 10 16 22 25		Greenish grey clayey gravel with silt (dense, wet, no product odor)
10				GC	
		3.9	E 20 26 18 21		
12					(Grades brown, some sand)
			20		
14		2.8	F 16 16 12		(Grades to medium dense)
					End of boring
16					
18					
20					
22					
24					

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GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

Geologist / Engineer [illegible] License No. 4394

Soil Boring OB-8

Drilling Log

Project PG&E/Oaklnnd Owner Pacific Gas & Electric Co.
Location Oakland Project Number 203-799-2727
Date Drilled 3/17/88 Total Depth of Hole 14.5ft Diameter 8 in.
Surface Elevation ____ Water Level Initial 8.5 ft 24-hrs. ____
Screen: Dia. ____ Length ____ Slot Size ____
Casing: Dia. ____ Length ____ Type ____
Drilling Company Pacific Gas & Electric Co. Drilling Method Hollow stem auger
Driller R. Hendrex Log by D. Higgins

Sketch Map

Notes

Depth (Feet)	Well Construction	TIP (ppm)	Sample Number	Graphic Log	Description/Soil Classification
0					8 inches concrete over 4 in. base course
2				CL	Black silty clay with some gravel (hard, slightly moist, no product odor)
4		5.5	A 64 38 40	SW	Grey fine to coarse sand (very dense, slightly moist, no product odor)
6		0.6	B 9 6 14 14	CL	Black, green mottled, silty clay with some sand (very stiff, moist, no product odor)
8		2.3	C 32 15 15 18		(Grades some gravel, hard)
10		2.0	D 21 12 E 12 25 40	CL	▼ Encountered water 3/17/88 (0920 hrs) Grey green clay with some gravel (hard, wet, no product odor)
12		3.2	F 14 G 21 23	GC	Brownish grey sandy gravel with clay and silt (very dense, wet, no product odor)
14		1.7	H 25 28 50		End of boring
16					
18					
20					
22					
24					

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GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

Geologist / Engineer A.B. Shan License No. 4394

Soil Boring OB-9

Drilling Log

Project PG&E/Oakland Owner Pacific Gas & Electric Co.

Location Oakland Project Number 203-799-2727

Date Drilled _____ Total Depth of Hole 14.5 ft Diameter 8 in.

Surface Elevation _____ Water Level Initial 10 ft. 24-hrs. _____

Screen: Dia. _____ Length _____ Slot Size _____

Casing: Dia. _____ Length _____ Type _____

Drilling Company Pacific Gas & Electric Co. Drilling Method Hollow stem auger

Driller R. Hendren Log by D. Higgins

Sketch Map

Notes

Depth (Feet)	Well Construction	TIP (ppm)	Sample Number	Graphic Log	Description/Soil Classification
0					8 in. concrete over 4 in. base course
2					Black gravelly clay with silt (very stiff, moist, no product odor)
4		92	A 5, B 6, 11	CL	(Grades no gravel, moderate tar odor)
6		21.7	C 16, D 10, 20		Greenish grey clayey sand with silt (very dense, moist, moderate tar odor)
8			D 31, 43	SC	(Grades orange mottled, no product odor)
10		3.5	E 11, F 20, 28, 40		▼ Encountered water 3/17/88 (1015hrs)
12		15.4	28, 38, 38, G 40	GC	Orange-brown sandy gravel with clay (very dense, wet, no product odor)
14		3.9	21, 28, H 50		End of boring
16					
18					
20					
22					
24					

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GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

Geologist / Engineer NBStamm License No. 4394

Soil Boring OB-10

Drilling Log

Project PG&E/Oakland Owner Pacifc Gas & Electric Co.

Location Oakland Project Number 203-799-2727

Date Drilled 3/17/88 Total Depth of Hole 15 ft. Diameter 8 in.

Surface Elevation ____ Water Level, Initial 10 ft. 24-hrs. ____

Screen: Dia. ____ Length ____ Slot Size ____

Casing: Dia. ____ Length ____ Type ____

Drilling Company Pacific Gas & Electric Co. Drilling Method Hollow stem auger

Driller R. Hendren Log by D. Higgins

Sketch Map

Notes

Depth (Feet)	Well Construction	TIP (ppm)	Sample Number	Graphic Log	Description/Soil Classification
0					8 in. concrete over 4 in. base course
2		4.6	A 40 50		Black gravelly clay with silt(hard, moist, no product odor)
4		3.7	B 5 C 4 5	CL	(Grades stiff)
6			10 9		(Grades more gravel)
		2.6	D 21 E 38		(Grades greenish-grey, some sand, hard)
8			31 11		
		5.7	F 21 G 22 24		(Grades less gravel, more sand)
10					▼ Encounter water 3/17/88 (1100hrs)
12		1.7	H 30 I 15 35 50	GM	Brownish-orange sandy gravel with silt(very dense, wet, no product odor)
			19		
14		1.8	J 21 K 23 13		End of boring
16					
18					
20					
22					
24					

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GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

Geologist / Engineer [signature] License No. 439

Soil Boring OB-11

Drilling Log

Project PG&E/Oakland Owner Pacific Gas & Electric Co.

Location Oakland Project Number 203-799-2727

Date Drilled 3/17/88 Total Depth of Hole 15 ft. Diameter 8 in.

Surface Elevation ____ Water Level Initial 9.5 ft. 24-hrs. ____

Screen: Dia. ____ Length ____ Slot Size ____

Casing: Dia. ____ Length ____ Type ____

Drilling Company Pacific Gas & Electric Co. Drilling Method Hollow stem auger

Driller R. Hendren Log by D. Higgins

Sketch Map

Notes

Depth (Feet)	Well Construction	TIP (ppm)	Sample Number	Graphic Log	Description/Soil Classification
0					Base course, ± 12 inches
2		1.5	A 27 18 24 27	CL	Dark grey sandy clay (hard, moist, no product odor)
4		2.0	4 B 5 9 15	SC	Dark grey clayey sand (medium dense, moist, no product odor)
6			7 14 18 C 24	CL	Black silty clay (very stiff, slightly moist, no product odor)
8		1.4	14 24 D 28 32	CL	(Grades hard) Greenish-grey, orange mottled, gravelly clay with sand and silt (hard, moist, no product odor)
10		1.7	E 20 F 21		▼ Encountered water 3/17/88 (1330hrs)
12		2.0	18 21	GC	Brownish-orange, clayey gravel with sand and silt (dense, wet, no product odor)
14		1.3	4 5 G 11 30		End of boring
16					
18					
20					
22					
24					

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GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

Geologist / Engineer RBSham License No. 4394

Soil Boring OB-12

Drilling Log

Project PG&E/Oakland Owner Pacific Gas & Electric Co.

Location Oakland Project Number 203-799-2727

Date Drilled 3/17/88 Total Depth of Hole 15 ft. Diameter 8 in.

Surface Elevation ____ Water Level, Initial 9.5 ft. 24-hrs. ____

Screen: Dia. ____ Length ____ Slot Size ____

Casing: Dia. ____ Length ____ Type ____

Drilling Company Pacific Gas & Electric Co. Drilling Method Hollow stem auger

Driller R. Hendren Log by D. Higgins

Sketch Map

Notes

Depth (Feet)	Well Construction	TIP (ppm)	Sample Number	Graphic Log	Description/Soil Classification
0					Base course, ± 12 inches
2		2.0	A 10 11 12	GW	Brown sandy gravel (medium dense, slightly moist, no product odor)
			12 9	SM	Dark grey silty fine-to-coarse sand (medium dense, moist, no product odor)
4		0.8	B 11 9	CL	Black silty clay (very stiff, moist, no product odor)
6		1.0	C 5 9 11		Dark grey, orange mottled, gravelly clay with sand and silt (hard, moist, no product odor)
8		1.2	D 27 14 14	CL	(Grades orangish-brown)
10		1.5	TIP 29 43 14		▼ Encountered water 3/17/88 (1430hrs)
12		0.8	18 32 31	GC	Orangish-brown clayey gravel with sand and silt (very dense, wet, no product odor)
14		2.7	15 15 18 18		(Grades dense)
16					End of boring
18					
20					
22					
24					

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FIELD SOIL BORING LOG

Project	Job No.	Boring No.	Sheet
PG and E Oakland GC Yard	TES 3647	OB-14	1 of 1

Ground Elevation	Type & Diameter of Boring	Location
	8" O.D. Hollow-Stem Augers	Coliseum Way, Oakland

Bottom of Hole Elevation	Depth	Groundwater Depth	Date	Date Started	Finished
	4'	NOT ENCOUNTERED	5/ /88	5/17/88	5/17/88

Name of Driller	Name of Inspector Logger	Boring Contractor
Ron Hendren	Darrell Klingman	PG and E Mobile B-80

DRILL RATE / MIN.

