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SUBSURFACE INVESTIGATION

at

Shell Service Station
WIC # 204-6001-0109
29 Wildwood Avenue
Piedmont, California

prepared for

Shell Oil Co.
P.O. Box 4023
Concord, CA 94524

September 19, 1989

WEISS ASSOCIATES

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Shell Service Station
WIC # 204-6001-0109
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prepared by

Weiss Associates
2938 McClure Street
Oakland, California

Jack K. Gardner
Staff Geologist

Joseph P. Theisen
Project Geologist

I certify that Weiss Associates' work on Shell Service Station, 29 Wildwood Avenue, Piedmont, California was conducted under my supervision. To the best of my knowledge, the data contained herein are true and accurate and satisfy the specified scope of work for this project.

REGISTERED GEOLOGIST
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Date

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SUMMARY

Weiss Associates (WA) conducted a subsurface investigation at the Shell Service Station at 29 Wildwood Avenue, Piedmont California between July 5 and 12, 1989. Hydrocarbons were detected in soil samples from four of the nine soil borings. The highest Total Purgeable Petroleum Hydrocarbons (TPPH) concentration detected in soil was 710 ppm, in a sample from 3.5 ft depth in a boring drilled adjacent to the northern pump island.

Hydrocarbons were detected in groundwater samples from two of the four wells on site. Monitoring well MW-3 contains the highest concentrations of hydrocarbons in groundwater with TPPH at 3.9 ppm, benzene at 0.38 ppm, ethylbenzene at 0.099 ppm, toluene at 0.014 ppm, and xylene at 0.30 ppm. Groundwater samples from MW-2 and MW-3 also contained benzene above the California State Department of Health Services (DHS) action level for drinking water.

The westward ground water flow direction suggested by ground water elevation data is somewhat uncertain due to the strong upward hydraulic gradient at the site. Based on the apparent westward flow direction, there are no water wells within one-half mile downgradient of the site. No potential sources were identified upgradient of the site.

1. INTRODUCTION

This report presents the results of the Weiss Associates (WA) subsurface investigation conducted in July 1989 at the Shell Service Station at 29 Wildwood Avenue, Piedmont California (Figure 1). The objectives of the investigation were to further define the extent of hydrocarbons in soil and ground water beneath the site, determine the ground water gradient, and to locate and identify nearby wells and potential nearby offsite hydrocarbon sources.

1.1. SCOPE OF WORK

The scope of work for the investigation was to:

1) Develop a Health and Safety Plan for the field investigation.

2) Perform an area reconnaissance to locate possible off-site hydrocarbon sources and prepare a map of the surrounding properties and businesses.

3) Locate and identify wells within approximately one-half mile of the site.

4) Drill nine soil borings and collect soil samples every 2.5 to 5 ft for subsurface sediment and hydrogeologic description, and for possible chemical analysis.

5) Survey the soil samples in the field with a portable photoionization detector (PID) to determine whether volatile hydrocarbons were in the samples.

6) Analyze selected soil samples for hydrocarbons.

7) Complete three of the borings as 4-inch diameter ground water monitoring wells.

8) Develop the wells, collect water samples and analyze the samples for hydrocarbons.

9) Arrange for the disposal of soil cuttings produced during drilling and ground water purged during well development and sampling.

10) Survey all monitoring well top-of-casing elevations relative to mean sea level, measure ground water levels and determine the ground water gradient.

11) Report the results.

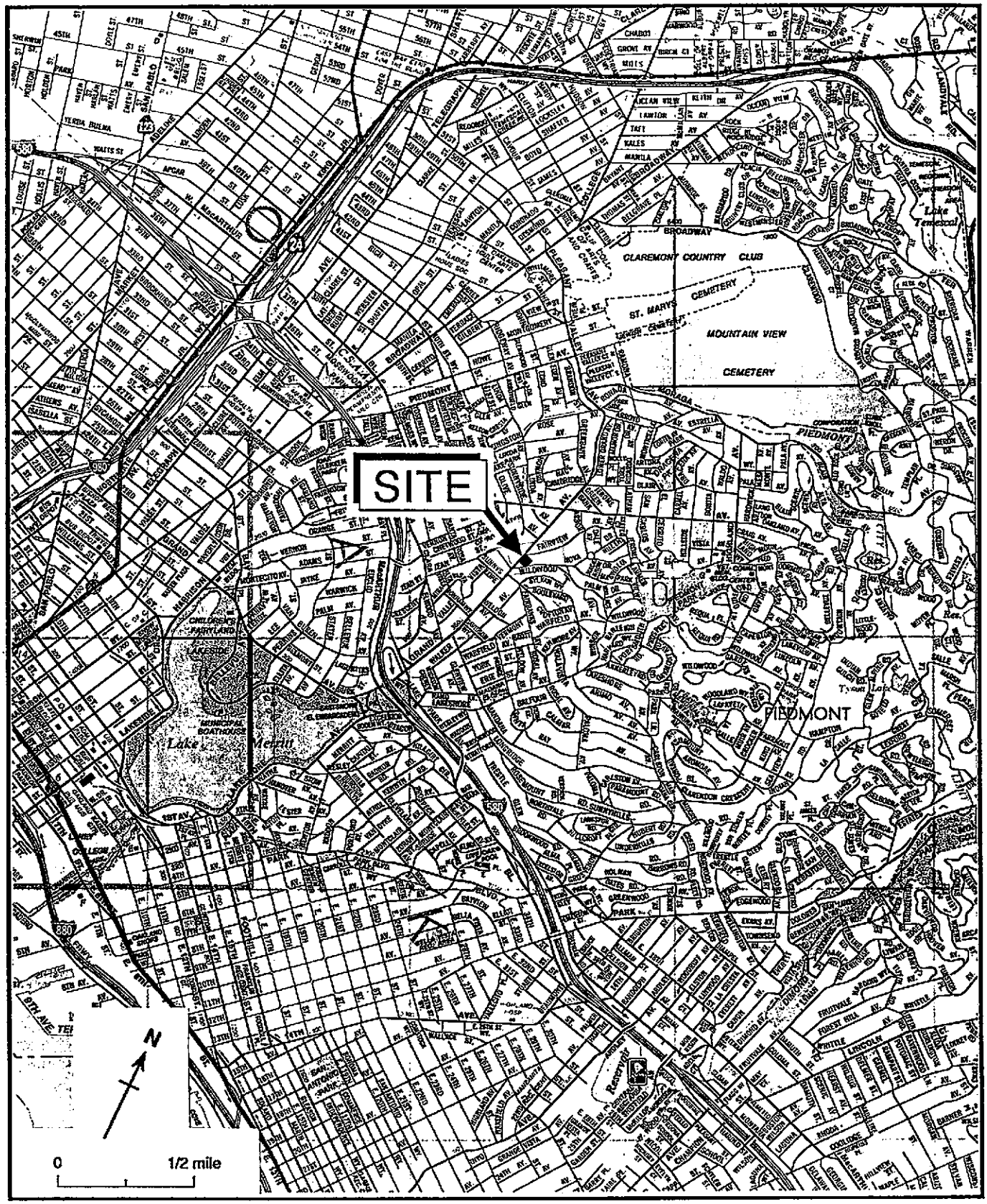

Figure 1. Location of Shell Service Station, 29 Wildwood Avenue, Piedmont, California

- Well E-4 screened 23 - 35' BG
- Artesian conditions reported

1.2. BACKGROUND

In August 1984 Gettler Ryan Inc. of Hayward, California contracted EMCON, Inc. of San Jose, California, to drill four soil borings around the existing steel underground storage tanks and install groundwater monitoring well E-4 to assess the extent of hydrocarbons along the western site boundary. Although the Shell engineering files reported no historical product loss at the site, the EMCON soil sample analytic results indicate hydrocarbons in soil surrounding the steel storage tanks. Monitoring well E-4, a flowing artesian well, was apparently completed in the second aquifer. This well is screened from 23 ft to 35 ft below grade, and is sand packed from 15 ft to 35 ft below grade (EMCON, 1984).

In September 1984, new fuel lines and three new single-walled fiberglass underground tanks were installed to replace the existing steel fuel storage tanks (Shell, 1988). In October 1988, Pacific Telephone Company encountered contaminated soil while excavating adjacent to the sidewalk along Grand Avenue northwest of the Shell Service Station fuel storage tanks (Shell, 1988).

Ensco Environmental Services of Fremont, California, was engaged in October 1988 to drill five soil borings to determine whether soils adjacent to the existing fiberglass gasoline storage tanks contained hydrocarbons. Analytic results indicated TPPH at 6,500 and 750 parts per million (ppm) in 10 ft depth soil samples from borings B-3 and B-4, respectively (Figure 2) (Ensco, 1988).

1988 data?

1.3. TOPOGRAPHIC AND GEOLOGIC SETTING

The Shell Service Station is located at the intersection of Grand and Wildwood Avenues in hilly topography approximately one mile west of the Hayward Fault Zone. The site lies at the confluence of surface water drainages which currently coincide with the trends of Grand and Wildwood Avenues and is built on Quaternary alluvial deposits underlain by the San Antonio Formation of Pleistocene age and the Franciscan Formation of Jurassic and Cretaceous age (Radbruch, 1969).

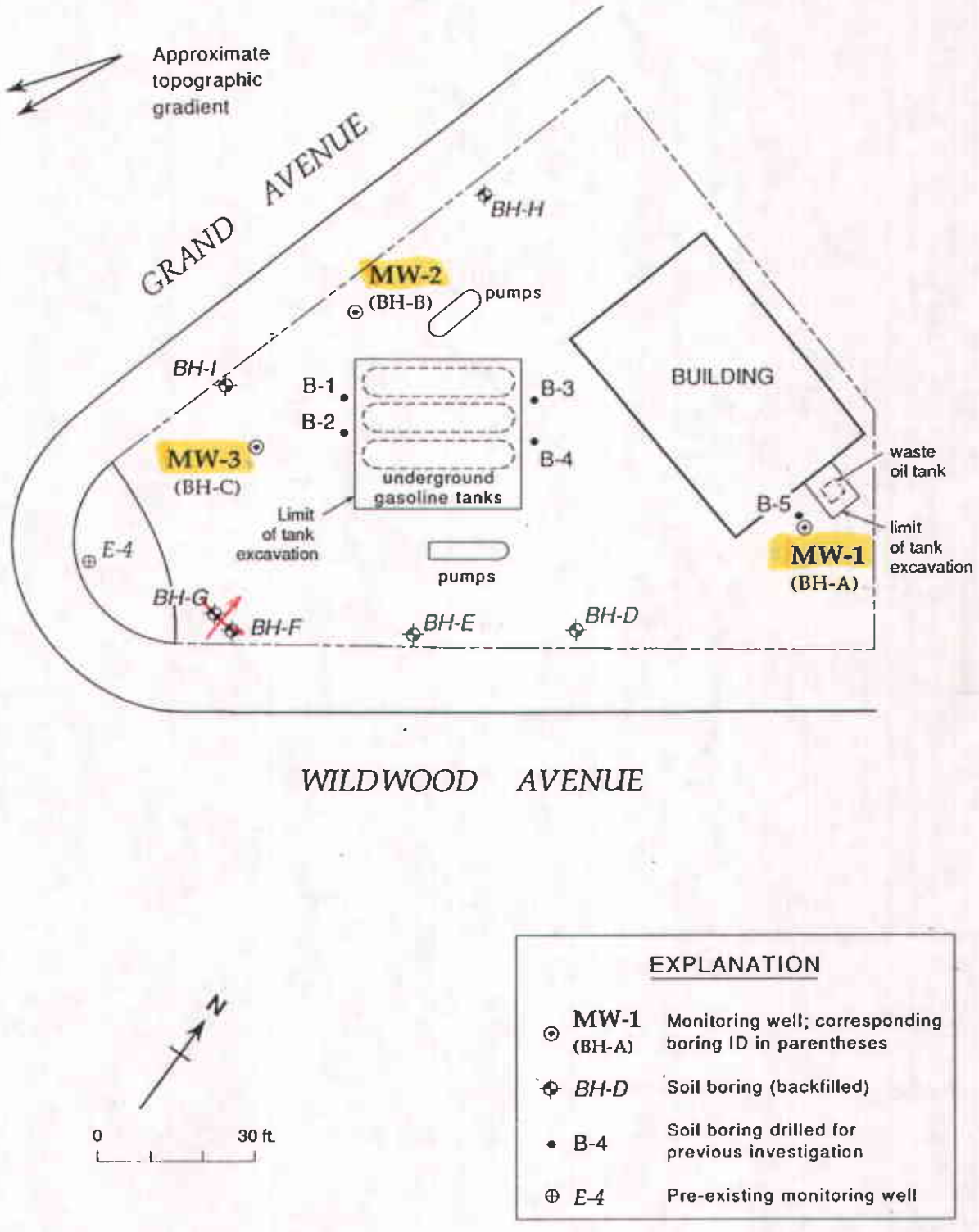

Figure 2. Site Map - Shell Service Station, 29 Wildwood Avenue, Piedmont, California

1.4. AREA SURVEY

Surveys of water wells within one-half mile of the site and neighboring properties were completed by WA for this investigation to determine whether any potential offsite sources of volatile organic compounds (VOCs) to the subsurface, or sensitive receptors were in the site vicinity. The property and business survey consisted of a site reconnaissance and telephone interviews with representatives of Alameda County and the Cities of Piedmont and Oakland. The water well survey consisted of reviewing California Department of Water Resources (DWR) water well drillers' reports, interviewing Alameda County Environmental Health Department personnel and observing nearby properties.

1.4.1. Adjacent Properties and Businesses

Properties and businesses near the site are shown on Figure 3. No fuel or oil storage tanks were discovered during the local business survey. There is a dry cleaner south of the site, and a hardware store and antique store to the west.

