



Chevron U.S.A. Inc.

2410 Camino Ramon, San Ramon, California • Phone (510) 842-9500
Mail Address: P.O. Box 5004, San Ramon, CA 94583-0804

91 057 00 0102 01

Marketing Department

October 24, 1991

Mr. Paul Smith
Alameda County Health Care Services
Department of Environmental Health
Hazardous Materials Program
80 Swan Way, Room 200
Oakland, CA 94621

**Re: Chevron Service Station #9-0121
3026 Lakeshore, Oakland**

Dear Mr. Smith:

Enclosed we are forwarding the Well Installation Report dated October 18, 1991, prepared by our consultant Groundwater Technology, Inc. for the above referenced site. This report documents the installation of the 3/4-inch experimental ground water monitor wells designed for shallow ground water environments.

As indicated in the report, four (4) borings were advanced and completed into ground water monitor wells to characterize the subsurface and ground water beneath the site. Soil samples collected from the drill cuttings were analyzed for total petroleum hydrocarbons as gasoline (TPH-G), total petroleum hydrocarbons as diesel (TPH-D) and BTEX. The results reported concentrations of TPH-G in the soils from ND to 660 ppm and TPH-D from 2 to 34 ppm.

Depth to ground water was measured at approximately 5 to 8-feet below grade, and the direction of flow appears to vary beneath the site with a direction changing from southwest to southeast. This variability may be due to an anomalous reading of the water level in monitor well MW-3 or indicate a localized variable ground water gradient. Subsequent water level measurements will confirm the ground water gradient and flow direction. Ground water samples collected were analyzed for TPH-G, TPH-D, and BTEX. Analytical results reported Benzene concentrations ranging from 200 to 3,700 ppb. TPH-D was detected at concentrations ranging from 160 to 600 ppb. The laboratory has indicated that a gasoline pattern was present in the chromatograph and that the TPH-D concentrations reported may be in part due to the existence of relatively high TPH-G concentrations as the hydrocarbon range for diesel and gasoline overlap.

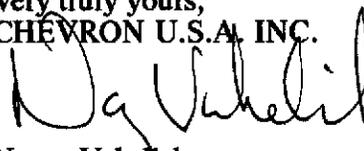
Upon establishing ground water flow direction, Chevron will instruct Groundwater Technology, Inc. to permit and install additional ground water monitor wells to delineate the extent of the hydrocarbon contamination in the subsurface and ground water. A work plan will be prepared proposing the additional assessment work and forwarded to your office for your review.

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October 24, 1991

The analytical results of the ground water samples collected indicate that the 3/4-inch wells do provide access to viable ground water samples. As agreed to, Chevron will perform sampling and monitoring of the newly installed wells each month for the first three months. After completion of the first quarter, a routine quarterly groundwater monitoring program will continue.

If you have any questions or comments, please do not hesitate to contact me at (510) 842-9581.

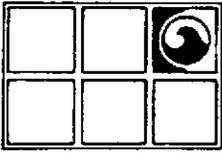
Very truly yours,
CHEVRON U.S.A. INC.



Nancy Vukelich
Environmental Engineer

Enclosures

cc: Mr. Eddie So, RWQCB-Bay Area
Mr. W.T. Scudder
File (9-0121A1)



**GROUNDWATER
TECHNOLOGY, INC.**

4057 Port Chicago Highway, Concord, CA 94520 (415) 671-2387

FAX: (415) 685-9148

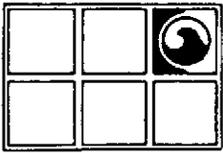
**WELL INSTALLATION REPORT
CHEVRON SERVICE STATION NO. 9-0121
3026 LAKESHORE AVENUE
OAKLAND, CALIFORNIA**

OCTOBER 18, 1991

Prepared for:

**Ms. Nancy Vukelich
Chevron U.S.A. Inc.
2410 Camino Ramon
Bishop Ranch #6
San Ramon, CA 94583**

**R1500A1.GLM
(020522)**



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San Ramon, CA 94583

Prepared by:

GROUNDWATER TECHNOLOGY, INC.
4057 Port Chicago Highway
Concord, CA 94520

Sandra L. Lindsey
Project Manager



Kevin Sullivan
Professional Engineer
No. C46253

R1500A1.GLM
(020522)

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**WELL INSTALLATION REPORT
CHEVRON SERVICE STATION NO. 9-0121
3026 LAKESHORE AVENUE
OAKLAND, CALIFORNIA**

OCTOBER 18, 1991

INTRODUCTION

This report presents the results of the groundwater monitoring well installation project conducted by Groundwater Technology, Inc. at Chevron Service Station No. 9-0121 located at 3026 Lakeshore Avenue, in Oakland, California (Figure 1). This work was performed under Work Release No. 538-8000 issued by Ms. Nancy Vukelich of Chevron U.S.A. Inc. (Chevron). Analytical services were provided by Superior Precision Analytical Laboratories (Superior Precision) of Martinez, California, under Release No. 440-3170. This phase of site work included the installation of four on-site groundwater monitoring wells, the collection and analyses of soil and groundwater samples, and the preparation of this report.

BACKGROUND

SITE HISTORY

Chevron Service Station No. 9-0121 has been active since the 1950s. In the mid-1960s, the owner of the property abutting the site to the west reported apparent gasoline odors in the basement of his building. The problem was corrected with improved ventilation. In 1969, all tanks and lines were replaced. In 1980, the adjacent property owner again reported the apparent presence of gasoline odors within the building. This prompted another assessment of the condition of the site tanks and fuel lines. The tanks did not pass the tightness test and were replaced. A separate-phase hydrocarbon recovery system was installed along the side of the adjacent building. In 1981, Groundwater

when?



**GROUNDWATER
TECHNOLOGY, INC.**

Technology was contracted by Chevron to oversee the expansion of the recovery system. Several monitoring wells and additional recovery wells were installed at this time. However, the system was never activated. No additional assessment or remedial work was performed at the site until December 1989.

In 1989 and 1990, Groundwater Technology performed a general assessment of site conditions, including collecting groundwater samples from the existing groundwater monitoring wells. Analytical results of the groundwater samples detected dissolved gasoline hydrocarbons in the groundwater beneath the site as well as possible separate-phase hydrocarbon emulsions in some wells. One well could not be located, presumably having been demolished during station reconstruction. None of the existing wells had appropriate surface seals. Groundwater Technology recommended destroying all the existing wells and installing new groundwater monitoring wells to assess current groundwater conditions beneath the site. The existing wells were destroyed in July 1991 under a permit issued by the Alameda County Flood Control and Water Conservation District.

SITE SETTING

Chevron Service Station No. 9-0121 is located on the southern corner of the intersection of MacArthur Boulevard and Lakeshore Avenue in Oakland. South of the site are residential apartment complexes. West of the site is an annex building owned by the Chancery Office Diocese of Oakland. Interstate 580 is east of the site, running roughly parallel to MacArthur Boulevard, and east of the interstate overpass are mixed commercial and residential buildings. Figure 2 presents the Site Vicinity Map. Lake Merritt is southwest of the site, within the boundary of Lake Merritt Park. Lake Merritt, the surface body of water closest to the site, is approximately 600 feet from the site.

Topographically, the site is situated approximately 3 miles southwest of the Gudde Ridge, a northwest-to-southeast-trending ridge line. The surface elevation at the site is approximately 10 feet above mean sea level. The site is situated on the northern flank of a small hill and the local land surface slopes generally southwest toward Lake Merritt.

