PACIFIC
ENVIRONMENTAL
GROUP INC.

September 30, 1997
Project 325-055.1A

Mr. Phil Briggs
Chevron Products Company
P.O. Box 5004
San Ramon, California 94583

Re: **Site Evaluation for Potential MtBE Impacts**
Chevron Service Station 9-1851
451 Hegenberger Road at Edgewater Drive
Alameda, California

Dear Mr. Briggs:

This letter, prepared by Pacific Environmental Group, Inc. (PACIFIC) on behalf of Chevron Products Company (Chevron), presents the results of an evaluation of the potential impacts of methyl tert-butyl ether (MtBE) confirmed in groundwater at the site referenced above. The scope of work included the evaluation of preferential migration pathways, the possibility of commingled plumes, and identification of sensitive receptors. This evaluation is presented in response to the May 1, 1997 letter from the Alameda County Health Care Services Agency (ACHCSA).

SITE BACKGROUND

Site Description

The site is located at the northwest corner of the intersection of Hegenberger Road and Edgewater Drive in Oakland, California (Figure 1). San Leandro Creek, which flows towards San Francisco Bay, is located approximately 1,700 feet west of the site. This portion of Hegenberger Road was formerly a tidal wetland that was filled between the 1940s and 1950s. Land use near the site is generally commercial and industrial. Locations of the station building, pump islands, and underground storage tank (UST) complexes are shown on Figure 2. The UST complex in the southeast corner of the property includes three 10,000-gallon fuel tanks. A waste oil UST is located immedi-

2025 Gateway Place, Suite 440, San Jose, California 95110 (408) 441-7500 FAX (408) 441-7539

ately west of the station building. A methanol UST is located north of the station building and is part of a State of California program.

Previous Investigations

In October 1995, Gettler-Ryan completed four groundwater monitoring wells (Wells MW-1 through MW-4) and advanced one soil boring (Boring SB-1, Appendix A). Quarterly groundwater monitoring has been performed since the wells were installed (Appendix A). Depth to groundwater has ranged from 2.81 to 5.33 feet below ground surface (bgs). Groundwater flow varies from west to southeast at an average gradient of 0.01 foot per foot.

Soils beneath the site vary in composition from clay to sand with gravel to the maximum depth explored of 16.5 feet bgs, and consist of heterogeneous fill on former Bay Mud flats. The lithology encountered during the site investigation has indicated that the western portion of the site is underlain by soils consisting of silty clay or clay to between approximately 3 or 4 feet bgs. Sand with gravel was then encountered to between approximately 6 to 7 feet bgs. Clay and silty clay was then encountered to the total depth explored of 16.5 feet bgs. Lithology on the eastern portion of the site is more variable. Boring SB-1 encountered clay and fat clay to 5 feet bgs. The boring was then terminated at 6 feet bgs after intersecting silty clay with lenses of clayey sand. The boring for Well MW-4 encountered silty clay to approximately 8 feet bgs. A layer of silty sand extended between approximately 8 and 10.5 feet bgs. Clay and silty clays were then encountered to the maximum depth of 16.5 feet bgs. Sand with gravel was not encountered in either Boring SB-1 or Well MW-4.

Analytical results of soils have indicated that only minor concentrations of petroleum hydrocarbons are present, and were only detected in one boring (the boring for Well MW-2) located near the waste oil tank. Well MW-2 at 5.5 feet reported the only concentration of total purgeable petroleum hydrocarbons calculated as gasoline (TPPH-g) in soil at 8.4 parts per million (ppm). The sample also reported 2,100 ppm total oil and grease, and 77 ppm total extractable petroleum hydrocarbons calculated as diesel (TEPH-d). Chloroform was reported at 9.2 ppm, but no other halogenated organic compounds were detected. No benzene was detected in any sample analyzed.

Groundwater analytical results also indicate that concentrations of petroleum hydrocarbons are generally limited to Well MW-2. During the most recent monitoring event (June 20, 1997) Well MW-2 reported 62 parts per billion (ppb) TPPH-g and 7.7 ppb benzene. TEPH-d was reported at 1,600 ppb, however the laboratory indicated that the chromatogram pattern indicated an unidentified hydrocarbon. Vinyl chloride and MtBE were detected at 5.2 and 38 ppb, respectively.

All wells have reported detectable concentrations of MtBE in groundwater. The maximum concentration of MtBE, 11,000 ppb, was reported from Well MW-4 on December 17, 1996. Well MW-4 is located immediately south of the UST complex and during the June 20, 1997 sampling event reported 9,300 ppb MtBE. Well MW-3, located adjacent to the methanol UST, reported 1,400 ppb MtBE on June 20, 1997. Well MW-1, located at the southwest corner of the property, has reported up to 940 ppb MtBE, but only 64 ppb MtBE was reported during the most recent monitoring event (June 20, 1997).

DISCUSSION

Concentrations of MtBE in groundwater have been confirmed at the site and are currently undefined. MtBE is very soluble and known to migrate with groundwater flow. In comparison to petroleum hydrocarbon plumes, MtBE plumes are typically narrow with relatively small transverse dispersion. In order to define the extent of the MtBE plume, it is necessary to understand groundwater flow patterns, which will affect plume shape and location. Groundwater flow patterns are complex at the site as evidenced by the variable flow directions (Figure 2). Local geology, and localized and variable recharge beneath and downgradient of the site affect groundwater flow patterns.

FINDINGS

The scope of work for this investigation was designed to evaluate groundwater flow patterns (preferential migration pathways). the possibility of commingled plumes, and identify possible receptors. An inventory check of the site to confirm that no prior or existing release has or is presently occurring will be submitted separate to this investigation report.

File Review

ACHCSA files were reviewed for sites, which have reported fuel, leaks and are located near the subject site. The files were reviewed by PACIFIC on June 24 and July 1, 1997. The following list of files were reviewed:

- Union Bank - 460 Hegenberger Road
- Unocal Service Station - 449 Hegenberger Road
- ARCO Service Station - 566 Hegenberger Road
- Marriott Courtyard - 265 Hegenberger Road
- Shell Service Station - 285 Hegenberger Road

- Caltrans (Hegenberger Maintenance Station) - 555 Hegenberger Road
- Rollins Truck Leasing - 295 Hegenberger Road

Only one of the above listed sites was determined to be a potential contributor to a commingled off-site MtBE plume; the Unocal service station.

The Unocal station at 449 Hegenberger Road, located across Edgewater Drive from the site, is approximately 150 feet south of the site. The first quarter 1997 groundwater monitoring results from the Unocal station (*Quarterly Data Report*, MPDS Services Inc., March 4, 1997) reported low concentrations of MtBE in Monitoring Wells MW-9 and MW-10. Monitoring Well MW-9 contained 5.4 ppb MtBE while Well MW-10 contained 11 ppb and were the only wells sampled during the first quarter 1997 event. Monitoring Well MW-6, located in the southwest corner of the Unocal property, contained separate-phase hydrocarbons (SPH) and was therefore not sampled. Monitoring Well MW-6 has contained up to 3.33 feet of SPH since before July 26, 1996. Monitoring Well MW-1 also contained SPH between November 1992 and February 1995, however this well, along with Wells MW-2, MW-4, and MW-5, were destroyed in early 1995 for UST removal. The USTs were removed in March 1995. Approximately 95,000 gallons of groundwater was purged during UST replacement activities. Groundwater monitoring data from the Unocal site during first quarter 1997 indicated a south-southeast direction of groundwater flow with a gradient of 0.01 foot per foot.

The Union Bank property at 460 Hegenberger Road immediately east of the site, across Hegenberger Road formerly contained two USTs. In 1993 Applied Geosystems, Inc. (AGI) installed three monitoring wells in the vicinity of the former USTs as part of a subsurface and historical investigation. AGI concluded that petroleum hydrocarbon concentrations detected at the site were probably due to the use of petroleum hydrocarbon-impacted soil as local wetland fill and not related to the former USTs. Anomalous groundwater levels were recorded by AGI, so groundwater flow direction was not calculated (*First Quarterly Monitoring Report*, AGI, July 19, 1993). The historical review by AGI indicated that the general groundwater gradient was southwesterly towards San Francisco Bay.

Well Survey

PACIFIC reviewed current Department of Water Resources well records and prepared a 1/2-mile well survey. Table 1 presents the information obtained from the water well survey. One agricultural irrigation well, designated as Well D on Figure 1, is located approximately 1,500 feet south of the site. Two shallow, groundwater remediation extraction wells, designated as Wells B and C, are located approximately 1,500 feet east

of the site, and one deep industrial well, Well A, is located approximately 2,500 feet northeast of the site. Since groundwater flow is generally to the south, only the irrigation well (D) is located in a possible downgradient direction. This well is 305 feet deep, however no information regarding the screen interval or sanitary seal was available.

