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

February 9, 1993

~~Mr. Edgar Howell~~ Susan
Alameda County Health Care Services
80 Swan Way, Room 200
Oakland, CA 94621

Re: Former Chevron Service Station #9-1026
3701 Broadway, Oakland

Dear Mr. Howell:

Enclosed we are forwarding the Environmental Assessment Report dated January 19, 1993, prepared by our consultant Groundwater Technology, Inc. (GTI) for the above referenced site. As indicated in the report, monitor wells E, F and B-1 were reconstructed to extended depths due to insufficient water in these wells. Monitor wells E and F were constructed of 2-inch diameter PVC casing and well B-1 was constructed of 4-inch diameter PVC casing for future recovery. Soil samples collected from the drill cuttings were analyzed for total petroleum hydrocarbons as gasoline (TPH-G) and BTEX. All results reported concentrations below the method detection limits for these constituents. Ground water samples were collected and analyzed for TPH-G and BTEX. Laboratory analysis reported benzene concentrations in wells E and B-1 only at concentrations of 2.7 and 9.7 ppb, respectively.

Groundwater samples were also collected from the existing wells at this time. Benzene was detected in monitor wells B-2, B-4, A and B only at concentrations of 11,000, 9,500, 1,500 and 2,200 ppb, respectively. Separate-phase hydrocarbons were observed in monitor well B-3 only at measured thickness of .03-ft. Depth to groundwater was measured at approximately 12.2 to 17.6-feet below grade, and the direction of flow is to the south-southwest.

We are currently re-evaluating remedial alternatives at this site. Prior pilot test data has suggested that conventional soil vapor extraction would not be an effective technology at this site based on a relatively large vacuum required to induce small flow rates. As requested in prior correspondence to you, we feel it would be beneficial to schedule a meeting with the assigned Hazardous Materials Specialist responsible for this site (formerly Gil Wistar) to review the site data and discuss appropriate site specific corrective actions and establish mutual objectives for the site. As you are aware, we do not feel that ground water remediation is an appropriate corrective action to implement at this time based on known up-gradient sources for hydrocarbons in ground water. Implementing remedial measures to address the contamination present in the ground water beneath the referenced site will not address the impacts from the up-gradient sources as it is undetermined what extent has migrated beneath our site.

Chevron will continue to monitor this site and report findings on a quarterly basis. Effective immediately, I will no longer be the Chevron Project Manager for the referenced site. The new project manager and your contact for all future correspondence will be Mr. Mark Miller. If you have any questions or comments, please contact Mark at (510) 842-8134. We look forward to your reply.

Very truly yours,
CHEVRON U.S.A. PRODUCTS COMPANY

Nancy Vukelich
Site Assessment and Remediation Engineer

Enclosure

cc: Mr. Rich Hiett, RWQCB-Bay Area
Ms. B.C. Owen
File (9-1026A1/Q5)

Mr. W. Bruce Bercovich
Kay & Merkel
100 The Embarcadero, 3rd Floor
San Francisco, CA 94105

JAN 20 '93 PWM

GROUNDWATER TECHNOLOGY, INC.

4057 Port Chicago Highway, Concord, CA 94520 (415) 671-2387
FAX: (415) 685-9148

ENVIRONMENTAL ASSESSMENT REPORT
CHEVRON SERVICE STATION NO. 9-1026
3701 BROADWAY
OAKLAND, CALIFORNIA

1-19-93

020202782

JANUARY 19, 1993

Prepared for:
Ms. Nancy Vukelich
Chevron U.S.A. Products Company
2410 Camino Ramon
San Ramon, California 94583-0804

Groundwater Technology, Inc.
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Sandra L. Lindsey
Project Manager

Groundwater Technology, Inc.
Reviewed/Approved by

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Registered Geologist
No. 5136

REGISTERED GEOLOGIST
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NO. 5136
STATE OF CALIFORNIA

For:
John S. Gaines
Vice President, General Manager
West Region

R2782A1.TW

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FIGURES

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(continued)

TABLES

APPENDICES

ENVIRONMENTAL ASSESSMENT REPORT
FORMER CHEVRON SERVICE STATION NO. 9-1026
3701 BROADWAY
OAKLAND, CALIFORNIA

JANUARY 19, 1993

1.0 INTRODUCTION

This report summarizes the environmental assessment work conducted by Groundwater Technology, Inc. (Groundwater Technology) at the Chevron USA Products Company (Chevron) Service Station No. 9-1026 located at 3701 Broadway in Oakland, California (Figure 1). The objective of this work was to further evaluate the lateral extent of dissolved petroleum hydrocarbons at the referenced site by extending the soil borings of two off-site wells and one on-site well. The assessment work conducted from October through December 1992 included:

- Abandoning three monitoring wells;
- Drilling out and extending the soil borings in the abandoned wells;
- Constructing two 2-inch-diameter wells and one 4-inch diameter monitoring well in the soil borings;
- Sampling soil and groundwater;
- Analyzing the collected samples;
- Evaluating the data; and
- Preparing this report.

2.0 BACKGROUND

The site is located in West Alameda County, West Oakland, on the northwest corner of the intersection of MacArthur Boulevard and Broadway (Figure 2). The parking lot of a small shopping mall abuts the site to the north and east. Commercial businesses are located north and southeast of the site. Mosswood Park is across MacArthur Boulevard to the south and a Kaiser Hospital is across Broadway to the east. A motel is west of the site and residential buildings are further west. The aboveground structures of the former station, including the pump island foundations, have been removed. Currently, the site is the location of a used automobile dealership.

The surface elevation at the site is approximately 70 feet above mean sea level. Lake Merritt is approximately 1 mile south of the site and San Francisco Bay approximately 4 miles east. Previously drilled on-site monitoring wells (1979?) were designated B-5, B-6, and B-7 by I.T. Enviroscience during on-site activities in April, 1982. These wells were drilled in response to hydrocarbons odors detected in Mosswood Park (across MacArthur Boulevard to the south) and in the motel west of the site (I.T. Enviroscience, April 28, 1982). The wells were constructed of 20 feet of octagonal corrugated plated steel. On March 24, 1982, separate-phase hydrocarbons were detected in wells B-5, B-6, and B-7. These 8-inch monitoring wells apparently have been abandoned in place by filling with concrete to grade.

On March 25, 1982, J.H. Kleinfelder & Associates drilled four on-site soil borings and designated these wells B-1, B-2, B-3, and B-4. Monitoring wells B-1, B-2, B-3, and B-4 were installed after B-5, B-6, and B-7. The four soil borings were converted to 20-foot-deep monitoring wells (J.H. Kleinfelder & Associates, April 6, 1982). Six of monitoring wells (B-1, B-2, B-3, B-5, B-6, and B-7) contained separate-phase hydrocarbons between March 30 and April 26, 1982, ranging in thickness from 5.82 feet to a sheen.

On April 23, 1982, five additional wells (A, B, C, E, and F) were drilled (I.T. Enviroscience, April 28, 1982). Monitoring wells A, B, and C were located on site and monitoring wells E and F were located off site. Monitoring wells B and C contained separate-phase hydrocarbons during April 1982 ranging in thickness from 0.34 to 2.32 feet.

In April 1985, Gettler-Ryan began routine monitoring and pumping of separate-phase hydrocarbons from the monitoring wells at the site. The monitoring and pumping of separate-phase hydrocarbons was repeated during August and September 1986. Gasoline was detected in monitoring wells B-2, B-3, B-7, B, and C (EA Engineering, July 13, 1988). During April 1988, E.A. Engineering drilled two off-site monitoring wells: EA-1 and EA-2.

On February 28, 1992, Weiss Associates monitored and sampled the site. A sheen was observed on the purge water from monitoring wells B-1, B-2, and B-3. Total petroleum hydrocarbons-as-gasoline (TPH-G) concentrations ranging from 280,000 to 6,800 parts per billion (ppb) were reported for the samples collected from on-site monitoring wells A, B, B-1, B-2, B-3, and B-4. Analytical results for

samples collected from off-site monitoring wells EA-1 and EA-2 reported benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations below method detection limits (MDLs).

3.0 WORK SCOPE

3.1 Site-Specific Health and Safety Plan and Permits

Groundwater Technology prepared a site-specific Health and Safety Plan required by the Occupational Health and Safety Administration (OSHA) Standard "Hazardous Waste Operations and Emergency Response" guidelines (29 CFR 1910.120). The site-specific Health and Safety Plan was prepared after a review of site conditions and existing available site-specific health and safety plans for the site. The Health and Safety Plan was reviewed and signed by all of Groundwater Technology's personnel and subcontractors before working at the site.

Groundwater Technology reviewed the site history and site information with Chevron representatives before beginning work at the site. Drilling permits to install the monitoring wells were obtained from Alameda County Flood Control and Water Conservation District Zone 7 Water Agency. Encroachment permits were obtained from the City of Oakland Public Works Department. Copies of the permits are included in Appendix A.

3.2 Soil Borings

On October 14 and 28, 1992, Groundwater Technology supervised the abandonment of three monitoring wells (E, F, and B-1) as shown on Figure 2. The casings of the monitoring wells were pulled out and the borings extended using a truck-mounted drill rig equipped with 8.5-inch hollow stem augers. On October 14, 1982, off-site monitoring wells E and F were extended to 35 and 30 feet below grade, respectively. On-site monitoring well B-1 was extended to 35.5 feet below grade on October 28, 1992. The augers were steam cleaned between each monitoring well installation. A Groundwater Technology field geologist, under the supervision of a California-registered geologist, logged the materials encountered during drilling of the soil boring for monitoring well B-1 using the Unified Soil Classification System. The extended soil borings for monitoring wells E and F were not logged.

The steam cleaning water was stored on site in labeled 55-gallon drums pending disposal. The soil cuttings generated during the drilling activities were placed in 55-gallon drums. Soil cuttings were then characterized, profiled, and transported to City of Mountain View Public Landfill in Mountain View, California on December 12, 1992. Water generated from steam cleaning, purging, and sampling activities was removed and transported to the Chevron Terminal in Richmond.

3.3 Soil Sampling

During drilling on October 28, 1992, soil samples from the extended soil boring B-1 were collected at 5-foot intervals from approximately 25 feet below grade to the bottom of the boring at 35.5 feet below grade. Soil samples were collected using a 2-inch-diameter split-spoon sampler, lined with three 2-inch-diameter by 6-inch-long brass sample tubes. The sampler was driven 18 inches ahead of the hollow-stem augers into undisturbed soil at each sample interval. One sample from every 5-foot interval was sealed with aluminum foil, capped, taped, labeled, placed on ice in an insulated container, and delivered to a California-certified laboratory. All sampling was performed according to Groundwater Technology Standard Operating Procedures (SOPs), which are included in Appendix B.

Three soil samples from on-site soil boring B-1 were submitted to a California-certified laboratory for BTEX and TPH-G analyses using EPA Methods 5030/8020 and modified EPA Method 8015.