SITE HYDROGEOLOGY

Soils beneath the site consist primarily of silty clay with scattered sandy layers. Soil color of the silty clay tends to be grayish to greenish. First groundwater beneath the site is encountered at approximately 4 to 8 feet below surface grade. The groundwater conditions beneath the site appear to be unconfined. The inferred groundwater flow direction, based on local topography and hydrogeology, is northwest toward Lake Merritt.

SCOPE OF WORK

Subsurface soil and groundwater conditions beneath this site were investigated to assess the possible presence and extent of adsorbed, dissolved, and separate-phase hydrocarbons. The following work steps were completed for this investigation:

- Obtained permission from Mr. Paul Smith of the Alameda County Health Care Services Department of Environmental Health, Hazardous Materials Program for the installation of four experimental, 3/4-inch-diameter groundwater monitoring wells.
- Obtained a groundwater well installation permit from the Alameda County Flood Control and Water Conservation District.
- Cored and logged four on-site soil borings to assess the possible extent of adsorbed hydrocarbons in the soils beneath the site. Soil samples were retained for laboratory analysis.
- Installed 3/4-inch-diameter polyvinyl chloride (PVC) groundwater monitoring wells in the soil borings.
- Subcontracted a professional survey company to determine wellhead elevation and location.
- Developed and sampled the groundwater monitoring wells to assess groundwater quality.
- Prepared this report.

MONITORING WELL INSTALLATION

Permitting. Before beginning monitoring well installation activities, Groundwater Technology applied to the Alameda County Health Services Department for permission to install a new type of groundwater monitoring well. After several months of negotiation, permission was granted to test the effectiveness of the proposed 3/4-inch-diameter monitoring wells. After securing permission to install the wells, Groundwater Technology submitted a Groundwater Protection Ordinance Permit Application for monitoring well installation to the Alameda County Flood Control and Water Conservation District. A copy of the approved permit is included in Appendix A.

Soil Borings. On August 7 and 13, 1991, a total of four soil borings were cored on-site at the locations shown on Figure 3. The boring locations were selected primarily (based on historical data) to assess the current extent of dissolved hydrocarbons in the groundwater. The soil borings were excavated using a portable soil sampling system that uses a hydraulic sledgehammer to drive a series of 2-inch-diameter steel sampling barrels into the ground. Each sampling barrel is 2½-foot-long and the barrels are extracted between each drive, producing a continuous core of the encountered soils and a 2-inch-diameter hole. Coring was supervised by a Groundwater Technology geologist who maintained continuous logs of the subsurface materials according to the Unified Soil Classification System. Copies of the boring logs are included in Appendix B. Selected soil samples were also field-screened for the presence of volatile organic vapors with a photo-ionization detector (PID). Apparent vapor concentrations are included in the boring logs.

During coring, soil samples were retained for possible laboratory analysis. Retained samples were packed in 2-inch-diameter by 6-inch-long brass tubes. The tubes were sealed with aluminum foil, capped and sealed with plastic tape. The labeled samples were placed on ice in an insulated cooler for transport under chain-of-custody protocol to the Superior Precision in Martinez, California, a California-certified facility.

Soil samples were analyzed for the presence of benzene, toluene, ethylbenzene, xylenes (BTEX), total petroleum hydrocarbons (TPH)-as-gasoline, and TPH-as-diesel fuel using modified U.S. Environmental Protection Agency (EPA) Methods 8015/8020. Copies of all laboratory reports and chain-of-custody records are included in Appendix C.

Monitoring Well Construction. All four soil-boring holes were completed as groundwater-monitoring wells. The wells were constructed of 3/4-inch-diameter, 0.020-inch machine-slotted Schedule 80 PVC well screen and blank casing. A well filter pack comprised of No. 2 Monterey sand was set in the annular space to a level equal to or above the well screen. A layer of hydrated bentonite 1 to 1 1/2-foot thick was placed above the filter pack and a cement surface seal was placed to grade level above the bentonite. The wellhead was capped and encased in a 9-inch-diameter traffic-rated street box. Well construction details are presented on the boring logs in Appendix B.

Wellhead Survey. After installation, the monitoring wells were professionally surveyed to establish wellhead elevation and location. A copy of the surveyor's notes are included in Appendix D and Table 1 presents the wellhead elevation data.

Well Development, Monitoring, and Sampling. On August 20, 1991, the four groundwater monitoring wells were monitored, developed, and sampled. The wells were first monitored using an electronic slope indicator to determine static water levels. These data, along with surveyed wellhead data, were used to construct the Groundwater Gradient Potentiometric Surface Map (Figure 3). The wells were developed using a peristaltic pump to extract water from the wells. Each well was pumped for approximately one hour or until groundwater was determined to be representative of the aquifer. Except for monitoring well MW-1, all wells pumped dry during well development. All purge water was stored on-site in a single 55-gallon steel drum pending disposal.

After development, the groundwater monitoring wells were monitored again to assure that they had recharged to at least 80 per cent of their static volume. The wells were then sampled using a 1/2-inch-diameter stainless steel bailer. The water samples were placed in clean glass containers with Teflon[®]-lined caps. Due to the apparent presence of dissolved carbonate in the water, the samples were not acidified. Samples were labeled and placed on ice for transport to Superior Precision for analysis. The samples were analyzed for the presence of BTEX, TPH-as-gasoline, and TPH-as-diesel fuel using EPA Methods 8015/8020.

SUBSURFACE CONDITIONS

SOIL

The soils encountered in borings MW-2, MW-3, and MW-4 consisted primarily of clays, silts, and clayey sands. The soils encountered in boring MW-1 from a depth of approximately 3 to 14 feet below grade appeared to be comprised primarily of sub-angular gravel. This material provided almost no recovery in the sample barrel and thus yielded no samples for laboratory analysis.

Based on field observations and PID readings, six soil samples were submitted for laboratory analysis. Analytical results indicate concentrations of benzene in the soil samples ranged from 0.021 parts per million (ppm) to 1.5 ppm and concentrations of TPH-as-gasoline ranged from 31 ppm to 660 ppm. The analytical results also reported concentrations of TPH-as-diesel fuel ranging from 2 ppm to 34 ppm. The analytical results are summarized in Table 2 and copies of the analytical reports are presented in Appendix C.

GROUNDWATER

Groundwater monitoring data collected on August 20, 1991, indicate that the groundwater elevation at the site is approximately 1½ feet above mean sea level. The hydraulic gradient beneath the site appears to be variable, with a flow direction changing from southwest to southeast across the site. This may be due to an anomalous reading of the water level in well MW-3. Subsequent monitoring of the wells will establish the variability of the groundwater elevation and gradient direction. Figure 3 shows the groundwater gradient information.

Laboratory analytical results of the groundwater samples indicated measurable concentrations of gasoline hydrocarbons in the groundwater samples collected from wells MW-1, MW-2, MW-3, and MW-4. Additionally, measurable TPH-as-diesel fuel concentrations were also detected.

Analytical results indicate concentrations of benzene in the groundwater samples ranged from 200 parts per billion (ppb) to 3,700 ppb and concentrations of TPH-as-gasoline ranged from 1,800 ppb to 9,300 ppb. The analytical results also reported concentrations of TPH-as-diesel fuel ranging from 160 ppb to 600 ppb.

According to Superior Precision, the hydrocarbon range for gasoline and diesel overlap. Therefore, due to the relatively high concentrations of gasoline hydrocarbons in the samples, the diesel concentrations reported in the laboratory report may be in part or entirely due to the presence of gasoline hydrocarbons. Table 3 presents the groundwater sample analytical results and Figure 4 shows the concentrations of dissolved TPH-as-gasoline.

