Chevron

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94610

October 13, 1990

Mr. Rafat Shahid
Alameda County
Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

Re: Former Chevron Service Station #9-0019
210 W. Grand Avenue
Oakland, CA

Dear Mr. Shahid:

Enclosed we are forwarding the Off-Site Subsurface Investigation Report dated August, 1990, conducted by our consultant Western Geologic Resources, Inc. for the above referenced site. As indicated in the report, four (4) borings were advanced and completed into groundwater monitoring wells. Analytic results of all soil borings showed no detectable hydrocarbon contaminants with the exception of boring B-6 which detected ethylbenzene at a concentration of .01 ppm. Groundwater analysis detected levels of TPH - Gasoline ranging from ND to 210 ppb; BTEX was reported as ND for all the monitoring wells. The metals Cd, Cr, Pb and Zn were detected at the maximum threshold concentrations in these wells. Lower concentrations of these metals previously detected in the on-site wells suggest that the levels detected off-site are not associated with an on-site source and may be naturally occuring due to the close proximity to the bay and the brackish water that exists.

Quarterly groundwater samples were also collected at this time from the existing five (5) on-site wells. Analytic testing of these wells is showing petroleum hydrocarbon contaminants in only two (2) of the monitoring wells.

Chevron is proceeding with the Remediation Work Plan submitted on September 28, 1990. Upon completion of this work plan we will have Western Geologic Resources, Inc. provide recommendations for appropriate next actions.

Chevron will continue to monitor the site and report findings on a quarterly basis.

If you have any questions or comments please do not hesitate to call me at (415) 842 - 9581.

Very truly yours,
C. G. Trimbach

By Nancy Vukelich

NLV/jmr
Enclosure

cc: Mr. Lester Feldman
RWQCB-Bay Area
1800 Harrison Street
Suite # 700
Oakland, CA 94612

Mr. W.T. Scudder - w/o enclosures

WESTERN GEOLOGIC RESOURCES INC.

2169 E. FRANCISCO BLVD., SUITE B / SAN RAFAEL
CALIFORNIA 94901 / FAX 415.457.8521
TELE 415.457.7595

OFF-SITE

SUBSURFACE INVESTIGATION

Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

Prepared For

Chevron USA
2410 Camino Ramon
San Ramon, California 94583

August 1990

COLORADO SPRINGS
SALT LAKE CITY
SAN DIEGO
VENTURA

OFF-SITE

SUBSURFACE INVESTIGATION

Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

Prepared For

Chevron USA
2410 Camino Ramon
San Ramon, California 94583

Prepared By

Western Geologic Resources, Inc.
2169 East Francisco Boulevard
San Rafael, California

August 1990

Leonard P. Niles
Senior Staff Geologist

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Principal Geologist
CRG No. 4815

REGISTERED GEOLOGIST
JAMES A. JACOBS
NO. 4815
STATE OF CALIFORNIA

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EXECUTIVE SUMMARY

A subsurface investigation was conducted by Western Geologic Resources, Inc. (WGR) in the vicinity of the former Chevron service station #90019 located at 210 Grand Avenue (at the intersection of Grand and Montecito Avenues) in Oakland, California. Four exploratory soil borings, B-6 through B-9, were drilled to a maximum depth of 14.0 feet (ft) below ground surface in the Grand and Montecito Avenue right-of-ways downgradient from the Chevron site from 27 to 29 June 1990. Unconfined groundwater was first encountered at depths ranging from 19.46 ft to 21.2 ft below ground surface. Borings B-6 through B-9 were completed as 2-inch diameter groundwater monitor wells MW-6 through MW-9, respectively. The newly installed monitor wells were developed and groundwater samples were collected from all existing wells at the site on 5 and 6 July 1[illegible]v. Static water levels in the newly completed wells MW-6 through MW-9 ranged from 3.98 ft to 9.09 ft below ground surface. Because of a very low recovery rate, well MW-6 was re-developed on 19 July 1990. The re-development process was not successful in enhancing the recovery rate of well MW-6.