Utility Survey

A utility survey was performed through a review of existing underground utility maps (Figure 3). A sanitary sewer main and a storm drain main run along Hegenberger Road and flow towards the south. The storm drain and sanitary sewer, which run along Edgewater Drive, flow to the east to connect with the Hegenberger Road storm drain and sanitary sewer systems, respectively. Figure 3 presents the utility locations, elevations, and diameters based on City of Oakland Engineering Department maps. City of Oakland datums were used to calculate the depth of utilities near the intersection of Hegenberger Road and Edgewater Drive. The bottom of the storm drain is approximately 6 to 7 feet bgs in the site vicinity, is 30-inches in diameter along Hegenberger Road and is 21 inches in diameter along Edgewater Drive. The sanitary sewer is between 7 and 11 feet bgs in the site vicinity. Diameter of the sanitary sewer in the site vicinity varies from 42 inches along Hegenberger Road to 15 inches along Edgewater Drive. The depth of East Bay Municipal Utility District (EBMUD) water lines in the site vicinity is unknown, however the minimum specification for water lines is 36-inches beneath a road surface, or 42-inches beneath a curb. Geologic cross-sections depicting the approximate locations and depths of underground utilities bassed on City of Oakland maps and datums are presented in Figures 4 and 5.

According to the City of Oakland Engineering Department, the utility trenches are backfilled with native material to within 1 foot of the utility. According to EBMUD, the water line trenches are backfilled with ¾-inch base rock. Groundwater at the site has ranged from 2.81 to 5.33 feet bgs. The fluctuation of the depth to groundwater in individual wells is shown on the cross sections (Figures 4 and 5). To evaluate the potential of existing utilities to act as migration pathways, one must consider the source location, groundwater flow direction, the minimum and maximum depth to water, local geology, and the depth of the sand backfill material surrounding and immediately overlying the utilities.

The suspected source is the UST complex as identified by elevated concentrations of MtBE in Well MW-4. Historic groundwater flow directions and gradients are presented on Figure 2. When groundwater flows to the south or southeast, concentrations of MtBE emanating from the UST complex may migrate along the 8" water line running along Edgewater Drive (Cross Section A-A', Figure 4). The actual depth of the water

line is unknown. The maximum extent of groundwater fluctuation is above both the sand backfill of the 15" sanitary sewer, and the 21" storm drain which also run down Edgewater Drive.

During groundwater flow to the west or southwest, cross section B-B' (Figure 5) shows that the 15" storm sewer along Edgewater Drive is too deep to act as a preferential pathway, assuming the utility is backfilled with native material. Cross Section B-B' (Figure 5) indicates that the water line across Edgewater Drive may act as a migration pathway, however the actual depth of the utility is unknown.

Sensitive Receptor Survey

A sensitive receptor survey was performed to identify existing sensitive receptors downgradient of the site. San Leandro Creek channel is approximately 1,700 feet west of the site and empties into San Leandro Bay, an estuary approximately 4,000 feet northwest of the site. San Leandro Creek is listed on the National Wetlands Inventory as an estuarine, subtidal, open water, wetland (E1OWL). The general vicinity of the site was formerly a tidal wetland area and is close to the current San Francisco Bay shoreline. Beneficial uses of these receptors would include fish and wildlife habitat as well as recreational and fishing activities associated with San Francisco Bay.

CONCLUSIONS

MtBE and SPH have been detected in groundwater samples from wells at the Unocal service station downgradient of the subject property. It is possible that a commingled MtBE plume may exist beneath these sites. The shallow depth of groundwater (less than 5 feet bgs) and the locations of water line trenches beneath Hegenberger Road and Edgewater Drive may present preferential pathways for MtBE migration.

San Leandro Creek and San Francisco Bay may be sensitive receptors located proximal to the site. Based on the findings of this investigation, PACIFIC recommends further investigation to determine the extent of MtBE in groundwater and to evaluate whether the water line trenches are acting as preferential pathways for the migration of MtBE.

If you have any questions regarding the contents of this letter, please call.

Sincerely,

Pacific Environmental Group, Inc.

Ross Tinline
Project Geologist
RG 5860

Attachments:
Table 1 - Water Well Survey Location Data
Figure 1 - Well Survey Map
Figure 2 - Site Map
Figure 3 - Extended Site and Utility Map
Figure 4 - Geologic Cross-section A-A'
Figure 5 - Geologic Cross-section B'-B
Attachment A - Quarterly Monitoring Data, Boring/Well Logs, and Soil Analytical Data

cc: Mr. Barney Chan, Alameda County Health Care Services Agency

ately west of the station building. A methanol UST is located north of the station building and is part of a State of California program.

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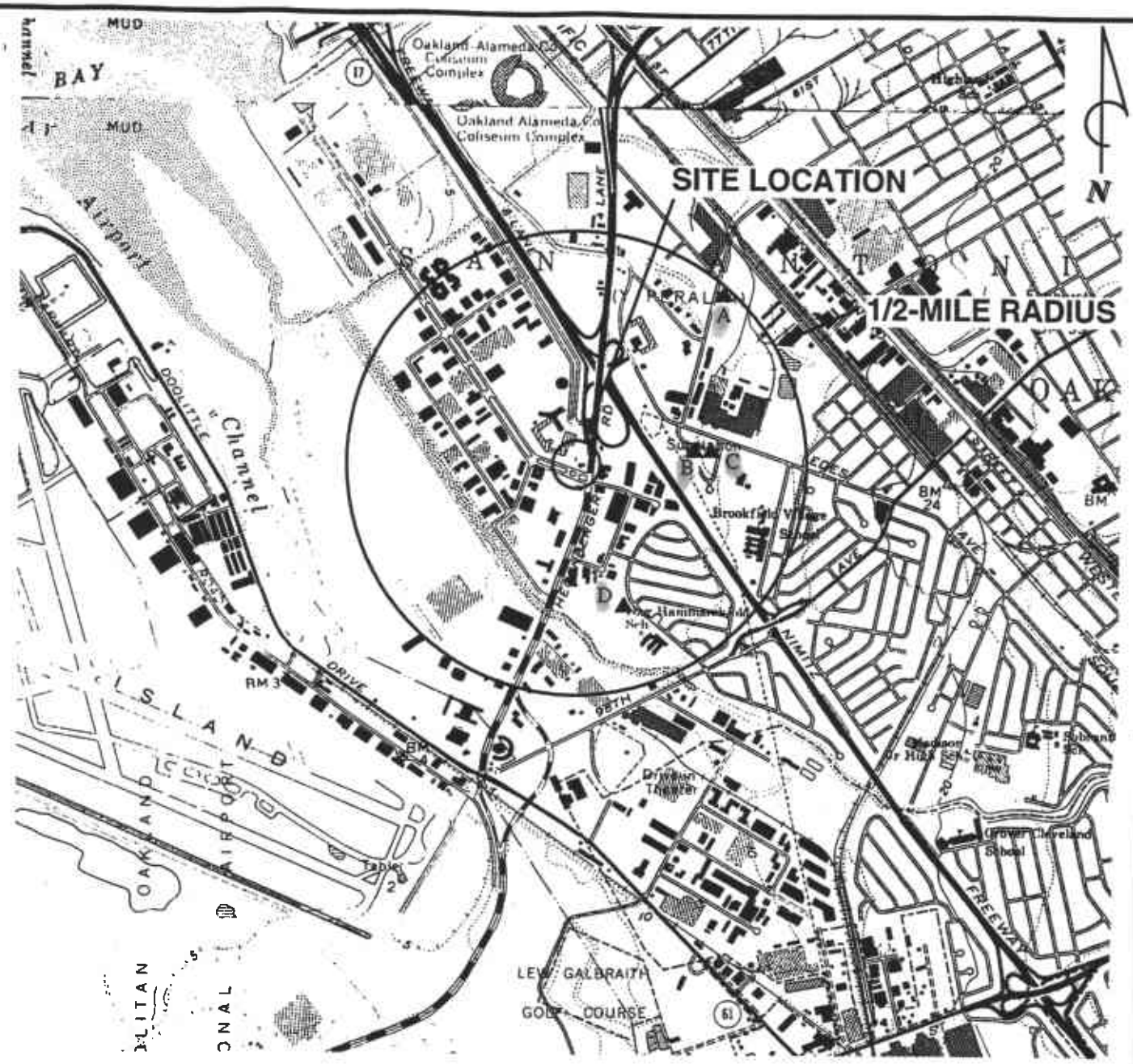
Table 1
Water Well Survey Location Data

Chevron Service Station 9-1851
451 Hegenbeger Road at Edgewater Road
Oakland, California

Well Designation	DWR Log No.	Owner	Well Depth (ft)	Well Status	Year Drilled	Well Type
A	106969	Transamer-Delaval	250	NA	1979	Industrial
B	271190	IMO Delaval, INC	30	NA	1989	Extraction
C	271178	IMO Delaval, INC	25	NA	1984	Extraction
D	273809	Ratto Brothers, Inc.	305	NA	1988	Irrigation

NA = Not available



QUADRANGLE LOCATION

LEGEND

A ▲ WATER SUPPLY WELL LOCATION AND DESIGNATION

REFERENCES:
USGS 7.5 MIN. TOPOGRAPHIC MAP
TITLED: OAKLAND EAST, CALIFORNIA
DATED: 1959 REVISED: 1980
TITLED: SAN LEANDRO, CALIFORNIA
DATED: 1959 REVISED: 1980