SUMMARY AND CONCLUSIONS

Data collected from this phase of work shows that the underlying sediments consist primarily of silts and clays. The gravel channel encountered during previous work phases was again encountered near the west edge of the property. Groundwater is present beneath the site at an elevation of approximately 1½ feet above mean sea level.

Analytical results for all of the soil and groundwater samples collected at the site during this investigation showed detectable concentrations of gasoline and diesel hydrocarbons. Analytical results indicate concentrations of TPH-as-gasoline in the groundwater samples ranged from 1,800 ppb to 9,300 ppb and concentrations of TPH-as-diesel fuel ranged from 160 ppb to 600 ppb. Analytical results for soil samples collected from wells MW-1 through MW-4 indicate concentrations of TPH-as-gasoline ranged from 31 ppm to 660 ppm and concentrations of TPH-as-diesel fuel ranged from 2 ppm to 34 ppm.

LIST OF FIGURES

- FIGURE 1 SITE LOCATION MAP
- FIGURE 2 SITE VICINITY MAP
- FIGURE 3 GROUNDWATER ELEVATION MAP (08/20/91)
- FIGURE 4 DISSOLVED TPH-AS-GASOLINE CONCENTRATIONS (08/20/91)

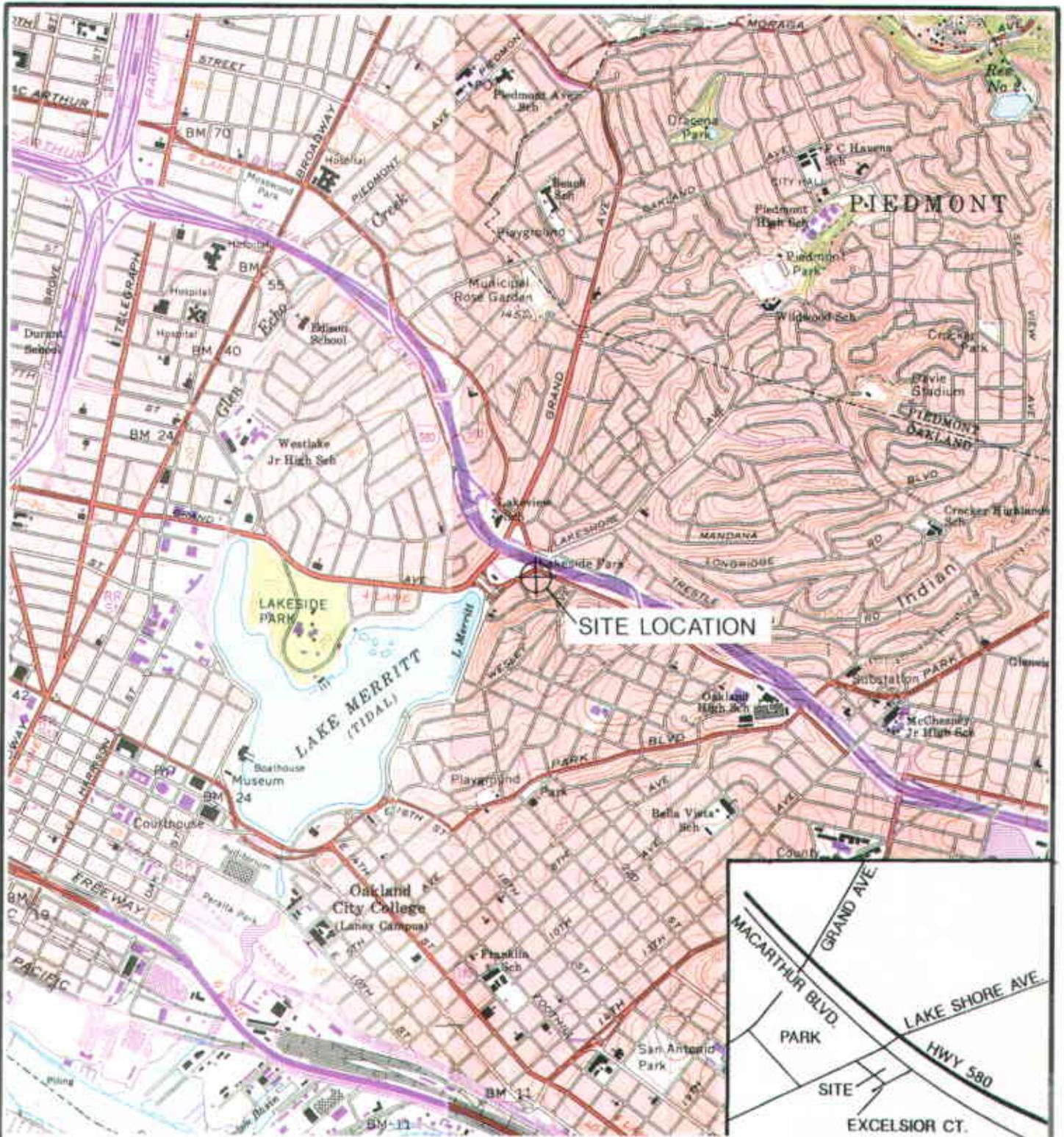
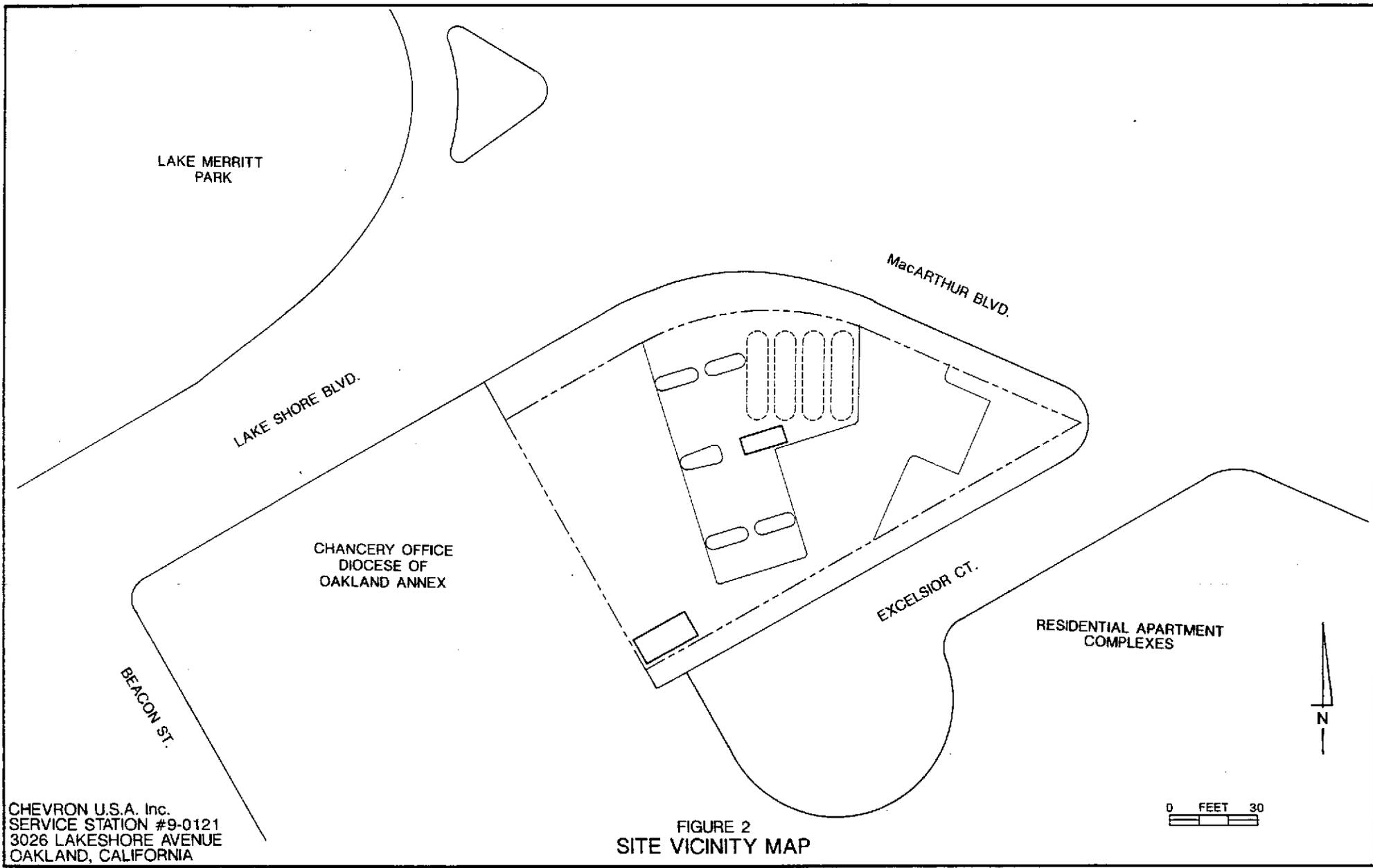