DESCRIPTION	DEPTH (FT.)	SOIL SYMBOL	SAMPLE TYPE & NUMBER	RECOVERY (INCHES)	BLOWS/6 in	NOTES ON GROUNDWATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, METHOD OF ADVANCING BORING, SIZE OF CASING
SURFACE: Concrete (4")	0					ppm readings taken with Photovac TIP 1
SILTY SAND with gravel - dark brown, moist, dense (slight "tar-like" odor)		SM	2" SS 1-1	8/9"	4	0 ppm @ 2'
					50/5"	
SILTY GRAVEL with sand - dark brown, moist to wet, dense, contains tar (tar wrapping for pipe?), gravels recovered are angular and upto 1" across (no odor)		GM		4/9"	8	0 ppm @ 3.5'
					36/12"	78 ppm @ 4' HIT A BURIED PIPE
	5					BORING TERMINATED @ 4'
						ENCOUNTERED A BURIED PIPE @ 4'
						GROUND WATER NOT ENCOUNTERED
	10					BACKFILLED WITH CEMENT/BENTONITE GROUT
	15					
	20					
	25					
						* sample submitted for lab chemical analysis

NOTES:

FIELD SOIL BORING LOG

Project	Job No.	Boring No.	Sheet
P and E Oakland GC Yard	TES 3647	SB-14A	1 of 1

Ground Elevation	Type & Diameter of Boring	Location
	8" O.D. Hollow-Stem Augers	Coliseum Way, Oakland

Bottom of Hole Elevation	Depth	Groundwater Depth	Date	Date Started	Finished
	22'	~10'	5/17/88	5/17/88	5/17/88

Name of Driller	Name of Inspector	Boring Contractor
Ron Hendren	Darrell Klingman	P and E Mobile B-80

DESCRIPTION	DEPTH (FT.)	SOIL SYMBOL	SAMPLE TYPE & NUMBER	RECOVERY (INCHES)	BLOWS/6 in	NOTES ON GROUNDWATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, METHOD OF ADVANCING BORING, SIZE OF CASING
SURFACE: Concrete (4")	0					ppm readings taken with Photovac TIP 1
SILTY SAND with gravel - dark brown, moist to wet, medium dense to dense (no hydrocarbon odor)		SM				
SANDY SILT with gravel - dark brown, wet, stiff, contains wood fragments, sand is fine- to coarse-grained (moderate oily? odor)	5	ML		4/24	5, 7, 15, 23	
			2" SS 1-1	12/24	3, 14, 29, 40	30 ppm @ 7' *
CLAY with silt, sand, and gravel - medium bluish-green with yellow mottling, moist, hard (slight hydrocarbon odor)		CL				
SILTY GRAVEL with clay and sand - medium green, moist, dense to very dense (free oil in pockets)		GM	2" SS 2-2	16/24	12, 15, 20, 42	55 ppm @ 8.5'
CLAY with silt - medium green, moist, very stiff		CL	2-1		21	▽
SILTY GRAVEL with clay and sand - medium green, moist (saturated along fractures @ 10'), dense (some free oil)	10	GM	2" SS 3-3	20/24	25, 28, 30, 24	*
			3-2			0 ppm @ 11.5'
SILTY GRAVEL with sand - medium brown with some green, saturated (along fractures), dense, sand is medium- to coarse-grained (slight diesel/oil odor)		GM	2" SS 4-3	29/22	27, 30, 50/4"	
			4-2			1.8 ppm @ 13.5'
SILTY SAND - medium brown, saturated, medium dense, sand is medium- to coarse-grained (no hydrocarbon odor)	15	SM				(submerged hammer)
CLAY with silt - light brown, saturated, stiff, with some pores		CL	2" SS 5-3	20/24	5, 14, 14, 16	
CLAY with sand - light brown with some yellow staining, saturated, stiff, sand is fine-grained, contains some black patches (organic debris? or manganese?) (no odor)		CL	5-2			1.7 ppm @ 17.5'
CLAY with silt and sand, light brown, saturated, stiff (no odor)	20	CL	2" SS 6-2	23/24	5, 9, 13, 16	(submerged hammer)
			6-1			1.6 ppm @ 20'
	25					BORING TERMINATED @ 22' GROUND WATER ENCOUNTERED @ ~10' BACKFILLED WITH CEMENT/BENTONITE GROUT
						* sample submitted for lab chemical analysis

NOTES:

FIELD SOIL BORING LOG

Project	Job No.	Boring No.	Sheet
PG and E Oakland GC Yard	TES 3647	OB-15	1 of 1

Ground Elevation	Type & Diameter of Boring	Location
	8" O.D. Hollow-Stem Augers	Coliseum Way, Oakland

Bottom of Hole Elevation	Depth	Groundwater Depth	Date	Date Started	Finished
	16'	~10'	5/17/88	5/17/88	5/17/88

Name of Driller	Name of Inspector Logger	Boring Contractor
Ron Hendren	Darrell Klingman	PG and E Mobile B-80

DRILL RATE / MIN.

DESCRIPTION	DEPTH (FT.)	SOIL SYMBOL	SAMPLE TYPE & NUMBER	RECOVERY (INCHES)	BLOWS/6 in	NOTES ON GROUNDWATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, METHOD OF ADVANCING BORING, SIZE OF CASING
SURFACE: CONCRETE (4")	0					
SILTY SAND with gravel - dark grayish-brown, moist to wet, medium dense to dense (slight hydrocarbon(?) odor)		SM	2" SS 1-1	16/17	28, 50	ppm readings taken with Photovac TIP 1
				5/5	50/5"	— 0.0 ppm @ 2'
	5					— 3.6 ppm @ 4'
CLAY with silt - medium bluish-green with olive green mottling, moist, hard (no hydrocarbon odor)			2" SS 2-1	13/24	9, 7, 14, 24	— 40 ppm @ 6'
		CL				— *
CLAY with silt, sand and gravel - medium bluish-green with olive green mottling, moist to wet(?), hard (free oil in pockets)			2" SS 3-1	13/24	15, 32, 50, 40	— 42 ppm @ 8'
Saturated @ 10'	10	CL	2" SS 4-2	15/24	16, 28, 20, 31	▽ — * — 3.1 ppm @ 10.5'
SILTY SAND - light brown, saturated, medium dense to dense, sand is medium- to coarse-grained (no odor)						(submerged hammer)
	15	SM	2" SS 5-2	20/24	18, 32, 20	— 2.7 ppm @ 15'
LEAN CLAY - light brown, saturated, very stiff (no odor)		CL	5-1		20	
						BORING TERMINATED @ 16'
						GROUND WATER ENCOUNTERED @ ~10'
	20					BACKFILLED WITH CEMENT/BENTONITE GROUT
	25					
						* sample submitted for lab chemical analysis

NOTES:

FIELD SOIL BORING LOG

Project: PG&E Oakland GC Yard	Job No.: TES 3647	Boring No.: OB-16	Sheet: 1 of 1	
Ground Elevation:	Type & Diameter of Boring: 8" O.D. Hollow-Stem Augers	Location: Coliseum Way, Oakland		
Bottom of Hole Elevation:	Depth: 17'	Groundwater Depth: ~9½'	Date: 5/17/88	Date Started: 5/17/88 Finished: 5/17/88
Name of Driller: Ron Hendren	Name of Inspector Logger: Darrell Klingman	Boring Contractor: PG&E Mobile B-80		

DRILL RATE / MIN.	DESCRIPTION	DEPTH (FT.)	SOIL SYMBOL	SAMPLE TYPE & NUMBER	RECOVERY (INCHES)	BLOWS/6 in	NOTES ON GROUNDWATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, METHOD OF ADVANCING BORING, SIZE OF CASING
	SURFACE: CONCRETE (8")	0					
	CLAYEY GRAVEL with sand - medium gray and greenish-gray, moist, dense (no odor)		GC				ppm readings taken with Photovac TIP 1
	SILTY SAND with gravel - dark grayish-brown, moist, dense (no odor)		SM		4/4	50/4"	- 4.4 ppm @ 2'
	POORLY GRADED GRAVEL with silt - dark grayish-brown, moist, dense (no odor)		GP-GM	2" SS 1-2	4/5	50/5"	- 5.0 ppm @ 3'
		5		1-1	20/24	3 5 12 18	- 4.6 ppm @ 6.5'
	CLAY with silt - dark grayish-brown, moist to wet, stiff (no odor)		CL	2" SS 2-2	14/24	10 17 22 25 15	- * - 4.8 ppm @ 8'
	CLAYEY GRAVEL with sand - medium green with olive green mottling, moist, dense (no odor) Saturated @ ~9½'	10	GC	2" SS 3-2	15/24	19 34 50 30	- * ▽ - 3.5 ppm @ 10'
	SILTY SAND with gravel - medium brown, saturated, dense, sand is medium- to coarse-grained (no odor)		SM	2" SS 4-2	15/23	50 45 50/5"	- 2.5 ppm @ 12'
	POORLY GRADED GRAVEL with silt - medium brown, saturated, dense, sand is medium- to coarse-grained, with interbeds of sand with silt (SP-SM) (no odor)	15	GP-GM	2" SS 5-2	16/24	28 26 25 41	(submerged hammer) - 3.0 ppm @ 17'
		20					BORING TERMINATED @ 17' GROUND WATER ENCOUNTERED @ 9½' BACKFILLED WITH CEMENT/BENTONITE GROUT
		25					* sample submitted for lab chemical analysis

NOTES:

FIELD SOIL BORING LOG

Project	Job No.	Boring No.	Sheet
PG and E Oakland GC Yard	TES 3647	B-17	1 of 1

Ground Elevation	Type & Diameter of Boring	Location
	8" O.D. Hollow-Stem Augers	Coliseum Way, Oakland

Bottom of Hole Elevation	Depth	Groundwater Depth	Date	Date Started	Finished
	17'	~9'	5/17/88	5/17/88	5/17/88

Name of Driller	Name of Inspector Logger	Boring Contractor
Ron Hendren	Darrell Klingman	PG and E Mobile B-80