3.4 Monitoring Well Installation

Monitoring well E was constructed of 20 feet of 2-inch-diameter, Schedule 40 polyvinyl chloride (PVC) casing with flush threads, and 15 feet of 0.020-inch-slot well screen. Monitoring well F was constructed of 15 feet of 2-inch-diameter, Schedule 40 PVC casing with flush threads, and 15 feet of 0.02-inch-slot well screen. Monitoring well B-1 was constructed of 10 feet of 4-inch-diameter, Schedule 40 PVC casing with flush threads, and 25 feet of 0.020-inch-slot well screen. A sand filter pack (clementia No. 3) was placed around the well screen in monitoring wells E, F, and B-1 to approximately 2 feet above the slotted well screen. Monitoring wells E and F were completed with 3 feet of hydrated bentonite and a neat-cement seal to grade. Monitoring well B-1 was completed with 1 foot of hydrated bentonite and a neat-cement seal to grade. The wellheads were protected

by a locking cap and a traffic-rated street box with a water-tight bolted lid. Well construction details are included with the drill logs (Appendix C). The top of casing elevation of each monitoring well was surveyed to standard City of Oakland brass disc at the midpoint of the sidewalk at the northeast corner of Broadway and MacArthur Boulevard in Oakland by a professional licensed surveyor.

3.5 Monitoring Well Development

On October 14, 1992, monitoring wells E and F were developed by surging and bailing groundwater using a PVC bailer. This technique promotes a uniform sand filter pack, removes fine-grain sediments from the well screen and filter pack, and improves the hydraulic communication between the well and aquifer. On October 15, 1992, monitoring well B-1 was developed using a truck mounted surge block and an electric pump. The groundwater from each well was bailed until suspended fine-grain sediments were removed from the groundwater flowing into the wells. Approximately 30 gallons of groundwater were removed from monitoring wells E and F and approximately 100 gallons of groundwater were removed from monitoring well B-1 during development activities.

3.6 Groundwater Monitoring

On November 18, 1992, each monitoring well (except monitoring well EA-1) was monitored to measure the depth to groundwater and the thickness of separate-phase hydrocarbons, if present. Monitoring well EA-1 was monitored on December 8 1992. The water levels were measured using an ORS Environmental Equipment INTERFACE PROBE™ Well Monitoring System, consisting of a dual optical sensor and electrical conductivity probe that distinguishes between water and petroleum products. Separate-phase hydrocarbons were detected in monitoring well B-3 at a thickness of 0.03 foot. Separate-phase hydrocarbon sheens were detected in monitoring wells A, B, B-2, and B-4.

3.7 Groundwater Sampling

During a previous routine site visit by Groundwater Technology, off-site monitoring wells EA-1, E, and F were found to have been mislabeled on a site map used for monitoring and sampling identifications (Weiss Associates, December 20, 1992). After a historical review, monitoring well E appeared to have been excluded from the Weiss Associates map and wells F and EA-1 were

mislabeled. Corrected site maps were prepared and are used in this report. Footnotes have been added to tables to explain analytical results of mislabeled off-site monitoring wells EA-1, E, and F during this assessment.

On November 18, 1992, the monitoring wells were purged and groundwater samples were collected from monitoring wells A, B, E, F, B-1, B-2, B-4, and EA-2. On December 8, 1992, monitoring well EA-1 was sampled. Monitoring wells were purged before groundwater samples were collected. Monitoring wells A, B-2, and B-4 went dry after approximately 1 gallon was purged from the wells. Monitoring wells were allowed to recharge before groundwater samples were collected. Immediately before collecting each water sample, a distilled water rinsate blank was collected from the Teflon® sampler as a quality control check on the cleanliness of the sampler. A trip/lab blank was also prepared for quality control. Each sample was acidified, labeled, placed on ice in an insulated container, and delivered to a California-certified laboratory. The samples were accompanied by a chain-of-custody record during transport. Each sample was analyzed for BTEX and TPH-G using EPA Methods 5030/8020 and modified EPA Method 8015. Water generated during the purging and sampling process was stored in Department of Transportation (DOT)-approved steel drums. The water was then pumped to a water trailer and transported for recycling to the Chevron refinery in Richmond, California.

4.0 SITE CONDITIONS

4.1 Analytical Results for Soil

Laboratory analytical results for soil samples collected during soil boring activities on October 28, 1992, reported BTEX and TPH-G concentrations below MDLs. These soil samples were collected during extension of the on-site soil boring for B-1 at depths of 25, 30, and 35 feet below grade. The results of the soil analyses are summarized in Table 1 and laboratory reports are included in Appendix D.

4.2 Analytical Results for Groundwater

Analytical results for groundwater samples collected on November 18 and December 8, 1992, reported detectable BTEX and TPH-G concentrations in samples collected from monitoring wells B-1, B-2, B-4, A, B, E, F, and EA-2. The highest concentration of benzene (11,000 ppb) was reported in the sample collected from monitoring well B-2. The highest concentration of TPH-G (32,000 ppb) was reported in the sample collected from monitoring well B-4. Concentrations of BTEX and TPH-G were reported below MDLs in the samples collected from monitoring wells F and EA-2. The analytical results for groundwater samples collected on November 18, and December 8, 1992, are illustrated in Figures 3 and 4, respectively. A summary of the groundwater sample analytical results is presented in Table 2. Copies of the laboratory reports are included in Appendix D.

4.3 Hydrogeology

The site is located on the Bay Plain in West Alameda County separated from the older nonbearing bedrocks of the East Bay hills by the Hayward Fault. The alluvial sediments in the Bay Plain consist of a mixture of gravels, sands, and clays that are Pliocene-Pleistocene to late Pleistocene in age and were deposited on the alluvial cones west of the foothills. Groundwater in these sediments can be either confined or unconfined. The major groundwater producing area in the East Bay region of Alameda County is the Bay Plain. Regional groundwater flow is generally to the southwest and toward San Francisco Bay (Western Alameda County Water Resources, 1984)

The materials encountered during drilling consisted of clays, silty clays, sandy clays, and fine sands. Groundwater levels measured on November 18, 1992, ranged from 14.30 feet below grade in monitoring well B-1 to 17.61 feet below grade in well EA-2. A potentiometric surface map (Figure 5) was prepared using the water level data collected on November 18, 1992. Figure 5 shows a southerly groundwater flow direction with a gradient between 0.01 and 0.02 foot per foot (ft/ft). Groundwater level data are presented in Table 2.

5.0 SUMMARY

- On October 14 and 28, 1992, Groundwater Technology supervised the reconstruction of three monitoring wells (E, F, and B-1) using a mobile B-51 drilling rig. The soil borings for these monitoring wells were extended and replacement monitoring wells were constructed. The materials encountered during drilling consisted of clays, silty clays, sandy clays, and fine sands.

- Analytical results of the soil samples collected during drilling activities for on-site monitoring well B-1 indicated that TPH-G and BTEX concentrations were below MDLs.

- On November 18, 1992, groundwater levels were measured in each of the monitoring wells at the site except monitoring well EA-1, which was measured on December 8, 1992. The depth to water ranged from 14 to 18 feet below grade. Analysis of the monitoring data indicated a groundwater flow direction toward the south with a gradient between 0.01 and 0.02 ft/ft.

- Analytical results of the groundwater samples collected from monitoring well B-4 reported the highest TPH-G concentration at 32,000 ppb. The highest benzene concentration (11,000 ppb) was reported for the sample collected from monitoring well B-2. Analytical results of the groundwater samples collected from monitoring wells F and EA-1 reported concentrations of TPH-G and BTEX below MDLs.

6.0 CONCLUSIONS

The analytical results of the groundwater samples report that on-site monitoring well B-4 has the highest TPH-G concentrations. The dissolved hydrocarbon plume appears to be defined to the south with nondetectable concentrations of TPH-G and BTEX in the water samples from wells F and EA-1. Groundwater elevations calculated from the current data show a groundwater flow direction to the south.

7.0 REFERENCES

E.A. Engineering Science and Technology, Inc., Former Chevron Service Station No. 9-1026, MacArthur Boulevard and Broadway, Oakland, California, July 13, 1988.

I.T. Enviroscience, Progress Report No. 1, Gasoline Leakage, Chevron Station No. 9-1026, 3701 Broadway, Oakland, California, April 28, 1982.

J.H. Kleinfelder & Associates, Groundwater Monitoring Well Installation Report, Candia's Chevron Station, Oakland, California, April 6, 1982.

Weiss Associates, Fourth Quarter 1991, Groundwater Monitoring Report, Former Chevron Service Station No. 9-1026, 3701 Broadway, Oakland, California, WA Job No. 4-418-01, December 20, 1991.

Western Alameda County Water Resources, Alameda County Flood Control and Conservation District, Groundwater in the San Leandro and San Lorenzo Alluvial Cones of the East Bay Plain of Alameda County, 1984.