FIGURE 1
SITE LOCATION MAP

CHEVRON U.S.A.
OAKLAND, CALIFORNIA





CHEVRON U.S.A. Inc.
SERVICE STATION #9-0121
3026 LAKESHORE AVENUE
OAKLAND, CALIFORNIA

FIGURE 2
SITE VICINITY MAP

0 FEET 30

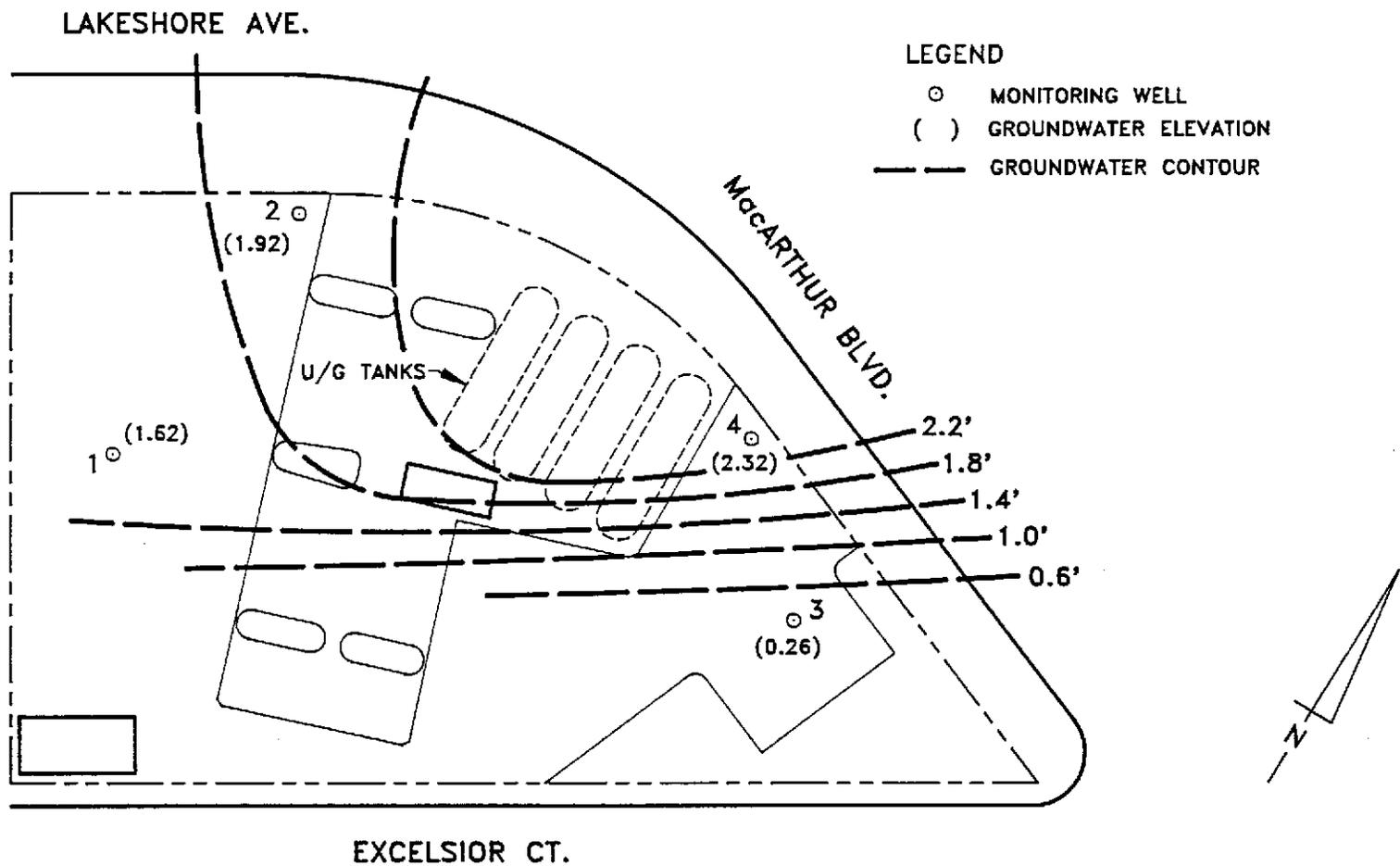


FIGURE 3
GROUNDWATER ELEVATION MAP
(8/20/91)

CHEVRON U.S.A. INC.
SERVICE STATION #9-0121
3026 LAKESHORE AVENUE
OAKLAND, CALIFORNIA



DRAWN BY: ML 9/13/91

LAKESHORE AVE.

LEGEND

- MONITORING WELL
- () TPH-AS-GASOLINE CONCENTRATION (ppb)

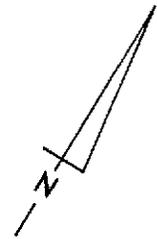
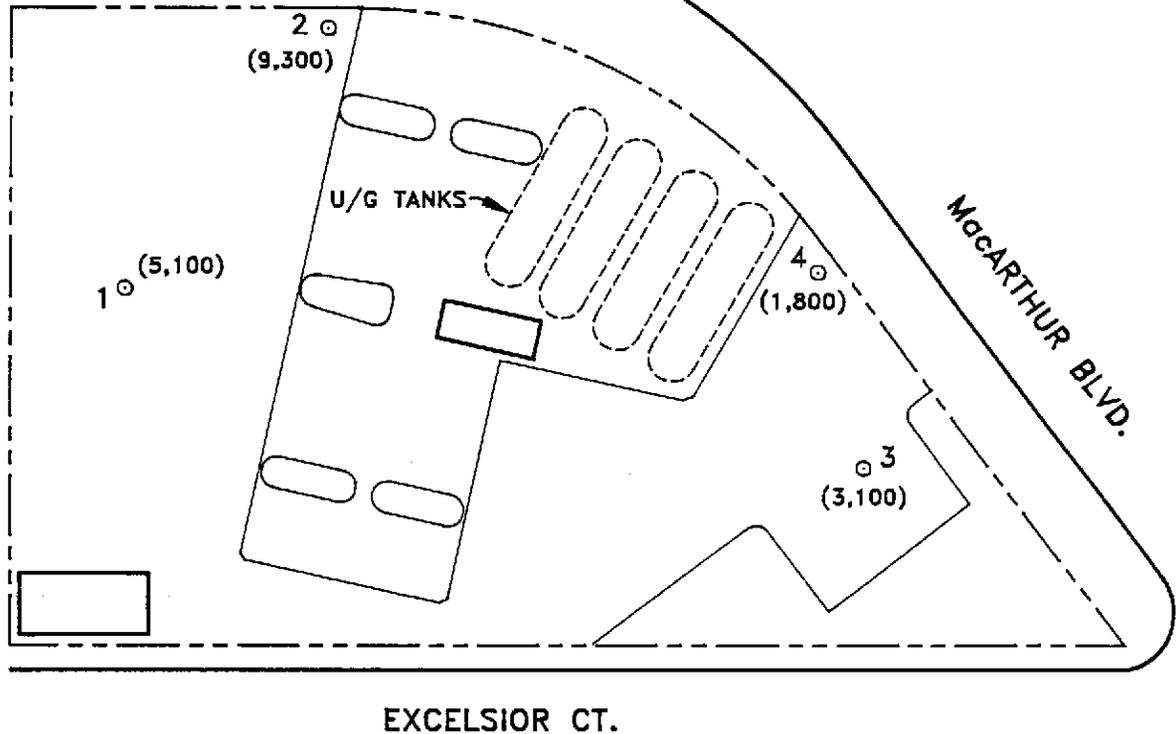