1.4.2. Well Survey

The area well survey identified two wells within one-half mile of the site and eleven others somewhat further (Figure 4). The two wells are cathodic protection wells, not water wells. The owner, location, year drilled and use of each identified well are presented in Table 1.

TABLE 1. Wells Within One-Half Mile of Shell Service Station, WIC # 204-6001-0109, 29 Wildwood Avenue, Piedmont, California

Well ID[1]	Well Owner	Well Location	Year Drilled	Well Use
1	Grey	377 Hillside Ave	NA	Irrigation
2	Traulsen	326 El Cerrito	1977	Domestic
3	Abbott	304 Hillside	1977	Domestic
4	East Bay Municipal Utility District	Grand Ave. and Holly Place	1976	Cathodic Protection
5	City of Piedmont	Ricardo and Artuna Ave.	1977	Irrigation
6	City of Piedmont	Ricardo and Artuna Ave.	1977	Irrigation
7	East Bay Municipal Utility District	Grand Ave. and Holly Place	1982	Cathodic Protection
8	John B. Bates	125 Hillside	1988	Irrigation
9	John Reynolds	30 Prospect Road	1977	NA
10	Shell Oil Co.	3201 Lakeshore Avenue	1985	Monitoring
11	Shell Oil Co.	3201 Lakeshore Avenue	1985	Monitoring
12	Shell Oil Co.	3201 Lakeshore Avenue	1986	Monitoring
13	PG&E	Montell Street	1988	Cathodic Protection

Notes:

NA = Not available

[1] Well number as shown on Figure 4.

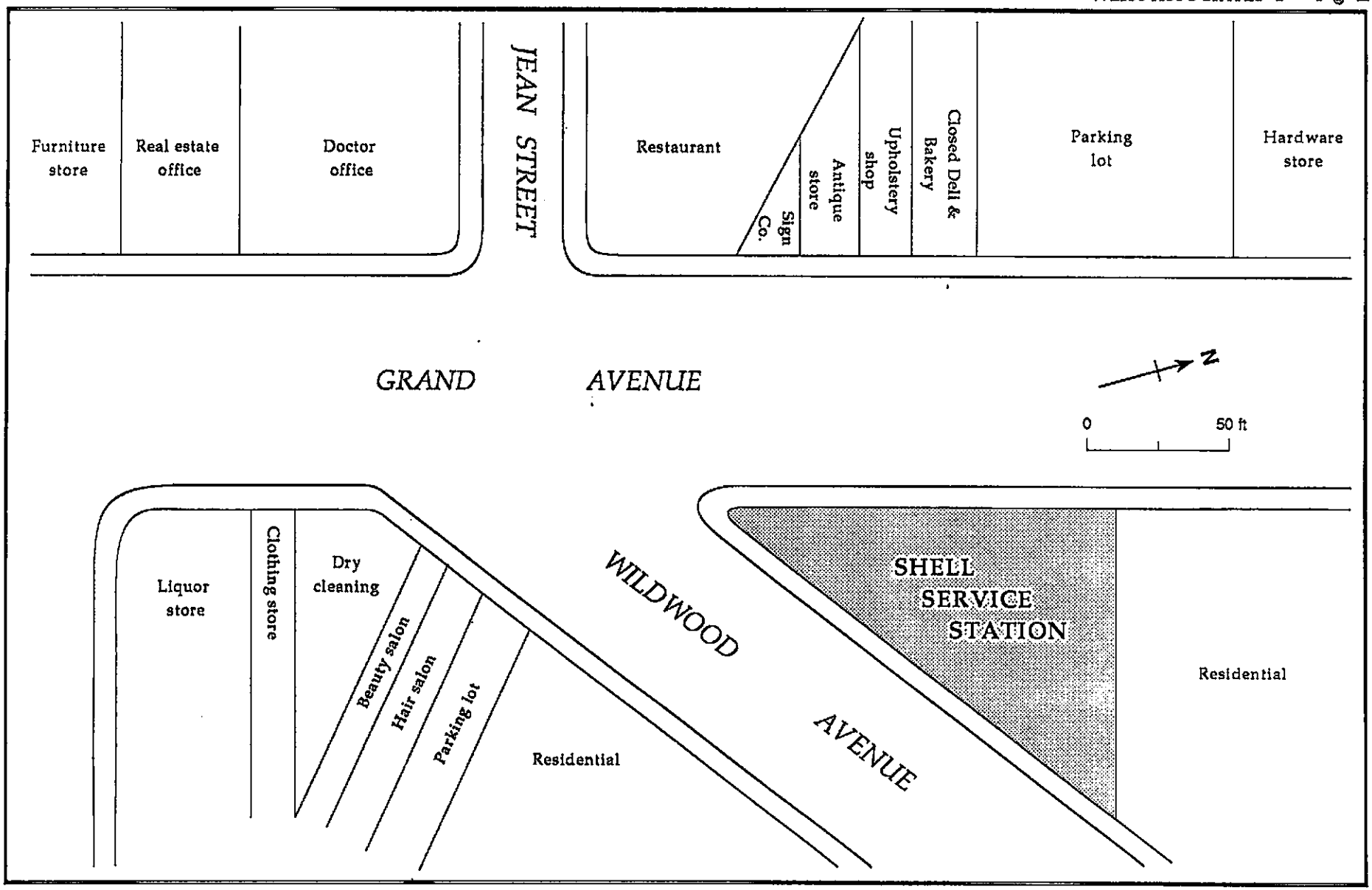

Figure 3. Properties and Businesses in the Vicinity of Shell Service Station, 29 Wildwood Avenue, Piedmont, California

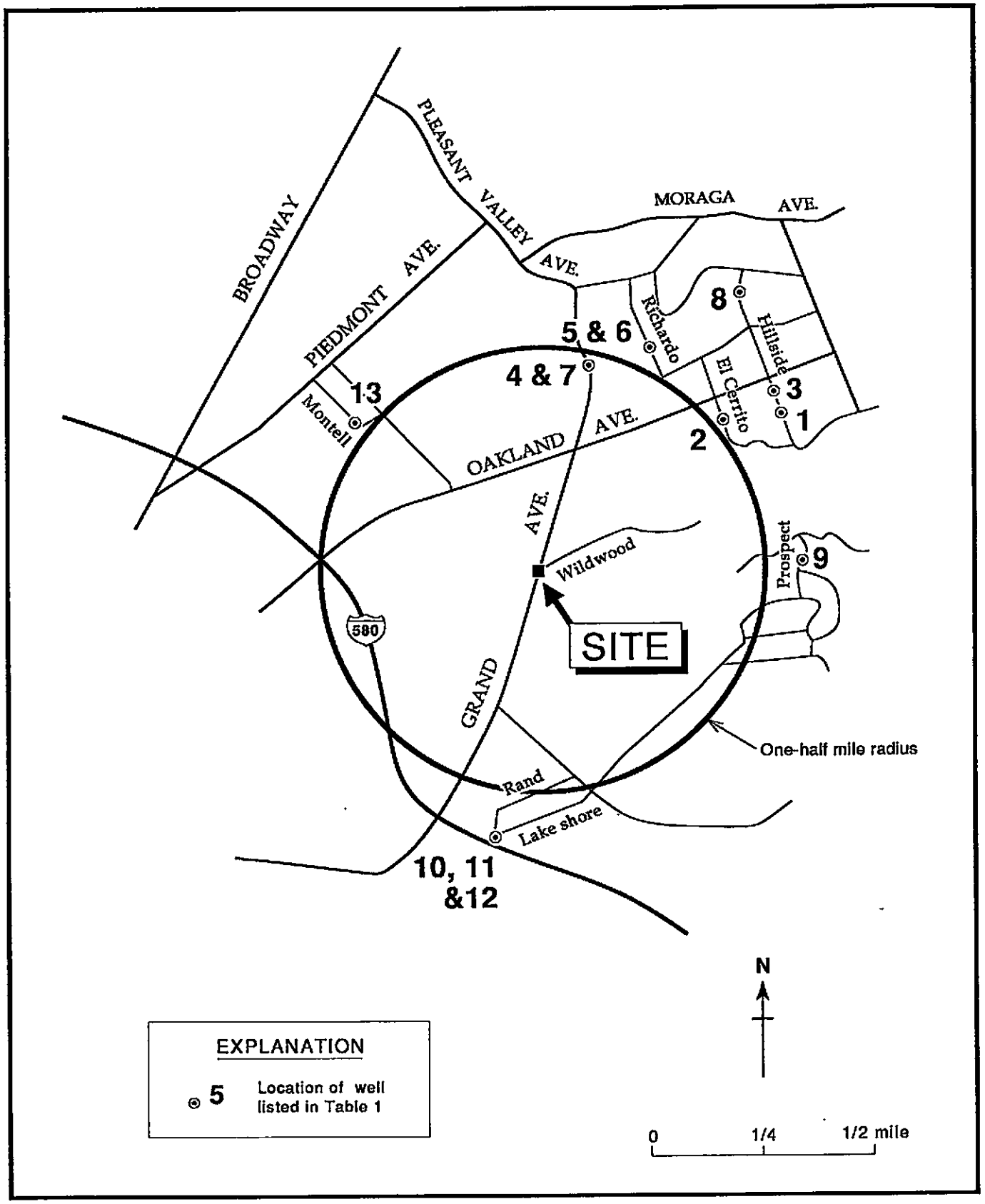

Figure 4. Wells Within One-Half Mile of Shell Service Station, 29 Wildwood Avenue, Piedmont, CA

2. SUBSURFACE INVESTIGATION

The objectives of the investigation were to determine the extent of hydrocarbons in soil along Grand and Wildwood Avenues and in the vicinity of the underground tanks, product piping and pump islands, and to define the horizontal extent of hydrocarbons in shallow ground water beneath the site. Based upon local topography, a southwestward to westward ground water gradient was anticipated. The borings and monitoring wells were located considering this assumed gradient, and the locations of the underground storage tanks, product piping, and pump islands.

2.1. SOIL BORING

Bay Area Exploration of Suisun, California drilled nine soil borings on July 5th and 6th, 1989 using a CME 55 truck-mounted drill rig. The drilling was directed by WA geologist Jack K. Gardner working under the supervision of Richard B. Weiss, California Certified Engineering Geologist #EG1112. The borings were drilled at the locations shown on Figure 2 to depths of less than 20 feet. Stratigraphy, PID results and hydrogeologic data are shown on the boring logs presented in Appendix A.

Based on the anticipated southwestward to westward ground water gradient, boring BH-A was drilled near the eastern side of the property, south of the waste oil storage tank to determine whether hydrocarbons were in subsurface materials adjacent to this underground tank. Boring BH-B was drilled west of the fuel tanks and piping in the area where the hydrocarbons were encountered by Pacific Telephone Company. Boring BH-C was located southwest of the underground fuel storage tanks to characterize sediments adjacent to the tanks and to quantify hydrocarbon concentrations in the soil. Borings BH-D, BH-E, BH-F and BH-G were located as shown on Figure 2 to describe subsurface conditions south of the underground tanks and pump islands, and along the southern property boundary. Boring BH-H was located north of the fuel storage tanks and pump islands to characterize potential northward migration of hydrocarbons. Boring BH-I is located to further characterize hydrocarbons in soil west of the fuel underground storage tanks. Borings BH-F and BH-G were abandoned because buried obstacles and/or utilities were encountered during drilling.

Well MW-1 was located to determine ground water quality immediately downgradient of the waste oil tank and upgradient of the gasoline tanks. Well MW-2 was located to determine ground water quality adjacent to the PG&E excavation and downgradient of the

northern pump island. Well MW-3 was installed to determine ground water quality downgradient of the underground fuel storage tanks.

Soil samples were collected at least every 5 ft for sediment and hydrogeologic description, and for possible chemical analysis. Samples were collected with a split barrel sampler in steam-cleaned brass tubes. Drilling equipment was steam-cleaned prior to use and sampling equipment was washed with a trisodium phosphate solution between samples to prevent possible cross-contamination. After removal from the sampler, the samples were immediately trimmed, capped with aluminum foil and plastic caps, hermetically sealed with duct tape, labeled and refrigerated for delivery under chain of custody to International Technology Corporation (IT) of San Jose, California. Copies of the chain of custody forms are presented as Appendix B.

The materials underlying the site consist primarily of low to moderate estimated permeability sandy silts, clayey silts, and silty clays interbedded with higher permeability layers or lenses of silty sands, and silty gravels generally from about 3 to 6 ft thick. The screened interval of each well was completed in the silty sand and silty gravel layers or lenses. The sandy silts and silty sands encountered typically contain small percentages of clay. Drill cuttings were temporarily stored on-site in DOT-approved 55-gallon steel drums pending analytic results for composite soil samples collected from the drums.

2.2. WELL INSTALLATION, DEVELOPMENT AND SAMPLING

Ground water was first encountered at 4 to 10 ft below the ground surface and stabilized after well installation between 2.5 ft and 4 ft depth. Monitoring wells MW-1, MW-2 and MW-3 were constructed in borings BH-A, BH-B and BH-C, respectively. Borings BH-D, BH-E, BH-F, BH-G, BH-H AND BH-I were grouted to the ground surface with sand slurry cement grout. Well construction details are shown on the boring logs in Appendix A.

Monitoring wells MW-1, MW-2 and MW-3 were constructed with 4-inch diameter flush threaded, 0.020-inch slotted PVC well screen and blank casing. For each monitoring well, number 3 Lonestar sand was placed in the annular space between the casing and the borehole wall, from the bottom of the screened interval to 1 ft or less above the well screen. Approximately 6 inches of bentonite pellets separate the sand pack from the surface seal. A surface seal of Portland cement sand slurry prevents infiltration of surface water into the well. Each well is protected with a locking stovepipe and an on-grade traffic-rated vault.