FIGURES

GROUNDWATER TECHNOLOGY

4057 PORT CHICAGO HWY
CONCORD, CA 94520
(510) 671-2387

N

SCALE: 0 FEET 2000

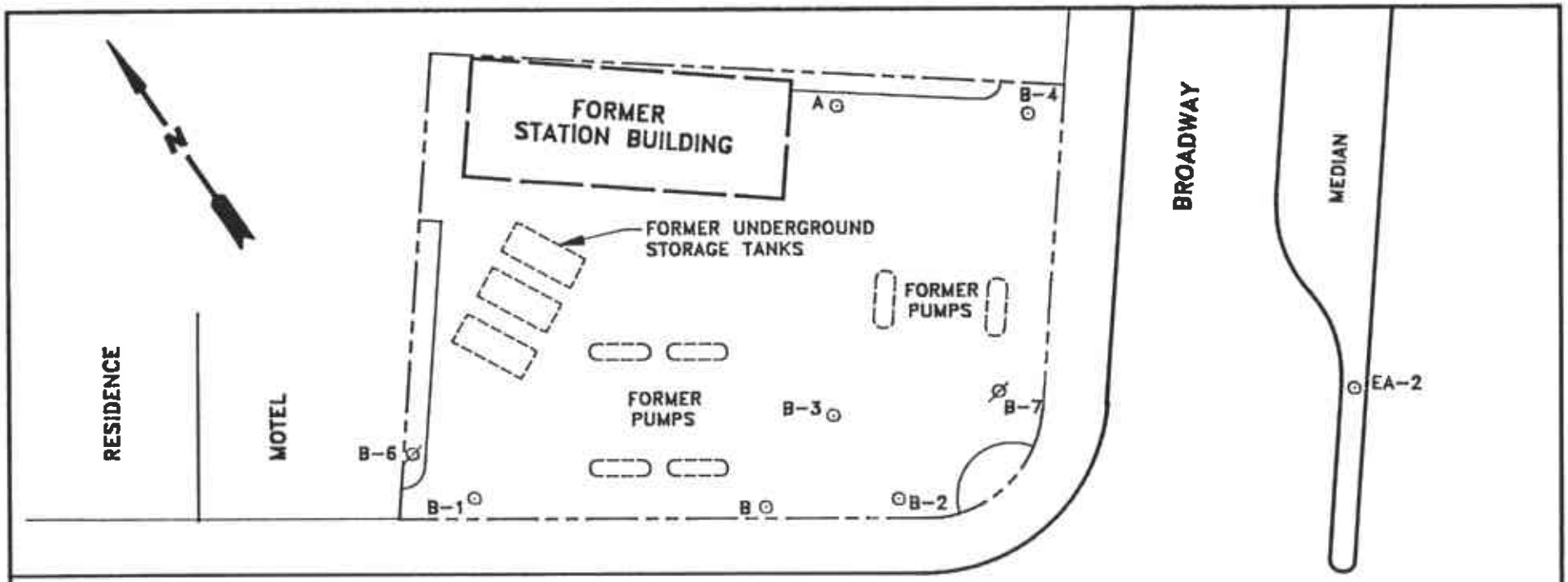
SITE LOCATION MAP

CLIENT: CHEVRON U.S.A. PRODUCTS CO.
SERVICE STATION No. 9-1026

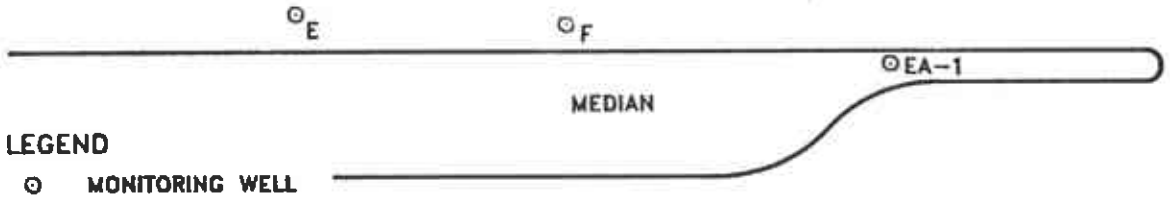
DATE: 1/18/93

LOCATION: 3701 BROADWAY
OAKLAND, CALIFORNIA

FIGURE: 1



MacARTHUR BLVD.



LEGEND

- ⊙ MONITORING WELL
- ⌀ ABANDONED WELL

0 FEET 50
SCALE

GROUNDWATER TECHNOLOGY
4057 PORT CHICAGO HWY
CONCORD, CA 94520
(510) 671-2387

SITE PLAN

CLIENT:	LOCATION:	REV. NO.:	DATE:
CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-1026	3701 BROADWAY OAKLAND, CALIFORNIA	0	10/28/92

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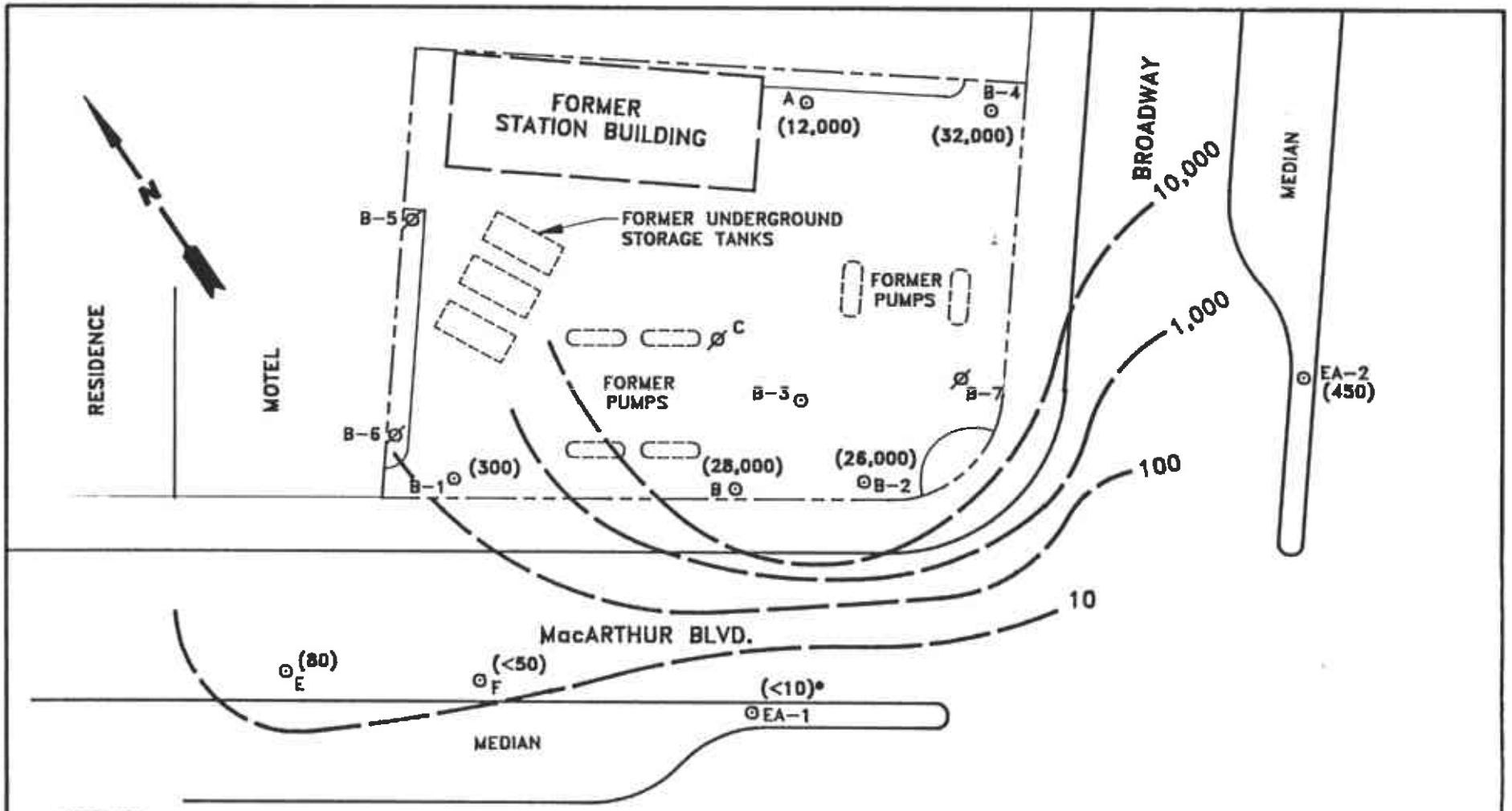

GROUNDWATER TECHNOLOGY
4057 PORT CHICAGO HWY
CONCORD, CA 94520
(510) 671-2387

DISSOLVED TPH-as-GASOLINE CONCENTRATION MAP (11/18/92)

CLIENT:	LOCATION:	REV. NO.:	DATE:
CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-1026	3701 BROADWAY OAKLAND, CALIFORNIA	1	1/7/93

PM	PE/RG	DESIGNED	DETAILED	ACAD FILE:	PROJECT NO.:	FIGURE:
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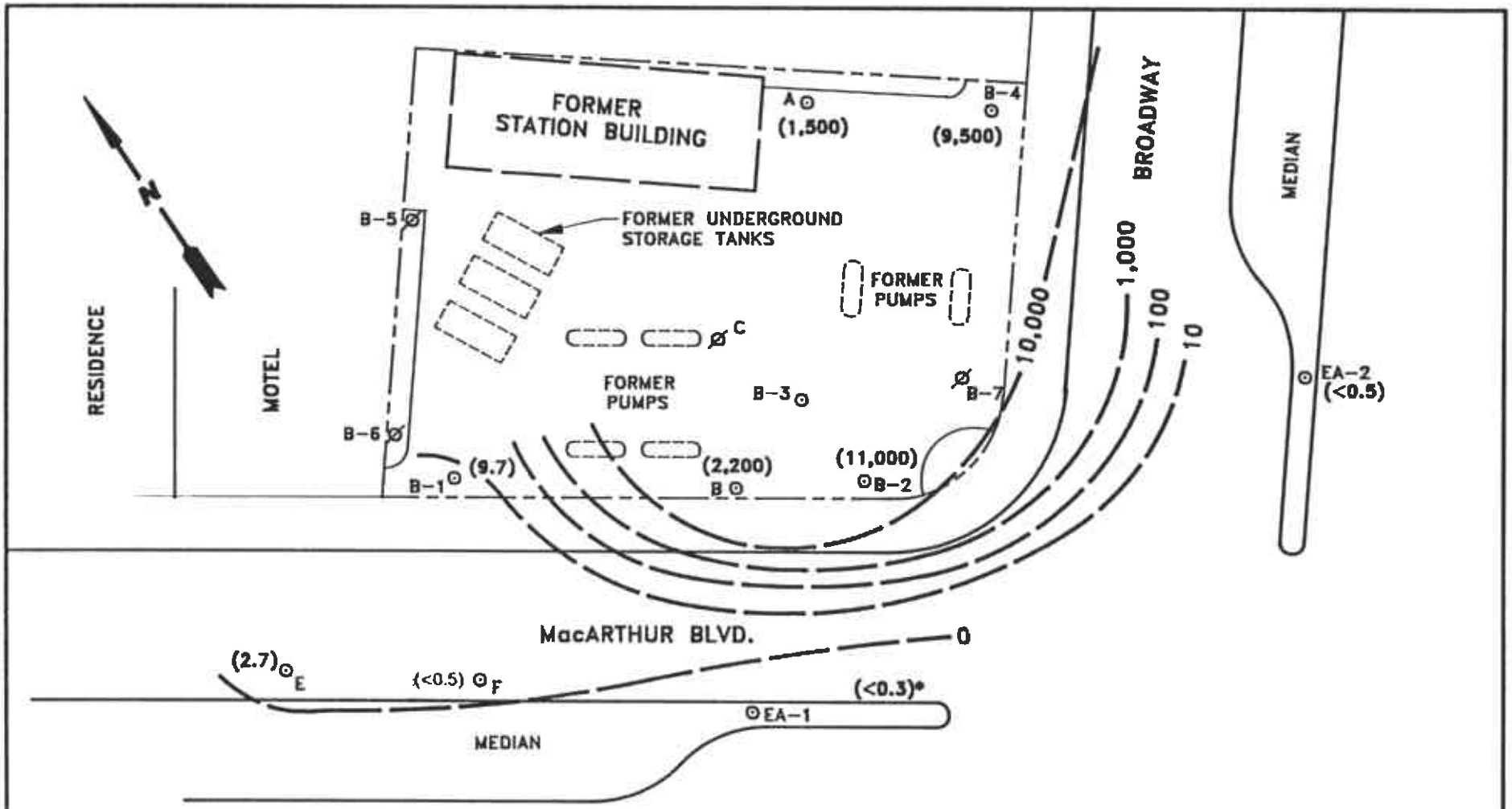