FIGURE 4
DISSOLVED TPH-AS-GASOLINE CONCENTRATIONS
(8/20/91)

CHEVRON U.S.A. INC.
SERVICE STATION #9-0121
3026 LAKESHORE AVENUE
OAKLAND, CALIFORNIA



DRAWN BY: ML 9/13/91

LIST OF TABLES

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TABLE 2	SOIL SAMPLE ANALYTICAL RESULTS (08/20/91)
TABLE 3	WATER SAMPLE ANALYTICAL RESULTS, (08/20/91)

TABLE 1
WELL SURVEY AND MONITORING DATA (08/20/91)
DATA COLLECTED AUGUST 20, 1991
(Measurements in feet above mean sea level)

WELL NO.	WELLHEAD ELEVATION	DEPTH-TO-WATER	HYDROSTATIC ELEVATION
MW-1	6.82	5.20	1.62
MW-2	6.27	4.35	1.92
MW-3	8.71	8.45	0.26
MW-4	7.37	5.05	2.32

TABLE 2
SOIL SAMPLE ANALYTICAL RESULTS
 (Results in parts per million)

SAMPLE ID	SAMPLE DATE	DEPTH (ft)	BENZENE	TOLUENE	ETHYL-BENZENE	XYLENES	TPH-AS-GASOLINE	TPH-AS-DIESEL
MW-2A	08/07/91	2	1.5	1.2	2.3	4.6	660	4
MW-2B	08/07/91	7	2.8	1.3	11.0	4.3	540	17
MW-3A	08/13/91	2	0.021	<0.005	<0.005	<0.005	<1.0	2
MW-3B	08/13/91	9	3.0	3.7	5.0	8.0	660	34
MW-4A	08/13/91	3	<0.6	4.5	3.6	7.4	560	13
MW-4B	08/13/91	8	0.170	0.290	0.110	0.220	31	2

TABLE 3
WATER SAMPLE ANALYTICAL RESULTS
 SAMPLES COLLECTED ON AUGUST 20, 1991
 (Results in parts per billion)

WELL ID	BENZENE	TOLUENE	ETHYL-BENZENE	XYLENES	TPH-AS-GASOLINE	TPH-AS-DIESEL *
MW-1	1,700	21	220	34	5,100	260
MW-2	3,700	55	530	75	9,300	600
MW-3	200	13	15	12	3,100	200
MW-4	870	4	3	9	1,800	160

* Gasoline pattern present in sample

APPENDIX A
WELL INSTALLATION PERMIT



ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
5997 PARKSIDE DRIVE PLEASANTON, CALIFORNIA 94566 (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

FOR OFFICE USE

LOCATION OF PROJECT 3026 Lakeshore Ave
Oakland, CA

PERMIT NUMBER 91426
LOCATION NUMBER _____

CLIENT
Name Chevron USA
Address P.O. Box 5004 Phone 842-1000
City San Ramon Zip 94583

PERMIT CONDITIONS

Circled Permit Requirements Apply

APPLICANT
Name Groundwater Technology Inc
Address 4057 Port Chicago Hwy Phone 671-2387
City Concord Zip 94520

TYPE OF PROJECT
Well Construction _____ Geotechnical Investigation _____
Cathodic Protection _____ General _____
Water Supply _____ Contamination _____
Monitoring Well Destruction _____

PROPOSED WATER SUPPLY WELL USE
Domestic _____ Industrial _____ Other _____
Municipal _____ Irrigation _____

DRILLING METHOD:
Mud Rotary _____ Air Rotary _____ Auger _____
Cable _____ Other

DRILLER'S LICENSE NO. 607550 (Contractor License No)

WELL PROJECTS
Drill Hole Diameter 2 in. Maximum _____
Casing Diameter 3/4 in. Depth 15 ft.
Surface Seal Depth 3 ft. Number 4

GEOTECHNICAL PROJECTS
Number of Borings _____ Maximum _____
Hole Diameter _____ in. Depth _____ ft.

ESTIMATED STARTING DATE 8/7/91
ESTIMATED COMPLETION DATE 8/17/91

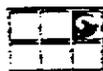
I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE Glenn C. Mitchell Date 7/24/91

- A. GENERAL
 1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
 2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling log and location sketch for geotechnical projects.
 3. Permit is void if project not begun within 90 days of approval date.
- B. WATER WELLS, INCLUDING PIEZOMETERS
 1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
 2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic and irrigation wells unless a lesser depth is specially approved. Minimum seal depth for monitoring wells is the maximum depth practicable or 20 feet.
- C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.
- D. CATHODIC. Fill hole above anode zone with concrete placed by tremie.
- E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 30 Jul 91
Wyman Hong

APPENDIX B
SOIL BORING LOGS

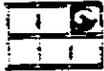


Project CHV/3026 Lakeshore Ave. Owner Chevron U.S.A. Inc.
 Location Oakland, CA Project Number 020301074.020503
 Date Drilled 8/07/91 Total Depth of Hole 14.0 ft. Diameter 2 in.
 Surface Elevation _____ Water Level Initial 5.5 ft. 24-hour _____
 Screen: Dia 0.75 in. Length 10.0 ft. Slot Size 0.020 in.
 Casing: Dia 0.75 in. Length 4 ft. Type SCH 80 PVC
 Filter Pack Material #2/12 Lapis Lustre
 Drilling Company Powercore Soil Sampling, Inc. Drilling Method Percussion Hammer
 Driller Jeff Arnold Log by Glen Mitchel
 Geologist/Engineer Ed Simonis License No RG# 4422

See Site Map
For Boring Location

NOTES:
X in sample box indicates poor core recovery.