Analytic Results: Soil

Total purgeable petroleum hydrocarbons (TPPH) as gasoline, total petroleum hydrocarbons (TPH) as gasoline, diesel and waste oil, benzene, toluene, total xylenes and halocarbons were not detected in any soil samples collected and analyzed from borings B-6 through B-9. Ethylbenzene was detected at a concentration of 0.01 parts-per-million (ppm) in two soil samples collected from boring B-6 at depths of 5.5 ft and 8.7 ft. Low concentrations of the metals cadmium, chromium, lead and zinc were detected in soil samples from boring B-6.

Analytic Results: Groundwater

TPPH and aromatic hydrocarbons were detected in groundwater samples collected from wells MW-4, MW-5 and MW-6, downgradient from the former underground storage tanks. A maximum

concentration of 30,000 parts-per-billion (ppb) TPPH characterized as gasoline, 5,600 ppb benzene, 890 ppb toluene, 210 ppb ethylbenzene and 1,400 ppb total xylenes were detected in a groundwater sample collected from well MW-5. The halocarbon 1,2-dichloroethane was detected in a sample from well MW-4 at 0.79 ppb. A groundwater sample collected from well MW-5 contained 1.2 ppb 1,2-dichloropropane. The metals Cd, Cr, Pb and Zn were detected at maximum concentrations of 79 ppb, 960 ppb, 100 ppb, and 790 ppb in groundwater samples collected from wells MW-7 through MW-9, with the highest concentrations detected in samples from well MW-8.

Groundwater Flow and Well Search

The estimated direction of groundwater flow on 6 July 1990 was to the west at a gradient of approximately 2.3% on-site, steepening to 4.1% in the vicinity of the off-site wells to the south. Flow direction and gradient have varied considerably during past sampling events, due to tidal influence caused by the close proximity of Lake Merritt to the site.

A search of registered wells conducted by the Alameda County Department of Public Works and by WGR at the State of California Department of Water Resources revealed 40 wells within and an additional 18 wells just outside a one-half mile radius of the site.

1 INTRODUCTION

This report presents the results of the off-site subsurface investigation conducted in June and July 1990 by Western Geologic Resources, Inc. (WGR) in the vicinity of the former Chevron service station #90019 located at 210 Grand Avenue (at the intersection of Grand and Montecito Avenues) in Oakland, California (Figure 1). This investigation was designed to further evaluate the lateral and vertical extent of petroleum hydrocarbons in the soil and groundwater downgradient from the Chevron site.

The scope of work for the subsurface investigation included the following:

1. Drill four exploratory soil borings in the off-site area adjacent to the former Chevron service station in the Grand Avenue and Montecito Avenue right-of-ways downgradient from the site and collect soil samples at a maximum of five foot (ft) intervals;

2. Analyze selected soil samples for total purgeable petroleum hydrocarbons (TPPH) as gasoline and total petroleum hydrocarbons (TPH) as gasoline, diesel and waste oil by EPA Method 8015, aromatic hydrocarbons including benzene, toluene, ethylbenzene and total xylenes (BTEX), by EPA Method 8020, halocarbons by EPA Method 8010, oil and grease by EPA Method 413.2, cadmium (Cd), chromium (Cd), lead (Pb) and zinc (Zn) by EPA Method 6010;

3. Complete the four borings as 2-inch diameter groundwater monitor wells;

4. Develop the new monitor wells, sample all monitor wells at the site and analyze the groundwater samples for TPPH as gasoline by EPA Method 8015, BTEX by EPA Method 8020, halocarbons by EPA Method 601, oil and grease by EPA Method 413.2, cadmium (Cd), chromium (Cr), lead (Pb) and zinc (Zn) by EPA Method 6010;

5. Survey top-of-casing (TOC) elevations and locations of the new monitor wells and re-survey the previously installed wells, measure depths-to-water and determine groundwater elevations of all monitor wells at the site and produce a potentiometric surface map for shallow groundwater;

6. Perform a well search within a one-half mile radius of the site; and

7. Review all field and laboratory data and prepare a report of this investigation.

2 BACKGROUND

2.1 SITE SETTING

Former Chevron service station #90019 is located in a residential and commercial district on 210 Grand Avenue at the northeast corner of the intersection of Grand and Montecito Avenues in Oakland, California (Figure 2). The site is presently abandoned with all structures demolished and surrounded by locked cyclone fencing. The nearest surface water feature is Lake Merritt, a tidal lake draining into San Francisco Bay, 200 ft southeast of the site. The elevation of the site is approximately 8 ft above sea level.