GROUNDWATER TECHNOLOGY
4057 PORT CHICAGO HWY
CONCORD, CA 94520
(510) 671-2387

DISSOLVED BENZENE CONCENTRATION MAP (11/18/92)

CLIENT:	LOCATION:	REV. NO.:	DATE:
CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-1026	3701 BROADWAY OAKLAND, CALIFORNIA	1	1/7/93

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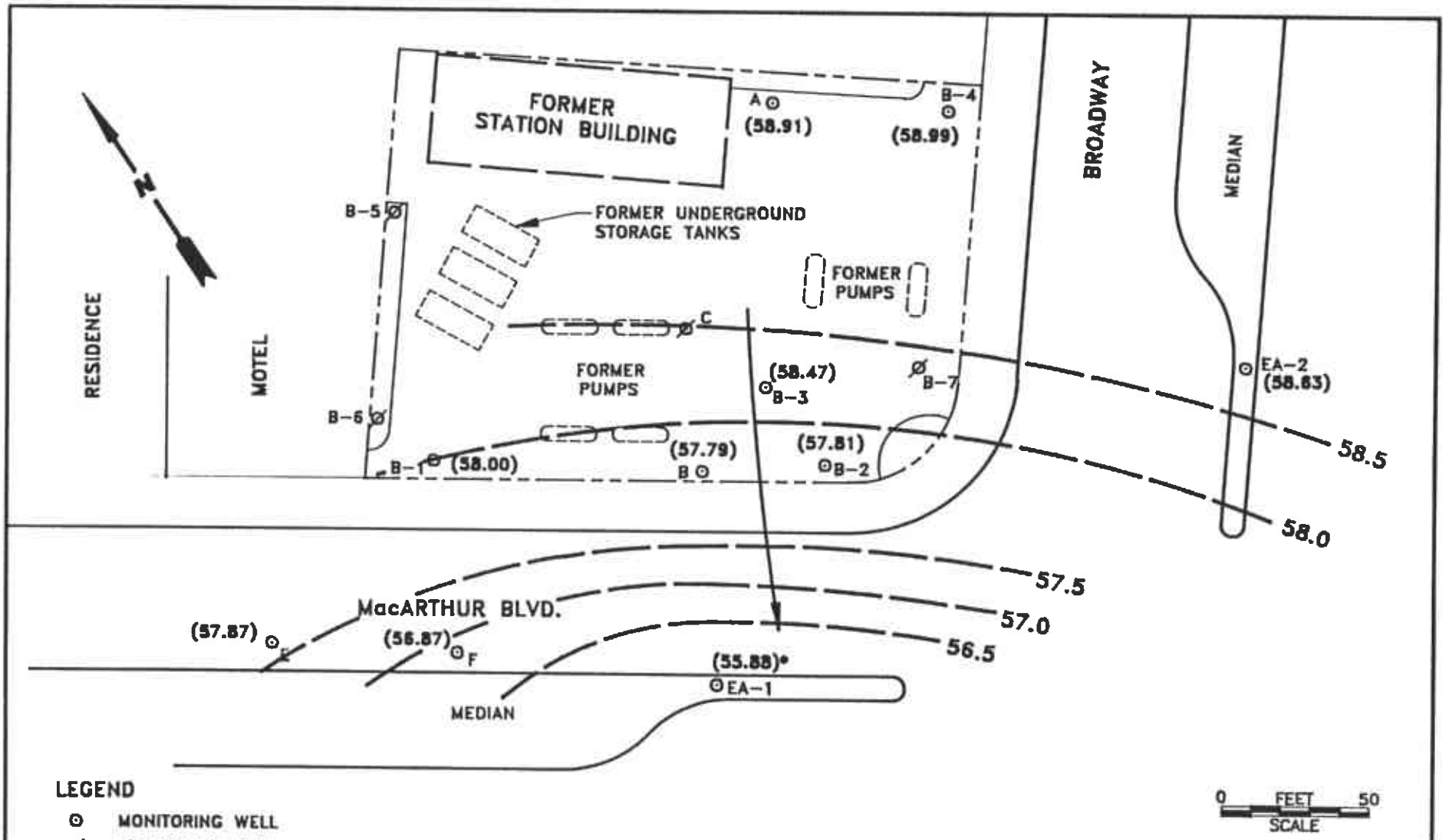

LEGEND

- ⊙ MONITORING WELL
- ⌀ ABANDONED WELL
- ( ) POTENTIOMETRIC SURFACE ELEVATION
- —— POTENTIOMETRIC SURFACE CONTOUR
- • MEASURED 12/8/92
- → GROUNDWATER FLOW DIRECTION

GROUNDWATER TECHNOLOGY 4057 PORT CHICAGO HWY CONCORD, CA 94520 (510) 671-2387

POTENTIOMETRIC SURFACE MAP (11/18/92)

CLIENT:	LOCATION:	REV. NO.:	DATE:
CHEVRON U.S.A. PRODUCTS CO. SERVICE STATION No. 9-1026	3701 BROADWAY OAKLAND, CALIFORNIA	1	1/7/93

PM	PE/RG	DESIGNED	DETAILED	ACAD FILE:	PROJECT NO.:	FIGURE:
JAW	DRF	TW	CSY	SP1292	020202782	5

TABLE 1
ANALYTICAL RESULTS FOR SOIL SAMPLES
COLLECTED ON OCTOBER 18, 1992
(Concentrations in parts per million)

DATE	SAMPLE ID	SAMPLE DEPTH (feet)	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPH-AS-GASOLINE
10/08/92	B1-25	25	<0.5	<0.5	<0.5	<0.5	<1
	B1-30	30	<0.5	<0.5	<0.5	<0.5	<1
	B1-35	35	<0.5	<0.5	<0.5	<0.5	<1

TPH = Total petroleum hydrocarbons

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TABLE 2
MONITORING DATA AND ANALYTICAL RESULTS
FOR GROUNDWATER SAMPLES COLLECTED ON NOVEMBER 18, 1992*
(Concentrations in parts per billion)

WELL ID	TOC ELEVATION (msl)	BENZENE	TOLUENE	ETHYL-BENZENE	TOTAL XYLENES	TPH-AS-GASOLINE	DTW (ft)	SPT (ft)	GWE (ft)
B-1	72.30	9.7	3.4	2.3	21	300	14.30	0.00	58.00
B-2	74.52	11,000	170	870	950	26,000	16.71	0.00	57.81
B-3	74.13	-	-	-	-	-	15.68	0.03	58.47
B-4	76.43	9,500	220	1,200	2,600	32,000	17.44	0.00	58.99
A	75.29	1,500	83	360	530	12,000	16.38	0.00	58.91
B	73.39	2,200	150	920	4,300	28,000	15.60	0.00	57.79
E	70.07	2.7	2.4	3.0	12	80	12.20	0.00	57.87
F	71.72	<0.5	<0.5	<0.5	<0.5	<50	14.85	0.00	56.87
EA-1	71.85	<0.3	<0.3	<0.3	<0.5	<10	15.97	0.00	55.88
EA-2	76.24	<0.5	3.3	<0.5	0.8	450	17.61	0.00	58.63

TPH = Total petroleum hydrocarbons
DTW = Depth to water
SPT = Separate-phase hydrocarbon thickness
GWE = Groundwater elevation above mean seal level relative to City of Oakland benchmark
MSL = Mean sea level
TOC = Top of casing
* = Groundwater elevations and sampling for monitoring well EA-1 took place on December 8, 1992.
- = Not sampled separate-phase hydrocarbons present

Superior Laboratory results for monitoring wells F and EA-1 are for wells E and F, respectively. This switch is explained in the first paragraph of Section 3.7.

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GROUNDWATER TECHNOLOGY

APPENDIX A

WELL INSTALLATION PERMITS

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94588 • (510) 484-2600

DRILLING PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

LOCATION OF PROJECT (9-1026)
3701 Broadway
Oakland, California

CLIENT
Name Chevron U.S.A. Products Company
Address P.O. Box 5004 Phone 842-9581
City San Ramon Zip 94583

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	X
Monitoring	X	Well Destruction	___

PROPOSED WATER SUPPLY WELL USE
Domestic ___ Industrial ___ Other None
Municipal ___ Irrigation ___

DRILLING METHOD:
Mud Rotary ___ Air Rotary ___ Auger X
Cable ___ Other ___

DRILLER'S LICENSE NO. 482390

WELL PROJECTS
Drill Hole Diameter 8 in. (10) Maximum
Casing Diameter 2 in. (4) Depth 35 ft. (35)
Surface Seal Depth 15 ft. (15) Number 2 * (1)
Drill out and deepen wells "F" and "B-1".

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

ESTIMATED STARTING DATE JUNE 18, 1992
ESTIMATED COMPLETION DATE JUNE 19, 1992

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

APPLICANT'S SIGNATURE Gregory A. Mitchell Date 4-30-92

FOR OFFICE USE

PERMIT NUMBER 92285
LOCATION NUMBER ___

PERMIT CONDITIONS

Circled Permit Requirements Apply

(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 logs 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 1 Jun 92
Wyman Hong

51991

CITY OF OAKLAND

PERMIT TO EXCAVATE IN STREETS OR OTHER WORK AS SPECIFIED

EXC 180.00
App Fee 30.00
210.00

LOCATION OF WORK: 3701 Broadway (on MacArthur) BETWEEN Manila AND Broadway
(Street or Address) (Street/Ave.) (Specify)

PERMISSION TO EXCAVATE IN THE PUBLIC RIGHT-OF-WAY IS HEREBY GRANTED TO:

APPLICANT Groundwater Technology, Inc.

ADDRESS 4057 Port Chicago Hwy., Concord, CA PHONE #: (510) 671-2387

EXCV 180.00
APPL 30.00
SUBTL 210.00
CHECK 210.00
TFER 2

X92013

TYPE OF WORK: GAS ___ ELECTRIC ___ WATER ___ TELEPHONE ___ CABLE TV ___ SEWER ___ OTHER Drilling (Specify)

NATURE OF WORK: Install monitoring well for groundwater Assessment

09-01-92 #2 ACC 8367 09:48TM

I hereby affirm that I am exempt from the Contractor's License Law for the following reason (Sec. 7031.5 Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for such permit to file a signed statement that he is licensed pursuant to the provisions of the Contractor's License Law (Chapter 9 (commencing with Sec. 7000) of Division 3 of the Business and Professions Code), or that he is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than $500).

☐ I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or through his own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he did not build or improve for the purpose of sale).

☐ I, as owner of the property, am exempt from the sole requirements of the above due to: (1) I am developing my principal place of residence or appurtenances thereto, (2) the work is to be performed prior to sale, (3) I have resided in the residence for the 12 months prior to completion of the work, and (4) I have not claimed exemption on this subdivision on more than two structures other than once during any three-year period (Sec. 7044, Business and Professions Code).

☐ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractor's License Law).

☐ I am exempt under Sec. ____, B&P, for the reason ____

Signature ____ Date ____

I hereby affirm that I have a certificate of consent to self-insure or a certificate of Workers' Compensation Insurance, or a certified copy thereof (Sec. 3800, Lab. C.)