Depth (feet)	Well Completion	Sample ID	Blow Count	Graphic Log	Soil Class	Description (Color, Texture, Structure)
0						CEMENT
0 - 1					GC	Brown clayey GRAVEL (fill, loose, moist)
1 - 2					CL	Greyish green sandy CLAY with scattered gravel (soft, moist, no hydrocarbon odor)
2 - 5.5						Grey sub-angular GRAVEL (wet, strong hydrocarbon odor, sheen)
5.5						▼ Encountered water at 5.5 feet on 8/07/91.
5.5 - 14					GP	Grey sub-angular GRAVEL (saturated)
14						End of boring at 14 feet. Installed monitoring well.
16						
18						
20						
22						
24						
26						



Project CHV/3026 Lakeshore Ave. Owner Chevron U.S.A. Inc.
 Location Oakland, CA Project Number 020301074.020503
 Date Drilled 8/07/91 Total Depth of Hole 12.0 ft. Diameter 2 in.
 Surface Elevation _____ Water Level Initial 8.5 ft. 24-hour _____
 Screen: Dia 0.75 in. Length 10.0 ft. Slot Size 0.020 in.
 Casing: Dia 0.75 in. Length 2 ft. Type SCH 80 PVC
 Filter Pack Material #2/12 Lapis Lustré
 Drilling Company Powercore Soil Sampling, Inc. Drilling Method Percussion Hammer
 Driller Jeff Arnold Log by Glen Mitchell
 Geologist/Engineer Ed Simonis License No. RG# 4422

See Site Map
For Boring Location

NOTES:

Depth (feet)	Well Completion	Sample ID	Blow Count	Graphic Log	Soil Class	Description (Color, Texture, Structure)
0	[Well Completion Diagram]	A	[Blow Count Diagram]	[Graphic Log Diagram]	GC	CEMENT
0					CL	Brown clayey GRAVEL (fill, loose, moist)
2					CL	Greyish green sandy CLAY (soft, moist, strong hydrocarbon odor)
4					SC	Grey clayey fine SAND (firm, moist, strong hydrocarbon odor)
6		B			SC	
8					CL	↓ Encountered water at 8.5 feet on 8/07/91. Grey CLAY (stiff, moist, strong hydrocarbon odor)
10					CL	
12						End of boring at 12 feet. Installed monitoring well.
14						
16						
18						
20						
22						
24						
26						

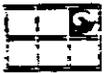


Project CHV/3026 Lakeshore Ave. Owner Chevron U.S.A. Inc.
 Location Oakland, CA Project Number 02030:074.020503
 Date Drilled 8/13/91 Total Depth of Hole 18.0 ft. Diameter 2 in.
 Surface Elevation _____ Water Level Initial 11.5 ft. 24-hour _____
 Screen: Dia 0.75 in. Length 10.0 ft. Slot Size 0.020 in.
 Casing: Dia 0.75 in. Length 8 ft. Type SCH 80 PVC
 Filter Pack Material #2/12 Lapis Lustré
 Drilling Company Powercore Soil Sampling, Inc. Drilling Method Percussion Hammer
 Driller Jeff Arnold Log by Glen Mitchell
 Geologist/Engineer Ed Simonis License No RG# 4422

See Site Map
For Boring Location

NOTES:

Depth (feet)	Well Completion	Sample ID	Blow Count	Graphic Log	Soil Class	Description (Color, Texture, Structure)
0						CEMENT
0 - 1					GC	Brown clayey GRAVEL (fill, loose, moist, no hydrocarbon odor)
1 - 2		A				Bluish grey silty CLAY (firm, wet, faint hydrocarbon odor)
2 - 4						Mottled bluish grey and green silty CLAY (firm, moist, faint hydrocarbon odor)
4 - 8					CL	Dark grey silty CLAY (firm, wet, strong hydrocarbon odor)
8 - 10		B				Greenish grey silty CLAY with trace fine sand (soft, very wet, strong hydrocarbon odor)
10 - 12						↓ Encountered water at 11.5 feet on 8/13/91.
12 - 14						Mottled brown and grey clayey SILT (firm, wet, no hydrocarbon odor)
14 - 16					ML	
16 - 18					CL	Brown silty CLAY (firm, moist, no hydrocarbon odor)
18						End of boring at 18 feet. Installed monitoring well.
20						
22						
24						
26						



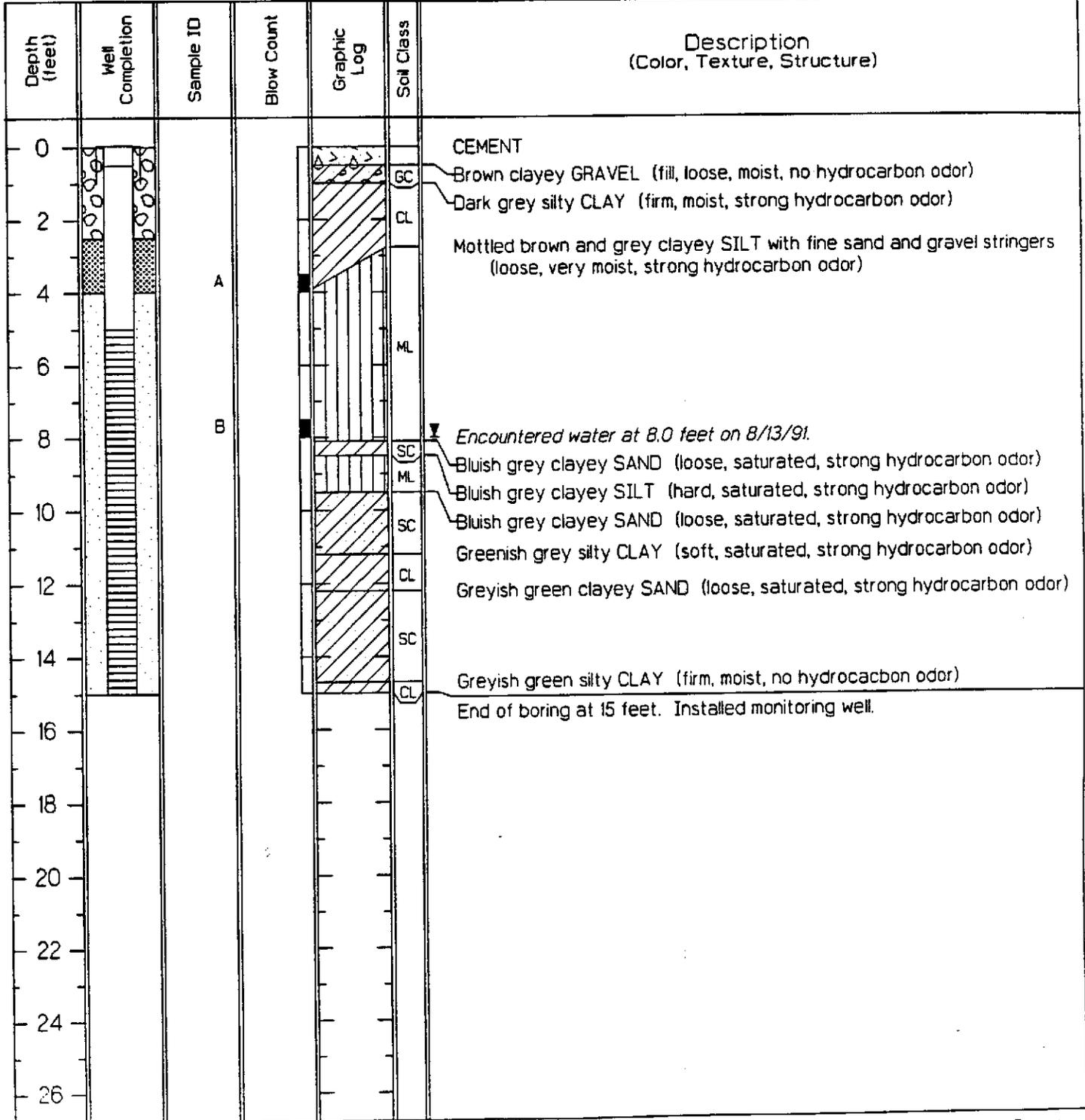
**GROUNDWATER
TECHNOLOGY, INC.**

**Monitoring Well MW-4
Drilling Log**

Project CHV/3026 Lakeshore Ave. Owner Chevron U.S.A. Inc.
 Location Oakland, CA Project Number 020301074.020503
 Date Drilled 8/13/91 Total Depth of Hole 15.0 ft. Diameter 2 in.
 Surface Elevation _____ Water Level Initial 8.0 ft. 24-hour _____
 Screen: Dia 0.75 in. Length 10.0 ft. Slot Size 0.020 in.
 Casing: Dia 0.75 in. Length 5 ft. Type SCH 80 PVC
 Filter Pack Material #2/12 Lapis Lustré
 Drilling Company Powercore Soil Sampling, Inc. Drilling Method Percussion Hammer
 Driller Jeff Arnold Log by Glen Mitchell
 Geologist/Engineer Ed Simonis License No RG# 4422

See Site Map
For Boring Location

NOTES:



APPENDIX C
LABORATORY REPORTS

Superior Precision Analytical, Inc.