The monitoring wells were developed on July 7, 1989 using airlift evacuation, bailing and surge block agitation. A total of approximately 250 gallons of ground water were evacuated from the wells.

Ground water samples were collected from the four site wells on July 12, 1989 by WA environmental technicians Dean Osaki and Andy Rodgers. The samples were collected with steam-cleaned Teflon bailers after four well volumes of ground water were purged from wells MW-1, MW-2, and MW-3 with steam-cleaned PVC or Teflon bailers. Previously installed well E-4 was a flowing artesian well and was therefore not purged prior to sampling. The samples were immediately decanted from the bailers into 40 ml volatile organic analysis vials, which were then labeled and refrigerated until delivery, under chain of custody, to IT. Copies of the chain of custody forms are included in Appendix B.

The water purged from the monitoring wells for development and sampling was collected in 55-gallon drums for temporary storage on-site. Disposal requirements for the water were determined from the ground water analytic results.

2.3. ANALYTIC RESULTS

2.3.1. Analytic Results for Soil

Analytic results are presented in Table 2 and the laboratory analytic reports are presented as Appendix C. Hydrocarbons were detected only in soil samples from borings BH-B, BH-C, BH-H and BH-I, all at less than one thousand ppm. The highest concentrations were in soil samples from borings BH-B and BH-C. The highest TPPH concentrations were found between three and six feet below ground surface near the water table elevation. Total lead was detected in all the composite soil samples at concentrations of 24 to 32 ppm.

Soil samples were surveyed in the field for volatile hydrocarbons using a PID. The PID, which measures in parts per million by volume (ppmv), is used for qualitative, not quantitative assessment because the correlation between the volume measurement of the instrument and the weight measurement of the analytical laboratory is not well defined, and the sample handling and measurement procedures in the field are less rigorous than in the laboratory. Field observations of odor and higher PID readings were used to select samples for analysis by the analytical laboratory. The samples were analyzed for TPPH as gasoline by EPA Method 8015, gas chromatography with flame ionization detection (GC/FID), and for benzene, ethylbenzene, toluene and xylenes (BETX) by EPA Method 8020, gas chromatography

TABLE 2. Analytic Results for Soil - Shell Service Station, WIC # 204-6001-0109, 29 Wildwood Avenue, Piedmont, California

Boring ID	Sample Depth (ft)	Date Sampled	Analytic Method	Sat/ Unsat	TPPH	B	E	T	X	Total Lead	Organic Lead
					<----------ppm---------->						
BH-A(MW-1)	3.6	7/5/89	8015/8020	Sat	<5	<0.05	<0.1	<0.1	<0.3	---	---
composite	---	7/5/89	8015/8020	Sat	<5	<0.05	<0.1	<0.1	<0.3	---	---
composite	---	7/5/89	6010/LUFT	---	---	---	---	---	---	27	<1
BH-B(MW-2)	1.0	7/5/89	8015/8020	Unsat	11	0.19	0.1	<0.1	<0.3	---	---
	3.5	7/5/89	8015/8020	Unsat	710	3	17	5	71	---	---
	7.4	7/5/89	8015/8020	Sat	5	<0.05	<0.1	<0.1	<0.3	---	---
	10.5	7/5/89	8015/8020	Sat	<5	<0.05	<0.1	<0.1	<0.3	---	---
	14.0	7/5/89	8015/8020	Sat	<5	<0.05	<0.1	<0.1	<0.3	---	---
composite	---	7/5/89	6010/LUFT	---	---	---	---	---	---	25	<1
BH-C(MW-3)	3.5	7/5/89	8015/8020	Unsat	72	1.3	0.2	0.3	0.7	---	---
	5.5	7/5/89	8015/8020	Sat	270	1.2	8.3	3.1	42.	---	---
	9.0	7/5/89	8015/8020	Sat	<5	<0.05	<0.1	<0.1	<0.3	---	---
composite	---	7/5/89	6010/LUFT	---	---	---	---	---	---	34	<1
BH-D	2.5	7/5/89	8015/8020	Unsat	<5	<0.05	<0.1	<0.1	<0.3	---	---
	6.0	7/5/89	8015/8020	Sat	<5	<0.05	<0.1	<0.1	<0.3	---	---
	9.5	7/5/89	8015/8020	Sat	<5	<0.05	<0.1	<0.1	<0.3	---	---
	15.0	7/5/89	8015/8020	Sat	<5	<0.05	<0.1	<0.1	<0.3	---	---
composite	---	7/5/89	6010/LUFT	---	---	---	---	---	---	26	<1
BH-E	2.0	7/5/89	8015/8020	Unsat	<5	<0.05	<0.1	<0.1	<0.3	---	---
	5.8	7/5/89	8015/8020	Sat	<5	<0.05	<0.1	<0.1	<0.3	---	---
composite	---	7/5/89	6010/LUFT	---	---	---	---	---	---	28	<1
BH-H	3.5	7/5/89	8015/8020	Sat	8.	0.07	<0.1	<0.1	<0.3	---	---
	7.0	7/5/89	8015/8020	Sat	<5	<0.05	<0.1	<0.1	<0.3	---	---
composite	---	7/5/89	6010/LUFT	---	---	---	---	---	---	32	<1

--Table 2 continues on next page--

TABLE 2. Analytic Results for Soil - Shell Service Station, WIC # 204-6001-0109, 29 Wildwood Avenue, Piedmont, California (continued)

Boring ID	Sample Depth (ft)	Date Sampled	Analytic Method	Sat/ Unsat	TPPH	B	E	T	X	Total Lead	Organic Lead
					<--------			ppm			------->
BH-I	4.0	7/5/89	8015/8020	? Sat	540	<1	<4	<2	<10	---	---
	7.5	7/5/89	8015/8020	Sat	29	<0.2	<0.2	<0.1	<0.3	---	---
	10.0	7/5/89	8015/8020	Sat	<5	<0.05	<0.1	<0.1	<0.3	---	---
composite	---	7/5/89	6010/LUFT	---	---	---	---	---	---	24	<1

Abbreviations:

TPPH = Total Purgeable Petroleum Hydrocarbons
B = Benzene
E = Ethylbenzene
T = Toluene
X = Xylenes
--- = Not analyzed or not applicable
Sat = Saturated soil sample
Unsat = Unsaturated soil sample

Analytic Laboratory:

All samples were analyzed by International Technology Analytical Services, San Jose, California

Analytic Methods:

8015 = Modified EPA Method 8015, gas chromatography/flame ionization for TPPH
8020 = EPA Method 8020, gas chromatography/photoionization for BETX
6010 = EPA method 6010 induction coupled Plasma, for total Lead
LUFT = California Regional Water Quality Control Board Leaking Underground Fuel Tank Manual Method, atomic absorption for organic lead

with photoionization detection (GC/PID). Composite samples from borings BH-A, BH-B, BH-C, BH-D, BH-E, BH-H, and BH-I, were analyzed for total and organic lead by EPA Method 6010, atomic absorption, and by the California Regional Water Quality Control Board method described in the Leaking Underground Fuel Tank (LUFT) Manual, respectively.

2.3.2. Analytic Results for Ground Water

No hydrocarbons were detected in groundwater samples from monitoring well MW-1 and pre-existing well E-4. The highest TPPH and benzene concentrations, at 3.9 and 0.38 ppm respectively, were detected in groundwater from MW-3, with almost two orders of magnitude lower concentrations in groundwater from MW-2.

Ground water samples were analyzed by IT for TPPH by EPA Method 8015 and for BETX by EPA Method 8020 with detection limits of 50 parts per billion (ppb) for TPH, 0.5 ppb for benzene, 1 ppb for toluene and ethylbenzene, and 3 ppb for total xylenes. The analytic results are shown on Table 3 and laboratory analytic reports are presented in Appendix C.

2.4. GROUND WATER GRADIENT

The top-of-casing elevations for the monitoring wells were surveyed by John E. Koch of Berkeley, California (California Registered Land Surveyor, No. LS4811) on July 19, 1989, using a City of Oakland datum located opposite of 3794 Grand Avenue. Ground water elevation data is presented in Table 4 and a ground water elevation contour map for July 12, 1989 is presented as Figure 5. The ground water elevation data on the site indicates a westward ground water gradient of approximately 0.04 ft/ft, toward San Francisco Bay.

Local topography and geologic conditions have produced a confined second aquifer beneath the site which is artesian and free flowing as indicated by monitoring well E-4. The apparent westward ground water gradient is somewhat inconsistent with local surface water drainage patterns. Since Wildwood Avenue drains into Grand Avenue which conveys surface water to the southwest, the groundwater flow direction should coincide with the trend of the Grand Avenue alluvial valley. However, the ground water contours determined from the three shallow wells installed by WA (Figure 5) indicate a ground water gradient to the west, oblique to the southwestward valley axis.

Flowing-artesian well E-4, screened from 23 to 35 ft depth, suggests a strong upward hydraulic gradient at the site. This significant vertical gradient may influence the water levels in well MW-1, MW-2, and MW-3, and affect the groundwater flow direction inferred from water elevation data measured in these wells. The completed depth of well MW-1 is

about 5 ft deeper than the completed depths of wells MW-2 and MW-3. Therefore, the significantly higher ground water level in well MW-1 may be caused by the strong vertical gradient influencing well MW-1 more than the other wells. If this is the case, the actual horizontal ground water gradient is somewhat uncertain, since the apparent westward ground water flow direction indicated by Figure 5 probably reflects the strong upward hydraulic gradient rather than the true shallow ground water flow direction.

TABLE 3. Analytic Results for Ground Water, Shell Service Station, WIC # 204-6001-0109, 29 Wildwood Avenue, Piedmont, California.

Sample ID	Date Sampled	Analytic Lab	Analytic Methods	TPPH	B	E	T	X
				<-----ppm----->				
MW-1	7/12/89	IT	8015/8020	<0.05	<0.0005	<0.001	<0.001	<0.003
MW-2	7/12/89	IT	8015/8020	0.06	0.0027	<0.001	<0.001	<0.003
MW-3	7/12/89	IT	8015/8020	3.9	0.38	0.099	0.041	0.30
E-4	7/12/89	IT	8015/8020	<0.05	<0.0005	<0.001	<0.001	<0.003
Trip Blank	7/12/89	IT	8015/8020	<0.05	<0.0005	<0.001	<0.001	<0.003
Bailer Blank	7/12/89	IT	8015/8020	<0.05	<0.0005	<0.001	<0.001	<0.003
DHS Action Levels	---	---	---	NE	0.0007	0.68	0.1	0.62

Abbreviations:

TPH = Total Purgeable Petroleum Hydrocarbons
B = Benzene
E = Ethylbenzene
T = Toluene
X = Xylenes
DHS Action Levels = Department of Health Services Recommended Drinking Water Action Levels
NE = DHS action level for TPPH not established

Analytic Laboratory:

IT = IT Analytical Services, San Jose, California

Analytic Methods:

8015 = Modified EPA Method 8015 (GC/FID) TPH
8020 = EPA Method 8020 (GC/PID) for BETX

TABLE 4. Ground Water Elevations, July 12, 1989, Shell Service Station, WIC # 204-6001-0109, 29 Wildwood Avenue, Piedmont, California.

Well ID	Top-of-Casing Elevation (ft above msl)	Depth to Water (ft)	Water Elevation (ft above msl)
MW-1	37.96	2.76	35.20
MW-2	34.89	3.66	31.23
MW-3	35.00	3.83	31.17
E-4	34.63	-4.5*	39.1*

* Well E-4 is a flowing artesian well. The height of standing water above the casing is at least 4.5 ft.

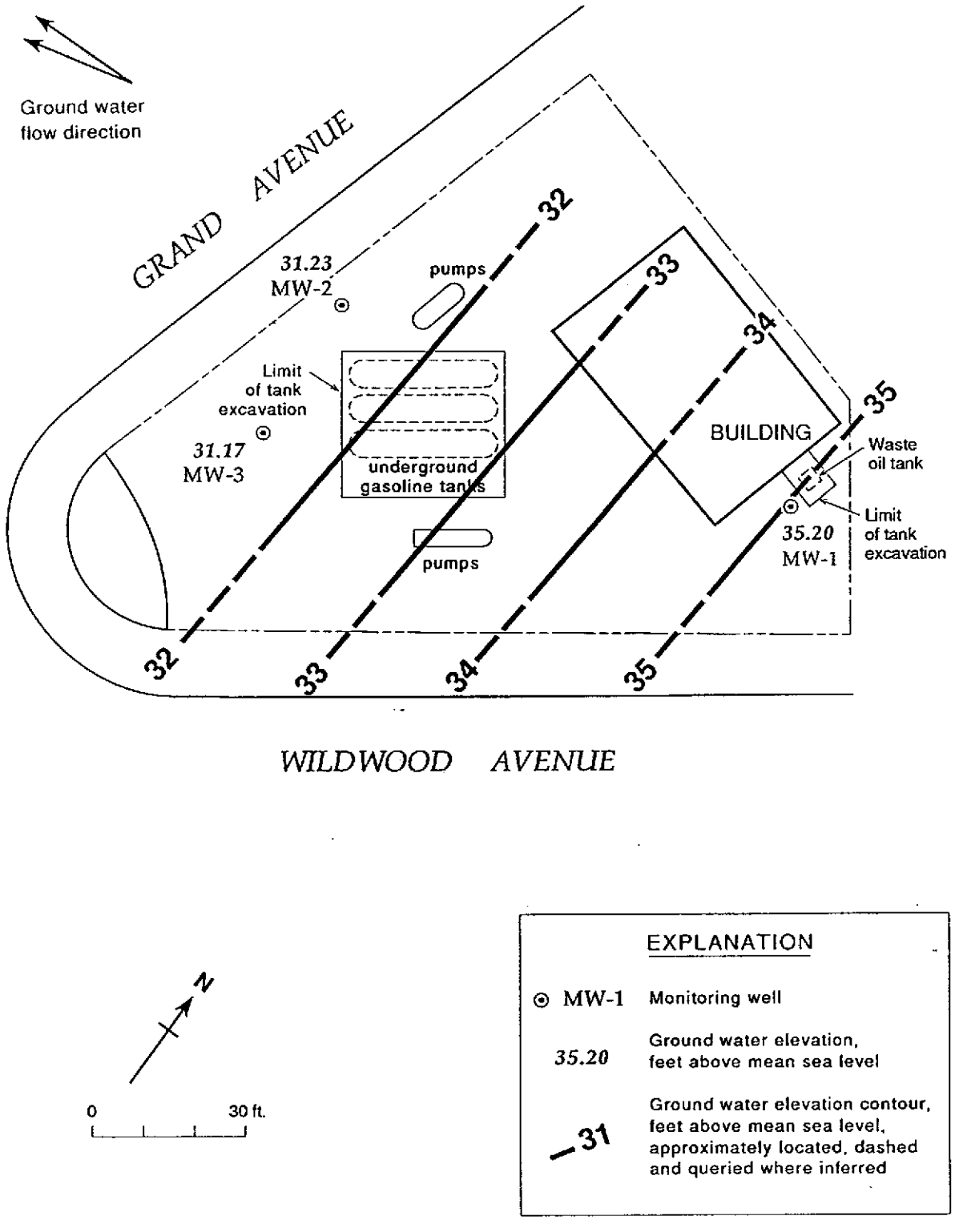

Figure 5. Ground Water Elevations - July 12, 1989 - Shell Service Station, 29 Wildwood Avenue, Piedmont, California

3. CONCLUSIONS

Hydrocarbons were detected in soil samples only from borings BH-B, BH-C, BH-H, and BH-I at a maximum TPPH concentration of 710 ppm in the 3.5 ft depth sample from boring BH-B. Total lead concentrations in all the analyzed composite samples were significantly lower than DHS Total Threshold Limit Concentrations (TTLC's).