Policy # ____ Company Name ____

Certified copy is filed with City Building Inspection Dept.

Certified copy is filed with City Building Inspection Dept.

Signature Gregg A. Medeiros Date 9/1/92

(This section need not be completed if the permit is for one hundred dollars ($100) or less.)

I certify that at the present time I do not employ any person in any manner so as to become subject to the Workers' Compensation Laws of California.

Signature ____ Date ____

NOTICE TO APPLICANT: If after making this Certificate of Exemption, you should become subject to the Workers' Compensation provisions of the Labor Code, you must forthwith comply with such provisions or this permit shall be deemed revoked.

PERMIT VOID 90 DAYS FROM DATE OF ISSUE UNLESS EXTENSION GRANTED BY DIRECTION OF PUBLIC WORKS.

Approximate Starting Date	DATE	9/21/92
Approximate Completion Date	DATE	9/25/92
HOLIDAY RESTRICTION (1 NOV — 1 JAN)	YES ✓	NO ___
LIMITED OPERATION AREA (7AM – 9AM / 4PM – 6PM)	YES ✓	NO ___
DATE STREET LAST RESURFACED	DATE	___
SPECIAL PAVING DETAIL REQUIRED	YES ___	NO X

24-HOUR EMERGENCY PHONE NUMBER ____

PERMIT NOT VALID WITHOUT 24 HOUR NUMBER

Telephone 273-3002 Forty-eight (48) HOURS BEFORE ACTUAL CONSTRUCTION

ATTENTION

State law requires that contractor/owner call Underground Service Alert two working days before excavating to have below ground utilities located. This permit is not valid unless applicant has secured an inquiry identification number issued by Underground Service Alert.

Call Toll Free 800-642-2444 USA ID Number ____

This permit issued pursuant to all provisions of Chapter 9, Article 4 of the Oakland Municipal Code.

This permit is granted upon the express condition that the permittee shall be responsible for all claims and liabilities arising out of work performed under the permit or arising out of the permittee's failure to perform the obligations with respect to street maintenance. It is particularly understood and by acceptance of the permit agrees to defend, hold harmless and indemnify the City, its officers and employees, from and against any and all claims, demands, liabilities or losses of any kind or nature which the City, its officers and employees may directly or indirectly sustain, suffer or incur or become liable for by any person for or on account of any bodily injuries, death or sickness or damage to persons and/or property sustained or arising in the course of the work covered by the permit or in consequence of permittee's failure to perform the obligations with respect to street maintenance.

CONTRACTOR

I hereby affirm that I am licensed under provisions of Chapter 9, Article 3 of the Business and Professions Code, and my license is in full force and effect.

LICENSE # AND CLASS ____ CITY BUSINESS TAX # ____

X Gregg A. Medeiros Date 9/1/92
Signature of Contractor (Owner or Agent)

☐ Agent for ☐ Contractor ☐ Owner

OFFICIAL USE ONLY

UTILITY COMPANY REPORT

Superintd. ____ Date ____

Completion Date ____

CITY INSPECTOR'S REPORT

	BACKFILL	PAVING
Initials		
Hours		
Date		
Concrete		
Asphalt		
Sidewalk		

Size of Cut: Sq Ft ___ Inches ___

Permit By ____ Type ____

Bill No. ____

Charges: Backfill ____ Paving ____ Paving Insp. ____

Traffic Striping Replaced ____ Date ____

APPROVED
Engineering Services JWO Date 9-1-92

Planting Date ____

Field Services Date ____

Construction Date ____

Traffic Engineering ____ Date ____

Electrical Engineering ____ Date ____

DIRECTION OF PUBLIC WORKS
APPROVED BY: JW Okelbo
DATE: 9-1-92

EXTENSION GRANTED BY: ____
DATE: ____

APPENDIX B

GROUNDWATER TECHNOLOGY'S STANDARD OPERATING PROCEDURES (SOPs)

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE
CONCERNING GROUNDWATER MONITORING
SOP 8

Groundwater monitoring of wells at the site shall be conducted using an ORS Environmental Equipment (ORS) INTERFACE PROBE ™ and SURFACE SAMPLER™. The INTERFACE PROBE ™ is a hand-held, battery-operated device for measuring depth to petroleum product and depth to water as measured from an established datum (*i.e.*, top of the well casing which has ben surveyed). Separate-phase hydrocarbon (product) thickness is then calculated by subtracting the depth to product from the depth to water. In addition, water elevations are adjusted for the presence of fuel with the following calculation:

(Product Thickness) (0.8) + (Water Elevation) = Corrected Water Elevation

Note: The factor of 0.8 accounts for the density difference between water and petroleum hydrocarbons.

The INTERFACE PROBE ™ consists of a dual-sensing probe which utilizes an optical liquid sensor and electrical conductivity to distinguish between water and petroleum products. A coated steel measuring tape transmits the sensor's signals to the reel assembly where an audible alarm sounds a continuous tone when the sensor is immersed in petroleum product and an oscillating tone when immersed in water. The INTERFACE PROBE ™ is accurate to 1/16th inch.

A SURFACE SAMPLER™ shall be used for visual inspection of the groundwater to note sheens (difficult to detect with the INTERFACE PROBE ™), odors, microbial action, etc.

The SURFACE SAMPLER™ used consists of a 12-inch-long case acrylic tube with a Delrin ball which closes onto a conical surface creating a seal as the sampler is pulled up. The sampler is calibrated in inches and centimeters for visual inspection of product thickness.

To reduce the potential for cross contamination between wells, the monitorings shall take place in order from the least to the most contaminated wells. Wells containing separate-phase hydrocarbons (free product) should be monitored last. Between each monitoring the equipment shall be washed with laboratory-grade detergent and double rinsed with distilled water.

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE
CONCERNING WATER SAMPLING METHODOLOGY
SOP 9

Before water sampling, each well shall be purged by pumping a minimum of four well volumes or until the discharge water indicates stabilization of temperature conductivity and pH. If the well is evacuated before four well volumes are removed or stabilization is achieved, the sample should be taken when the water level in the well recovers to 80 percent of its initial level.

Retrieval of the water sample, sample handling and sample preservation shall be conducted according to Standard Operating Procedure 10 concerning "Sampling for Volatiles in Water." The sampling equipment used shall consist of a Teflon® and/or stainless steel samplers which meet U.S. Environmental Protection Agency (EPA) regulations. Glass vials with Teflon® lids should be used to store the collected samples.

To ensure sample integrity, each vial shall be filled with the sampled water in such a way that the water stands above the lip of the vial. The cap should then be quickly placed on the vial and tightened securely. The vial should then be checked to ensure that air bubbles are not present prior to labeling of the sample. Label information should include a sample identification number, job identification, date, time, type of analysis requested, and sampler's name. Chain-of-custody records shall be completed according to Standard Operating Procedure (SOP) 11 concerning chain of custody.

The vials should be immediately placed in high quality coolers for shipment to the laboratory. The coolers should be packed with sufficient ice or freezer packs to ensure that the samples are kept below 4° Celsius (C). To minimize sample degradation the prescribed analysis shall take place within seven days of sample collection unless specially prepared acidified vials are used.

To minimize the potential for cross contamination between wells, all the well development and water sampling equipment which contacts the groundwater shall be cleaned between each sampling. As a second precautionary measure, the wells shall be sampled in order of increasing contaminant concentrations (the least contaminated well first, the most contaminated well last) as established by previous analysis.

STANDARD OPERATING PROCEDURE 10
CONCERNING SAMPLING FOR VOLATILES IN WATER
(DISSOLVED GASOLINE, SOLVENTS, ETC.)
SOP 10

1. Use only vials properly washed and baked.

2. Use clean sampling equipment. Scrub with Alconox or equivalent laboratory detergent and water followed by a thorough water rinse. Complete with a distilled water rinse.

   Sampling equipment which has come into contact with liquid hydrocarbons (free product) should be regarded with suspicion. Such equipment should have tubing and cables replaced and all resilient parts washed with laboratory detergent solution as indicated above. Visible deposits may have to be removed with hexane. Solvent washing should be followed by detergent washing, as indicated above.

   This procedure is valid for volatile organic analysis only. For extractable organics (for example, pesticides, or base neutrals for U.S. Environmental Protection Agency [EPA] Method 625 a final rinse with pesticide-grade isopropyl alcohol), followed by overnight or oven drying will be necessary.

3. Take duplicate samples. Mark on forms as a single sample with two containers to avoid duplication of analyses.

4. Take a site blank using distilled water or known uncontaminated source. This sample will be run at the discretion of the project manager.

5. Fill out labels and forms as much as possible ahead of time. Use an indelible marker.

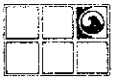
6. Preservatives are required for some types of samples. Use specially prepared vials marked as indicated below, or use the appropriate field procedure (SOP 12 for acidification). Make note on forms that samples were preserved. Always have extra vials in case of problems. Samples for volatile analyses should be acidified below pH 2 upright. Eye protection, foot protection, and disposable vinyl gloves are required for handling. Samples designated for expedited service and analyzed within seven (7) days of sampling will be acceptable without preservation. Acid-causing burns. Glasses or goggles (not contact lenses) are necessary for protection of the eyes. Flush eyes with water for 15 minutes if contact occurs and seek medical attention. Rinse off hands frequently with water during handling.

   For sampling chlorinated drinking water supplies for chlorinated volatiles, samples shall be preserved with sodium thiosulfate. Use vials labeled "CONTAINS THIOSULFATE." No particular cautions are necessary.

7. Fill vial to overflowing with water, avoiding turbulence and bubbling as much as possible. Water should stand above lip of vial.

8. Carefully, but quickly, slip cap onto vial. Avoid dropping the Teflon® septum from cap by not inverting cap until it is in contact with the vial. Disc should have Teflon® face toward the water. Also avoid touching white Teflon® face with dirty fingers.

9. Tighten cap securely, invert vial, and tap against hand to see there are not bubbles inside.



10. Label vial, using indelible ink, as follows:

    A. Sample I.D. No.
    B. Job I.D. No.
    C. Date and Time
    D. Type of analysis required
    E. Your name

11. Unless the fabric-type label is used, place Scotch™ tape over the label to preserve its integrity.

12. For chain-of-custody reasons, sample vial should be wrapped end-for-end with Scotch™ tape or evidence tape and signed with indelible ink where the end of the tape seals on itself. The septum needs to be covered.

13. Chill samples immediately. Samples to be stored should be kept at 4° Celsius (C) (30° Fahrenheit [F]). Samples received at the laboratory above 10°C (as measured at glass surface by a thermocouple probe), after overnight shipping, will be considered substandard, so use a high quality cooler with sufficient ice or freezer packs.