DRILL RATE MIN

DESCRIPTION	DEPTH (FT.)	SOIL SYMBOL	SAMPLE TYPE & NUMBER	RECOVERY (INCHES)	BLOWS/6 in	NOTES ON GROUNDWATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, METHOD OF ADVANCING BORING, SIZE OF CASING
SURFACE: Concrete (9")	0					ppm readings taken with Photovac TIP 1
SILTY GRAVEL with clay - dark brownish-gray, moist, dense, gravels to 2" across (no odor)		GM				
SILTY SAND with gravel - dark brown, moist, dense (no odor)		SM				
CLAY with silt - dark brownish-gray, moist, very stiff (no odor)	5	CL	2" SS 1-2	24/24	3, 6, 9	— 3.3 ppm @ 5'
			1-1		20	
CLAYEY GRAVEL with sand - medium greenish-yellow, moist to wet, dense, sand is fine- to medium-grained (no odor)			2" SS 2-2	15/17	16, 29, 50/5"	—* — 2.6 ppm @ 7'
saturated @ ~9'		GC	2" SS 3-2	17/24	20, 22, 28, 40	▽ —* — 2.8 ppm @ 10'
POORLY GRADED GRAVEL - medium gray, saturated, dense (no odor)	10	GP	2" SS 4-2	15/24	9, 24, 39, 36	— 2.3 ppm @ 12'
SILTY GRAVEL - medium yellowish-brown, saturated, dense, recovered gravels to 1" across, gravels are angular (no odor)		GM				
POORLY GRADED SAND with silt - medium yellowish-brown, saturated, dense (no odor)	15	SP-SM	2" SS 5-3	23/23	20, 17, 30	(submerged hammer)
LEAN CLAY with minor sand - light brown, saturated, hard, with some minute organic(?) debris (no odor)		CL	5-2		50/5"	— 3.1 ppm @ 17'
	20					BORING TERMINATED @ 17'
						GROUND WATER ENCOUNTERED @ ~9'
	25					BACKFILLED WITH CEMENT/BENTONITE GROUT
						* sample submitted for lab chemical analysis

NOTES:

FIELD SOIL BORING LOG

Project	Job No.	Boring No.	Sheet
PG and E Oakland GC Yard	TES 3647	OB-18	1 of 1

Ground Elevation	Type & Diameter of Boring	Location
	8" O.D. Hollow-Stem Augers	Coliseum Way, Oakland

Bottom of Hole Elevation	Depth	Groundwater Depth	Date	Date Started	Finished
	17'	~9½'	5/18/88	5/18/88	5/18/88

Name of Driller	Name of Inspector Logger	Boring Contractor
Ron Hendren	Darrell Klingman	PG and E Mobile B-80

DRILL RIG / HAMMER	DESCRIPTION	DEPTH (FT.)	SOIL SYMBOL	SAMPLE TYPE & NUMBER	RECOVERY (INCHES)	BLOWS/6 in	NOTES ON GROUNDWATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, METHOD OF ADVANCING BORING, SIZE OF CASING
	SURFACE: GRAVEL	0					
	WELL GRADED GRAVEL - medium brown, dry to moist, dense		GW				ppm readings taken with Photovac TIP 1
	SANDY SILT with clay - dark brownish-gray, moist, stiff (slight oily(?) odor)		ML				
	LEAN CLAY with silt - light greenish-gray, moist, stiff (no odor)		CL	2" SS 1-2	13/24	7 10 13 16	
	LEAN CLAY with silt - dark brownish-gray, moist to wet, stiff, with some organic debris (no odor)		CL	2" SS 2-2	17/24	16 8 10 20	— 2.2 ppm @ 4'
	LEAN CLAY with silt - medium greenish-gray, moist, stiff (no odor) with some gravel @ 6'	5	CL	2" SS 2-2		28 10	— 2.5 ppm @ 5'
	CLAYEY GRAVEL with sand - medium green, moist, dense, recovered gravels to 2" across (no odor)		GC	2" SS 3-2	14/24	20 40 49 17	— 2.2 ppm @ 6' — * — 2.5 ppm @ 9'
	SILTY SAND - medium greenish-gray, moist to wet, dense (no odor)		SM	2" SS 4-1	10/24	19 45 48	— 2.8 ppm ▽ @ 10' — *
	SILTY SAND - medium yellowish-brown, saturated, dense, with some gravels @ 10' and 12' (no odor)	10	SM	2" SS 5-2	16/24	8 13 29 28	— 3.0 ppm @ 12'
	LEAN CLAY - light brown, saturated, hard (no odor)						
	CLAYEY SAND - light brown, saturated, dense, sand is medium- to coarse-grained (no odor)	15	CL	2" SS 6-3	24	14 18	(submerged hammer)
			SC	6-2	24	23 29	— 3.2 ppm @ 17'
		20					BORING TERMINATED @ 17' GROUND WATER ENCOUNTERED @ ~9½' BACKFILLED WITH CEMENT/BENTONITE GROUT
		25					* sample submitted for lab chemical analysis

NOTES:

GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

Geologist / Engineer PGEston License No. 4394

Soil Boring OW-1

Drilling Log

Project PG&E/Oakland Owner Pacific Gas & Electric Co.

Location Oakland Project Number 203-799-2727

Date Drilled 3/17/88 Total Depth of Hole 15 ft. Diameter 8 in.

Surface Elevation ____ Water Level Initial 9.5 ft. 24-hrs. ____

Screen: Dia. 2 IN. Length 15 FEET Slot Size .010

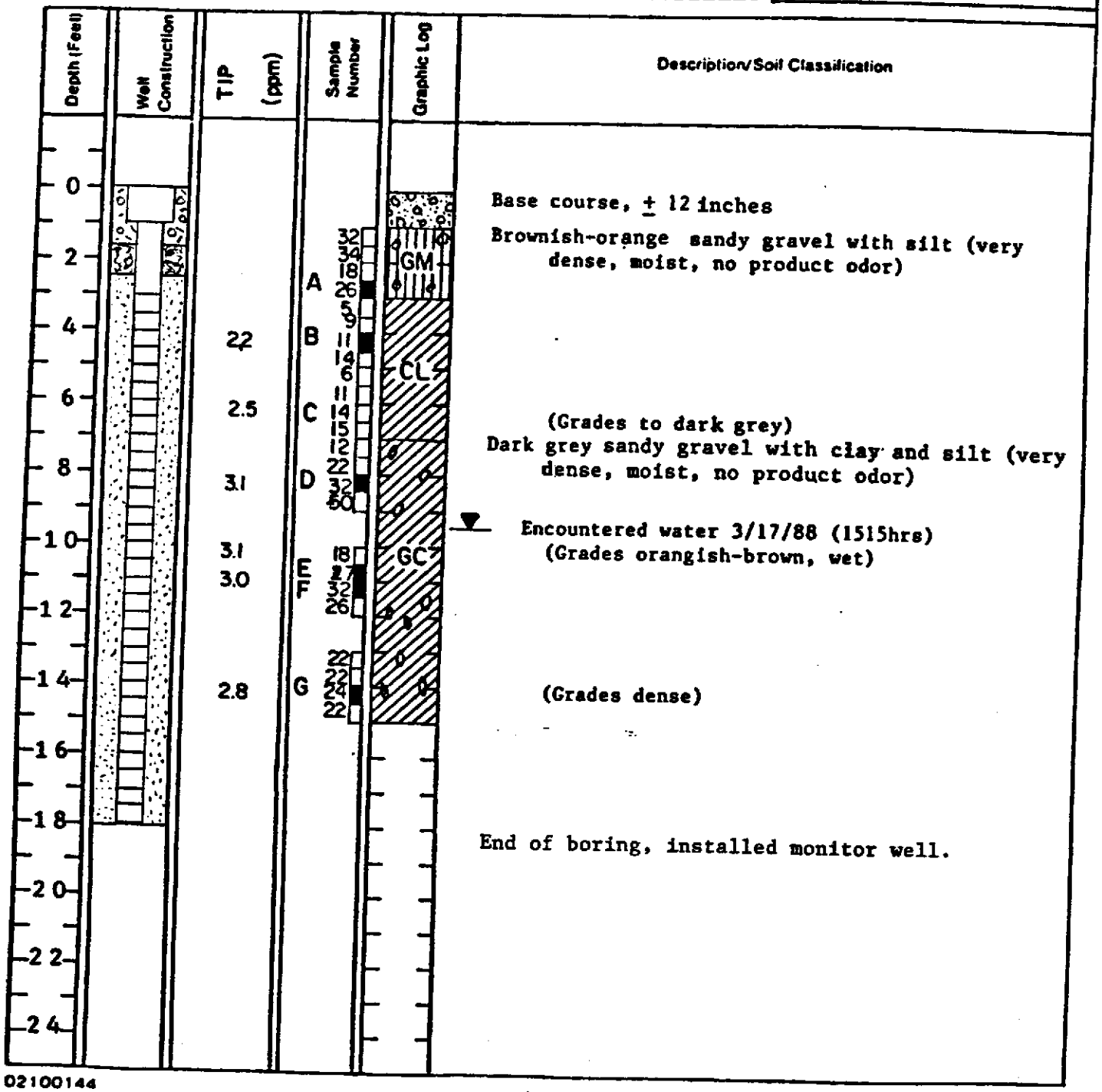
Casing: Dia. 2 IN. Length 3 FEET Type PVC

Drilling Company Pacific Gas & Electric Co. Drilling Method Hollow stem auger

Driller R. Hendren Log by D. Higgins

Sketch Map

Notes



Description/Soil Classification

Base course, ± 12 inches

Brownish-orange sandy gravel with silt (very dense, moist, no product odor)

(Grades to dark grey)

Dark grey sandy gravel with clay and silt (very dense, moist, no product odor)

▼ Encountered water 3/17/88 (1515hrs)

(Grades orangish-brown, wet)

(Grades dense)

End of boring, installed monitor well.