Ground water samples from monitoring wells MW-2 and MW-3 contained benzene above DHS recommended action levels. No hydrocarbons were detected in groundwater from monitored wells MW-1 and E-4. This suggests no hydrocarbons in ground water upgradient, or below the shallowest water-bearing zone. The upward hydraulic gradient indicated by flowing artesian well E-4 may inhibit the downward migration of dissolved hydrocarbons into the deeper water-bearing zone.

Ground water elevation data indicates a westward ground water flow direction on the site. However, this apparent flow direction is uncertain due to the strong upward hydraulic gradient at the site.

Two wells identified within one-half mile of the site are not used for water supply. Three monitoring wells at a Shell Oil service station on Lakeshore Avenue, about one-half mile south of the site are potentially downgradient if the actual site ground water flow direction coincides with the southwestward regional topographic gradient, rather than the westward flow direction indicated by the three shallow site monitoring wells.

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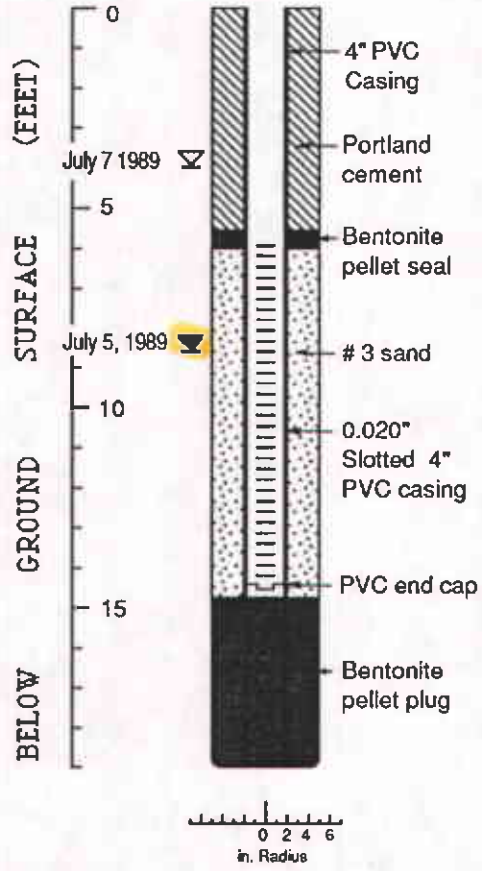
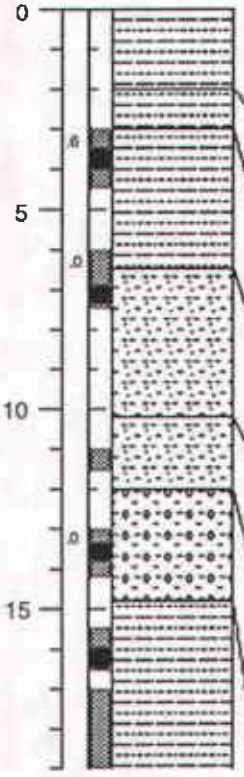
WELL MW-1 (BH-A)





DESCRIPTION

Silty CLAY (CL); dark brown; medium stiff; damp; 10-20% very fine to very coarse sand; high plasticity; low est K; roots; orange mottling, some black staining

Clayey SILT / Sandy SILT (ML); yellow-brown; medium stiff; damp; 10-30% very fine to medium sand; moderate plasticity; low est K

Silty CLAY (CH); medium brown mottled orange-brown; damp; <10% very fine to medium sand; high plasticity; low est K

Sandy SILT (ML); orange-brown mottled gray; medium stiff; damp; 20-40% very fine to medium sand; moderate plasticity; low est K

Silty SAND (SM); gray mottled orange; medium dense; moist; 20-40% moderate plasticity fines; very fine to medium sand; <30% subangular to subrounded pebbles to 1/4" diameter; mod est K

Silty GRAVEL / Sandy SILT (GM/ML); orange-brown, multicolored; 20-40% very fine to very coarse sand; 20-50% subangular to subrounded pebbles; 20-40% low plasticity fines; mod to high est K

Silty CLAY (CH); red-brown mottled black, orange-brown; medium stiff; damp; <10% very fine to medium sand; high plasticity fines; very low est K

6" black organic interbed at ~15'

EXPLANATION

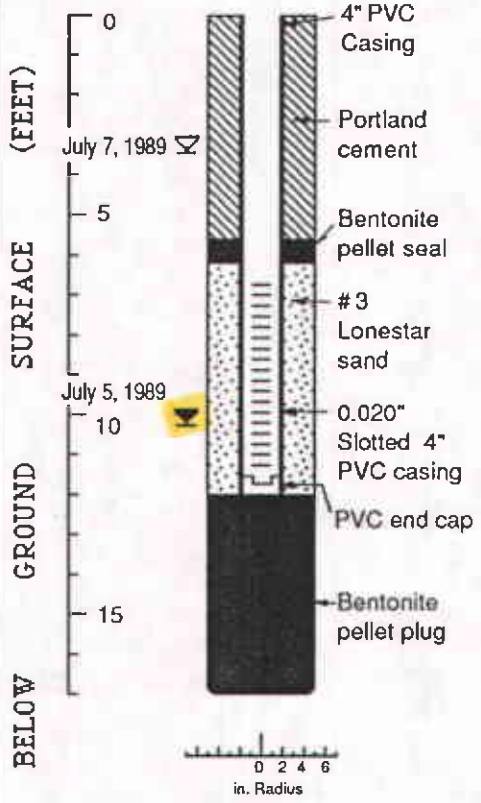
- Water level during drilling (date)
- Water level (date)
- Contact (dotted where approx.)
- Uncertain contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample
- K = Estimated hydraulic conductivity

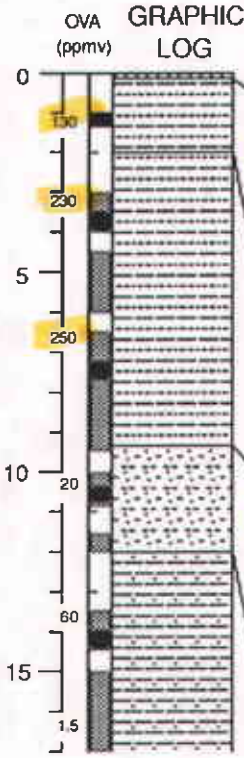
Logged by:	Jack Gardner
Supervisor:	Richard Weiss; EG 1112
Drilling Company:	Bay Area Exploration, Suisun, CA
Driller:	Carr / Mossman
Drilling Method:	Hollow stem auger
Dates Drilled:	July 5 to 6, 1989
Well Head Completion:	Locking cap with traffic-rated vault
Type of sampler:	Split barrel (1.5", 2.0", 2.5" ID)

Well Construction and Boring Log - Well MW-1 (BH-A)

Shell Service Station, 29 Wildwood Ave., Piedmont, California

WELL MW-2 (BH-B)





DESCRIPTION

Asphalt

Black; strong hydrocarbon odor from 0.2' to 0.4'

Silty CLAY (CH); black to dark gray-brown; medium stiff; damp; <10% very fine to very coarse sand; <10% subangular to subrounded pebbles to 1/8" diameter; highly plastic fines; low est K

Clayey SILT (ML/MH); blue-brown mottled orange; medium stiff; damp; <20% very fine to medium sand; <5% subangular to subrounded pebbles to 1/4" diameter; high plasticity fines; low to mod est K

Silty SAND (SM); orange-brown; medium stiff; moist; very fine to very coarse sand; <30% subangular to subrounded pebbles to 1" diameter; 20-40% non-plastic fines; mod est K

~10-20% non-plastic fines; high est K at 10'

CLAY interbed from 11.5' to 11.7'

Sandy CLAY to Clayey SILT (CH/MH); yellow-brown to orange-brown; medium stiff; damp; ~10% very fine to coarse sand; 10-20% subangular to subrounded pebbles to 1/2" diameter; high plasticity fines; low est K

1" pebbles interbed at 16.5;

EXPLANATION

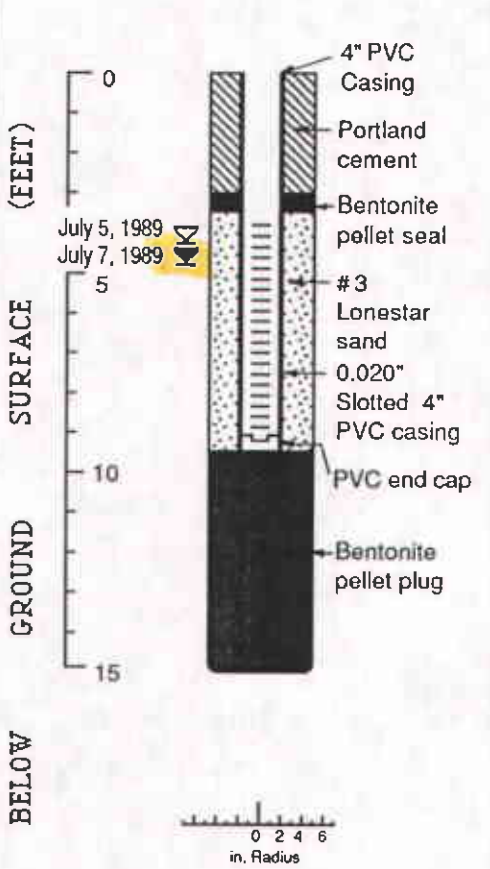
- Water level during drilling (date)
- Water level (date)
- Contact (dotted where approx.)
- Uncertain contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample
- K = Estimated hydraulic conductivity

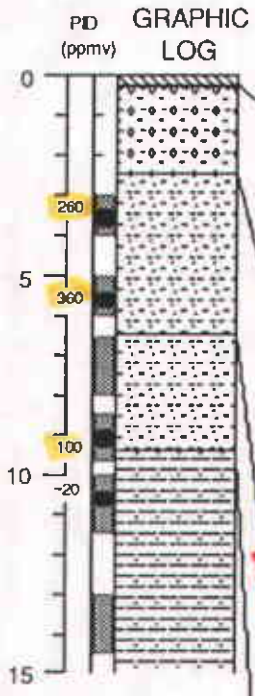
Logged by:	Jack Gardner
Supervisor:	Richard Weiss; EG 1112
Drilling Company:	Bay Area Exploration, Suisun, CA
Driller:	Carr/Mossman
Drilling Method:	Hollow stem auger
Dates Drilled:	July 5, 1989
Well Head Completion:	Locking cap with traffic-rated vault
Type of sampler:	Split barrel (1.5", 2.0", 2.5" ID)

Well Construction and Boring Log - Well MW-2 (BH-B)

Shell Service Station, 29 Wildwood Ave., Piedmont, California

WELL MW-3 (BH-C)





DESCRIPTION

Asphalt

Silty GRAVEL (GM); orange-brown; dense; damp; 20-40% very fine to very coarse sand; subangular to subrounded sand to 1 1/2" diameter; 20-40% low plasticity fines; mod est K [fill]

Strong hydrocarbon odor at 2'

Sandy SILT (ML); black; medium dense; damp; 10-30% very fine to medium sand; low plasticity fines; >10% subangular to subrounded pebbles to 1/4" diameter; low to mod est K; strong hydrocarbon odor

Oil saturated; black; moist; strong hydrocarbon odor at 5'

Very strong gasoline odor; sheen from 6.5' to 8.5'

Silty GRAVEL (GM) from 6.5' to 7.2'

Silty SAND to Silty GRAVEL (SM/GM); black; medium dense to loose, saturated; 30-60% very fine to very coarse sand; 10-60% subangular to subrounded pebbles to 1 1/2" diameter; 10-30% non-plastic fines; very high est K; strong hydrocarbon odor

Very fine to medium sand; very high est K from 8.5' to 9.3'