14. Fill out Chain-of-Custody Manifest and Analysis Request Form (see Chain of Custody Procedures, SOP 11).

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE
CONCERNING CHAIN OF CUSTODY
SOP 11

1. Samples must be maintained under custody until shipped or delivered to the laboratory. The laboratory will then maintain custody. A sample is under custody if:

    a) It is in your possession
    b) It is in your view after being in your possession
    c) You locked it up after it was in your possession
    d) It is in a designated secure area

2. Custody of samples may be transferred from one person to another. Each transferer and recipient must date, sign and note the time on the chain-of-custody form.

3. In shipping, the container must be sealed with tape, and bear the sender's signature across the area of bonding at the ends of the tape to prevent undetected tampering. Each sampling jar should be taped and signed as well. Scotch tape works well.

4. Write "sealed by" and sign in the "Remarks" box at the bottom of the form before sealing the box. Place form in a plastic bag and seal it inside the box.

5. The "REMARKS" section of the form is for documenting details such as:

    a) Correlation of sample numbers if samples are split between labs.
    b) QC numbers when lab is logging in the samples.
    c) Sample temperature and condition when received by lab.
    d) Preservation notation.
    e) pH of samples when opened for analysis (if acidified).
    f) Sampling observation or sampling problem.

6. The chain-of-custody form should be included inside the shipping container. A copy should be sent to the project manager.

7. When the samples are received by the lab, the chain-of-custody form will be dated, signed, and the time noted by a laboratory representative. The form will be retained in the laboratory files along with shipping bills and receipts .

8. At the time of receipt of samples by the laboratory, the shipping container will be inspected and the sealing signature will be checked. The samples will be inspected for condition and bubbles, and the temperature of a representative sample container will be measured externally by a thermocouple probe (held tightly between two samples) and recorded. The laboratory QC numbers will be placed on the labels, in the accession log, and on the chain-of-custody form. If samples are acidified, their pH will be measured by narrow range pH paper at the time of opening for analysis. All comments concerning procedures requiring handling of the samples will be dated and initialed on the form by the laboratory person performing the procedure. A copy of the completed chain-of-custody form with the comments on sample integrity will be returned to the sampler.

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE
CONCERNING SOIL SAMPLING METHODOLOGY
SOP 14

1. Soil samples should be collected and preserved in accordance with Groundwater Technology Standard Operating Procedure (SOP 15) concerning Soil Sample Collection and Handling when Sampling for Volatile Organics. A hollow stem soil auger should be used to drill to the desired sampling depth. A standard 2 inch diameter split spoon sampler 18 inches in length shall be used to collect the samples. The samples are contained in 2 inch diameter by 6 inch long thin walled brass tube liners fitted into the split spoon sampler (three per sampler).

2. The split spoon sampler should be driven the full depth of the spoon into the soil by a 140 pound hammer. The spoon shall then be extracted from the borehole and the brass tube liners containing the soil sample removed from the sampler. The ends of the liner tubes should be immediately covered with aluminum foil, sealed with a teflon or plastic cap, and taped with duct tape. After being properly identified with sample data entered on a standard chain of custody form the samples shall be placed on dry ice (maintained below 4~C) and transported to the laboratory within 24 hours.

3. One of the three soil samples retrieved at each sample depth shall be analyzed in the field using a photoionization detector and/or explosimeter. The purpose of the field analysis is to provide a means to choose samples to be laboratory analyzed for hydrocarbon concentrations and to enable comparisons between the field and laboratory analyses. The soil sample shall be sealed in a plastic bag and allowed to equilibrate with the air surrounding the soil for approximately 10 minutes. One of the two field vapor instruments shall be used to quantify the amount of hydrocarbon released to the air from the soils. The data shall be recorded on the drill logs at the depth corresponding to the sample point.

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE
CONCERNING SOIL SAMPLE COLLECTION AND
HANDLING WHEN SAMPLING FOR VOLATILE ORGANICS
SOP 15

1. Use a sampling means which maintains the physical integrity of the samples. The project sampling protocol will designate a preferred sampling tool. A split spoon sampler with liners, or similar tube sampler which can be sealed, is best.

2. The samples should be sealed in the liner, with teflon plugs (The "California Sampler") or plastic caps.

3. For sending whole-core samples (above):

   A. Seal ends of liner with teflon plugs or plastic caps, leaving no free air space inside.

   B. Tape with duct tape.

   C. Label the sample with the following information: sample identification, depth, date and time, project number and required analyses.

   D. Place in plastic bag labeled with indelible marker. Use Well #, depth, date, and job #.

   E. Place inside a second bag and place a labelling tag inside outer bag.

   F. Enclose samples in a cooler with sufficient ice or dry ice to maintain samples at 4 degrees C during shipment.

   G. Seal cooler with a lock, or tape with samplers signature so tampering can be detected.

   H. Package cooler in a box with insulating material. Chain of custody forms can be placed in a plastic bag in this outer box.

   I. If dry ice is used, a maximum of 5 pounds is allowed by Federal Express without special documents(documents are easy to obtain but are not necessary for under 5 pounds). Write "ORM-A dry ice", "_____ pounds, for research" on outside packaging and on regular airbill under classification. UPS does not accept dry ice.

   J. Soil cores kept a 4 degrees C are only viable for up to 7 days when aromatic hydrocarbons are involved. The lab should prepare the samples in methanol once in the lab.

4. Good sampling practice would include preparing 1 out of 5 samples to be prepared in duplicates for analysis. These 4 out of 20 samples will be used for the following purposes:

   A. One in every 20 samples should be analyzed as a field replicate to evaluate the precision of the sampling technique. A minimum of 1 sample per data set is suggested.

   B. An additional 1 in 20 samples should be selected by sampler to be prepared in duplicate as alternative to Step (A). Choose a different soil type if available.

C. The remaining 2 in 20 samples should be used by lab for spiking with reference materials for internal QC.

Other QC procedures can be specified at the project manager's discretion. See Table 3-2 (reference 2) attached.

5. Decontamination of equipment in the field requires a detergent wash, with a distilled water rinse.

REFERENCES

1. Soil Sampling Quality Assurance Users Guide, U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, NV, EPA 600/4-84-043, May 1984.

2. Preparation of Soil Sampling Protocol. Techniques and Strategies, U.S. EPA, Environmental Monitoring Systems Laboratory, Las Vegas, NV, EPA 600/4-83-020, August 1983 (PB83-206979).

3. Test Methods for Evaluating Solid Waste, U.S. EPA, Office of Solid Waste and Emergency Response, Washington, D.C., SW 846, July 1982.

GROUNDWATER TECHNOLOGY, INC.
STANDARD OPERATING PROCEDURE
CONCERNING OPERATION/CALIBRATION OF
PHOTOIONIZATION ANALYZER
SOP 19

1. The Thermo Environmental Instruments Inc. Model 580B OVM Photoionization Analyzer shall be used, using photoionization, to measure the concentration of trace gases over a range of less than 1 ppm to 2,000 ppm. The specific instrument used for investigations related to hydrocarbon contamination should be calibrated for direct readings in parts per million (ppm) volume/volume of isobutylene. Specifics of the detection principle/theory and functions of various components can be found in the manufactures instruction manual.

2. To assure optimum performance, the photoionization analyzer should be calibrated with a standard gas mixture of known concentration from a pressurized container. A daily procedure for calibration involves bringing the probe and readout close to the calibration gas, cracking the valve on the tank and checking the instrument reading. This provides a useful spot check for the instrument.

3. A procedure conducted weekly for more accurate calibration of the instrument from a pressurized container is to connect one side of a "T" to the pressurized container of calibration gas, another side of the "T" to a rotameter and the third side of the "T" directly to the 8" extension to the photoionization probe (see Figure 2). Crack the valve of the pressurized container until a slight flow is indicated on the rotameter. The instrument draws in the volume of sample required for detection, and the flow in the rotameter indicates an excess of sample. Now adjust the span pot so that the instrument reads the exact value of the calibration gas. (If the instrument span setting is changed, the instrument should be turned back to the standby position and the electronic zero should be readjusted, if necessary).

APPENDIX C

DRILL LOGS AND WELL CONSTRUCTION SPECIFICATIONS

Drilling Log

GROUNDWATER TECHNOLOGY

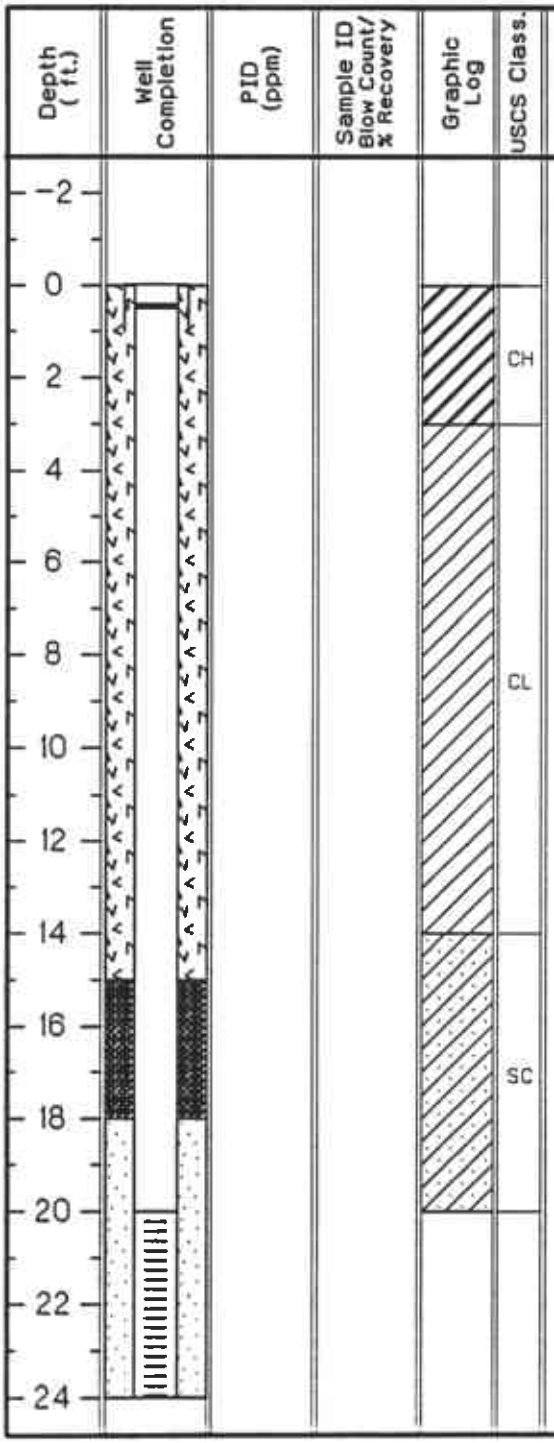
Monitoring Well MW-E

Project CHV/3701 Broadway Owner Chevron U.S.A. Products Co.
Location Oakland, California Project No. 02320 2782 Date drilled 10/14/92
Surface Elev. 70.53 ft. Total Hole Depth 35 ft. Diameter 8.5 inches
Top of Casing 70.07 ft. Water Level Initial NA Static 12.2 ft.
Screen: Dia 2 in. Length 15 ft. Type/Size 0.020 in.
Casing: Dia 2 in. Length 20 ft. Type SCH 40 PVC
Filter Pack Material Clementia #3 sand Rig/Core Type Mobile B-51
Drilling Company Kvilhaug Well Drilling Method Hollow Stem Auger Permit # 92285
Driller Mike Crocker Log By Craig Robertson
Checked By David Kleesattel License No. RG# 5136 David Kleesattel

See Site Map For Boring Location

COMMENTS:

Orginal well was 20-feet deep. Lithology is from orginal boring by Kleinfelder & Associates, Groundwater Monitoring Well Installation Report, Candle's Chevron Station, Oakland, California April 6, 1982.