SCALE IN FEET

2000 0 2000

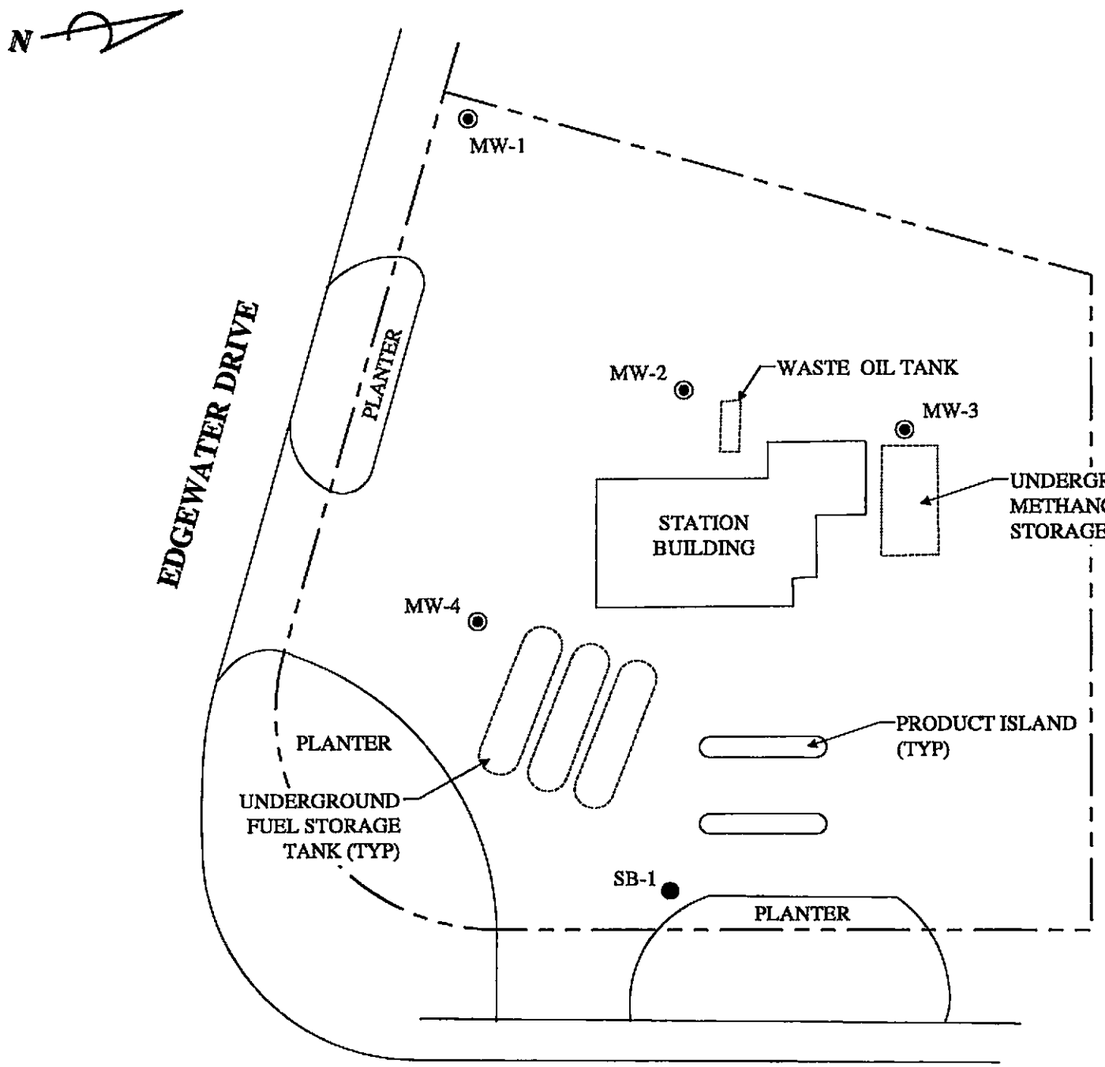
PACIFIC ENVIRONMENTAL GROUP, INC.

CHEVRON SERVICE STATION 9-1851
451 Hegenberger Road at Edgewater Drive
Oakland, California

WELL SURVEY MAP

FIGURE: **1**

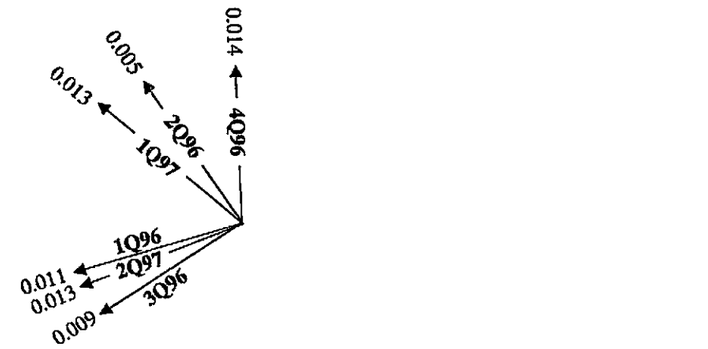
PROJECT: 325-055.1A



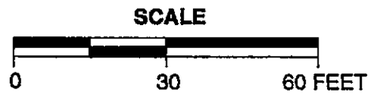
LEGEND

MW-1 ◉ GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

SB-1 ● SOIL BORING LOCATION AND DESIGNATION



HISTORIC FLOW DIRECTIONS AND GRADIENTS



PACIFIC ENVIRONMENTAL GROUP, INC.

TITLE:

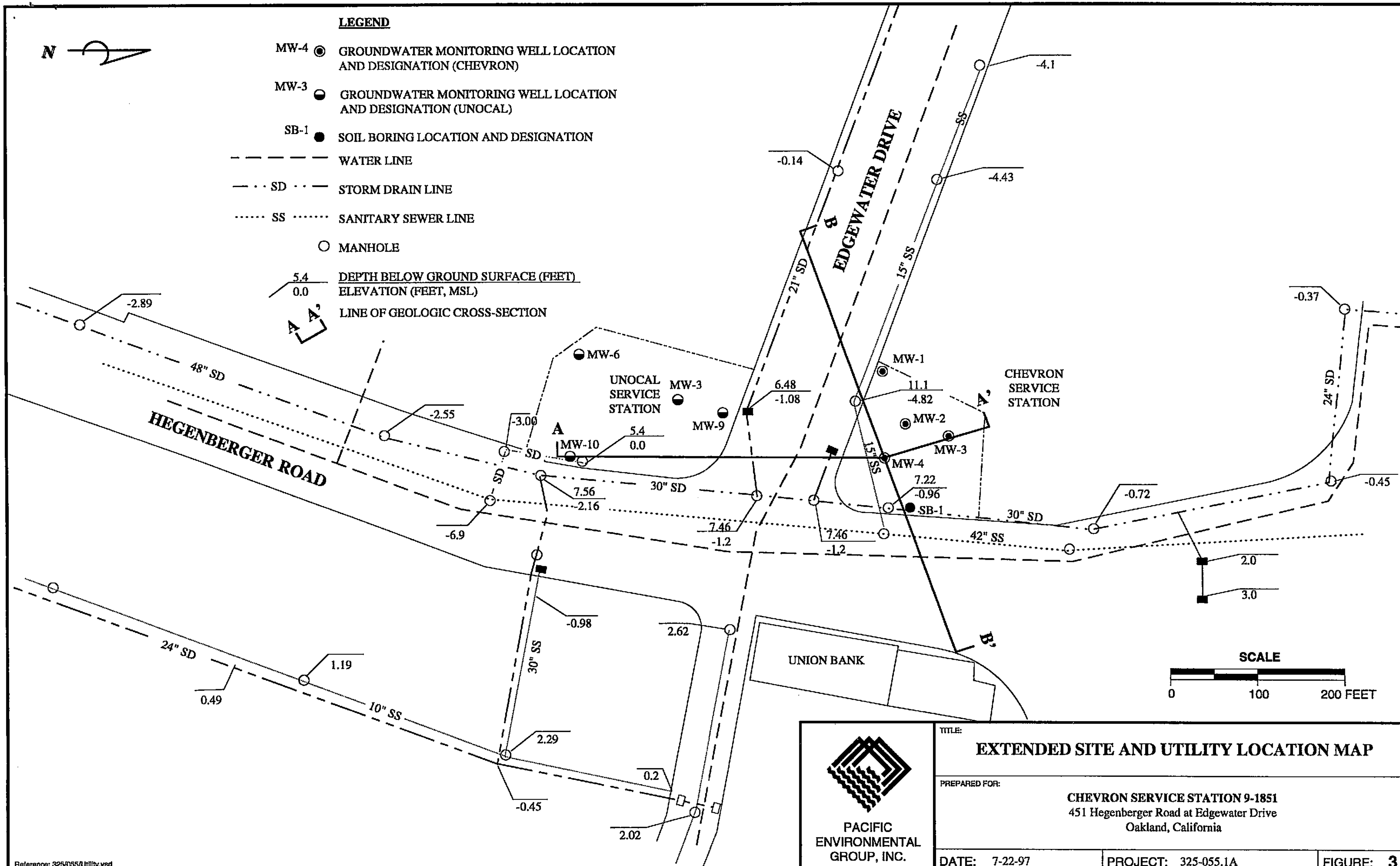
SITE MAP

PREPARED FOR:

CHEVRON SERVICE STATION 9-1851
451 Hegenberger Road at Edgewater Drive
Oakland, California

DATE: 5-30-97 | PROJECT: 325-055.1A | FIGURE: 2

Reference: 328/055/Sitemp30.vsd



N
LEGEND
MW-4 GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION (CHEVRON)
MW-3 GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION (UNOCAL)
SB-1 SOIL BORING LOCATION AND DESIGNATION
WATER LINE
SD STORM DRAIN LINE
SS SANITARY SEWER LINE
MANHOLE
5.4 DEPTH BELOW GROUND SURFACE (FEET)
0.0 ELEVATION (FEET, MSL)
A A' LINE OF GEOLOGIC CROSS-SECTION
EDGEWATER DRIVE
HEGENBERGER ROAD
UNOCAL SERVICE STATION
CHEVRON SERVICE STATION
UNION BANK
48" SD
30" SD
21" SD
15" SS
42" SS
24" SD
10" SS
30" SS
SD
SS
MW-1
MW-2
MW-3
MW-4
MW-6
MW-9
MW-10
SB-1
A
A'
B
B'
-2.89
-2.55
-3.00
-6.9
7.56
-2.16
5.4
0.0
6.48
-1.08
7.46
-1.2
7.46
-1.2
11.1
-4.82
7.22
-0.96
-0.14
-4.1
-4.43
-0.37
-0.72
-0.45
2.0
3.0
-0.98
2.62
1.19
0.49
2.29
-0.45
0.2
2.02
SCALE
0
100
200 FEET

Reference: 325/055/Utility.vsd

PACIFIC ENVIRONMENTAL GROUP, INC.

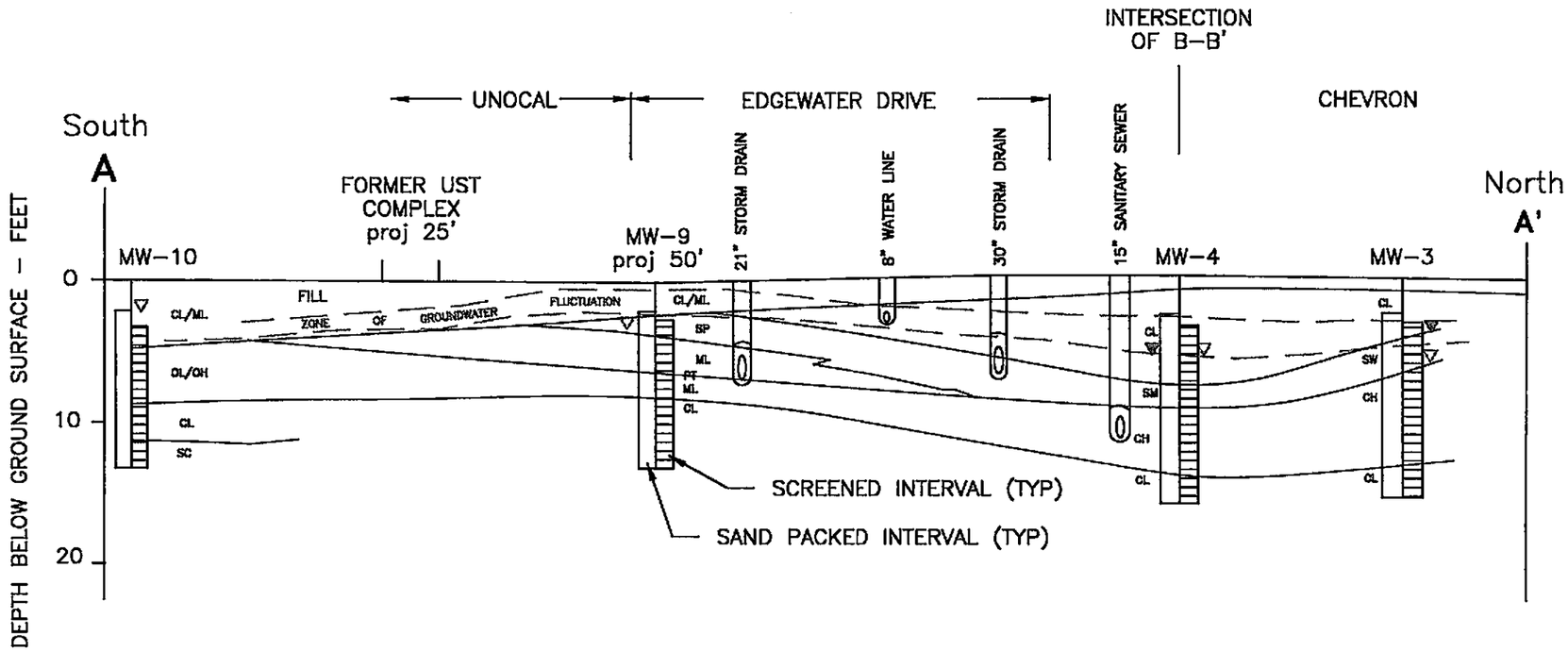
TITLE:

EXTENDED SITE AND UTILITY LOCATION MAP

PREPARED FOR:

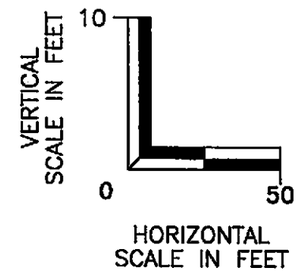
CHEVRON SERVICE STATION 9-1851
451 Hegenberger Road at Edgewater Drive
Oakland, California

DATE: 7-22-97 | PROJECT: 325-055.1A | FIGURE: 3



LEGEND

ML, CL, OL, CH, OH, Pt	PRIMARILY FINE GRAINED DEPOSITS
SW, SP, SC	PRIMARILY COARSE GRAINED DEPOSITS
MW–10	GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
▽	FIRST ENCOUNTERED WATER LEVEL
▼	STATIC WATER LEVEL, 6–20–97
proj	PROJECTED ONTO LINE OF SECTION IN FEET



Reference: 325/055/XSecAA.dwg

PACIFIC ENVIRONMENTAL GROUP, INC.

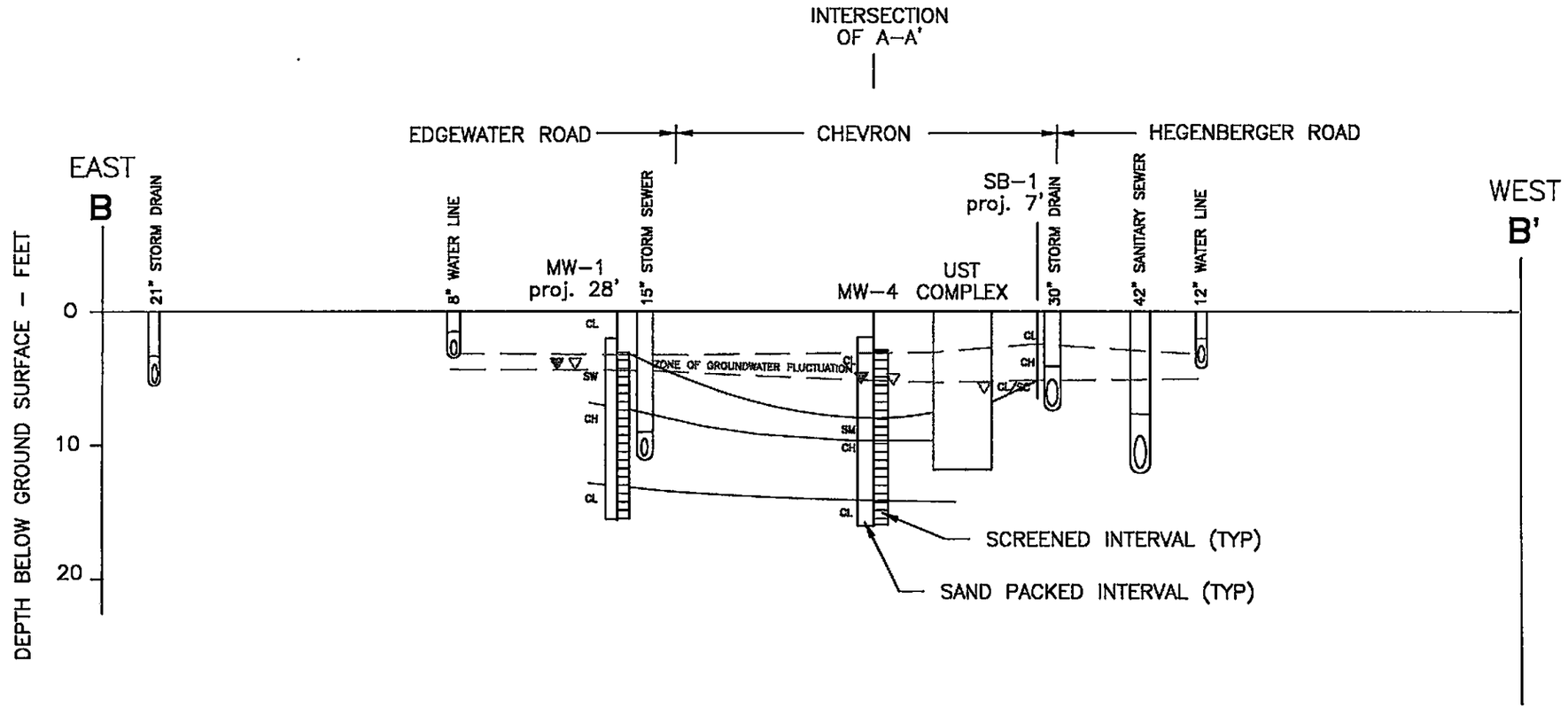
TITLE:

GEOLOGIC CROSS-SECTION A-A'

PREPARED FOR:

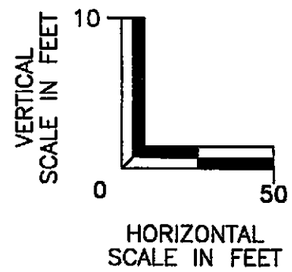
CHEVRON SERVICE STATION 9-1851
451 Hegenberger Road at Edgewater Drive
Oakland, California

DATE: 9–3–97	PROJECT: 325–055.1A	FIGURE: 4



LEGEND

CL, CH, ML	PRIMARILY FINE GRAINED DEPOSITS
SW, SM, SC	PRIMARILY COARSE GRAINED DEPOSITS
MW–1	GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
SB–1	SOIL BORING LOCATION AND DESIGNATION
▽	FIRST ENCOUNTERED WATER LEVEL
▼	STATIC WATER LEVEL, 6–20–97
proj	PROJECTED ONTO LINE OF SECTION IN FEET



Reference: 325/055/XSecBB.dwg

PACIFIC ENVIRONMENTAL GROUP, INC.

TITLE:

GEOLOGIC CROSS-SECTION B-B'

PREPARED FOR:

CHEVRON SERVICE STATION 9-1851
451 Hegenberger Road at Edgewater Drive
Oakland, California

DATE: 9–3–97	PROJECT: 325–055.1A	FIGURE: 5

ATTACHMENT A

QUARTERLY MONITORING DATA, BORING/WELL LOGS, AND SOIL ANALYTICAL DATA

Table 1: Current Water Level Data and Analytical Results

Vertical Measurements are in feet. Analytical results are in parts per billion (ppb)

WELL ID	DATE	Well Head Elev.	Ground Water Elev.	Depth To Water	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	TOG	TPH-Diesel	Benzene by (EPA 8240)	Xylene by (EPA 8240)	C-1, 2-DCE	Carbon Disulfide	Vinyl Chloride	MTBE
MW-1	06/20/97	2.81	-1.72	4.33	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	64
MW-2	06/20/97	3.51	-1.53	5.04	--	62	7.7	<0.5	<0.5	<0.5	--	1600**	7.2	<2.0	4.6	2.2	5.2	38
MW-3	06/20/97	3.08	-0.78	3.86	--	<500	<5.0	<5.0	<5.0	<5.0	--	--	--	--	--	--	--	1400
MW-4	06/20/97	3.48	-2.20	5.68	--	<2500	<25	<25	<25	<25	--	--	--	--	--	--	--	9300

** Chromatagram pattern indicates an unidentified hydrocarbon.

325 0551 14

BLAINE
TECH SERVICES

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(408) 573-7771 FAX
(408) 573-0555 PHONE

April 16, 1997

Phil Briggs
Chevron U.S.A. Products Company
P. O. Box 6004
San Ramon, CA 94583-0904

1st Quarter 1997 Monitoring at 9-1851

First Quarter 1997 Groundwater Monitoring at
Chevron Service Station Number 9-1851
451 Hegenberger Rd.
Oakland, CA

Monitoring Performed on March 20, 1997

Groundwater Sampling Report 970320-W-3

This report covers the routine quarterly monitoring of groundwater wells at this Chevron facility. Blaine Tech Services, Inc.'s work at the site includes inspection, gauging, evacuation, purgewater containment, sample collection and sample handling in accordance with standard procedures that conform to Regional Water Quality Control Board requirements.

Routine field data collection includes depth to water, total well depth, thickness of any separate immiscible layer, water column volume, calculated volume of a three-case volume purge, elapsed evacuation time, total volume of water removed, and standard water parameter instrument readings. Sample material is collected, contained, stored, and transported to the laboratory in conformance with EPA standards. Purgewater is, likewise, collected and transported to McKittrick waste treatment site for disposal.

Basic field information is presented alongside analytical values excerpted from the laboratory report in the cumulative table of **WELL DATA AND ANALYTICAL RESULTS**. The full analytical report for the most recent samples is located in the **Analytical Appendix**. The table

also contains new groundwater elevation calculations taken from the computer plotted gradient map which is located in the Professional Engineering Appendix.

At a minimum, Blaine Tech Services, Inc. field personnel are certified upon completion of a forty-hour Hazardous Materials and Emergency Response training course per 29 CFR 1910.120. Field personnel are also enrolled in annual eight hour refresher courses.

Blaine Tech Services, Inc. conducts sampling and documentation assignments of this type as an independent third party. In order to avoid compromising the objectivity necessary for the proper and disinterested performance of this work, Blaine Tech Services, Inc. concentrates on objective data collection and does not participate in the interpretation of analytical results, the definition of geological or hydrological conditions, the formulation of recommendations, or the marketing of remedial systems.

Please call if you have any questions.

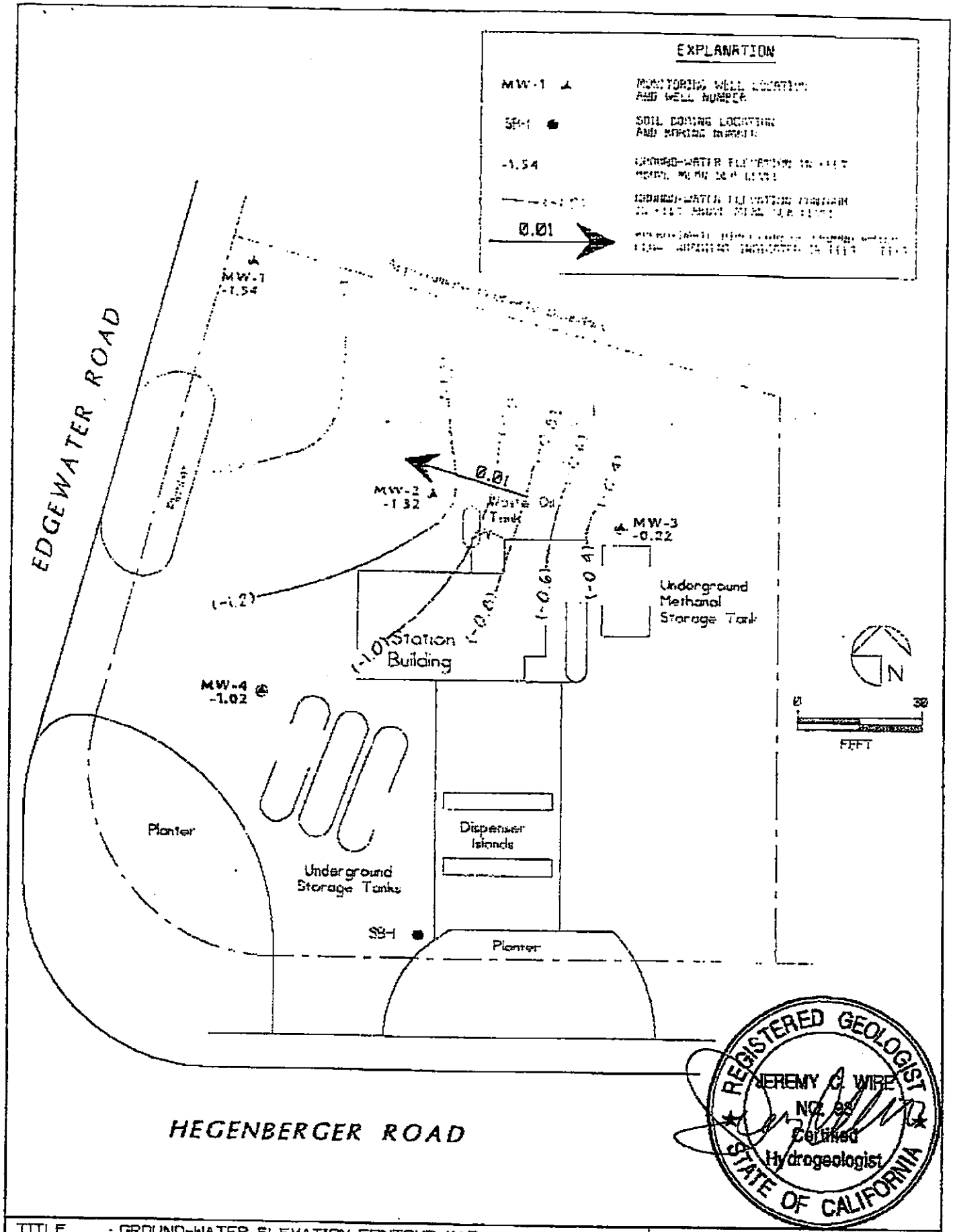
Yours truly,

Francis Thie
Vice President

FPT/cg

attachments: Professional Engineering Appendix
Cumulative Table of Well Data and Analytical Results
Analytical Appendix
Field Data Sheets