Sandy CLAY (CH); red-brown mottled orange; medium stiff; damp; <10% very fine to very coarse sand; high plasticity fines; <10% subangular to subrounded pebbles to 3/4" diameter; low est K; no hydrocarbon odor

EXPLANATION

- Water level during drilling (date)
- Water level (date)
- Contact (dotted where approx.)
- Uncertain contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample

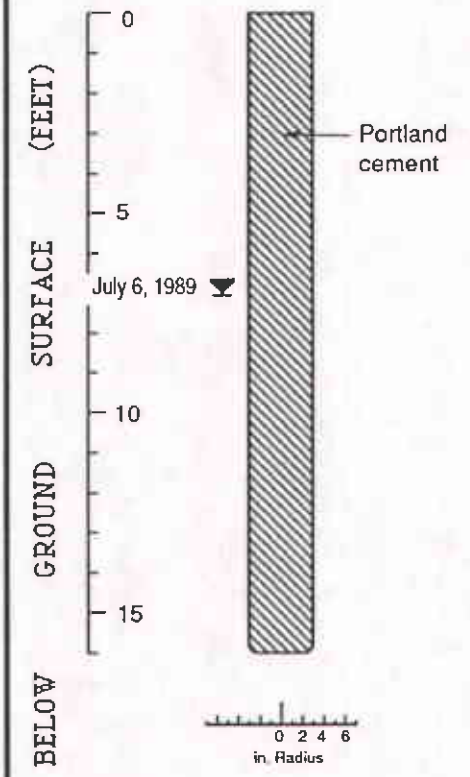
K = Estimated hydraulic conductivity

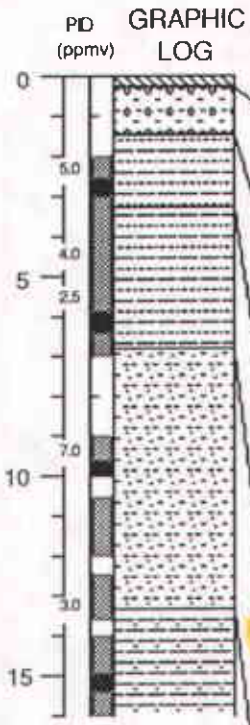
Logged by: Jack Gardner
Supervisor: Richard Weiss; EG 1112
Drilling Company: Bay Area Exploration, Suisun, CA
Driller: Carr/Mossman
Drilling Method: Hollow stem auger
Dates Drilled: July 5 to 6, 1989
Well Head Completion: Locking cap with traffic-rated vault
Type of sampler: Split barrel (1.5", 2.0", 2.5" ID)

Well Construction and Boring Log - Well MW-3 (BH-C)

Shell Service Station, 29 Wildwood Ave., Piedmont, California

BORING BH-D





DESCRIPTION

Asphalt

Silty GRAVEL (GM); orange-brown; medium dense; damp; subangular to subrounded pebbles to 2" diameter; 20-40% low plasticity fines; mod est K

Clayey SILT (ML); black; medium stiff; damp; 10-20% very fine to very coarse sand; moderate plasticity fines; <10% subangular to subrounded pebbles to 3/8" diameter; low est K

Orange at 2.5'

Silty CLAY (CH); dark gray mottled orange; medium stiff; damp; high plasticity fines; 10-20% subangular to subrounded pebbles to 1/4" diameter; very low est K; moderate hydrocarbon odor

Strong hydrocarbon odor at 9.5'

Sandy SILT to Silty SAND (ML/SM); orange-brown; medium stiff; moist; 30-60% very fine to very coarse sand; 30-60% moderate plasticity fines; <20% subangular to subrounded pebbles, variable to 1/2" diameter; mod to high est K; no hydrocarbon odor

Sandy CLAY (CH); orange-brown; stiff; damp; <10% very fine to very coarse sand; high plasticity fines; <10% subangular to subrounded pebbles to 3/8" diameter; very low est K

EXPLANATION

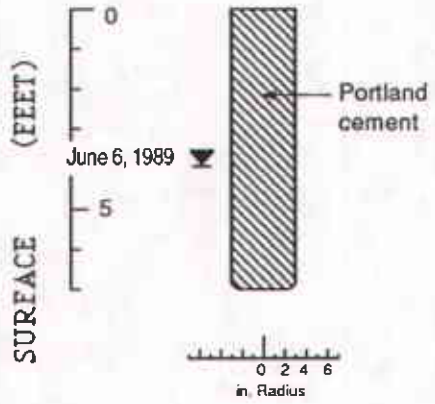
- Water level during drilling (date)
- Water level (date)
- Contact (dotted where approx.)
- Uncertain contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample
- K = Estimated hydraulic conductivity

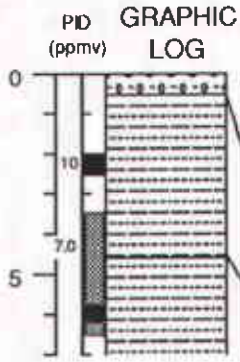
Logged by: Jack Gardner
Supervisor: Richard Weiss; EG 1112
Drilling Company: Bay Area Exploration, Suisun, CA
Driller: Carr/Mossman
Drilling Method: Hollow stem auger
Dates Drilled: July 6, 1989
Well Head Completion: None
Type of sampler: Split barrel (1.5", 2.0", 2.5" ID)

Boring Log - Boring BH-D

Shell Service Station, 29 Wildwood Ave., Piedmont, California

BORING BH-E





DESCRIPTION

Silty GRAVEL (GM); orange-brown; medium dense; damp; subangular to subrounded pebbles to 2" diameter; 20-40% low plasticity fines; mod est K [fill]

Silty CLAY (CH); dark gray-brown; medium stiff; damp; high plasticity fines; low est K

Strong hydrocarbon odor at 4 1/2'

Clayey SILT (ML/MH); gray-brown mottled orange; 10-20% very fine to medium sand; moderate to high plasticity fines; low est K

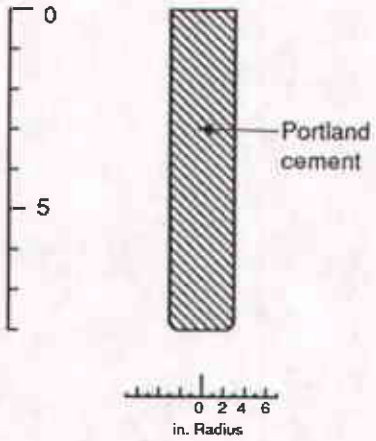
EXPLANATION

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

Logged by: Jack Gardner
Supervisor: Richard Weiss; EG 1112
Drilling Company: Bay Area Exploration, Suisun, CA
Driller: Carr/Mossman
Drilling Method: Hollow stem auger
Dates Drilled: July 6, 1989
Well Head Completion: None
Type of sampler: Split barrel (1.5", 2.0", 2.5" ID)

BORING BH-F

DEPTH BELOW GROUND SURFACE (FEET)



PID (ppmv)	GRAPHIC LOG	DESCRIPTION
0		Asphalt
		Silty GRAVEL (GM); orange-brown; medium dense; damp; 20-40% very fine to very coarse sand; 20-40% low plasticity fines; subangular to subrounded pebbles to 2" diameter; low mod to high est K
5		Gravel interbed; hard at ~2.5'
		3" Sand interbed at ~8'
		Clayey SILT (ML/MH); brown to orange-brown; medium stiff; damp; 10-20% very fine to very coarse sand; <20% subangular to subrounded pebbles to 1 1/2" diameter; moderate to high plasticity fines; low est K

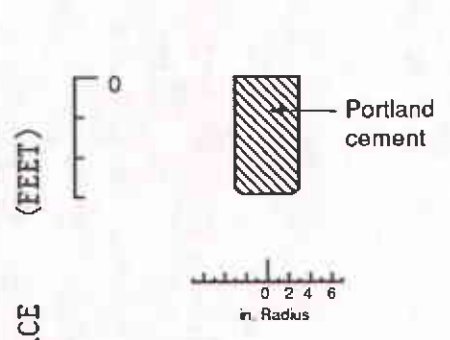
EXPLANATION

- Water level during drilling (date)
- Water level (date)
- Contact (dotted where approx.)
- Uncertain contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample

K = Estimated hydraulic conductivity

Logged by: Jack Gardner
Supervisor: Richard Weiss; EG 1112
Drilling Company: Bay Area Exploration, Suisun, CA
Driller: Carr/Mossman
Drilling Method: Hollow stem auger
Dates Drilled: July 6, 1989
Well Head Completion: None
Type of sampler: Split barrel (1.5", 2.0", 2.5" ID)

BORING BH-G



OVA (ppmv) | GRAPHIC LOG | DESCRIPTION

0

Asphalt

Silty GRAVEL (GM); orange-brown; dense; damp; 20-40% low plasticity fines; 20-40% very fine to very coarse sand; subangular to subrounded pebbles to ~2" diameter; mod est K; concrete fragments to 4" diameter [fill]

Clayey SILT (ML); mulitcolored; medium stiff; damp; 10-20% very fine to very coarse sand; moderate plasticity fines; low est K [fill]

EXPLANATION

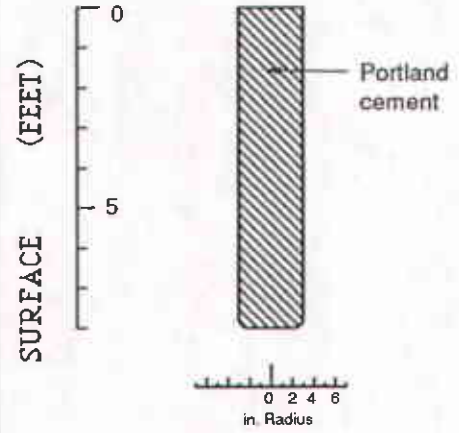
- Water level during drilling (date)
- Water level (date)
- Contact (dotted where approx.)
- Uncertain contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample
- K = Estimated hydraulic conductivity

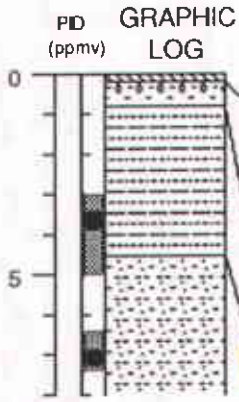
Logged by: Jack Gardner
Supervisor: Richard Weiss; EG 1112
Drilling Company: Bay Area Exploration, Suisun, CA
Driller: Carr/Mossman
Drilling Method: Hollow stem auger
Dates Drilled: July 6, 1989
Well Head Completion: None
Type of sampler: Split barrel (1.5", 2.0", 2.5" ID)

Boring Log - Boring BH-G

Shell Service Station, 29 Wildwood Ave., Piedmont, California

BORING BH-H





DESCRIPTION

Asphalt

Silty GRAVEL(GM); orange-brown; medium dense; damp; 10-30% very fine to very coarse sand; subangular to subrounded pebbles to 2" diameter; 30-50% low to moderate plasticity fines; mod est K

Silty CLAY (CH); black mottled gray; medium stiff; damp; high plasticity fines; low est K; strong hydrocarbon odor

Sandy SILT to Clayey SILT (ML); yellow-brown mottled orange; medium stiff; damp;20-40% very fine to medium sand; low to moderate plasticity; low to mod est K

EXPLANATION

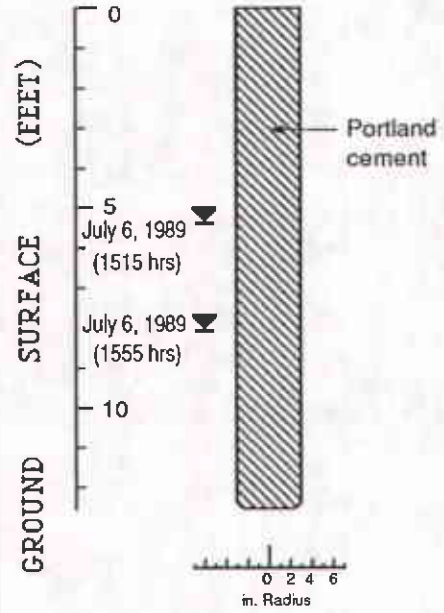
- Water level during drilling (date)
- Water level (date)
- Contact (dotted where approx.)
- Uncertain contact
- Location of recovered drive sample
- Location of drive sample sealed for chemical analysis
- Cutting sample
- K = Estimated hydraulic conductivity

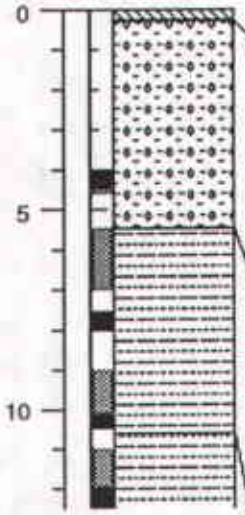
Logged by: Jack Gardner
Supervisor: Richard Weiss; EG 1112
Drilling Company: Bay Area Exploration, Suisun, CA
Driller: Carr/Mossman
Drilling Method: Hollow stem auger
Dates Drilled: July 6, 1989
Well Head Completion: None
Type of sampler: Split barrel (1.5", 2.0", 2.5" ID)

Boring Log - Boring BH-H

Shell Service Station, 29 Wildwood Ave., Piedmont, California

BORING BH-I





DESCRIPTION

Asphalt

Silty GRAVEL interbedded with Clayey SILT (GM/ML); orange-brown to dark brown; dense to medium stiff; damp; 20-40% very fine to very coarse sand; angular to subrounded pebbles to 2" diameter; 20-50% low to moderate plastic fines; low to mod est K

Black soil; minor hydrocarbon odor at 2.5'

Strong smell at 4'

Clayey SILT to Silty SAND (ML/SM); yellow-brown mottled orange-brown and gray; medium stiff; wet; 20-60% moderate to non-plastic fines; low to high est K

Strong gasoline odor at 6'

Very fine to medium sand; very high est K from 9.5' to 10'

(Gravelly from 10' to 10.3')

Silty CLAY (CH); red-brown mottled gray; stiff; damp; ~10-20% very fine to very coarse sand; <5% to 20% subangular to subrounded pebbles to 3/8" diameter; highly plastic fines; very low est K

EXPLANATION

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

Logged by: Jack Gardner
Supervisor: Richard Weiss; EG 1112
Drilling Company: Bay Area Exploration, Suisun, CA
Driller: Carr/Mossman
Drilling Method: Hollow stem auger
Dates Drilled: July 6, 1989
Well Head Completion: None
Type of sampler: Split barrel (1.5", 2.0", 2.5" ID)

Boring Log - Boring BH-I

Shell Service Station, 29 Wildwood Ave., Piedmont, California

WEISS ASSOCIATES
38 McClure St., Oakland, CA 94609 415-465-1100

Report Results to Joseph Theisen II

SEND RESULTS TO: Joseph Theisen

CHAIN-OF-CUSTODY RECORD AND ANALYTIC INSTRUCTIONS

WA Personnel: Be sure to include copy of this form in the field sampling files

Shuttle Inventory Number: _____

Project ID: 81-401-00

Shipping Seal No. _____

NOTES TO LAB:
1) Specify analytic method and detection limit in report.
2) Notify us if there are any anomalous peaks on GC or other scans.
3) ANY QUESTIONS/CLARIFICATIONS: CALL US.