Description

(Color, Texture, Structure)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%

This well is a replacement for the original "E" well. The original well was abandoned by extracting the casing and reaming out the annulus. The boring was then extended to 35 feet and a monitoring well constructed as shown in the well completion diagram.

Dark brown silty CLAY (trace of fine sand, moist and medium stiff)

Grades yellow brown

Hard drilling through stiff clay at 11 to 12 feet

Yellow to olive brown fine sandy CLAY to clayey SAND (saturated and medium dense)

The extended portion of the soil boring was not logged.

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well **MW-E**

Project *CHV/3701 Broadway* Owner *Chevron U.S.A. Products Co.*

Location *Oakland, California* Project No. *02320 2782* Date drilled *10/14/92*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26						
28						
30						
32						
34						End of boring. Constructed monitoring well.
36						
38						
40						
42						
44						
46						
48						
50						
52						
54						
56						

Drilling Log

GROUNDWATER TECHNOLOGY

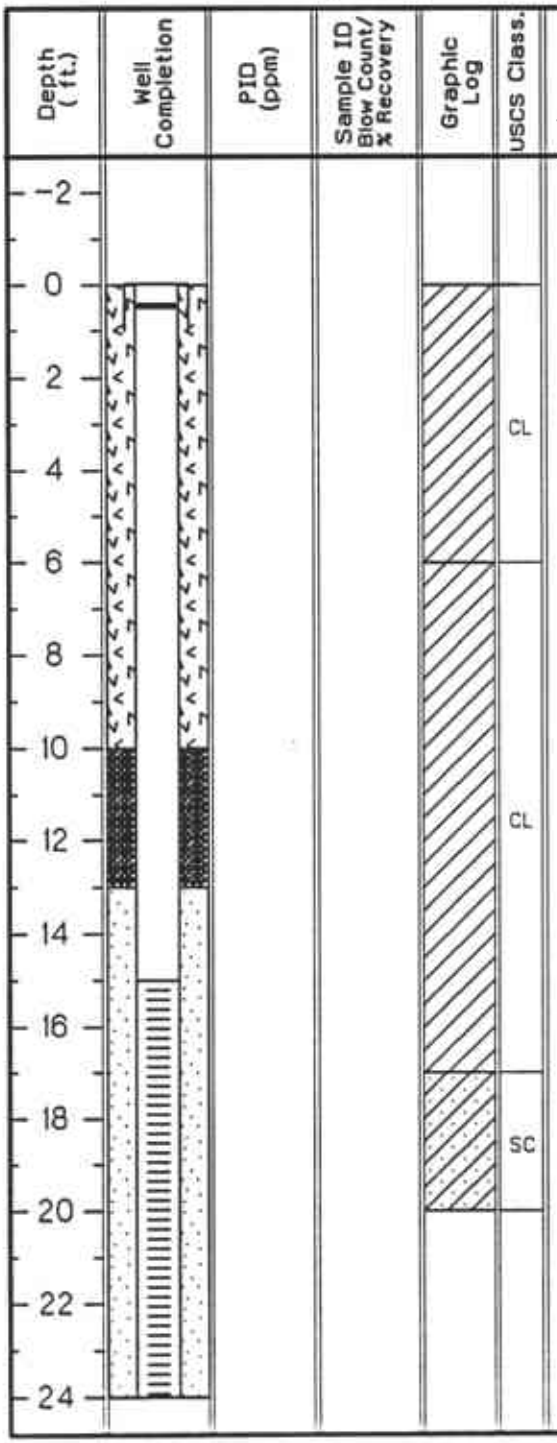
Monitoring Well **MW-F**

Project *CHV/3701 Broadway* Owner *Chevron U.S.A. Products Co.*
Location *Oakland, California* Project No. *02320 2782* Date drilled *10/14/92*
Surface Elev. *72.45 ft.* Total Hole Depth *30 ft.* Diameter *8.5 inches*
Top of Casing *71.72 ft.* Water Level Initial *NA* Static *14.85 ft.*
Screen: Dia *2 in.* Length *15 ft.* Type/Size *0.020 in.*
Casing: Dia *2 in.* Length *15 ft.* Type *SCH 40 PVC*
Filter Pack Material *Clementia #3 sand* Rig/Core Type *Mobile B-51*
Drilling Company *Kvilhaug Well Drilling* Method *Hollow Stem Auger* Permit # *92285*
Driller *Mike Crocker* Log By *Craig Robertson*
Checked By *Dave Kleesattel* License No. *RG# 5136* *Dave Kleesattel*

See Site Map For Boring Location

COMMENTS:

Orginal well was 20 feet deep. Lithology is from orginal boring by Kleinfelder & Associates, Groundwater Monitoring Well Installation Report, Candie's Chevron Station, Oakland, California April 6, 1982.



Description

(Color, Texture, Structure)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%

This well is a replacement for the original well identified as MW-F on the site map. The original well was abandoned by extracting the casing and reaming out the annulus. The boring was then extended to 30 feet and a monitoring well constructed as shown in the well completion diagram.

Dark brown silty CLAY (trace of fine sand, moist and stiff)

Light brown silty CLAY (fine sand, moist and stiff)

Yellow brown sandy CLAY to clayey SAND (very moist to saturated)

The extended portion of the soil boring was not logged.

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well **MW-F**

Project CHV/3701 Broadway Owner Chevron U.S.A. Products Co.
Location Oakland, California Project No. 02320 2782 Date drilled 10/14/92

Depth (ft.)	Well Completion	PID (ppm)	Sample ID Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26						
28						
30						End of soil boring. Constructed monitoring well.
32						
34						
36						
38						
40						
42						
44						
46						
48						
50						
52						
54						
56						

Drilling Log

GROUNDWATER TECHNOLOGY

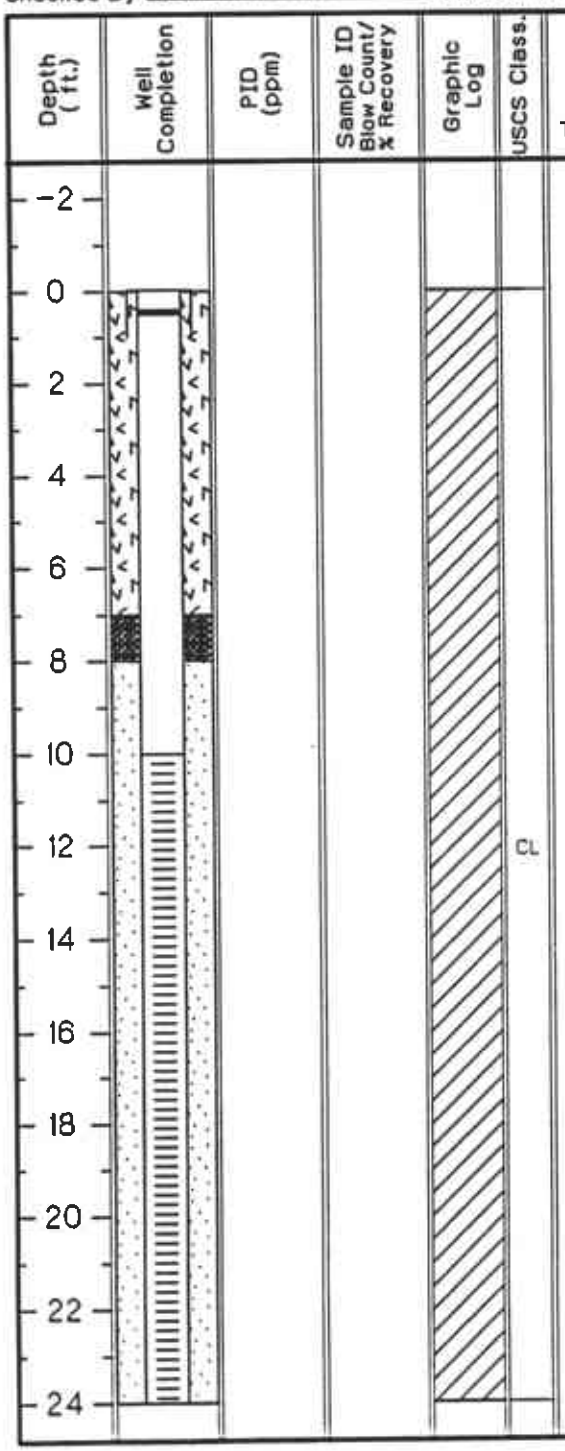
Monitoring Well **B-1**

Project CHV/3701 Broadway Owner Chevron U.S.A. Products Co.
Location Oakland, California Project No. 02320 2782 Date drilled 10/28/92
Surface Elev. 72.67 ft. Total Hole Depth 35.5 ft. Diameter 8.5 inches
Top of Casing 72.30 ft. Water Level Initial 15 ft. Static 14.30 ft.
Screen: Dia 4 in. Length 25 ft. Type/Size 0.020 in.
Casing: Dia 4 in. Length 10 ft. Type SCH 40 PVC
Filter Pack Material Clementia #3 sand Rig/Core Type Mobile B-61
Drilling Company Kvilhaug Well Drilling Method Hollow Stem Auger Permit # 92285
Driller Rod Furlow Log By Jason Fedota
Checked By David Kleesattel License No. RG# 5136

See Site Map For Boring Location

COMMENTS:

The well was orginally 20 feet deep. The well was extended to 35.5 feet below grade. No soil samples were were collected from 0 to 20 feet.