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FIELD SOIL BORING LOG

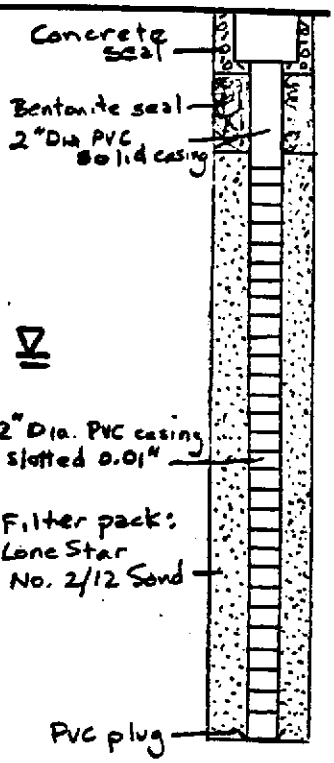
Project	Job No.	Boring No.	Sheet
Oakland GC Yard	TES 3647	OW-2	1 of 1

Ground Elevation	Type & Diameter of Boring	Location
	8" O.D. Hollow-Stem Auger	Coliseum Way, Oakland

Bottom of Hole Elevation	Depth	Groundwater Elevation	Date	Date Started	Finished
	19'	~ 9' below grade	3/21/88	3/21/88	3/22/88

Name of Driller	Name of Inspector	Boring Contractor
Ron Hendren	Eric Johnson	PG and E Mobile B-80

ELEVATION	DESCRIPTION	DEPTH (FT.)	SOIL SYMBOL	SAMPLE TYPE & NUMBER	RECOVERY (INCHES)	BLOWS/ 6 in	NOTES ON GROUNDWATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, METHOD OF ADVANCING BORING, SIZE OF CASING
	PIEZOMETER ONLY. BORING NOT LOGGED. NO SOIL SAMPLES COLLECTED.	0					
	GROUNDWATER ENCOUNTERED AT ~ 9'	5					
		10					
		15					
		20					



Watertight, security traffic box installed at ground surface. 2" PVC cap installed on top of casing.

GROUNDWATER TECHNOLOGY, INC.
OIL RECOVERY SYSTEMS

Geologist / Engineer K B Starr License No. 4394

Soil Boring OW-3

Drilling Log

Project PG&E/Oakland Owner Pacific Gas & Electric

Location Oakland Project Number 203 799 2727

Date Drilled 3/16/88 Total Depth of Hole 14.5 ft Diameter 8 in

Surface Elevation ____ Water Level, Initial 9 ft 24-hrs. ____

Screen: Dia. 2 IN. Length 15 FEET Slot Size .010

Casing: Dia. 2 IN. Length 3.5 FEET Type PVC

Drilling Company Pacific Gas & Electric Drilling Method Hollow Stem Auger

Driller R. Hendren Log by D. Higgins

Sketch Map

Notes

Depth (Feet)	Well Construction	TIP (ppm)	Sample Number	Graphic Log	Description/Soil Classification
0					Base course, ± 12 inches
2		37	A 11, B 21, 13, 11	ML	Black sandy silt (very stiff, slightly moist, moderate oil odor)
4		16	C 5, 6, 9, 11, 17	SW	(grades grey, stiff) Grey silty fine to coarse sand (medium dense, very moist, moderate oil odor)
6		96	D 28, 30, E 40	CL	Black silty clay (hard, very moist, moderate oil odor) (grades grey)
8		292	E 9, 17, F 28, G 32	GP	Greenish grey-black sandy gravel (very dense, very moist, strong oil odor)(sheen on samples)
10		2.0	H 26, 38, I 30, 32	GM	▼ Encountered water 3/16/88 (0930 hrs.) Brown sandy, fine to coarse gravel with silt and clay (very dense, wet, no product odor)
12					
14		1.5	J 15, 40, 80		
16					
18					End of boring, installed monitor well.
20					
22					
24					

02100144

FIELD SOIL BORING LOG

Project	Job No.	Boring No.	Sheet
PG&E Oakland GC Yard	TES 3647	OW-4	1 of 1

Ground Elevation	Type & Diameter of Boring	Location
	12" O.D. Hollow-Stem Augers	Coliseum Way, Oakland

Bottom of Hole Elevation	Depth	Groundwater Depth	Date	Date Started	Finished
	20'9"	~9'	5/18/88	5/18/88	5/18/88

Name of Driller	Name of Inspector Logger	Boring Contractor
Ron Hendren	Darrell Klingman	PG&E Mobile B-80

DRILL RATE / MIN.

DESCRIPTION	DEPTH (FT.)	SOIL SYMBOL	SAMPLE TYPE & NUMBER	RECOVERY (INCHES)	BLOWS/6 in	NOTES ON GROUNDWATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, METHOD OF ADVANCING BORING, SIZE OF CASING
						WATERTIGHT, SECURITY TRAFFIC COVER
WELL GRADED GRAVEL - medium brown, dry, dense, gravels to 4" across, FILL (no odor)	0	GW	2" SS 1-3	19/24	3 4 9	ppm readings taken with Photovac TIP 1
CLAY with silt, sand, gravel and debris - dark gray with brown mottling, moist, stiff, FILL (no odor) saturated @ 2', decreasing gravel content @ 3'		CL	1-2		16	PVC CAP
moist @ 4', saturated @ 5'	5		2" SS 2-2	16/24	6 13 20	CEMENT/BENTONITE GROUT; 2.6ppm @ 4'; BENTONITE SEAL 5'; 2" DIA. PVC SOLID CASING 6½'
CLAYEY GRAVEL with sand - medium grayish-green, moist, dense (no odor)		GC	2" SS 3-1	11/17	33 7 24	2.9ppm @ 6'; 2.3ppm @ 7.5
					50/5" *	8'
SILTY GRAVEL with sand - medium yellowish-brown, wet to saturated (@ 9'), dense (no odor)		GM	2" SS 4-2	15/24	39 33 30	1.5ppm @ 10'
SILTY SAND - medium yellowish-brown, saturated, dense, sand is medium-grained (no odor)	10	SM	2" SS 5-2	16/24	14 21 23	2.9ppm @ 11'
POORLY GRADED GRAVEL with silt - medium yellowish-brown, saturated, dense, recovered gravels to 1" across (no odor)		GP-GM	5-1		25	* SANDPACK LONESTAR 2/12
						12" DIA. BOREHOLE
CLAYEY SAND - light brown, saturated, dense, sand is medium- to coarse-grained (no odor)	15	SC	2" SS 6-1	10/24	8 7 11 22	2.7ppm @ 16'
LEAN CLAY - light brown, saturated, stiff to very stiff (no odor)		CL	2" SS 7-2 7-1		5 7 11 15	2" DIA. PVC SCH. 40 SCREEN, 0.01-INCH WIDE SLOTS; 3.5ppm @ 18.5'; PVC PLUG
	20					
						BORING TERMINATED @ 21'9"
	25					MONITORING WELL (2" ø) INSTALLED

* sample submitted for lab chemical analysis

WELL CONSTRUCTION

NOTES:

APPENDIX B

Sampling data and laboratory data sheets

GT Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane, Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

PROJECT MGR: Dave Higgins
Groundwater Technology, Inc.
4080-D Pike Lane
Concord, CA 94520

PROJECT #:203-799-2727-3
LOCATION: Oakland, CA
SAMPLED: 03/16,17/88 BY: D. Higgins
RECEIVED: 03/18/88 BY: J. Floro
ANALYZED: 03/24,28/88 BY: T. Alusi
MATRIX: Soil E. Lapurga
UNITS: ppm (mg/kg) R. Bly
Contract #: Z19-5-115-85

TEST RESULTS

PARAMETER	MDL	LAB # I.D.#	18844C SB-1C	18845C SB-1F	18846C SB-2C	18847C SB-2E
Total Oil and Grease (TOG)	3		630	(3	220	1100

MDL = Method Detection Limit.
METHOD: TOG = EPA 413.2

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-3
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: ppm (mg/kg)
Contract #: Z19-5-115-85

TEST RESULTS

PARAMETER	MDL	LAB # I.D.#	18848C SB-2B	18849C SB-3C	18850C SB-3F	18851C SB-3H
Total Oil and Grease (TOG)	3		<3	27	250	13

MDL = Method Detection Limit.
METHOD: TOG = EPA 413.2

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-3
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: ppm (mg/kg)
Contract #: Z19-5-115-85

TEST RESULTS

PARAMETER	MDL	LAB # I.D.#	18852C SB-4G	18853C SB-5D	18854C SB-7D	18855C SB-6B-A1
Total Oil and Grease (TOG)	3		29	(3	34	21

MDL = Method Detection Limit.
METHOD: TOG = EPA 413.2

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-3
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: ppm (mg/kg)
Contract #: Z19-5-115-85

TEST RESULTS

PARAMETER	MDL	LAB # I.D.#	18856C SB8-D	18857C SB-9B	18858C SB-9D	18859C SB-9G
Total Oil and Grease (TOG)	3		<3	52000	1000	<3

MDL = Method Detection Limit.
METHOD: TOG = EPA 413.2

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-3
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: ppm (mg/kg)
Contract #: 719-5-115-85

TEST RESULTS

PARAMETER	MDL	LAB # I.D.#	18860C SB-10H	18861C SB-11E	18862C SB-12E	18863C SB-13E
Total Oil and Grease (TOG)	3		<3	<3	<3	<3