Sampled by: Jack Gardner Laboratory Name: IT

No. of Containers	Sample ID	Sampling Date	Container Type[A]	Sample/ Analyze/ Hold[B]	Turn-around[C]	Analyze For:	Analytic Method/ Detection Limit	Comments
1	BH-A-3.6	7/5/89	T	A	N = 1 wk	TPH-gas BETX	8015/8020 purge trap	
1	BH-A-7.0	7/5/89	T			Comp for TOT and	7421 / DHS CAM	Composite 7.0, 13.3 16.0
1	BH-A-13.3	7/5/89	T	A		organic lead		into (1) for TPH/BETX anal
1	BH-A-16.0	7/5/89	T					Composite all BH-A samples into
1	BH-B-1.0	7/5/89	T	A				(1) for total and organic lead anal
1	BH-B-3.5	7/5/89	T	A				
1	BH-B-7.4	7/5/89	T	A				Comp all BH-B for total
1	BH-B-10.5	7/5/89	T	A				and organic lead anal
1	BH-B-14.0	7/5/89	T	A				
1	BH-C-3.5	7/5/89	T	A				
1	BH-C-5.5	7/5/89	T	A				Comp all BH-C for total
1	BH-C-9.0	7/5/89	T	A				and organic lead anal
1	BH-C-10.5	7/5/89	T	Hold				
1	BH-C-14.0	7/5/89	T	Hold				
1	BH-D-2.5	7/6/89	T	A				

1 Jack Gardner 7/7/89 — Released by (Signature), Date

2 _____ 7/7/89 1215 — Received by (Signature), Date

3 _____ 7/7/89 12:15 — Released by (Signature), Date

4 Same — Shipping Carrier, Method, Date

5 _____ — Released by (Signature), Date

6 _____ — Received by Lab Personnel, Date, Telephone

x _____ — Seal intact?, Number

A Sample Type Codes: W = Water, S = Soil, O = Other (Specify) Container Type Codes: P = Plastic bottles, G = Glass bottle, T = Brass tube, O = Other (Specify)
B Analyze/Hold: A = Analyze; HOLD (spell out) = DO NOT ANALYZE UNLESS NECESSARY OR REQUESTED.
C N = Normal Turnaround, F = 1-Week Turnaround, R = 24-hour Turnaround

WEISS ASSOCIATES
8 McClure St. Oakland, CA 94609 415-465-1100

SEND RESULTS TO: J. Theisen

WA Personnel: Be sure to include copy of this form in the field sampling files

Project ID: 81-401-00

CHAIN-OF-CUSTODY RECORD AND ANALYTIC INSTRUCTIONS

Shuttle Inventory Number: _____

Shipping Seal No. _____

NOTES TO LAB:
1) Specify analytic method and detection limit in report.
2) Notify us if there are any anomalous peaks on GC or other scans.
3) ANY QUESTIONS/CLARIFICATIONS: CALL US.

Sampled by: JKG Laboratory Name: IT

No. of Containers	Sample ID	Sampling Date	Container Type[A]	Sample/ Analyze/ Hold[B]	Turn-around[C]	Analyze For:	Analytic Method/ Detection Limit	Comments
1	BH-D-6.0	7/6/89	T	A	N = 1wk	TPH-gas/BETX	8015/8020/7421/	comp all BH-D for total
1	BH-D-9.5	7/6/89	T	A		comp for total and	DHS-LUFT	and organic lead anal
1	BH-D-15.0	7/6/89	T	A		organic lead		
1	BH-E-2.0	7/6/89	T	▼3.0 A				comp all BH-E for tot and
1	BH-E-5.8	7/6/89	T	A				organic lead anal
1	BH-H-3.5	7/6/89	T	▼5.0 A				comp all BH-H for tot and
1	BH-H-7.0	7/6/89	T	A				organic lead anal
1	BH-I-4.0	7/6/89	T	▼5.5 A				
1	BH-I-7.5	7/6/89	T	A				comp all BH-I for total
1	BH-I-10.0	7/6/89	T	A				and organic lead anal
1	BH-I-12.0	7/6/89	T	HOLD				
1	Drum-1	7/5/89	T			TPH-gas/BETX/		
1	Drum-2	7/5/89	T	Comp		total and organic lead		Composite Drum 1, 2, 3
1	Drum-3	7/5/89	T					anal for fuel and lead
1	Drum 4	7/5/89	T	A w/ Drum 5&6				Composite w/ Drum 5&6 anal for fuel and lead

1 Jack Gaskin 7/7/89 — Released by (Signature), Date

2 [signature] 7/7/89 12:15 — Received by (Signature), Date

3 [signature] 7/7/89 12:15 — Released by (Signature), Date

4 [signature] — Shipping Carrier, Method, Date

5 _____ — Released by (Signature), Date

6 _____ — Received by Lab Personnel, Date, Telephone

x _____ — Seal Intact?, Number

A Sample Type Codes: W = Water, S = Soil, O = Other (Specify) Container Type Codes: P = Plastic bottles, G = Glass bottle, T = Brass tube, O = Other (Specifiy)
B Analyze/Hold: A = Analyze; HOLD (spell out) = DO NOT ANALYZE UNLESS NECESSARY OR REQUESTED.
C N = Normal Turnaround, F = 1-Week Turnaround, R = 24-hour Turnaround

WEISS ASSOCIATES
038 McClure St., Oakland, CA 94609 415-465-1100

SEND RESULTS TO: J. Theisen

CHAIN-OF-CUSTODY RECORD AND ANALYTIC INSTRUCTIONS

WA Personnel: Be sure to include copy of this form in the field sampling files

Shuttle Inventory Number: _____

Project ID: 81-401-00

Shipping Seal No. _____

NOTES TO LAB:
1) Specify analytic method and detection limit in report.
2) Notify us if there are any anomalous peaks on GC or other scans.
3) ANY QUESTIONS/CLARIFICATIONS: CALL US.

Sampled by: JKG

Laboratory Name: IT

No. of Containers	Sample ID	Sampling Date	Container Type[A]	Sample/ Analyze/ Hold[B]	Turn-around[C]	Analyze For:	Analytic Method/ Detection Limit	Comments
1	Drum 5	7/6/89	T	} Comp w/ Drum 6	N ≤ 1 wk	TPH-gas/BETX	8015/8020/7421/	Composite Drums 4,5, for fuel and lead
1	Drum 6	7/6/89	T		↓	tot & organic lead	DHS CAFT	

1 Jack Gardner 7/7/89 — Released by (Signature), Date

2 [signature] 7/7/89 1225 — Received by (Signature), Date

3 PTLS 7/7/89 12:15 — Released by (Signature), Date

4 Same — Shipping Carrier, Method, Date

5 _____ — Released by (Signature), Date

6 _____ — Received by Lab Personnel, Date, Telephone

x _____ — Seal intact?, Number

A Sample Type Codes: W = Water, S = Soil, O = Other (Specify) . Container Type Codes: P = Plastic bottles, G = Glass bottle, T = Brass tube, O = Other (Specifiy)
B Analyze/Hold: A = Analyze; HOLD (spell out) = DO NOT ANALYZE UNLESS NECESSARY OR REQUESTED.
C N = Normal Turnaround, F = 1-Week Turnaround, R = 24-hour Turnaround

SEND RESULTS TO TH[illegible]

WEISS ASSOCIATES

2938 McClure St., Oakland, CA 94609 415-465-1100

CHAIN-OF-CUSTODY RECORD AND ANALYTIC INSTRUCTIONS

Shuttle Inventory Number: NA

Shipping Seal No. NA

Sampled by: Dean Osaki Laboratory Name: I.T.

WA Personnel: Be sure to include copy of this form in the field sampling files

Project ID: 81-401-00

NOTES TO LAB:
1) Specify analytic method and detection limit in report.
2) Notify us if there are any anomalous peaks on GC or other scans.
3) Duplicates listed in parentheses.
4) ANY QUESTIONS/CLARIFICATIONS: CALL US.

Sample ID	Sampling Date	Sample/ Container Type[1]	Analyze/ Hold[2]	Turn-around[3]	Analyze For:	Analytic Method/ Detection Limit	Comments
(2) 81-401-21	7/12/89	W/V	A	N	T.F.H & BETX		
(3) 81-401-22	↓	↓	↓	↓	↓		
81-401-1					EPA 624 + T.F.H.		
81-401-2					↓		
81-401-3							
81-401-E4							

X _____ Received by (Signature), Date

X Kathryn Yamamoto Released by (Signature), Date 7/13/89 12:30pm

X _____ Released by (Signature), Date

X _____ Released by (Signature), Date

X Same Shipping Carrier, Method, Date

X [signature] Received by Lab Personnel, Date, Telephone 7/13/89 1230

X X Seal Intact?, Number

1 - Sample Type Codes: W = Water, S = Soil, O = Other (specify).
Container Type Codes: V = VOA Bottle, P = Plastic Bottle, G = Glass Bottle, T = Brass Tube, O = Other (specify).

2 - Analyze/Hold: A = Analyze; HOLD (spell out) = DO NOT ANALYZE UNLESS NECESSARY OR REQUESTED.

3 - N = Normal Turnaround, F = 1-Week Turnaround, R = 24-Hour Turnaround

1C:/FORMS/CHAINCUS

INTERNATIONAL TECHNOLOGY CORPORATION

July 11, 1989

Weiss Associates
2936 McClure Street
Oakland, CA 94609
(415) 465-1100

RE:Project #: 81-401-00

ATTENTION: Joseph Theisen:

On July 07, 1989, the following samples were received at the ITAS San Jose Laboratory:
Your Sample ID's :

BH-A-13.3
BH-A-16.0
BH-A-3.6
BH-A-7.0
BH-B-1.0
BH-B-10.5
BH-B-14.0
BH-B-3.5
BH-B-7.4
BH-C-10.5
BH-C-14.0
BH-C-3.5
BH-C-5.5
BH-C-9.0
BH-D-15.0
BH-D-2.5
BH-D-6.0
BH-D-9.5
BH-E-2.0
BH-E-5.8
BH-H-3.5
BH-H-7.0
BH-I-10.0
BH-I-12.0
BH-I-4.0
BH-I-7.5
Drum-1
Drum-2
Drum-3
Drum-4
Drum-5
Drum-6

The samples were checked into our sample tracking system as order number S9-07-063 and assigned testing for the following parameters:

Metal Digestion-water
Graphite Furnace Lead
Total Petroleum HC's

When the above analyses are completed, your report will be issued to the address or addresses stated on the request for analysis form. If you need to arrange for other reporting, please contact me.

Sincerely,

Efren Sablan
Sample Control Manager

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

The results of the analysis for Organic Lead performed by ITAS-Cerritos are attached. The sample identifications are as follows:

Client Sample ID	ITAS-San Jose Sample ID	ITAS-Cerritos Sample ID
BH-A-3.6, BH-A-7.0, BH-A-13.3, BH-A-16.0 [composite]	S9-07-063-01, S9-07-063-02, S9-07-063-03, S9-07-063-04 [composite]	01A
BH-B-1.0, BH-B-3.5, BH-B-7.4, BH-B-10.5, BH-B-14.0 [composite]	S9-07-063-05, S9-07-063-06, S9-07-063-07, S9-07-063-08, S9-07-063-09 [composite]	02A
BH-C-3.5, BH-C-5.5, BH-C-9.0 [composite]	S9-07-063-10, S9-07-063-11, S9-07-063-12 [composite]	03A
BH-D-2.5, BH-D-6.0, BH-D-9.5 [composite]	S9-07-063-15, S9-07-063-16, S9-07-063-17 [composite]	04A
BH-E-2.0, BH-E-5.8 [composite]	S9-07-063-19, S9-07-063-20 [composite]	05A
BH-H-3.5, BH-H-7.0 [composite]	S9-07-063-21, S9-07-063-22 [composite]	06A
BH-I-4.0, BH-I-7.5, BH-I-10.0 [composite]	S9-07-063-23, S9-07-063-24, S9-07-063-25 [composite]	07A

Reviewed and Approved

Michael E. Dean
Project Manager

MED/jd
26 Pages Following - Tables of Results
Enclosure: ITAS-Cerritos Report

INTERNATIONAL TECHNOLOGY CORPORATION

July 18, 1989

Weiss Associates
2938 McClure Street
Oakland, CA 94609
(415) 465-1100

RE:Project #: 81-401-00

ATTENTION: Joseph Theisen

On July 13, 1989, the following samples were received at the ITAS San Jose Laboratory:
Your Sample ID's :

81-401-1
81-401-2
81-401-21
81-401-22
81-401-3
81-401-E4

The samples were checked into our sample tracking system as order number S9-07-102 and assigned testing for the following parameters:

Gasoline/BTEX in Water
Volatiles Water

When the above analyses are completed, your report will be issued to the address or addresses stated on the request for analysis form. If you need to arrange for other reporting, please contact me.