Professional Engineering Appendix



REGISTERED GEOLOGIST
JEREMY C. WIRE
NO. 98
Certified Hydrogeologist
STATE OF CALIFORNIA

TITLE : GROUND-WATER ELEVATION CONTOUR MAP - MARCH 20, 1997

LOCATION : CHEVRON SERVICE STATION No. 9-1851
451 HEGENBERGER ROAD, OAKLAND, CALIFORNIA

SOURCE : GETTLER-RYAN INC

GEOCONSULTANTS, INC
SAN JOSE, CALIFORNIA
Project No. G758-09

Table of Well Data and Analytical Results

Cumulative Table of Well Data and Analytical Results

ical Measurements are in feet. Analytical results are in parts per billion (ppb)

TE	Well Head Elev.	Ground Water Elev.	Depth To Water	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	TOG	TPH-Diesel	Benzene by (EPA 8240)	Xylene by (EPA 8240)	C-1, 2-DCE	Vinyl Chloride	MTBE
W-1																
17/95	2.61	-1.51	4.12	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
29/96	2.61	-0.72	3.33	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	9.5
26/96	2.61	-1.23	3.84	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	46
25/96	2.61	-1.41	4.02	--	<250	<2.5	<2.5	<2.5	<2.5	--	--	--	--	--	--	940
17/96	2.61	-0.96	3.57	--	<50	0.86	<0.5	<0.5	<0.5	--	--	--	--	--	--	260
20/97	2.61	-1.54	4.15	--	<50	<2.0	<2.0	<2.0	<2.0	--	--	--	--	--	--	76
W-2																
17/95	3.51	-1.82	5.33	*	170	3.5	<0.5	1.0	6.1	<5000	1600**	--	--	11	--	--
29/96	3.51	-0.44	3.95	--	89	4.7	<0.5	0.84	0.74	--	3000**	11	2.5	17	5.4	21
26/96	3.51	-1.09	4.60	--	80	8.7	<0.5	1.2	1.3	--	2000**	11	<2.0	15	12	31
25/96	3.51	--	--	Inaccessible	--	--	--	--	--	--	--	--	--	--	--	--
17/96	3.51	-0.41	3.92	--	110	<0.5	<0.5	0.75	2.1	--	2400**	10	<2.0	2.3	5.5	27
20/97	3.51	-1.32	4.83	--	140	8.2	<2.0	<2.0	<2.0	--	3400**	--	--	<2.0	3.2	58
W-3																
17/95	3.08	-1.34	4.42	***	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
29/96	3.08	0.08	3.00	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	26
26/96	3.08	-0.52	3.60	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	47
25/96	3.08	-1.06	4.14	--	<125	<1.2	<1.2	<1.2	<1.2	--	--	--	--	--	--	570
17/96	3.08	-0.12	3.20	--	<500	<5.0	<5.0	<5.0	<5.0	--	--	--	--	--	--	600
20/97	3.08	-0.22	3.30	--	<50	<5.7	<5.7	<5.7	<5.7	--	--	--	--	--	--	430
W-4																
17/95	3.48	-1.60	5.08	--	<125	<1.2	<1.2	<1.2	<1.2	--	--	--	--	--	--	--
29/96	3.48	-1.13	4.61	--	<1000	<10	<10	<10	<10	--	--	--	--	--	--	6700
26/96	3.48	-0.82	4.30	--	<2000	<20	<20	<20	<20	--	--	--	--	--	--	7200
25/96	3.48	-1.85	5.33	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	<2.5
17/96	3.48	0.67	2.81	--	<2000	120	<20	<20	<20	--	--	--	--	--	--	11,000
20/97	3.48	-1.02	4.50	--	250**	<2.0	<2.0	<2.0	<2.0	--	--	--	--	--	--	10,000
20/97	3.48	-1.02	4.50	Conf. run	--	--	--	--	--	--	--	--	--	--	--	8600

esults of EPA 8010 test indicates that the detection of 1,1-Dichloroethane is 1.7 ppb.
Chromatagram pattern indicates an unidentified hydrocarbon.
Results of EPA 8015 test indicates that levels of Methanol and Methyl ethyl ketone are respetively <1000 and <200 ppb.

Cumulative Table of Well Data and Analytical Results

ical Measurements are in feet.					Analytical results are in parts per billion (ppb)											
TE	Well Head Elev.	Ground Water Elev.	Depth To Water	Notes	TPH-Gasoline	Benzene	Toluene	Ethyl-Benzene	Xylene	TOG	TPH-Diesel	Benzene (EPA 8240)	Xylene (EPA 8240)	1, 2-DCE	Vinyl Chloride	MTBE
RIP BLANK																
17/95	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	--
29/96	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	<2.5
26/96	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	<2.5
25/96	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	<2.5
17/96	--	--	--	--	<50	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	--	<2.5
20/97	--	--	--	--	<50	<2.0	<2.0	<2.0	<2.0	--	--	--	--	--	--	--

te: Blaine Tech Services, Inc. began routine monitoring of the groundwater wells at this site on March 29, 1996.
Earlier field data and analytical results are drawn from the December 29, 1995 Gettler-Ryan, Inc. report.

BREVIATIONS:
PH = Total Petroleum Hydrocarbons
) = Not detected at or above the minimum quantitation limit. See laboratory reports for minimum quantitation limits.
OG = Total Oil Grease
TBE = Methyl t-butyl ether
1,2 DCE = Cis-1,2-Dichloroethylene
nf. run = Confirmation run

Analytical Appendix

Table 2. Water Level Data and Groundwater Analytical Results - Chevron Service Station #9-1851, 451 Hegenberger Road, Oakland, California

Well ID/ TOC (ft)	Date	DTW (ft)	GWE (msl)	Product Thickness*	Analytic Method	TPHg	B	T	E	X	O&G	TPHd	HVOCs	VOCs	Methanol	MEK
						<---ppb--->										
MW-1/ 2.61	10/17/95	4.12	-1.51	0	8015/8020	<50	<0.50	<0.50	<0.50	<0.50	---	---	---	---	---	---
MW-2/ 3.51	10/17/95	5.33	-1.81	0	8015/8020/ 8010/5520B&F	170	3.5	<0.50	1.0	6.1	<5,000	1,600[1]	1.7* 11**	---	---	---
MW-3/ 3.08	10/17/95	4.42	-1.34	0	8015/8020 8240	<50	<0.50	<0.50	<0.50	<0.50	---	---	---	ND	<1000	<200
MW-4/ 3.48	10/17/95	5.08	-1.60	0	8015/8020	<125	<1.2	<1.2	<1.2	<1.2	---	---	---	---	---	---
TB	10/17/95	---	---	---	8015/8020	<50	<0.50	<0.50	<0.50	<0.50	---	---	---	---	---	---

EXPLANATION:

DTW = Depth to water
TOC = Top of casing elevation
GWE = Groundwater elevation
msl = Measurements referenced relative to mean sea level
TPHg = Total Petroleum Hydrocarbons as gasoline
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes
O&G = Oil and Grease
TPHd = Total Petroleum Hydrocarbons as diesel
HVOCs = Halogenated Volatile Organic Compounds
VOCs = Volatile Organic Compounds
MEK = Methyl ethyl ketone
ppb = Parts per billion
--- = Not analyzed/not applicable
* = 1,1-Dichloroethane
** = cis-1,2-Dichloroethene
ND = 38 compounds analyzed not detected
[1] = Sequoia notes the chromatograph pattern is unidentified in the range of C9-C24.

ANALYTICAL METHODS:

8015 = EPA Method 8015Mod for TPHg, TPHd, methanol and MEK.
8020 = EPA Method 8020 for BTEX
5520B&F = Standard Method 5520B&F for O&G
8010 = EPA Method for HVOCs
8240 = EPA Method for VOCs

NOTES:

Top of casing elevations were surveyed by Virgil Chavez, PLS #6323, on November 22, 1995.