MDL = Method Detection Limit.
METHOD: TOG = EPA 413.2

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-3
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: ppm (mg/kg)
Contract #: Z19-5-115-85

TEST RESULTS

PARAMETER	MDL	LAB # I.D.#	18944B SB-14A	18945B SB-14B
Total Oil and Grease (TOG)	3		(3	(3

MDL = Method Detection Limit.
METHOD: TOG = EPA 413.2

SAFY KHALIPA, Ph.D., Director

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03/29/88 mh

PROJECT MGR: Dave Higgins
Groundwater Technology, Inc.
4080-D Pike Lane
Concord, CA 94520
PROJECT #:203-799-2727-1
LOCATION: 4930 Coliseum Way
Oakland, CA
SAMPLED: 03/16,17,21/88 BY: D. Higgins
RECEIVED: 03/18/88 BY: J. Floro
ANALYZED: 03/28/88 BY: P. Sra
MATRIX: Soil
UNITS: mg/kg (ppm)
Contract #: Z19-5-115-85

TEST RESULTS

COMPOUNDS	MDL	LAB # I.D.#	18844A SB-1C	18845A SB-1F	18846A SB-2C	18847A SB-2E	18848A SB-2B
Total Petroleum Hydrocarbons as Diesel	10		<10	<10	<10	<10	<10
Total Petroleum Hydrocarbons as Mineral Spirits	10		54	<10	<10	98	<10

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.
METHODS: Modified EPA 8015.
METHOD:
Modified EPA Method 5030/8020/8015

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-1
LOCATION: 4930 Coliseum Way
Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)
Contract #: 219-5-115-85

TEST RESULTS

COMPOUNDS	MDL	LAB # I.D.#	18849A SB-3C	18850A SB-3F	18851A SB-3H	18852A SB-4G	18853A SB-5D
Total Petroleum Hydrocarbons as Diesel	10		210	<10	<10	<10	<10
Total Petroleum Hydrocarbons as Mineral Spirits	10		<10	30	<10	<10	<10

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.
METHODS: Modified EPA 8015.

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-1
LOCATION: 4930 Coliseum Way
Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)
Contract #: Z19-5-115-85

TEST RESULTS

COMPOUNDS	MDL	LAB # / I.D.#	18854A / SB-7D	18855A / SB-6B-A	18856A / SB-8D	18857A / SB-9B	18858A / SB-9D
Total Petroleum Hydrocarbons as Diesel	10		<10	<10	<10	3900	400
Total Petroleum Hydrocarbons as Mineral Spirits	10		59	<10	<10	<10	<10

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.
METHODS: Modified EPA 8015.

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-1
LOCATION: 4930 Coliseum Way
Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)
Contract #: Z19-5-115-85

TEST RESULTS

COMPOUNDS	MDL	LAB #	18859A	18860A	18861A	18862A	18863A
		I.D.#	SB-9G	SB-10H	SB-11E	SB-12E	SB-13E
Total Petroleum Hydrocarbons as Diesel	10		<10	<10	<10	<10	<10
Total Petroleum Hydrocarbons as Mineral Spirits	10		<10	<10	<10	<10	<10

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.
METHODS: Modified EPA 8015.

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PROJECT #:203-799-2727-1
LOCATION: 4930 Coliseum Way
Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)
Contract #: Z19-5-115-85

TEST RESULTS

PARAMETER	MDL	LAB # I.D.#	18944A SB-14A	18945A SB-14B			
Total Petroleum Hydrocarbons as Diesel	10		<10	<10			
Total Petroleum Hydrocarbons as Mineral Spirits	10		<10	<10			

MDL = Method Detection limit; compound below this level would not be detected.
Results rounded to two significant figures.
METHODS: Modified EPA 8015.

Safy Khalifa for

SAFY KHALIFA, Ph.D., Director

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04/22/88 mh Page 1 of 6

PROJECT MGR: Dave Higgins
Groundwater Technology, Inc.
4080-D Pike Lane
Concord, CA 94520
PROJECT #:203-799-2727-2
LOCATION: Oakland, CA

SAMPLED: 3/16,17/88 BY: D. Higgins
RECEIVED: 03/18/88 BY: J. Floro
ANALYZED: 04/20/88 BY: P. Sra
MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	18844B SB-1C	18845B SB-1F	18846B SB-2C	18847B SB-2E
Benzene	0.5		<0.5	<0.5	<0.5	<0.5
Toluene	0.5		<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5		<0.5	<0.5	<0.5	<0.5
Xylenes	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,4 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,2 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5

MDL = Method Detection Limit.
METHOD: EPA 8020.

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-2
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	18848B SB-2B	18849B SB-3C	18850B SB-3F	18851B SB-3H
Benzene	0.5		<0.5	<0.5	<0.5	<0.5
Toluene	0.5		<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5		<0.5	<0.5	<0.5	<0.5
Xylenes	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,4 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,2 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-2
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	18852B SB-4B	18853B SB-5D	18854B SB-7D	18855B SB-6B/A
Benzene	0.5		<0.5	<0.5	<0.5	<0.5
Toluene	0.5		<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5		<0.5	<0.5	<0.5	<0.5
Xylenes	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,4 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,2 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-2
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	18856B SB-8D	18857B SB-9B	18858B SB-9D	18859B SB-9G
Benzene	0.5		<0.5	<0.5	<0.5	<0.5
Toluene	0.5		<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5		<0.5	1.1	<0.5	<0.5
Xylenes	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,4 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,2 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-2
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	18860B SB-10H	18861B SB-11E	18862B SB-12E	18863B SB-13E
Benzene	0.5		<0.5	<0.5	<0.5	<0.5
Toluene	0.5		<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5		<0.5	<0.5	<0.5	<0.5
Xylenes	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,4 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,2 Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5

MDL = Method Detection Limit.
METHOD: EPA 8020.

Emma P. Popek
SAFY KHALIFA, Ph.D., Director

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PROJECT MGR: Dave Higgins
PROJECT #:283-799-2727-2
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	18944C SB-14A	18945C SB-14B		
Benzene	0.5		<0.5	<0.5		
Toluene	0.5		<0.5	<0.5		
Ethylbenzene	0.5		<0.5	<0.5		
Xylenes	0.5		<0.5	<0.5		
Chlorobenzene	0.5		<0.5	<0.5		
1,4 Dichlorobenzene	0.5		<0.5	<0.5		
1,3 Dichlorobenzene	0.5		<0.5	<0.5		
1,2 Dichlorobenzene	0.5		<0.5	<0.5		

MDL = Method Detection Limit.
METHOD: EPA 8020.

Emma P. Popek

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PROJECT MGR: Dave Higgins
Groundwater Technology, Inc.
4080-D Pike Lane
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PROJECT #:203-799-2727-2
LOCATION: Oakland, CA

SAMPLED: 3/16,17/88 BY: D. Higgins
RECEIVED: 03/18/88 BY: J. Floro
ANALYZED: 04/20/88 BY: P. Sra
MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	18844B SB-1C	18845B SB-1F	18846B SB-2C	18847B SB-2E
Bromodichloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Bromoform	0.5		<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5		<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Chloroethane	0.5		<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinyl ether	1.0		<1.0	<1.0	<1.0	<1.0
Chloroform	0.5		<0.5	<0.5	<0.5	<0.5
Chloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	0.2		<0.2	<0.2	<0.2	<0.2
trans-1,2-Dichloroethene	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5		<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
Methylene chloride	3.0		<3.0	<3.0	<3.0	<3.0
1,1,2,2-Tetrachloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	0.5		<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Trichloroethene	0.5		<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
Vinyl Chloride	1.0		<1.0	<1.0	<1.0	<1.0

MDL = Method Detection Limit.
METHOD: EPA 8010.

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

PROJECT MGR: Dave Higgins
PROJECT #:283-799-2727-2
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	18848B SB-2B	18849B SB-3C	18850B SB-3F	18851B SB-3H
Bromodichloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Bromoform	0.5		<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5		<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Chloroethane	0.5		<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinyl ether	1.0		<1.0	<1.0	<1.0	<1.0
Chloroform	0.5		<0.5	<0.5	<0.5	<0.5
Chloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	0.2		<0.2	<0.2	<0.2	<0.2
trans-1,2-Dichloroethene	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5		<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
Methylene chloride	3.0		<3.0	<3.0	<3.0	<3.0
1,1,2,2-Tetrachloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	0.5		<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Trichloroethene	0.5		<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
Vinyl Chloride	1.0		<1.0	<1.0	<1.0	<1.0

MDL = Method Detection Limit.
METHOD: EPA 8010.

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PROJECT MGR: Dave Higgins
PROJECT #:283-799-2727-2
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	18852B SB-4B	18853B SB-5D	18854B SB-7D	18855B SB-6B/A
Bromodichloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Bromoform	0.5		<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5		<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Chloroethane	0.5		<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinyl ether	1.0		<1.0	<1.0	<1.0	<1.0
Chloroform	0.5		<0.5	<0.5	<0.5	<0.5
Chloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	0.2		<0.2	<0.2	<0.2	<0.2
trans-1,2-Dichloroethene	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5		<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
Methylene chloride	3.0		<3.0	<3.0	<3.0	<3.0
1,1,2,2-Tetrachloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	0.5		<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Trichloroethene	0.5		<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
Vinyl Chloride	1.0		<1.0	<1.0	<1.0	<1.0

MDL = Method Detection Limit.
METHOD: EPA 8010.