825 Arnold Drive, Ste. 114 • Martinez, California 94553 • 415: 229-1512 / fax 415: 229-1526

C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 83658
CLIENT: GROUNDWATER TECHNOLOGIES INC.
CLIENT JOB NO.: 020301500 020503

DATE RECEIVED: 08/07/91
DATE REPORTED: 08/15/91

Page 1 of 2

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
83658- 1	2-A	08/07/91	08/15/91
83658- 2	2-B	08/07/91	08/15/91

Laboratory Number: 83658 83658
 1 2

ANALYTE LIST	Amounts/Quantitation Limits (mg/Kg)	
OIL AND GREASE:	NA	NA
TPH/GASOLINE RANGE:	660	540
TPH/DIESEL RANGE:	4	17
BENZENE:	1.5	2.8
TOLUENE:	1.2	1.3
ETHYL BENZENE:	2.3	11
XYLENES:	4.6	4.3

Superior Precision Analytical, Inc.

825 Arnold Drive, Ste. 114 • Martinez, California 94553 • (415) 229-1512 / fax 415-229-1526

CERTIFICATE OF ANALYSIS

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

Page 2 of 2
QA/QC INFORMATION
SET: 83658

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
mg/Kg = part per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 503E:
Minimum Detection Limit in Soil: 50mg/Kg

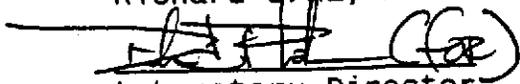
Modified EPA-SW846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Soil: 1mg/Kg
Standard Reference: 05/17/91

EPA-SW846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/Kg
Standard Reference: 06/26/91

SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Soil: 0.005mg/Kg
Standard Reference: 07/08/91

<u>ANALYTE</u>	<u>REFERENCE</u>	<u>SPIKE LEVEL</u>	<u>MS/MSD RECOVERY</u>	<u>RPD</u>	<u>CONTROL LIMIT</u>
Oil & Grease	NA	NA	NA	NA	NA
Diesel	05/17/91	200 ppm	125/111	12	75-125
Gasoline	06/26/91	200 ng	83/88	7	70-130
Benzene	07/08/91	200 ng	89/85	5	70-130
Toluene	07/08/91	200 ng	87/87	1	70-130
Ethyl Benzene	07/08/91	200 ng	92/91	1	70-130
Total Xylene	07/08/91	200 ng	99/99	0	70-130

Richard Srna, Ph.D.


Laboratory Director

Chevron U.S.A. Inc.
 P.O. BOX 5004
 San Ramon, CA 94583
 FAX (415)842-9591

Chevron Facility Number 9-6121
 Facility Address 3026 Lakeshore Ave, Oakland
 Consultant Project Number 020301500 020503
 Consultant Name GTI
 Address 4057 Port Chicago Highway, Concord
 Project Contact (Name) Glen L. Mitchell
 (Phone) 871-2332 ²¹⁴ (Fax Number) 685-4148

Chevron Contact (Name) Nancy Vukelich
 (Phone) 848-9581
 Laboratory Name Superior Analytical
 Laboratory Release Number 440-3170
 Samples Collected by (Name) Glen L. Mitchell
 Collection Date 8/7/91
 Signature Glen L. Mitchell

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil W = Water C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	Analyses To Be Performed										Remarks					
								BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd, Cr, Pb, Zn, Ni (ICAP or AA)								
2-A	1	1	S	G	10:16		Yes	X	X														
B	2	1	S	G	10:18		Yes	X	X														

Please Initial _____ *ML*
 Samples Stored in Ice _____ *ML*
 Appropriate Containers _____ *ML*
 Samples preserved _____ *ML*
 Vials without headspace _____ *ML*
 Comments: _____

Relinquished By (Signature) <u>Glen L. Mitchell</u>	Organization <u>GTI</u>	Date/Time <u>8/7/91 3:4</u>	Received By (Signature) <u>Nancy Vukelich</u>	Organization _____	Date/Time _____	Turn Around Time (Circle Choice) 24 Hrs. 48 Hrs. 5 Days 10 Days <u>As Contracted</u>
Relinquished By (Signature) _____	Organization _____	Date/Time _____	Received By (Signature) _____	Organization <u>A</u>	Date/Time _____	
Relinquished By (Signature) _____	Organization _____	Date/Time _____	Received For Laboratory By (Signature) <u>Glen L. Mitchell</u>	Date/Time <u>8/7/91 1541</u>		

Superior Precision Analytical, Inc.

825 Arnold Drive, Ste. 114 • Martinez, California 94553 • (415) 229-1512 / fax (415) 229-1523

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 83734
CLIENT: GROUNDWATER TECHNOLOGIES INC.
CLIENT JOB NO.: 020301500

DATE RECEIVED: 08/20/91
DATE REPORTED: 08/28/91

Page 1 of 2

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
83734- 1	Trip Blank	08/20/91	/ /
83734- 2	RB MW-3	08/20/91	/ /
83734- 3	MW-3	08/20/91	08/28/91
83734- 4	RB MW-4	08/20/91	/ /
83734- 5	MW-4	08/20/91	08/28/91
83734- 6	RB MW-1	08/20/91	08/29/91
83734- 7	MW-1	08/20/91	08/28/91
83734- 8	RB MW-2	08/20/91	/ /
83734- 9	MW-2	08/20/91	08/28/91

Laboratory Number:	83734	83734	83734	83734	83734
	1	2	3	4	5

ANALYTE LIST	Amounts/Quantitation Limits (ug/L)				
OIL AND GREASE:	NA	NA	NA	NA	NA
TPH/GASOLINE RANGE:	NA	NA	3100	NA	1800
TPH/DIESEL RANGE:	NA	NA	*200	NA	*160
BENZENE:	NA	NA	200	NA	870
TOLUENE:	NA	NA	13	NA	4
ETHYL BENZENE:	NA	NA	15	NA	3
XYLENES:	NA	NA	12	NA	9

Laboratory Number:	83734	83734	83734	83734
	6	7	8	9

ANALYTE LIST	Amounts/Quantitation Limits (ug/L)			
OIL AND GREASE:	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<50	5100	NA	9300
TPH/DIESEL RANGE:	NA	*260	NA	*600
BENZENE:	ND<0.5	1700	NA	3700
TOLUENE:	ND<0.5	21	NA	55
ETHYL BENZENE:	ND<0.5	220	NA	530
XYLENES:	ND<0.5	34	NA	75

Superior Precision Analytical, Inc.