Table 1. Soil Analytical Results - Chevron Service Station #9-1851, 451 Hegenberger Road, Oakland, California

Sample ID	Depth (ft)	Date	Analytic Method	TPHg	B	T	E	X	O&G	TPHd	HVOCs	VOCs	Methanol	MEK
				<---				ppm						--->
SB1-5.5	5.5	10/12/95	8015/8020	<1	<0.0050	<0.0050	<0.0050	<0.0050	---	---	---	---	---	---
MW1-4	4.0	10/12/95	0815/8020	<1	<0.0050	<0.0050	<0.0050	<0.0050	---	---	---	---	---	---
MW2-5.5	5.5	10/12/95	8015/8020/ 8010/5520E&F	8.4	<0.005	<0.0050	0.0097	0.025	2,100	77	9.2*	---	---	---
MW3-5	5.0	10/12/95	8015/8020 8240	<1	<0.0050	<0.0050	<0.0050	<0.0050	---	---	---	ND	<1.0	<0.20
MW4-5	5.0	10/12/95	8015/8020	<1	<0.0050	<0.0050	<0.0050	<0.0050	---	---	---	---	---	---
SP-(A-D)comp	---	10/12/95	8015/8020	<1	0.044	0.064	0.015	0.058	---	---	---	---	---	---

EXPLANATION:

TPHg = Total Petroleum Hydrocarbons as gasoline
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes
O&G = Oil and Grease
TPHd = Total Petroleum Hydrocarbons as diesel
HVOCs = Halogenated Volatile Organic Compounds
VOCs = Volatile Organic Compounds
MEK = Methyl ethyl ketone
ppm = Parts per million
--- = Not analyzed/not applicable
[1] = Sequoia indicates the chromatograph pattern is unidentified in the C9-C24 range.
* = Chloroform (other HVOCs were not detected)
ND = 38 compounds analyzed not detected

ANALYTICAL METHODS:

8015 = EPA Method 8015Mod for TPHg, TPHd, methanol and MEK.
8020 = EPA Method 8020 for BTEX
5520E&F = Standard Method 5520E&F for O&G
8010 = EPA Method for HVOCs
8240 = EPA Method for VOCs

ANALYTICAL LABORATORY:

Sequoia Analytical of Redwood City, California.

Sample Identification: MW1-4
- 4 — Sample depth
- 1 — Boring number
- MW — Soil sample from boring

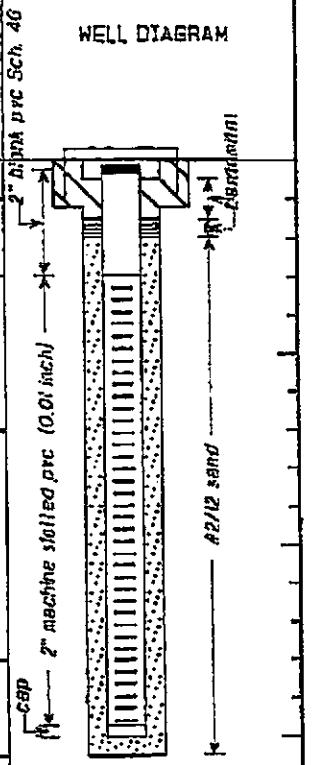
Gettler-Ryan, Inc.

Log of Boring MW-1

PROJECT: *Chevron SS# 9-1851*	LOCATION: *451 Hegenberger Road, Oakland, CA*
G-R PROJECT NO.: *5145.01*	SURFACE ELEVATION: *2.61 feet MSL*
DATE STARTED: *10/11/95*	WL (ft. bgs): *4.3* DATE: *10/11/95* TIME: *14:50*
DATE FINISHED: *10/12/95*	WL (ft. bgs): *4.3* DATE: *10/12/95* TIME: *10:40*
DRILLING METHOD: *8 in. Hollow Stem Auger*	TOTAL DEPTH: *15.5 Feet*
DRILLING COMPANY: *Bay Area Exploration, Inc.*	GEOLOGIST: *B. Sieminski*

DEPTH (feet)	PID (ppm)	BLOWS/FT. *	SAMPLE NUMBER	SAMPLE INT.	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
							PAVEMENT – 3 inches asphalt over baserock.
						CL	SILTY CLAY (CL) – dark greenish grey (5GY 4/1), damp, stiff, medium plasticity; 100% fines.
5	0	2	MW1-4			SW	SAND WITH GRAVEL (SW) – olive brown (2.5Y 4/4), moist, medium dense; 55% fine to coarse sand, 45% fine gravel. Saturated at 4.3 feet.
10	0	5	MW1-11			CH	CLAY (CH) – very dark grey (N3 3/0), saturated, medium stiff, high plasticity; 100% clay; roots.
15	0	10	MW1-15			CL	SILTY CLAY (CL) – light yellowish brown (10YR 6/4) mottled grey (N5/0), moist, stiff, medium plasticity; 95% fines, 5% fine sand.
							Bottom of boring at 15.5 feet, 10/12/95.
20							(* = converted to equivalent standard penetration blows/ft.)
25							
30							
35							

WELL DIAGRAM



JOB NUMBER: *5145.01*

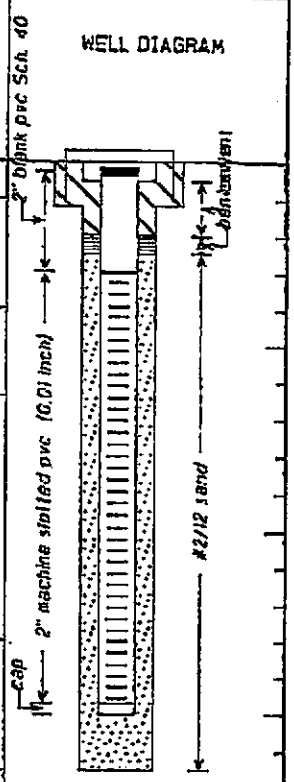
Gettler-Ryan, Inc.

Log of Boring MW-3

PROJECT: *Chevron SS# 9-1851*	LOCATION: *451 Hegenberger Road, Oakland, CA*
G-R PROJECT NO.: *5145.01*	SURFACE ELEVATION: *3.08 feet MSL*
DATE STARTED: *10/11/95*	WL (ft. bgs): *5.5* DATE: *10/11/95* TIME: *10:45*
DATE FINISHED: *10/11/95*	WL (ft. bgs): *5.1* DATE: *10/11/95* TIME: *11:25*
DRILLING METHOD: *8 in. Hollow Stem Auger*	TOTAL DEPTH: *16.5 Feet*
DRILLING COMPANY: *Bay Area Exploration, Inc.*	GEOLOGIST: *B. Sieminski*

DEPTH (feet)	PID (ppm)	BLOWS/FT. *	SAMPLE NUMBER	SAMPLE INT.	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
						CL	PAVEMENT – 3 inches asphalt over baserock.
							CLAY (CL) – olive (5Y 4/3) mottled yellowish brown (10YR 5/8), moist, medium stiff, medium plasticity; 100% clay.
5	0	2	MW3-5			SW	SAND WITH GRAVEL (SW) – olive gray (5Y 4/2), moist, very loose; 70% fine to coarse sand, 30% subrounded to well rounded gravel up to 1 inch in diameter.
						CH	Saturated at 5.5 feet.
10	0	2	MW3-11				CLAY (CH) – dark gray (5Y 4/2), saturated, soft, high plasticity; 100% clay; roots.
						CL	SILTY CLAY (CL) – olive (5G 5/3) mottled gray (5Y 5/1), moist to saturated, stiff, medium plasticity; 100% fines; roothales.
15	0	8	MW3-16				
							Bottom of boring at 16.5 feet, 10/11/95.
20							(* = converted to equivalent standard penetration blows/ft.)
25							
30							
35							

WELL DIAGRAM



JOB NUMBER: *5145.01*

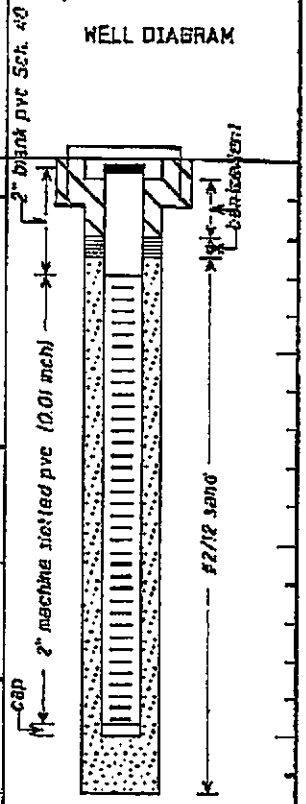
Gettler–Ryan, Inc.

Log of Boring MW-4

PROJECT: *Chevron SS# 9-1851*	LOCATION: *451 Hegenberger Road, Oakland, CA*
G-R PROJECT NO.: *5145.01*	SURFACE ELEVATION: *3.48 feet MSL*
DATE STARTED: *10/11/95*	WL (ft. bgs): *5.5* DATE: *10/11/95* TIME: *14:15*
DATE FINISHED: *10/11/95*	WL (ft. bgs): *5.5* DATE: *10/12/95* TIME: *10:15*
DRILLING METHOD: *8 in. Hollow Stem Auger*	TOTAL DEPTH: *16.5 Feet*
DRILLING COMPANY: *Bay Area Exploration, Inc.*	GEOLOGIST: *B. Sieminski*

DEPTH feet	PID (ppm)	BLOWS/FT. *	SAMPLE NUMBER	SAMPLE INT.	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION
							PAVEMENT – .3 inches asphalt over baserock.
						CL	SILTY CLAY (CL) – very dark gray (5y 3/1), moist, soft, medium plasticity; 100% fines.
5	0	2	MW4-5				▽ Saturated at 5.5 feet.
						SM	SILTY SAND (SM) – dark gray (2.5Y 4/1), saturated, very loose; 85% fine sand, 15% silt.
10	0	2	MW4-11			CH	CLAY (CH) – black (5Y 2.5/1), saturated, soft, high plasticity; 100% clay; roots.
						CL	SILTY CLAY (CL) – greenish gray (5G 5/1) mottled dark gray (N4/1), moist to saturated, medium stiff, medium plasticity; 100% fines.
15	0	7	MW4-16				Bottom of boring at 16.5 feet, 10/11/95.
20							(* = converted to equivalent standard penetration blows/ft.)
25							
30							
35							