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-2
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	188568 SB-8D	188578 SB-9B	188588 SB-9D	188598 SB-9S
Bromodichloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Bromoform	0.5		<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5		<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Chloroethane	0.5		<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinyl ether	1.0		<1.0	<1.0	<1.0	<1.0
Chloroform	0.5		<0.5	<0.5	<0.5	<0.5
Chloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	0.2		<0.2	<0.2	<0.2	<0.2
trans-1,2-Dichloroethene	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5		<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
Methylene chloride	3.0		33.0	<3.0	<3.0	<3.0
1,1,2,2-Tetrachloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	0.5		<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Trichloroethene	0.5		<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
Vinyl Chloride	1.0		<1.0	<1.0	<1.0	<1.0

MDL = Method Detection Limit.
METHOD: EPA 8010.

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-2
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	18860B SB-10H	18861B SB-11E	18862B SB-12E	18863B SB-13E
Bromodichloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Bromoform	0.5		<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5		<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Chloroethane	0.5		<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinyl ether	1.0		<1.0	<1.0	<1.0	<1.0
Chloroform	0.5		<0.5	<0.5	<0.5	<0.5
Chloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	0.2		<0.2	<0.2	<0.2	<0.2
trans-1,2-Dichloroethene	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5		<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
Methylene chloride	3.0		<3.0	<3.0	<3.0	<3.0
1,1,2,2-Tetrachloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	0.5		<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Trichloroethene	0.5		<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
Vinyl Chloride	1.0		<1.0	<1.0	<1.0	<1.0

MDL = Method Detection Limit.
METHOD: EPA 8010.

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PROJECT MGR: Dave Higgins
PROJECT #:283-799-2727-2
LOCATION: Oakland, CA
MATRIX: Soil
UNITS: ug/kg (ppm)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	18944C SB-14A	18945C SB-14B		
Bromodichloromethane	0.5		<0.5	<0.5		
Bromoform	0.5		<0.5	<0.5		
Bromomethane	0.5		<0.5	<0.5		
Carbon tetrachloride	0.5		<0.5	<0.5		
Chlorobenzene	0.5		<0.5	<0.5		
Chloroethane	0.5		<0.5	<0.5		
2-Chloroethylvinyl ether	1.0		<1.0	<1.0		
Chloroform	0.5		<0.5	<0.5		
Chloromethane	0.5		<0.5	<0.5		
Dibromochloromethane	0.5		<0.5	<0.5		
1,2-Dichlorobenzene	0.5		<0.5	<0.5		
1,3-Dichlorobenzene	0.5		<0.5	<0.5		
1,4-Dichlorobenzene	0.5		<0.5	<0.5		
Dichlorodifluoromethane	0.5		<0.5	<0.5		
1,1-Dichloroethane	0.5		<0.5	<0.5		
1,2-Dichloroethane	0.5		<0.5	<0.5		
1,1-Dichloroethene	0.2		<0.2	<0.2		
trans-1,2-Dichloroethene	0.5		<0.5	<0.5		
1,2-Dichloropropane	0.5		<0.5	<0.5		
cis-1,3-Dichloropropene	0.5		<0.5	<0.5		
trans-1,3-Dichloropropene	0.5		<0.5	<0.5		
Methylene chloride	3.0		<3.0	<3.0		
1,1,2,2-Tetrachloroethane	0.5		<0.5	<0.5		
Tetrachloroethene	0.5		<0.5	<0.5		
1,1,1-Trichloroethane	0.5		<0.5	<0.5		
1,1,2-Trichloroethane	0.5		<0.5	<0.5		
Trichloroethene	0.5		<0.5	<0.5		
Trichlorofluoromethane	0.5		<0.5	<0.5		
Vinyl Chloride	1.0		<1.0	<1.0		

MDL = Method Detection Limit.
METHOD: EPA 8010.

Emma P. Popek
SAFY KHALIFA, Ph.D., Director

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06/14/88 rw
PROJECT MGR: Eric Johnson
Pacific Gas & Electric
3400 Crow Canyon Rd.
San Ramon, CA 94583
PROJECT #: 203-799-2727-4A

SAMPLED: 05/17/88 BY: E. Johnson
RECEIVED: 05/19/88 BY: M. Huth
ANALYZED: 06/09/88 BY: E. Popek
MATRIX: Soil
UNITS: mg/kg (ppm)
CONTRACT #: Z19-5-115-85

TEST RESULTS

COMPOUNDS	MDL	LAB # I.D.#	23329A 14A-1-1	23330A 14A-3-2	23331A 15-2-1	23332A 15-4-2	23333A 16-2-2
Total Petroleum Hydrocarbons as Kerosene	10		260	<10	340	<10	<10

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.

METHOD:
Modified EPA Method 8015
* No indication of diesel or mineral spirits present.

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PROJECT MGR: Eric Johnson
PROJECT #: 203-799-2727-4A

TEST RESULTS

MATRIX: Soil
UNITS: mg/kg (ppm)

COMPOUNDS	MDL	LAB # I.D.#	23334A 16-3-2	23335A 17-2-2	23336A 17-3-2	23337A 18-3-2	23338A 18-4-1
Total Petroleum Hydrocarbons as Kerosene	10		<10	<10	<10	<10	<10

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.

METHOD:
Modified EPA Method 8015

*** No indication of diesel or mineral spirits present.**

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PROJECT MGR: Eric Johnson
PROJECT #: 203-799-2727-4A

TEST RESULTS

MATRIX: Soil
UNITS: mg/kg (ppm)

COMPOUNDS	MDL	LAB # I.D.#	23339A OW4-3-1	23340A OW4-5-2
Total Petroleum Hydrocarbons as Kerosene	10		<10	<10

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.

METHOD:
Modified EPA Method 8015
* No indication of diesel or mineral spirits present.

Safy Khalifa 5/17

SAFY KHALIFA, Ph.D., Director

cc: Dave Higgins

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05/24/88 rw
PROJECT MGR: Dave Higgins
Groundwater Technology, Inc.
4080-D Pike Lane
Concord, CA 94520
PROJECT #:203-799-2727-5

SAMPLED: 05/17,18/88 BY: E. Johnson
RECEIVED: 05/19/88 BY: M. Huth
ANALYZED: 05/23/88 BY: T. Alusi
MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

PARAMETER	MDL	LAB # I.D.#	23329B 14A-1-1	23330B 14A-3-2	23331B 15-2-1
Total Oil and Grease	5		1200	(5	4800

MDL = Method Detection Limit.
METHOD:
TOG = EPA 413.2

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-5

MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

PARAMETER	MDL	LAB # I.D.#	23332B 15-4-2	23333B 16-2-2	23334B 16-3-2
Total Oil and Grease	5		5	100	(5

MDL = Method Detection Limit.
METHOD:
TOG = EPA 413.2

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-5

MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

PARAMETER	MDL	LAB # I.D.#	23335B 17-2-2	23336B 17-3-2	23337B 18-3-2
Total Oil and Grease	5		9	<5	<5

MDL = Method Detection Limit.
METHOD:
TOG = EPA 413.2

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PROJECT MGR: Dave Higgins
PROJECT #:203-799-2727-5

MATRIX: Soil
UNITS: mg/kg (ppm)

TEST RESULTS

PARAMETER	MDL	LAB #	23338B	23339B	23340B
		I.D.#	18-4-1	OW4-3-1	OW4-5-2
Total Oil and Grease	5		<5	<5	<5

MDL = Method Detection Limit.
METHOD:
TOG = EPA 413.2

SAFY KHALIFA, Ph.D., Director

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06/07/88 rw
PROJECT MGR: Dave Higgins
4080-D Pike Lane
Concord, CA 94520

PROJECT #: 203-799-2727-4

SAMPLED: 05/17/88 BY: E. Johnson
RECEIVED: 05/19/88 BY: M. Huth
ANALYZED: 06/03/88 BY: E. Popek
MATRIX: Soil
UNITS: mg/kg (ppm)
CONTRACT #: Z19-5-115-85

TEST RESULTS

COMPOUNDS	MDL	LAB # I.D.#	23329A 14A-1-11	23330A 14A-3-21	23331A 15-2-1	23332A 15-4-2	23333A 16-2-2
Benzene	0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes	0.5		<0.5	<0.5	1	<0.5	<0.5
Total BTEX	0.5		<0.5	<0.5	1	<0.5	<0.5
Misc. Hydrocarbons (C4-C12)	1.0		80	<1	130	<1	<1
Total Petroleum Hydrocarbons as Gasoline	1.0		80	<1	130	<1	<1

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.

METHOD:
Modified EPA Method 5030/8020/8015

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

PROJECT MGR: Dave Higgins
PROJECT #: 203-799-2727-4

TEST RESULTS

MATRIX: Soil
UNITS: mg/kg (ppm)

COMPOUNDS	MDL	LAB # I.D.#	23334A 16-3-2	23335A 17-2-2	23336A 17-3-2	23337A 18-3-2	23338A 18-4-1
Benzene	0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes	0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Total BTEX	0.5		<0.5	<0.5	<0.5	<0.5	<0.5
Misc. Hydrocarbons (C4-C12)	1.0		<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons as Gasoline	1.0		<1	<1	<1	<1	<1

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.