Sincerely,

Efren Sablan
Sample Control Manager

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Weiss Associates
2938 McClure Street
Oakland, CA 94609
ATTN: Joseph Theisen

Date: July 24, 1989

Work Order Number: S9-07-063

P.O. Number: Verbal

This is the Certificate of Analysis for the following samples:

Client Project ID:	81-401-00
Date Received by Lab:	7/7/89
Number of Samples:	29
Sample Type:	Soil

The methods of analysis for metals and general chemistry are taken from E.P.A. protocol, using methods from SW-846, 3rd Edition or Methods for Chemical Analysis of Water and Wastes, 600/4-79-020. The method used is listed adjacent to the parameter in the table.

The method of analysis for low boiling hydrocarbons is taken from EPA Methods 8015, 8020 and 5030. The sample is examined using the purge and trap technique. Final detection is by gas chromatography using a flame ionization detector as well as a photoionization detector. The result for total low boiling hydrocarbons is calculated as gasoline and includes benzene, toluene, ethyl benzene and xylenes.

Continued

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-A-3.6

Sample Date: 7/5/89
Lab Sample ID: S9-07-063-01
Receipt Condition: Cool
Extraction Date: 7/12/89
Analysis Date: 7/13/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Lab Sample ID	Client Sample ID	Sample Date
S9-07-063-01, S9-07-063-02, S9-07-063-03, S9-07-063-04 [composite]	BH-A-3.6, BH-A-7.0, BH-A-13.3, BH-A-16.0 [composite]	7/5/89
S9-07-063-05, S9-07-063-06, S9-07-063-07, S9-07-063-08 S9-07-063-09 [composite]	BH-B-1.0, BH-B-3.5, BH-B-7.4, BH-B-10.5, BH-B-14.0 [composite]	7/5/89
S9-07-063-10, S9-07-063-11 S9-07-063-12 [composite]	BH-C-3.5, BH-C-5.5, BH-C-9.0 [composite]	7/5/89

Results - Milligrams per Kilogram

Lab Sample ID	Parameter	E.P.A. Method	Detected
S9-07-063-01, S9-07-063-02, S9-07-063-03, S9-07-063-04 [composite]	Lead	6010	27.
S9-07-063-05, S9-07-063-06, S9-07-063-07, S9-07-063-08 S9-07-063-09 [composite]	Lead	6010	25.
S9-07-063-10, S9-07-063-11 S9-07-063-12 [composite]	Lead	6010	34.
Detection Limit			1.5

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Lab Sample ID	Client Sample ID	Sample Date
S9-07-063-15, S9-07-063-16, S9-07-063-17, S9-07-063-18 [composite]	BH-D-2.5, BH-D-6.0, BH-D-9.5, BH-D-15.0 [composite]	7/6/89
S9-07-063-19, S9-07-063-20, [composite]	BH-E-2.0, BH-E-5.8 [composite]	7/6/89
S9-07-063-21, S9-07-063-22, [composite]	BH-H-3.5, BH-H-7.0 [composite]	7/6/89

Results - Milligrams per Kilogram

Lab Sample ID	Parameter	E.P.A. Method	Detected
S9-07-063-15, S9-07-063-16, S9-07-063-17, S9-07-063-18 [composite]	Lead	6010	26.
S9-07-063-19, S9-07-063-20, [composite]	Lead	6010	28.
S9-07-063-21, S9-07-063-22, [composite]	Lead	6010	32.
Detection Limit			1.5

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Lab Sample ID	Client Sample ID	Sample Date
S9-07-063-23, S9-07-063-24, S9-07-063-25 [composite]	BH-I-4.0, BH-I-7.5, BH-I-10.0 [composite]	7/6/89
S9-07-063-27, S9-07-063-28, S9-07-063-29 [composite]	Drum 1, Drum 2, Drum 3 [composite]	7/5/89
S9-07-063-30, S9-07-063-31, S9-07-063-32 [composite]	Drum 4, Drum 5 Drum 6 [composite]	7/5/89, 7/6/89

Results - Milligrams per Kilogram

Lab Sample ID	Parameter	E.P.A. Method	Detected
S9-07-063-23, S9-07-063-24, S9-07-063-25 [composite]	Lead	6010	24.
S9-07-063-27, S9-07-063-28, S9-07-063-29 [composite]	Lead	6010	19.
S9-07-063-30, S9-07-063-31, S9-07-063-32 [composite]	Lead	6010	46.
Detection Limit			1.5

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00 Work Order Number: S9-07-063

Client Sample ID: BH-A-7.0, BH-A-13.3, BH-A-16.0 [composite]

Sample Date: 7/5/89
Lab Sample ID: S9-07-063-02, S9-07-063-03, S9-07-063-04 [composite]
Receipt Condition: Cool
Extraction Date: 7/12/89
Analysis Date: 7/13/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-B-1.0

Sample Date: 7/5/89
Lab Sample ID: S9-07-063-05
Receipt Condition: Cool
Extraction Date: 7/12/89
Analysis Date: 7/13/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	11.
Benzene	0.05	0.19
Toluene	0.1	None
Ethyl Benzene	0.1	0.1
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00 Work Order Number: S9-07-063

Client Sample ID: BH-B-3.5

Sample Date: 7/5/89
Lab Sample ID: S9-07-063-06
Receipt Condition: Cool
Extraction Date: 7/12/89
Analysis Date: 7/13/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	90.	710.
Benzene	1.	3.
Toluene	2.	5.
Ethyl Benzene	2.	17.
Xylenes (total)	6.	71.

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-B-7.4
Sample Date: 7/5/89
Lab Sample ID: S9-07-063-07
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/14/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	5.
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-B-10.5
Sample Date: 7/5/89
Lab Sample ID: S9-07-063-08
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/14/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00 Work Order Number: S9-07-063

Client Sample ID: BH-B-14.0
Sample Date: 7/5/89
Lab Sample ID: S9-07-063-09
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/14/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00 Work Order Number: S9-07-063

Client Sample ID: BH-C-3.5
Sample Date: 7/5/89
Lab Sample ID: S9-07-063-10
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/14/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	72.
Benzene	0.05	1.3
Toluene	0.1	0.3
Ethyl Benzene	0.1	0.2
Xylenes (total)	0.3	0.7

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-C-5.5
Sample Date: 7/5/89
Lab Sample ID: S9-07-063-11
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/14/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	30.	270.
Benzene	0.3	1.2
Toluene	0.6	3.1
Ethyl Benzene	0.6	8.3
Xylenes (total)	2.	42.

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-C-9.0
Sample Date: 7/5/89
Lab Sample ID: S9-07-063-12
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89
Low Boiling Hydrocarbons Analysis Date: 7/14/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-D-2.5
Sample Date: 7/6/89
Lab Sample ID: S9-07-063-15
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/14/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-D-6.0
Sample Date: 7/6/89
Lab Sample ID: S9-07-063-16
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/14/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-D-9.5
Sample Date: 7/6/89
Lab Sample ID: S9-07-063-17
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/17/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-D-15.0
Sample Date: 7/6/89
Lab Sample ID: S9-07-063-18
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/17/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-E-2.0
Sample Date: 7/6/89
Lab Sample ID: S9-07-063-19
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/17/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-E-5.8
Sample Date: 7/6/89
Lab Sample ID: S9-07-063-20
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/17/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-H-3.5
Sample Date: 7/6/89
Lab Sample ID: S9-07-063-21
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/17/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	8.
Benzene	0.05	0.07
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-H-7.0
Sample Date: 7/6/89
Lab Sample ID: S9-07-063-22
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/17/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-I-4.0
Sample Date: 7/6/89
Lab Sample ID: S9-07-063-23
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/17/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	60.	540.
Benzene	1.	None
Toluene	2.	None
Ethyl Benzene	1.	4.
Xylenes (total)	10.	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-I-7.5
Sample Date: 7/6/89
Lab Sample ID: S9-07-063-24
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/17/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	29.
Benzene	0.2	None
Toluene	0.1	None
Ethyl Benzene	0.1	0.2
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: BH-I-10.0
Sample Date: 7/6/89
Lab Sample ID: S9-07-063-25
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/17/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	None
Benzene	0.05	None
Toluene	0.1	None
Ethyl Benzene	0.1	None
Xylenes (total)	0.3	None

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: Drum-1, Drum-2, Drum-3 [composite]
Sample Date: 7/5/89
Lab Sample ID: S9-07-063-27, S9-07-063-28, S9-07-063-29 [composite]
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/13/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	5.	53.
Benzene	0.05	0.11
Toluene	0.1	0.2
Ethyl Benzene	0.1	1.0
Xylenes (total)	0.3	4.3

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-063

Client Sample ID: Drum-4, Drum-5, Drum-6 [composite]
Sample Date: 7/5/89, 7/6/89
Lab Sample ID: S9-07-063-30, S9-07-063-31, S9-07-063-32 [composite]
Receipt Condition: Cool

Low Boiling Hydrocarbons Extraction Date: 7/12/89

Low Boiling Hydrocarbons Analysis Date: 7/13/89

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

Results - Milligrams per Kilogram

Parameter	Detection Limit	Detected
Low Boiling Hydrocarbons, calculated as Gasoline	50.	420.
Benzene	0.5	2.2
Toluene	1.	1.
Ethyl Benzene	1.	3.
Xylenes (total)	3.	5.

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation
2055 Junction Avenue
San Jose, CA 95051

July 27, 1989

Attn: Mike Dean

Job No: 52579

P.O. No: 4631-270

This is the Certificate of Analysis for the following samples:

Client Project ID:	4631-270 (Weiss/Shell)
Date Received by Lab:	July 13, 1989
Number of Samples:	7
Sample Type:	Soil

Corrected Report

I. Introduction

ITAS-Cerritos received seven (7) soil samples July 13, 1989. The samples were received for the analytical work summarized in the Table of Contents.

The samples were labeled as follows:

S9-07-063-1A,2A,3A,4A S9-07-063-5A,6A,7A,8A,9A S9-07-063-10A,11A,12A
S9-07-063-15A,16A,17A S9-07-063-19A,20A S9-07-063-21A,22A
S9-07-063-23A,24A,25A

II. Analytical Results/Methodology

The samples were extracted and analyzed for organic lead according to the California DHS LUFT Method. The samples were analyzed for organic lead using flame atomic absorption spectroscopy. The results are listed in the Metals Section.

Explanations of all data qualifiers are listed in Appendix A.

Reviewed and Approved:

Donna Kozak
Donna Kozak
Project Manager

MC

III. Quality Control

The sample was analyzed in accordance with the ITAS Quality Control Program.

IV. Table of Contents

DK:wh

IT Corporation (Weiss/Shell)
Date: 07/27/89

Client Project ID: 4631-270

IT ANALYTICAL SERVICES
CERRITOS, CA

Page: MET-1
Job Number: 52579

Metals Section

Organic Lead - LUFT Method [h]

Client Sample ID		Date Sampled	Lab Sample ID	Date Analysis Completed	Detection Limit (A)	Conc. mg/kg
S9-07-063-1A,2A,3A,4A	A	07/05/89	01A	07/17/89	0.2	ND<1
S9-07-063-5A,6A,7A,8A,9A	B	07/05/89	02A	07/17/89	0.2	ND<1
S9-07-063-10A,11A,12A	C	07/05/89	03A	07/17/89	0.2	ND<1
S9-07-063-15A,16A,17A	D	07/06/89	04A	07/17/89	0.2	ND<1
S9-07-063-19A,20A	E	07/06/89	05A	07/17/89	0.2	ND<1
S9-07-063-21A,22A	H	07/06/89	06A	07/17/89	0.2	ND<1
S9-07-063-23A,24A,25A	J	07/06/89	07A	07/17/89	0.2	ND<1

APPENDIX A

Definitions:

A - Detection limits are based upon concentration in the aqueous extract and are expressed in milligrams per liter. Actual detection limits may vary due to sample matrix.

CE - Compounds co-elute. Amount reported is total.

NA - Not Applicable.

ND - Indicates analyte was analyzed for but not detected. Unless otherwise stated, the method detection limit for each analyte is as reported in the "Detection Limit" column. Detection limits which are adjusted due to sample matrix or volume are stated where applicable.

1 - Cannot be separated from Diphenylamine.

2 - Quantitated as Azobenzene.

References:

a = EPA 600/4-79-020
b = SW846, 3rd edition
c = Standard Method for Analysis of Water and Wastewater, 16th edition
d = American Standard Testing Methods
f = NIOSH, 3rd edition
g = EPA 600/4-84-017
h = California DHS LUFT Manual

Units:

ug/L = Micrograms per liter
ug/kg = Micrograms per kilogram
mg/L = Milligrams per liter
mg/kg = Milligrams per kilogram
mg/cm3 = Milligrams per cubic centimeter
mg/M3 = Milligrams per cubic meter

Quality Control Definitions:

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
% Rec. = Percent Recovery

$$RPD = \frac{|MS-MSD|}{((MS+MSD)/2)}$$

BS = Blank Spike
BSD = Blank Spike Duplicate
RPD = Relative Percent Difference
% Rec. = Percent Recovery

$$RPD = \frac{|BS-BSD|}{((BS+BSD)/2)}$$

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

It Corporation
2055 Junction Avenue
San Jose, CA 95051

July 17, 1989

Attn: Mike Dean

Job No: 52585

P.O. No: S9-07

This is the Certificate of Analysis for the following sample:

Client Project ID:	S9-07-063 (Weiss/Shell)
Date Received by Lab:	July 13, 1989
Number of Samples:	2
Sample Type:	Soil

I. Introduction

ITAS-Cerritos received two (2) soil samples July 13, 1989. The samples were received for the analytical work summarized in the Table of Contents.