WELL DIAGRAM



JOB NUMBER: *5145.01*

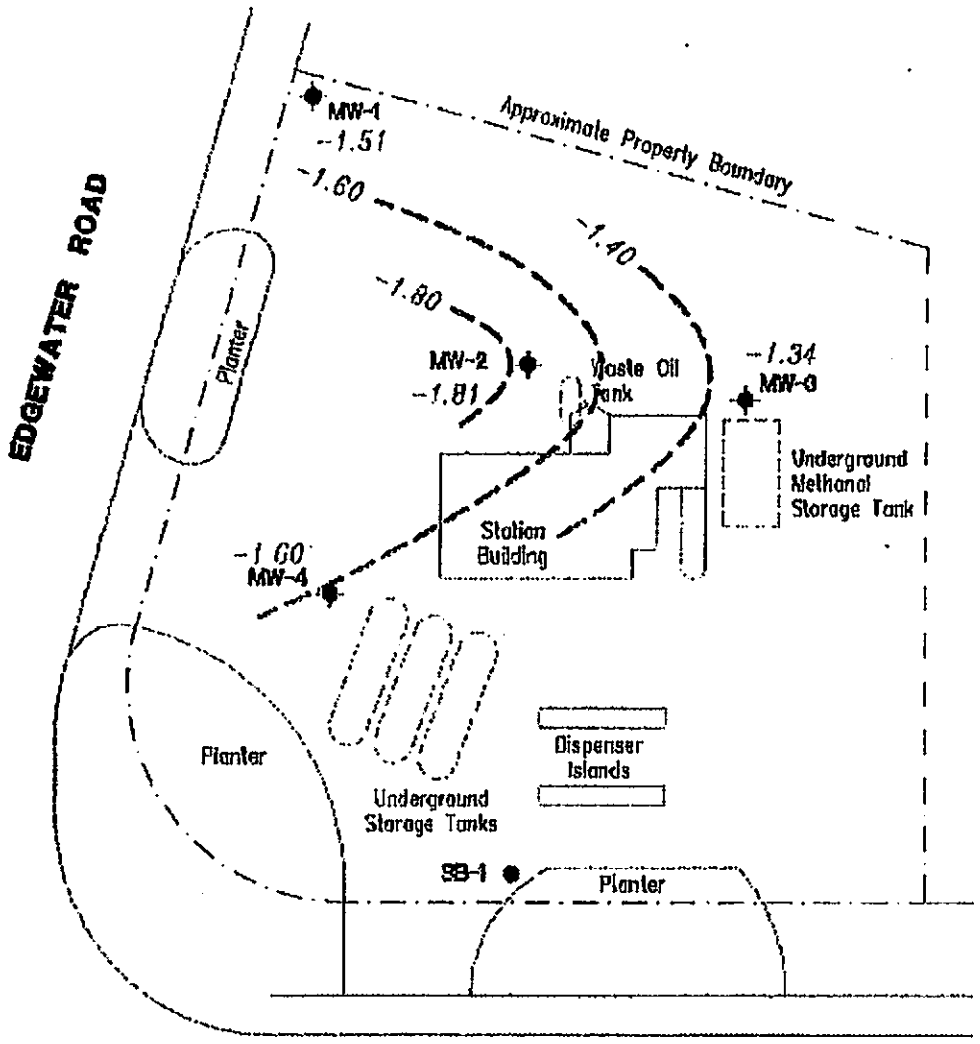
Gettler-Ryan, Inc.

Log of Boring SB-1

PROJECT: *Chevron SS# 9-1851*	LOCATION: *451 Hegenberger Road, Oakland, CA*
G-R PROJECT NO. : *5145.01*	SURFACE ELEVATION: *MSL*
DATE STARTED: *10/12/95*	WL (ft. bgs): *6.0* DATE: *10/12/95* TIME: *12:00*
DATE FINISHED: *10/12/95*	WL (ft. bgs): DATE: TIME:
DRILLING METHOD: *8 in. Hollow Stem Auger*	TOTAL DEPTH: *6.5 Feet*
DRILLING COMPANY: *Bay Area Exploration, Inc.*	GEOLOGIST: *B. Steminski*

DEPTH feet	PID (ppm)	BLOWS/FT. #	SAMPLE NUMBER	SAMPLE INT.	GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	REMARKS
							PAVEMENT - 4 inches of asphalt over baserock	Boring backfilled with neat cement with 5% bentonite.
						CL	CLAY (CL) - olive (5Y 4/3), moist, stiff, medium plasticity; 100% clay ; roots.	
						CH	CLAY (CH) - black (5Y 2.5/1), moist, soft, high plasticity; 100% clay; roots.	
5	0	N/A	SB-5.5			CL/SC	▽ SILTY CLAY WITH LENSES OF CLAYEY SAND (CL/SC) - dark greenish gray (5 G 1/1), moist, soft, low plasticity; 80% clay, 20% fine sand.	
							Saturated at 6.2 feet.	
							Bottom of boring at 6.5 feet, 10/12/95.	
10								
15								
20								
25								
30								
35								

JOB NUMBER: *5145.01*



EXPLANATION

- Groundwater monitoring well
- Soil boring
- 99.99 Groundwater elevation in feet referenced to Mean Sea Level (MSL)
- 99.99 Groundwater elevation contour, dashed where inferred.

Approximate groundwater flow direction at a gradient of 0.01 ft/ft

N

0 40

Scale in Feet

Gettler - Ryan Inc.
6747 Sierra Ct., Suite J
Dublin, CA 94568
(510) 551-7555

POTENTIOMETRIC MAP
Chevron Service Station No. 9-1851
451 Hegenberger Road
Oakland, California

FIGURE
2

JOB NUMBER	REVIEWED BY	DATE	REVISED DATE
5145.01		October 17, 1995	

BORING LOG

Project No. KEI-P 91-1004	**Boring Diameter** 8.5"	**Logged By** JGG
	Casing Diameter 2"	D.L. CEG 1633
Project Name Unocal S/S #5043 499 Hegenberger road Oakland, California	**Well Cover Elevation** N/A	**Date Drilled** 1/25/95
Boring No. MW9	**Drilling Method** Hollow-stem Auger	**Drilling Company** V & W Drilling

Pene-tration blows/6"	G.W level	O.V.M. (P.P.M.)	Depth (feet) Samples	Stratigraphy USCS	Description
			0		A.C. pavement over sand and gravel base.
				CL/ ML	Pocketed clayey silt and silty clay, stiff, moist, black and dark greenish gray, with organic matter (fill and/or disturbed native soil).
1/2/2	▽			SP	Poorly graded sand, predominantly fine to medium-grained, loose, moist grading to saturated, dark greenish gray.
			5	ML	Silt, estimated at 5-15% variable clay content, soft, wet, dark greenish gray.
1/2/2				PT	Peat with variable clay and silt content to 30%, soft, fibrous, wet, brown and black.
				ML	Clayey silt, soft, wet, black, with abundant plant fibers and organic matter.
2/4/5			10	CL	Silty clay, firm to stiff, moist, black, with plant fibers and organic matter.
13/15/18					Silty clay, estimated at 10-15% sand, trace gravel, very stiff to hard, moist, olive and dark olive gray, mottled with olive brown below 12-1/2 feet.
					TOTAL DEPTH: 13'
			15		
			20		

BORING LOG

Project No. KEI-P 91-1004	**Boring Diameter** 8.5"	**Logged By** JGG
	Casing Diameter 2"	**D.L.** CEG 1633
Project Name Unocal S/S #5043 499 Hegenberger Road Oakland, California	**Well Cover Elevation** N/A	**Date Drilled** 1/25/95
Boring No. MW10	**Drilling Method** Hollow-stem Auger	**Drilling Company** V & W Drilling

Pene-tration blows/6"	G.W. level	O.V.M. (P.P.M.)	Depth (feet) Samples	Stratigraphy USCS		Description
			0			A.C. pavement over sand and gravel base.
			1			Perched water at base of gravel base.
	▽		2			
4/4/5			3	CL/ ML		Pocketed clayey silt and silty clay, trace-15% sand and gravel, stiff, very moist, black and dark greenish gray, with abundant plant fibers and organic matter (fill and disturbed native soil).
			4			
			5			
1/2/2			6	OL/ OH		Silty clay, soft to firm, wet, black, with abundant plant fibers and organic matter.
			7			
			8			
			9			
3/5/5			10	CL		Silty clay, stiff, moist, black, grades to dark greenish gray below 10 feet, with plant fibers and organic matter, trace sand below 10 feet.
			11			
			12			
9/11/13			13	SC		Clayey sand, estimated at 20-25% clay and 10-15% silt, trace gravel, medium dense, moist, dark greenish gray, with plant fibers and organic matter.
			14			TOTAL DEPTH: 13'
			15			
			16			
			17			
			18			
			19			
			20			