METHOD:
Modified EPA Method 5030/8020/8015

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(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

PROJECT MGR: Dave Higgins
PROJECT #: 203-799-2727-4

TEST RESULTS

MATRIX: Soil
UNITS: mg/kg (ppm)

COMPOUNDS	MDL	LAB # I.D.#	23339A OW4-3-11	23340A OW4-5-21
Benzene	0.5		<0.5	<0.5
Toluene	0.5		<0.5	<0.5
Ethylbenzene	0.5		<0.5	<0.5
Xylenes	0.5		<0.5	<0.5
Total BTEX	0.5		<0.5	<0.5
Misc. Hydrocarbons (C4-C12)	1.0		<1	<1
Total Petroleum Hydrocarbons as Gasoline	1.0		<1	<1

MDL = Method Detection Limit; compound below this level would not be detected.
Results rounded to two significant figures.

METHOD:
Modified EPA Method 5030/8020/8015

Emma P. Popek

SAFY KHALIFA, Ph.D., Director

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

ANALYTICAL REPORT

LOG NO: E88-04-198

Received: 11 APR 88
Reported: 29 APR 88

Mr. Eric Johnson
PG&E Technical & Eco. Services
3400 Crow Canyon Road
San Ramon, California 94583

Purchase Order: A047516

Requisition: Z19-5-046-83

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
04-198-1	OW-0 (ow-3 replicate)	11 APR 88
04-198-2	OW-1	11 APR 88
04-198-3	OW-2	11 APR 88
04-198-4	OW-3	11 APR 88

PARAMETER	04-198-1	04-198-2	04-198-3	04-198-4
Oil & Grease by Infrared, mg/L	<5	<5	<5	<5
Total Fuel Hydrocarbons, mg/L	<1.0	<1.0	<1.0	<1.0

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Purchase Order: A047516

Requisition: Z19-5-046-83

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
04-198-1	OW-0 (OW-3 replicate)	11 APR 88
04-198-2	OW-1	11 APR 88
04-198-3	OW-2	11 APR 88
04-198-4	OW-3	11 APR 88

PARAMETER	04-198-1	04-198-2	04-198-3	04-198-4
Purgeable Priority Pollutants				
Date Extracted	04.22.88	04.22.88	04.22.88	04.22.88
1,1,1-Trichloroethane, ug/L	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane, ug/L	<1	<1	<1	<1
1,1,2-Trichloroethane, ug/L	<1	<1	<1	<1
1,1-Dichloroethane, ug/L	4	<1	<1	4
1,1-Dichloroethylene, ug/L	<1	<1	<1	<1
1,2-Dichloroethane, ug/L	<1	<1	<1	<1
1,2-Dichloropropane, ug/L	<1	<1	<1	<1
1,3-Dichloropropene, ug/L	<1	<1	<1	<1
2-Chloroethylvinylether, ug/L	<1	<1	<1	<1
Acrolein, ug/L	<10	<10	<10	<10
Acrylonitrile, ug/L	<10	<10	<10	<10
Bromodichloromethane, ug/L	<1	<1	<1	<1
Bromomethane, ug/L	<1	<1	<1	<1
Benzene, ug/L	<1	<1	<1	<1
Chlorobenzene, ug/L	<1	<1	<1	<1
Carbon Tetrachloride, ug/L	<1	<1	<1	<1
Chloroethane, ug/L	<1	<1	<1	<1
Bromoform, ug/L	<1	<1	<1	<1
Chloroform, ug/L	1	<1	<1	2
Chloromethane, ug/L	<1	<1	<1	<1
Dibromochloromethane, ug/L	<1	<1	<1	<1
Ethylbenzene, ug/L	<1	<1	<1	<1

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REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, GROUND WATER SAMPLES	DATE SAMPLED
04-198-1	OW-0 (ow-3 replicate)	11 APR 88
04-198-2	OW-1	11 APR 88
04-198-3	OW-2	11 APR 88
04-198-4	OW-3	11 APR 88

PARAMETER	04-198-1	04-198-2	04-198-3	04-198-4
Methylene chloride, ug/L	<1	<1	<1	<1
Tetrachloroethylene, ug/L	<1	<1	<1	<1
Trichloroethylene, ug/L	<1	<1	<1	<1
Trichlorofluoromethane, ug/L	<1	<1	<1	<1
Toluene, ug/L	<1	<1	<1	<1
Vinyl chloride, ug/L	<1	<1	<1	<1
trans-1,2-Dichloroethylene, ug/L	<1	<1	<1	<1
trans-1,3-Dichloropropene, ug/L	<1	<1	<1	<1
Semi-Quantified Results **				
C6H14O (Ether), ug/L	20	5	---	10
Total Dichlorobenzenes, ug/L	---	4	---	---

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

Linda Brackon
Steve Fisher, Laboratory Director

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

ANALYTICAL REPORT

LOG NO: E88-06-439

Received: 16 JUN 88
Reported: 30 JUN 88

Mr. Eric Johnson
PG&E Technical & Eco. Services
3400 Crov Canyon Road
San Ramon, California 94583

Purchase Order: A047517

Requisition: Z19-5-046-83

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, AQUEOUS SAMPLES	DATE SAMPLED
06-439-1	OW-3-2	16 JUN 88
06-439-2	OW-4-1	16 JUN 88

PARAMETER	06-439-1	06-439-2
Oil & Grease by Infrared, mg/L	<5	<5
Total Fuel Hydrocarbons		
Date Analyzed	06.29.88	06.29.88
Total Fuel Hydrocarbons, mg/L	<1.0	<1.0
Other Total Fuel Hydrocarbons	---	---

BROWN AND CALDWELL LABORATORIES
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ANALYTICAL REPORT

LOG NO: E88-06-439

Received: 16 JUN 88
Reported: 30 JUN 88

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PG&E Technical & Eco. Services
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San Ramon, California 94583

Purchase Order: A047517

Requisition: Z19-5-046-83

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, AQUEOUS SAMPLES	DATE SAMPLED
06-439-1	OW-3-2	16 JUN 88
06-439-2	OW-4-1	16 JUN 88

PARAMETER	06-439-1	06-439-2
Purgeable Priority Pollutants		
Date Extracted	06.21.88	06.21.88
1,1,1-Trichloroethane, ug/L	<1	<1
1,1,2,2-Tetrachloroethane, ug/L	<1	<1
1,1,2-Trichloroethane, ug/L	<1	<1
1,1-Dichloroethane, ug/L	5	<1
1,1-Dichloroethylene, ug/L	<1	<1
1,2-Dichloroethane, ug/L	<1	<1
1,2-Dichloropropane, ug/L	<1	<1
1,3-Dichloropropene, ug/L	<1	<1
2-Chloroethylvinylether, ug/L	<1	<1
Acrolein, ug/L	<10	<10
Acrylonitrile, ug/L	<10	<10
Bromodichloromethane, ug/L	<1	<1
Bromomethane, ug/L	<1	<1
Benzene, ug/L	<1	<1
Chlorobenzene, ug/L	1	<1
Carbon Tetrachloride, ug/L	<1	<1
Chloroethane, ug/L	<1	<1
Bromoform, ug/L	<1	<1
Chloroform, ug/L	<1	<1
Chloromethane, ug/L	<1	<1
Dibromochloromethane, ug/L	<1	<1
Ethylbenzene, ug/L	<1	<1
Methylene chloride, ug/L	<1	<1
Tetrachloroethylene, ug/L	<1	<1

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ANALYTICAL REPORT

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Purchase Order: A047517

Requisition: Z19-5-046-83

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION, AQUEOUS SAMPLES	DATE SAMPLED
06-439-1	OW-3-2	16 JUN 88
06-439-2	OW-4-1	16 JUN 88

PARAMETER	06-439-1	06-439-2
Trichloroethylene, ug/L	<1	<1
Trichlorofluoromethane, ug/L	<1	<1
Toluene, ug/L	<1	<1
Vinyl chloride, ug/L	<1	<1
trans-1,2-Dichloroethylene, ug/L	2	<1
trans-1,3-Dichloropropene, ug/L	<1	<1
Semi-Quantified Results **		
C6H14O (Ether), ug/L	30	7

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

S. D. Lessley

Sim D. Lessley, Ph.D., Laboratory Director

PG&E WATER PURGING & SAMPLING LOG

SITE Oakland [illegible] JOB ID 3647 WELL NO OW-1
SAMPLING DATE 4/1/8[illegible], by [illegible] WEATHER: clear, hot
PURGE DATE same, by "

WATER ELEVATION/VOLUME CALCULATIONS

Description of Measuring Point (MP): TOC PVC
Total depth of well: 18 ft
Depth (from MP) to Water: 5.10 ft Screen interval from 3 ft to 18 ft.
Total water depth: 12.9 ft Hydrocarbons present: Yes ___ No X
Measurement method: Solinst Hydrocarbons thickness: —

PURGE VOLUME CALCULATION

13 ft water * casing factor = 2.21 (0.17) gal/casing vol. * 3 volumes= 6.7 Total gals purged.
Casing Factor: For 2" dia = 0.17 gal/ft
(circle one) For 3" dia = 0.38 gal/ft
For 4" dia = 0.66 gal/ft

DRAWDOWN DETERMINATION

Water level begin ___ time: ___ time pump on ___
Water level end ___ time: ___ time pump off ___

PURGING

Time Start	Time End	Cumulative Discharge (gal)	pH	Conductivity µmho/cm	Turbidity	°C Temp	Comments
1206		3	6.7	1050	Nil (>1000)	21	Very turbid
		10	6.8	990	"	19	
		14	6.8	1000	"	19	
		19	6.8	1000	"	20	
1212		24	6.8	1005	"	20	Recharge rate dropped off 1214
	1217	29	7.0	1000	>500 NTU	22	Slow recharge

Method of discharge disposal ground (diesel tank excavation hole)
Method of purging/sampling Centrifugal Pump / Bailer
Method of cleaning bailer/pump: Alconox / DI
Pump lines/bailer ropes (new), cleaned or dedicated? (circle one)

pH meter DSP [illegible] calibrated yes conductivity meter same calibrated ✓
temp corrected? No

SAMPLES

Lab analyses to be performed EPA Mod 8015, 413.2, 624
Laboratory Brown and Caldwell
Remarks Recharge rate dropped off at 24 gal. Better than a trickle.