The samples were labeled as follows:
S9-07-063-27A,28A,29A S9-07-063-30A,31A,32A.

II. Analytical Results/Methodology

The samples were extracted and analyzed for organic lead according to the California DHS LUFT Method using flame atomic absorption spectroscopy. The results are listed in the Metals Section.

Explanations of all data qualifiers are listed in Appendix A.

Reviewed and Approved:

Donna Kozak
Project Manager

III. Quality Control

The sample was analyzed in accordance with the ITAS Quality Control Program.

IV. Table of Contents

DK:dc

IT Corporation (Weiss/Shell)
Date: 7/17/89

Client Project ID: S9-07-063

IT ANALYTICAL SERVICES
CERRITOS, CA

Page: MET-1
Job Number: 52585

Metals Section

Organic Lead - LUFT Method [h]

Client Sample ID	Date Sampled	Lab Sample ID	Date Analysis Completed	Detection Limit	Conc. mg/Kg
S9-07-063-27A,28A,29A	7/5/89	01A	7/14/89	0.2	ND<1
S9-07-063-30A,31A,32A	7/5&6/89	02A	7/14/89	0.2	ND<1

APPENDIX A

Definitions:

ND - Indicates analyte was analyzed for but not detected. Unless otherwise stated, the method detection limit for each analyte is as reported in the "Detection Limit" column. Detection limits which are adjusted due to sample matrix or volume are stated where applicable.

A - Detection limits are based upon concentration in the aqueous extract and are expressed in milligrams per liter. Actual detection limits may vary due to sample matrix.

CE - Compounds co-elute. Amount reported is total.

1 - Cannot be separated from Diphenylamine.

2 - Quantitated as Azobenzene.

References:

a = EPA 600/4-79-020
b = SW846, 3rd edition
c = Standard Method for Analysis of Water and Wastewater, 16th edition
d = American Standard Testing Methods
e = NIOSH, 2nd edition
f = NIOSH, 3rd edition
g = EPA 600/4-84-017
h = LUFT Manual

Units:

ug/L = Micrograms per liter
ug/kg = Micrograms per kilogram
mg/L = Milligrams per liter
mg/kg = Milligrams per kilogram
mg/cm3 = Milligrams per cubic centimeter
mg/M3 = Milligrams per cubic meter

Quality Control Definitions:

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
% Rec. = Percent Recovery

$$RPD = \frac{|MS-MSD|}{}$$

BS = Blank Spike
BSD = Blank Spike Duplicate
RPD = Relative Percent Difference
% Rec. = Percent Recovery

$$RPD = \frac{|BS-BSD|}{}$$

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Weiss Associates
2938 McClure Street
Oakland, CA 94609
ATTN: Joseph Theisen

Date: August 7, 1989

Work Order Number: S9-07-102

P.O. Number: MOH 890501A

This is the Certificate of Analysis for the following samples:

Client Project ID:	81-401-00, Shell
Date Received by Lab:	7/13/89
Number of Samples:	6
Sample Type:	Water

The method of analysis for low boiling hydrocarbons is taken from EPA Methods 8015, 8020 and 5030. The sample is examined using the purge and trap technique. Final detection is by gas chromatography using a flame ionization detector as well as a photoionization detector. The result for total low boiling hydrocarbons is calculated as gasoline and includes benzene, toluene, ethyl benzene and xylenes.

The method of analysis for volatile organics is taken from E.P.A. Methods 624 and 8240. Water samples and low-level soil samples are analyzed directly using the purge and trap technique. Medium-level soil samples are extracted with methanol and a portion of the extract is analyzed using the purge and trap technique. Final detection is by gas chromatography/mass spectrometry.

Any of the compounds in a table of results would have been detected had it been present at or above the limit of detection listed. Detection limits are adjusted to reflect dilution of the sample. Also, detection limits may vary due to sample matrix.

Reviewed and Approved

Michael E. Dean
Project Manager

MED/an
5 Pages Following - Tables of Results

Date: August 7, 1989

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00, Shell

Work Order Number: S9-07-102

Lab Sample ID	Client Sample ID	Sample Date	Date Analysis Completed	Sample Condition on Receipt
S9-07-102-01	81-401-21	7/12/89	7/19/89	cool pH >2
S9-07-102-02	81-401-22	7/12/89	7/19/89	cool pH <2
S9-07-102-03	81-401-1	7/12/89	7/19/89	cool pH <2
S9-07-102-04	81-401-2	7/12/89	7/19/89	cool pH <2
S9-07-102-05	81-401-3	7/12/89	7/19/89	cool pH <2
S9-07-102-06	81-401-E4	7/12/89	7/19/89	cool pH <2

Total Petroleum Hydrocarbons - Modified E.P.A. Methods 8015, 8020

ND = None Detected

Results - Milligrams per Liter

Lab Sample ID	Client Sample ID	Low Boiling Hydrocarbons (calculated as Gasoline)	Benzene	Toluene	Ethyl Benzene	Xylenes (total)
S9-07-102-01	81-401-21	ND	ND	ND	ND	ND
S9-07-102-02	81-401-22	ND	ND	ND	ND	ND
S9-07-102-03	81-401-1	ND	ND	ND	ND	ND
S9-07-102-04	81-401-2	0.06	0.0027	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003
S9-07-102-05	81-401-3	3.9	0.38	0.041	0.099	0.30
Detection Limit		0.2	0.002	0.005	0.005	0.02
S9-07-102-06	81-401-E4	ND	ND	ND	ND	ND
Detection Limit		0.05	0.0005	0.001	0.001	0.003

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-102

Client Sample ID: 81-401-1

Sample Date: 7/12/89
Lab Sample ID: S9-07-102-03
Receipt Condition: Cool, pH <2
Analysis Date: 7/17/89

Volatile Organics - E.P.A. Methods 624, 8240

Results - Milligrams per Liter

Parameter	Detection Limit	Detected	Parameter	Detection Limit	Detected
Chloromethane	0.010	None	cis-1,3-Dichloropropene	0.005	None
Bromomethane	0.010	None	Trichloroethene	0.005	None
Vinyl Chloride	0.010	None	Chlorodibromomethane	0.005	None
Chloroethane	0.010	None	1,1,2-Trichloroethane	0.005	None
Methylene Chloride	0.005	None	Benzene	0.005	None
Acetone	0.010	None	trans-1,3-Dichloropropene	0.005	None
Carbon Disulfide	0.005	None	Bromoform	0.005	None
1,1-Dichloroethene	0.005	None	4-Methyl-2-pentanone	0.010	None
1,1-Dichloroethane	0.005	None	2-Hexanone	0.010	None
1,2-Dichloroethene (Total)	0.005	None	Tetrachloroethene	0.005	None
Chloroform	0.005	None	1,1,2,2-Tetrachloroethane	0.005	None
1,2-Dichlorethane	0.005	None	Toluene	0.005	None
2-Butanone	0.010	None	Chlorobenzene	0.005	None
1,1,1-Trichloroethane	0.005	None	Ethylbenzene	0.005	None
Carbon Tetrachloride	0.005	None	Styrene	0.005	None
Vinyl Acetate	0.010	None	Xylenes (Total)	0.005	None
Bromodichloromethane	0.005	None	Acrolein	0.010	None
1,2-Dichloropropane	0.005	None	Acrylonitrile	0.010	None

Surrogates	Limits	% Rec
1,2-Dichloroethane-d4	76-114	103.
Toluene-d8	88-110	98.
4-Bromofluorobenzene	86-115	95.

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-102

Client Sample ID: 81-401-2

Sample Date: 7/12/89
Lab Sample ID: S9-07-102-04
Receipt Condition: Cool, pH <2
Analysis Date: 7/17/89

Volatile Organics - E.P.A. Methods 624, 8240

Results - Milligrams per Liter

Parameter	Detection Limit	Detected	Parameter	Detection Limit	Detected
Chloromethane	0.010	None	cis-1,3-Dichloropropene	0.005	None
Bromomethane	0.010	None	Trichloroethene	0.005	None
Vinyl Chloride	0.010	None	Chlorodibromomethane	0.005	None
Chloroethane	0.010	None	1,1,2-Trichloroethane	0.005	None
Methylene Chloride	0.005	None	Benzene	0.005	None
Acetone	0.010	None	trans-1,3-Dichloropropene	0.005	None
Carbon Disulfide	0.005	None	Bromoform	0.005	None
1,1-Dichloroethene	0.005	None	4-Methyl-2-pentanone	0.010	None
1,1-Dichloroethane	0.005	None	2-Hexanone	0.010	None
1,2-Dichloroethene (Total)	0.005	None	Tetrachloroethene	0.005	None
Chloroform	0.005	None	1,1,2,2-Tetrachloroethane	0.005	None
1,2-Dichlorethane	0.005	None	Toluene	0.005	None
2-Butanone	0.010	None	Chlorobenzene	0.005	None
1,1,1-Trichloroethane	0.005	None	Ethylbenzene	0.005	None
Carbon Tetrachloride	0.005	None	Styrene	0.005	None
Vinyl Acetate	0.010	None	Xylenes (Total)	0.005	None
Bromodichloromethane	0.005	None	Acrolein	0.010	None
1,2-Dichloropropane	0.005	None	Acrylonitrile	0.010	None

Surrogates	Limits	% Rec
1,2-Dichloroethane-d4	76-114	103.
Toluene-d8	88-110	99.
4-Bromofluorobenzene	86-115	95.

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-102

Client Sample ID: 81-401-3

Sample Date: 7/12/89
Lab Sample ID: S9-07-102-05
Receipt Condition: Cool, pH <2
Analysis Date: 7/17/89

Volatile Organics - E.P.A. Methods 624, 8240

Results - Milligrams per Liter

Parameter	Detection Limit	Detected	Parameter	Detection Limit	Detected
Chloromethane	0.050	None	cis-1,3-Dichloropropene	0.025	None
Bromomethane	0.050	None	Trichloroethene	0.025	None
Vinyl Chloride	0.050	None	Chlorodibromomethane	0.025	None
Chloroethane	0.050	None	1,1,2-Trichloroethane	0.025	None
Methylene Chloride	0.025	None	Benzene	0.025	0.410
Acetone	0.050	None	trans-1,3-Dichloropropene	0.025	None
Carbon Disulfide	0.025	None	Bromoform	0.025	None
1,1-Dichloroethene	0.025	None	4-Methyl-2-pentanone	0.050	None
1,1-Dichloroethane	0.025	None	2-Hexanone	0.050	None
1,2-Dichloroethene (Total)	0.025	None	Tetrachloroethene	0.025	None
Chloroform	0.025	None	1,1,2,2-Tetrachloroethane	0.025	None
1,2-Dichlorethane	0.025	None	Toluene	0.025	0.036
2-Butanone	0.050	None	Chlorobenzene	0.025	None
1,1,1-Trichloroethane	0.025	None	Ethylbenzene	0.025	0.097
Carbon Tetrachloride	0.025	None	Styrene	0.025	None
Vinyl Acetate	0.050	None	Xylenes (Total)	0.025	0.300
Bromodichloromethane	0.025	None	Acrolein	0.050	None
1,2-Dichloropropane	0.025	None	Acrylonitrile	0.050	None

Surrogates	Limits	% Rec
1,2-Dichloroethane-d4	76-114	102.
Toluene-d8	88-110	101.
4-Bromofluorobenzene	86-115	99.

IT ANALYTICAL SERVICES
SAN JOSE, CA

Client Project ID: 81-401-00

Work Order Number: S9-07-102

Client Sample ID: 81-401-E4

Sample Date: 7/12/89
Lab Sample ID: S9-07-102-06
Receipt Condition: Cool, pH <2
Analysis Date: 7/17/89

Volatile Organics - E.P.A. Methods 624, 8240

Results - Milligrams per Liter

Parameter	Detection Limit	Detected	Parameter	Detection Limit	Detected
Chloromethane	0.010	None	cis-1,3-Dichloropropene	0.005	None
Bromomethane	0.010	None	Trichloroethene	0.005	None
Vinyl Chloride	0.010	None	Chlorodibromomethane	0.005	None
Chloroethane	0.010	None	1,1,2-Trichloroethane	0.005	None
Methylene Chloride	0.005	None	Benzene	0.005	None
Acetone	0.010	None	trans-1,3-Dichloropropene	0.005	None
Carbon Disulfide	0.005	None	Bromoform	0.005	None
1,1-Dichloroethene	0.005	None	4-Methyl-2-pentanone	0.010	None
1,1-Dichloroethane	0.005	None	2-Hexanone	0.010	None
1,2-Dichloroethene (Total)	0.005	None	Tetrachloroethene	0.005	None
Chloroform	0.005	None	1,1,2,2-Tetrachloroethane	0.005	None
1,2-Dichlorethane	0.005	None	Toluene	0.005	None
2-Butanone	0.010	None	Chlorobenzene	0.005	None
1,1,1-Trichloroethane	0.005	None	Ethylbenzene	0.005	None
Carbon Tetrachloride	0.005	None	Styrene	0.005	None
Vinyl Acetate	0.010	None	Xylenes (Total)	0.005	None
Bromodichloromethane	0.005	None	Acrolein	0.010	None
1,2-Dichloropropane	0.005	None	Acrylonitrile	0.010	None

Surrogates	Limits	% Rec
1,2-Dichloroethane-d4	76-114	105.
Toluene-d8	88-110	104.
4-Bromofluorobenzene	86-115	99.