Description

(Color, Texture, Structure)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%

Pulled 20-feet of casing from B-1. No grout in hole.
Dark gray to black CLAY

Brown silty CLAY

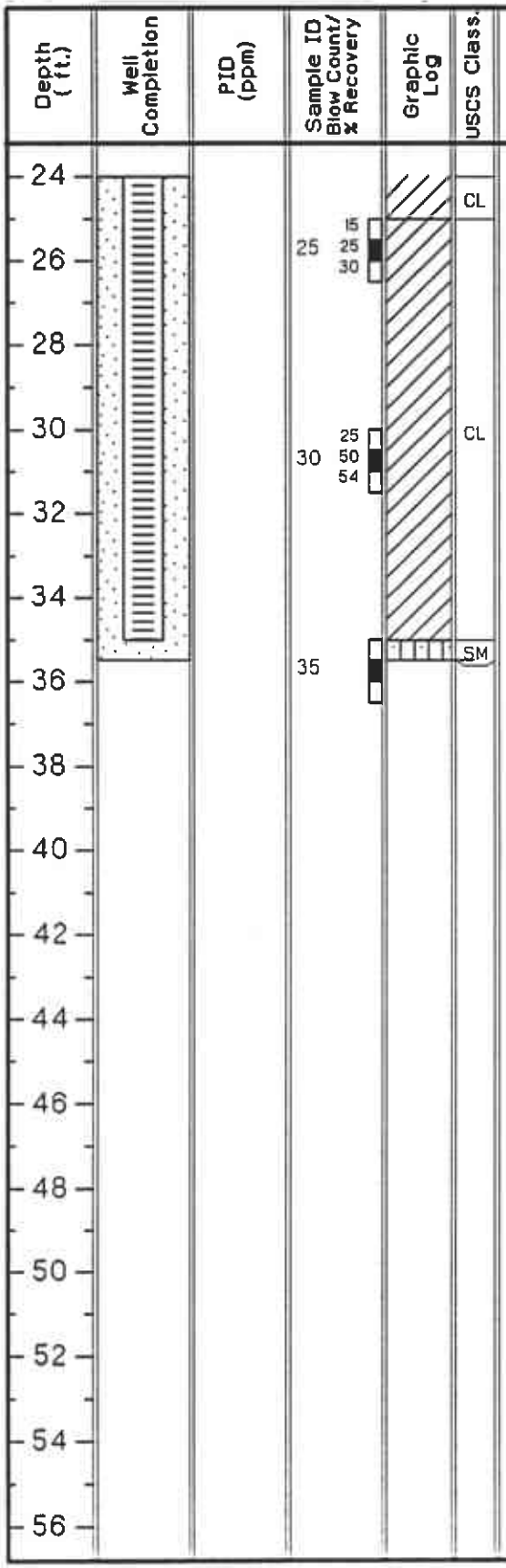
Very strong odors, measured 175 parts per million (ppm) with photo-ionization detector (PID) in work area, put on respirators.
Gray green silty CLAY (grades brown)

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well **B-1**

Project CHV/3701 Broadway Owner Chevron U.S.A. Products Co.
Location Oakland, California Project No. 02320 2782 Date drilled 10/28/92



Description

(Color, Texture, Structure)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%

(thin gravel interbed at 24.5 to 25 feet)

Light brown CLAY (saturated, firm, trace black organic clasts)

Work area readings with PID to 12 ppm, respirators removed.
Light brown silty, sandy CLAY (saturated, firm)

Brown silty fine sand (saturated)

End of boring. Constructed monitoring well.

APPENDIX D

LABORATORY REPORTS AND CHAIN-OF-CUSTODY RECORDS

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 ▪ Martinez, California 94553 ▪ (510) 229-1512 / fax (510) 229-1526

GROUNDWATER TECHNOLOGY, INC.
Attn: TIM WITCHER

Project 020202282
Reported 11/13/92

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
87053- 1	B1-25	10/28/92	11/04/92	Soil
87053- 2	B1-30	10/28/92	11/05/92	Soil
87053- 3	B1-35	10/28/92	11/04/92	Soil

RESULTS OF ANALYSIS

Laboratory Number:	87053- 1	87053- 2	87053- 3
Gasoline:	ND<1	ND<1	ND<1
Benzene:	ND<.005	ND<.005	ND<.005
Toluene:	ND<.005	ND<.005	ND<.005
Ethyl Benzene:	ND<.005	ND<.005	ND<.005
Xylenes:	ND<.005	ND<.005	ND<.005
Concentration:	mg/kg	mg/kg	mg/kg

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 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

QA/QC INFORMATION
SET: 87053

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

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Soil: 50mg/kg

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Soil: 1mg/kg

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Soil: 1mg/kg

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Soil: 0.005mg/kg

ANALYTE	SPIKE LEVEL	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Gasoline:	200 ng	97/100	3%	70-130
Benzene:	200 ng	92/102	10%	70-130
Toluene:	200 ng	93/103	10%	70-130
Ethyl Benzene:	200 ng	95/105	10%	70-130
Xylenes:	200 ng	94/104	10%	70-130

Richard Srna, Ph.D.
Ilemina V Jamguing (for)
Laboratory Director

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

87053

Chain-of-Custody-Record

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

Chevron Facility Number: 9-1026
Facility Address: 3701 Broadway, Oakland, CA
Consultant Project Number: 02020 2782
Consultant Name: Groundwater Technology, Inc.
Address: 4057 Port Chicago Hwy, Concord, CA
Project Contact (Name): Sandra Lindsey Tim WATCHERS
(Phone) 510-671-2387 (Fax Number) 510-

Chevron Contact (Name): Nancy Vukelich
(Phone)
Laboratory Name: Superior Analytical
Laboratory Release Number: #4950430
Samples Collected by (Name): Jason Fedota
Collection Date: 10-28-92
Signature:

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: 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)					Remarks
BI-25		1	S	D			Y	X												
BI-30		↓	↓	↓			↓	↓												
BI-35		↓	↓	↓			↓	↓												

Please Initial:
Samples Stored in Ice. ✓
Appropriate containers ✓
Samples preserved
VOA's without headspace
Comments:

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Nancy M. Vukelich	GTI	10/29/92			
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Tim Walsh	GTI	30 Oct 92 2:10			
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
			Flanguilz		10-30-92 7:10 PM

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 ▪ Martinez, California 94553 ▪ (510) 229-1512 / fax (510) 229-1526

GROUNDWATER TECHNOLOGY, INC.
Attn: Sandra Lindsey

Project 020302539
Reported 12/06/92

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
87223- 1	TB-LB	11/18/92	11/28/92	Water
87223- 2	RB-F	11/18/92	11/28/92	Water
87223- 3	F	11/18/92	11/30/92	Water
87223- 5	EA1	11/18/92	11/28/92	Water
87223- 7	EA2	11/18/92	11/28/92	Water
87223- 9	A	11/18/92	11/28/92	Water
87223-11	B	11/18/92	11/28/92	Water
87223-13	B1	11/18/92	11/30/92	Water
87223-15	B2	11/18/92	11/28/92	Water
87223-17	B4	11/18/92	11/30/92	Water

RESULTS OF ANALYSIS

Laboratory Number:	87223- 1	87223- 2	87223- 3	87223- 5	87223- 7
Gasoline:	ND<50	ND<50	80	ND<50	450
Benzene:	ND<0.5	ND<0.5	2.7	ND<0.5	ND<0.5
Toluene:	ND<0.5	ND<0.5	2.4	ND<0.5	3.3
Ethyl Benzene:	ND<0.5	ND<0.5	3.0	ND<0.5	ND<0.5
Xylenes:	ND<0.5	ND<0.5	12	ND<0.5	0.8
Concentration:	ug/L	ug/L	ug/L	ug/L	ug/L

Laboratory Number:	87223- 9	87223-11	87223-13	87223-15	87223-17
Gasoline:	12000	28000	300	26000	32000
Benzene:	1500	2200	9.7	11000	9500
Toluene:	83	150	3.4	170	220
Ethyl Benzene:	360	920	2.3	870	1200
Xylenes:	530	4300	21	950	2600
Concentration:	ug/L	ug/L	ug/L	ug/L	ug/L

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 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

QA/QC INFORMATION
SET: 87223

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
ug/L = parts per billion (ppb)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Water: 5000ug/L

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Water: 50ug/L

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Water: 50ug/L

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Water: 0.5ug/L

ANALYTE	SPIKE LEVEL	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Gasoline:	200 ng	88/86	2%	70-130
Benzene:	200 ng	93/98	5%	70-130
Toluene:	200 ng	94/99	5%	70-130
Ethyl Benzene:	200 ng	98/108	10%	70-130
Xylenes:	200 ng	95/105	10%	70-130

Richard Srna, Ph.D.
Laboratory Director

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

67223 Chain-of-Custody Record

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

Chevron Facility Number: 9-1026
Facility Address: 3701 Broadway, Oakland
Consultant Project Number: 020302539
Consultant Name: Groundwater Technology, Inc.
Address: 4057 Port Chicago Hwy, Concord
Project Contact (Name): Ms. Sandra L. Lindsey
(Phone): 671-2387 (Fax Number): 685-9148

Chevron Contact (Name): Ms. Nancy Vukelich
(Phone): 510-842-9581
Laboratory Name: Superior Analytical
Laboratory Release Number: 495-0430
Samples Collected by (Name): Greg MASON + Hector Merino
Collection Date: 11-18-92
Signature:

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil A = Air W = Water C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	Analyses To Be Performed: 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)	HCl					Remarks
RBB2	14	1	W	G		HCl	Y									X					
B2	15	3	↓	↓		↓	↓	X													
RB B4	16	1														X					
B4	17	3	↓	↓		↓	↓	X									AB				

Please initial:
Samples Stored in ice.
Appropriate containers.
Samples preserved.
VOA's without headspace.
Comments:

Analyze But do not charge for TBLB

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
	GTI	11-19-92		GTI	11-19-92
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
	GTI	11-19-92			
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
			Afsaneh Salimpour		11-19-92 10:45

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted

COC-3.DWG/03 91/MCH

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: 9-1026
Facility Address: 3701 Broadway, Oakland
Consultant Project Number: 020302539
Consultant Name: Groundwater Technology, Inc.
Address: 4057 Port Chicago Hwy. Concord
Project Contact (Name): Ms. Sandra L. Lindsey
(Phone): 671-2387 (Fax Number): 685-9148

Chevron Contact (Name): Ms. Nancy Vukelich
(Phone): 510-842-9581
Laboratory Name: Superior Analytical
Laboratory Release Number: 495-0430
Samples Collected by (Name): HECTOR MERINO
Collection Date: 11-18-92
Signature:

Sample Number	Lab Sample Number	Number of Containers	Matrix S = Soil A = Air W = Water C = Charcoal	Type G = Grab C = Composite D = Discrete	Time	Sample Preservation	Iced (Yes or No)	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)		HB				Remarks
TB-LB	1	1	W	G		HCl	Y	X									X				Analyze but do not charge for TBLB
RBF	2	1						X													
F	3	3						X													
RBEA	4	1															X				
EA	5	3						X													
RBFAZ	6	1															X				
FAZ	7	3						X													
RBA	8	1															X				
A	9	3						X													
RBB	10	1															X				
B	11	3						X													
RBB-1	12	1															X				
B-1	13	3	↓	↓		↓	↓	X													

Please initial:
Samples Stored in ice
Appropriate containers
Samples preserved
VOA's without bubbles
Comments:

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
	GTI	11/19/92		GTI	11/19/92
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
	GTI	11-19-92			
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
					11/19/92 10:45

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
10 Days
As Contracted

COC-3.DWG/03-91/HOH