825 Arnold Drive, Ste. 114 • Martinez, California 94553 • (415) 229-1512 / fax (415) 229-1526

C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

Page 2 of 2
QA/QC INFORMATION

SET: 83734

* gasoline pattern present in sample

NA = ANALYSIS NOT REQUESTED

ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT

ug/L = part per billion (ppb)

OIL AND GREASE ANALYSIS By Standard Methods Method 503E:
Minimum Detection Limit in Water: 5000ug/L

Modified EPA-SW846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Water: 50ug/L
Standard Reference: 07/20/91

EPA-SW846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Water: 50ug/L
Standard Reference: 06/26/91

SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Water: 0.5ug/L
Standard Reference: 07/08/91

ANALYTE	REFERENCE	SPIKE LEVEL	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Oil & Grease	NA	NA	NA	NA	NA
Diesel	07/20/91	200 ppm	117/101	15	75-125
Gasoline	06/26/91	200 ng	79/75	5	70-130
Benzene	07/08/91	200 ng	111/112	1	70-130
Toluene	07/08/91	200 ng	106/107	1	70-130
Ethyl Benzene	07/08/91	200 ng	105/105	0	70-130
Total Xylene	07/08/91	200 ng	102/102	0	70-130

Richard Srna, Ph.D.


Laboratory Director

Superior Precision Analytical, Inc.

825 Arnold Drive, Ste. 114 • Martinez, California 94553 • Tel: 415-229-1512 / fax: 415-229-1526

C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 83697
CLIENT: GROUNDWATER TECHNOLOGIES INC.
CLIENT JOB NO.: 020301500

DATE RECEIVED: 08/13/91
DATE REPORTED: 08/19/91

Page 1 of 2

Lab Number	Customer Sample Identification	Date Sampled	Date Analyzed
83697- 1	mw-3A	08/13/91	08/16/91
83697- 2	mw-3B	08/13/91	08/16/91
83697- 3	mw-4A	08/13/91	08/16/91
83697- 4	mw-4B	08/13/91	08/18/91

Laboratory Number:	83697	83697	83697	83697
	1	2	3	4

ANALYTE LIST	Amounts/Quantitation Limits (mg/Kg)			
OIL AND GREASE:	NA	NA	NA	NA
TPH/GASOLINE RANGE:	ND<1	660	560	31
TPH/DIESEL RANGE:	2	34	13	2
BENZENE:	0.021	3.0	ND<0.6	0.170
TOLUENE:	ND<.005	3.7	4.5	0.290
ETHYL BENZENE:	ND<.005	5.0	3.6	0.110
XYLENES:	ND<.005	8.0	7.4	0.220

Superior Precision Analytical, Inc.

825 Arnold Drive, Ste. 114 • Martinez, California 94553 • 415-229-1512 / fax 415-229-1526

C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

Page 2 of 2
QA/QC INFORMATION
SET: 83697

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
mg/kg = part per million (ppm)

OIL AND GREASE ANALYSIS By Standard Methods Method 503E:
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA-SW846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Soil: 1mg/kg
Standard Reference: 05/17/91

EPA-SW846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg
Standard Reference: 06/26/91

SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Soil: 0.005mg/kg
Standard Reference: 07/08/91

ANALYTE	REFERENCE	SPIKE LEVEL	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Oil & Grease	NA	NA	NA	NA	NA
Diesel	05/17/91	200 ppm	105/104	1	75-125
Gasoline	06/26/91	200 ng	103/97	6	70-130
Benzene	07/08/91	200 ng	99/98	1	70-130
Toluene	07/08/91	200 ng	94/94	0	70-130
Ethyl Benzene	07/08/91	200 ng	93/94	1	70-130
Total Xylene	07/08/91	200 ng	90/91	1	70-130

Richard Srna, Ph.D.

Robert Watson Hoy
Laboratory Director

Fax copy of Lab Report and COC to Chevron Contact: Yes No

Chain-of-Custody-Record

Chevron U.S.A. Inc.
P.O. BOX 5004
San Ramon, CA 94583
FAX (415)842-9591

Chevron Facility Number 9-0121
Facility Address 3026 Lakeshore Ave, Oakland
Consultant Project Number 020301500 020503
Consultant Name GTI
Address 4057 Port Chicago Highway, Concord
Project Contact (Name) Glen C. Mitchell
(Phone) 671-2327 (Fax Number) 685-9148

Chevron Contact (Name) Ms Nancy Vukelich
(Phone) 842-8581
Laboratory Name Superior Analytical
Laboratory Release Number 440-33170
Samples Collected by (Name) Glen C. Mitchell
Collection Date 8/13/91
Signature Glen C. Mitchell

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	Analyses To Be Performed										Remarks		
								BTEX + TPH GAS (8020 + 8015)	TPH Diesel (8015)	Oil and Grease (5520)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240)	Extractable Organics (8270)	Metals Cd, Cr, Pb, Zn, Ni (ICAP or AA)					
MW-3A	1	1	S	G	9:30		Y	X	X											
3B	2	1	S	G	10:05 9:30		Y	X	X											
4A-	3	1	S	G	10:58		Y	X	X											
4-B	4	1	S	G	11:05		Y	X	X											

Please Initial:
 Samples Stored in ice. BM
 Appropriate containers BM
 Samples preserved BM
 UOA's without headspace BM
 Comments: BM

Relinquished By (Signature) <u>6 M. Miller</u>	Organization <u>GTI</u>	Date/Time <u>8/13/91 13:00</u>	Received By (Signature) <u>[Signature]</u>	Organization <u>[Signature]</u>	Date/Time	Turn Around Time (Circle Choice) 24 Hrs. 48 Hrs. <u>5 Days</u> 10 Days As Contracted
Relinquished By (Signature) <u>[Signature]</u>	Organization <u>[Signature]</u>	Date/Time	Received By (Signature) <u>[Signature]</u>	Organization <u>[Signature]</u>	Date/Time	
Relinquished By (Signature) <u>[Signature]</u>	Organization <u>[Signature]</u>	Date/Time	Received By (Signature) <u>[Signature]</u>	Organization <u>[Signature]</u>	Date/Time <u>1500 8/13/91</u>	

COC-1.0MG/03 01/HCH

APPENDIX D
WELL SURVEY AND MONITORING DATA

#3924? #3942

LOCATIONS & ELEVATIONS OF MONITORING WELLS
 @ MACARTHUR BLVD & LAKESHORE AVE - OAKLAND
 @ CHEVRON STATION

FOR GROUNDWATER TECHNOLOGY INC.

P.O. # ~~119159~~ 120364 *

* - LOCATIONS & ELEVATIONS TAKEN ON AUGUST 20, 1991

BENCHMARK - SURFACE DISC MONUMENT @ BACK/WALK

EAST SIDE OF GRAND AVE NEAR END OF

LAKE MERITT (NORTH END) ACROSS STREET

FROM 554 GRAND AVE STAMPED "SEC-B" STA.A

ELEVATION 6.534

STA	T	HI	-	ELEV	DESC.
8/A				6.53	BM
	3.82	10.35			
TP#1			5.68	4.67	VC WEST END LAKESHORE
	4.88	9.55			
TBM			3.32	6.23	P/C P/C @ Q SWI
	3.65	9.88			
TP#1			5.21	4.67	VC WEST END LAKESHORE
	5.77	10.44			ETA
8/A			3.91	6.53	BM

* LEGEND

- SET NAIL ON BISC LINE @ BACK/WALK
- ⊙ FOUND MONITORING WELL (NUMBERS PER GROUNDWATER TECH)
- ▲ TBM LOCATION

MORNING

PORTIONS

APRIL 18, 1991

* UPDATE - AUGUST 20, 1991