29 gallons = 13 well volumes

2965a/capA14

PG&E WATER PURGING & SAMPLING LOG

Oakland GC Gas Yard

SITE Collision Lot 1 JOB ID 3647 WELL NO OW-2
SAMPLING DATE 4/11/88, by ENV. ENG
PURGE DATE 4/11/88, by " WEATHER: Clear Sunny

WATER ELEVATION/VOLUME CALCULATIONS

Description of Measuring Point (MP): TOC PVC
Total depth of well: 18 ft
Depth (from MP) to Water: 3.77 ft Screen interval from 4 ft to 19 ft.
Total water depth: 14.23 ft Hydrocarbons present: Yes ___ No X
Measurement method: Solinst Hydrocarbons thickness: NA

PURGE VOLUME CALCULATION

14 ft water * casing factor = 2.38 gal/casing vol. * 3 volumes = 72 Total gals purged.
Casing Factor: For 2" dia = 0.17 gal/ft
(circle one) For 3" dia = 0.38 gal/ft
For 4" dia = 0.66 gal/ft

DRAWDOWN DETERMINATION

Water level begin _____ time: _____ time pump on _____
Water level end _____ time: _____ time pump off _____

PURGING

Time Start	Time End	Cumulative Discharge (gal)	pH	Conductivity µmho/cm	Turbidity	°C Temp	Comments
1137					high Brown		Water Very Turbid Brownish
		5 gal	7.3	1485	Brown Med.	25	
1145		9	8.1	1740	high Grayish	22	Purged 9 gal
		12	8.6	1640	med Grayish	25	
		15	8.7	1650	±20 NTU	—	Better turbidity
	1155	16	—	—	—	—	—

Method of discharge disposal ground
Method of purging/sampling cent. pump / bailer
Method of cleaning bailer/pump: Alconox / DI
Pump lines/bailer ropes new, cleaned or dedicated? (circle one)

pH meter DSPH3 calibrated YES conductivity meter DSPH3 calibrated YES
temp corrected? NO

SAMPLES

Lab analyses to be performed EPA modified 8015, 413.2, 624
Laboratory Brown & Caldwell

Remarks Water not warmed as recharge slowed, due to holding time in pump.
Very poor (trickle) recharge after 9 gal.
16 gallons = 6.7 well volumes

2965a/capA14

PG&E WATER PURGING & SAMPLING LOG

SITE Oakl. G JOB ID 3647 WELL NO OW-4
SAMPLING DATE 6-16-88, by EFJ WEATHER: clear, cool
PURGE DATE 6-15-88, by EFJ

WATER ELEVATION/VOLUME CALCULATIONS

Description of Measuring Point (MP): TOC PVC
Total depth of well: 21 ft
Depth (from MP) to Water: 4.0 ft Screen interval from ___ ft to ___ ft.
Total water depth: 17.0 ft Hydrocarbons present: Yes ___ No ___
Measurement method: Solinst 6/9/88 Hydrocarbons thickness: ___

PURGE VOLUME CALCULATION

17 ft water * casing factor = 2.9 gal/casing vol. * 3 volumes = 9 Total gals purged.
Casing Factor: For 2" dia = 0.17 gal/ft (circle one)
For 3" dia = 0.38 gal/ft
For 4" dia = 0.66 gal/ft

17
17
119
17
289

289
3

DRAWDOWN DETERMINATION

Water level begin ___ time: ___ time pump on ___
Water level end ___ time: ___ time pump off ___

PURGING

Time Start	Time End	Cumulative Discharge (gal)	pH	Conductivity µmho/cm	Turbidity	°C Temp	Comments
1740		3	6.7	990	≥200	?	Turb much better than on 6/14/88
		5	6.8	1085	≥100		(when discharge co Turb better)
		8	7.4	1210	≥500		Turb worse
		10	7.5	1160	≥100		Turb better
		12	7.5	1140	<100		Turb better
	1757	13	end				

Method of discharge disposal pumped to pit
Method of purging/sampling centrifugal pump / bailer
Method of cleaning bailer/pump: Alconox / DI
Pump lines/bailer ropes (new) cleaned or dedicated? (circle one)

"1413" = 1270

pH meter Orion calibrated 7.00 = 7.00 conductivity meter DSP/13 calibrated ___
temp corrected? ___ 4.00 = 4.17

SAMPLES

Lab analyses to be performed Modified 8015, 413.2, 624
Laboratory Brown & Caldwell

Remarks "1413" EC std reads 1270. Allowed to recharge aquifer
Bailed add'l 2-3 gallons before sampling w/ bailer.

4.0
-1.00
-1.09

13 gallons = 4.5 well volumes

2965a/capA14

PG&E WATER PURGING & SAMPLING LOG

SITE [illegible] JOB ID 3647 WELL NO OW-3
SAMPLING DATE [illegible], by [illegible]
PURGE DATE 4/[illegible], by [illegible] WEATHER: Clear - Calm

WATER ELEVATION/VOLUME CALCULATIONS

Description of Measuring Point (MP): TOC PVC
Total depth of well: 19 ft
Depth (from MP) to Water: 5.37 ft Screen interval from 3.5 ft to 18.5 ft.
Total water depth: 13.6 ft Hydrocarbons present: Yes ___ No ?. THIN FILM on outside of Sample Unknown substance
Measurement method: Solinst Hydrocarbons thickness: ___

PURGE VOLUME CALCULATION

19 ft water * casing factor = 2.38 gal/casing vol. * 3 volumes = 7.2 Total gals purged.
Casing Factor: For 2" dia = 0.17 gal/ft
(circle one) For 3" dia = 0.38 gal/ft
For 4" dia = 0.66 gal/ft

DRAWDOWN DETERMINATION

Water level begin ___ time: ___ time pump on ___
Water level end ___ time: ___ time pump off ___

PURGING

Time Start	Time End	Cumulative Discharge (gal)	pH	Conductivity µmho/cm	Turbidity	°C Temp	Comments
1227		4	7.6	1750	Brown/Grey Muddy	20	
		9	8.0	1665	"	19	Recharge rate fair to trickle at 9 gal
1235		14	7.2	1591	"	23	
		18	8.3	1511	"	27	
1239		21	8.4	1505	"	30	

Method of discharge disposal ground
Method of purging/sampling Bailer / Bailer
Method of cleaning bailer/pump: Alconox / H2O
Pump lines/bailer ropes (new,) cleaned or dedicated? (circle one)

pH meter [illegible] calibrated ✓ conductivity meter [illegible] calibrated ✓
temp corrected? No

SAMPLES

Lab analyses to be performed EPA Modified 8015, 413.2, 624
Laboratory Byron & Caldwell

Remarks 21 gallons = 8.8 well volumes

2965a/capA14

PG&E WATER PURGING & SAMPLING LOG

SITE Oakland JOB ID 3647
SAMPLING DATE 6/16/88, by ERJ
PURGE DATE 6/15/88, by ERJ

WELL NO OW-3
WEATHER: clear, cool

WATER ELEVATION/VOLUME CALCULATIONS

Description of Measuring Point (MP): TOC (PVC)
Total depth of well: 18.5 ft
Depth (from MP) to Water: 5.2 ft
Total water depth: 13.3 ft
Measurement method: Solinst 6/9/88

Screen interval from 3.5 ft to 18.5 ft.
Hydrocarbons present: Yes ___ No X
Hydrocarbons thickness: ___

PURGE VOLUME CALCULATION

13.3 ft water * casing factor = 2.26 gal/casing vol. * 3 volumes = 7 Total gals purged.

Casing Factor: For 2" dia = 0.17 gal/ft
(circle one) For 3" dia = 0.38 gal/ft
For 4" dia = 0.66 gal/ft

13.3 × .17 = 2.261 → 2.26

2.26 × 3 = 6.78 → 7

DRAWDOWN DETERMINATION

Water level begin ___ time: ___ time pump on ___
Water level end ___ time: ___ time pump off ___

PURGING

Time Start	Time End	Cumulative Discharge (gal)	pH	Conductivity µmho/cm	Turbidity	°C Temp	Comments
1800		3	6.3	1000	<100		Pumping solid
		5	6.9	980	200		"
		8	6.9	980	200		Still pumping well
		11	7.05	1000	7500		"
		13	7.4	1000	1000		Intermittent produc- tion
	1820	14	7.65	980			"

Method of discharge disposal pumped to pit
Method of purging/sampling Centrifugal pump / bailer
Method of cleaning bailer/pump: Alconox / DI
Pump lines/bailer ropes (new) cleaned or dedicated? (circle one)

pH meter Orion calibrated 7.0 7.3 4.0 4.3 conductivity meter YSI 3 calibrated yes
temp corrected? No

1413 1260 ←

SAMPLES

Lab analyses to be performed Mod 8015, 413.2, 624
Laboratory Brown & Caldwell

Remarks Allowed well to recharge overnite. Bailed add'l 2-3 gallons before sampling w/ bailer at 6/16.

	PH	EC	Turb
15 gal	7.8	970	7500

15 gallons = 6.6 well volumes