2.2 SITE HISTORY

In February 1989, a soil vapor survey was performed by WGR. A total of 19 vapor points at 12 sampling locations were installed. The highest concentrations of total volatile hydrocarbons (TVH), ranging from 9.2 parts-per-million (ppm) to 73,000 ppm, were detected in points installed at 5 ft and between 13 ft and 15 ft below ground surface, located in the vicinity of the underground fuel-storage tanks and pump islands on the south half of the site. Lower concentrations of TVH, ranging from 17 ppm to 5,100 ppm, were detected on the north part of the site behind the service station building (reference: WGR report to Chevron of 30 March 1989).

In March 1989, WGR drilled and collected soil samples from five borings B-1 through B-5 and converted them to 4-inch diameter groundwater monitor wells MW-1 through MW-5. TPPH and BTEX were detected in soil samples collected from borings B-2 through B-5. A maximum concentration of 390 ppm TPPH were detected in a soil sample collected from a depth of 5.5 ft in boring B-5. Maximum concentrations of 4.5 ppm benzene, 16 ppm toluene, 8.4 ppm ethylbenzene and 32 ppm total xylenes were detected in a soil sample collected from a depth of 5.0 ft in boring B-2. Soil samples collected from a depth of 5 ft in borings B-2, B-3 and B-5 contained up

to 0.2 ppm 1,2-dichloroethane (1,2-DCA). Oil and grease were detected in soil samples from boring B-3 at up to 360 ppm. TPPH were detected in groundwater samples collected from wells MW-1, MW-4 and MW-5. Aromatic hydrocarbons were detected in groundwater samples collected from wells MW-1 through MW-5. Maximum concentrations of 20,000 parts-per-billion (ppb) TPPH, 6,600 ppb benzene, 1,600 ppb toluene, 270 ppb ethylbenzene and 1,100 ppb total xylenes were detected in a groundwater sample from well MW-5. Groundwater samples from wells MW-2 and MW-3 contained 1,2-DCA at 0.7 ppb and 3.0 ppb, respectively (reference: WGR Subsurface Investigation Report to Chevron of June 1989).

Quarterly groundwater sampling has been conducted by WGR since March 1989. Historic groundwater elevation data are presented in Table 1; historic groundwater analytic data are presented in Table 2.

In June 1990, all existing structures at the site were demolished. Three fiberglass gasoline tanks and one fiberglass waste oil tank were excavated and removed by Blaine Tech Services, Inc., of San Jose, California and Armer Norman, of Walnut Creek, California. WGR is currently conducting further excavation and soil stockpile aeration on the site.

3 SUBSURFACE INVESTIGATION

3.1 SOIL BORINGS AND HYDROGEOLOGY

From 27 to 29 June 1990 four exploratory soil borings B-6 through B-10 were drilled to a maximum depth of 14.0 ft by B & F Drilling Company, Inc. of Rancho Cordova, California using a Mobile B-61 truck-mounted hollow-stem auger drill rig. Drilling, soil logging and soil sampling was supervised by WGR geologists David Reichard and Justin Power. Boring and monitor well locations, shown on Figure 3, were selected at various locations down gradient from the site based on estimated direction of groundwater flow, analytic results from soil and groundwater samples collected from previous borings and wells at the site and feasibility of access. Three borings were located in the Grand Avenue right-of-way south of the site and one boring was located on the northwest corner of Montecito Avenue and Grand Avenue west of the site. Prior to beginning drilling, the proper monitor well construction permits were obtained from Zone 7 Alameda County Flood Control and Water Conservation District and encroachment, street excavation and street obstruction permits from the City of Oakland.

Soil samples were collected at 1 ft to 5 ft depth intervals for lithologic and hydrogeologic description and chemical analysis. Soil was classified in accordance with the Unified Soil Classification System (USCS). Field estimates of permeability are based on grain size, sorting, sedimentary fabric and cementation. The WGR operating procedure for soil sampling is included in Appendix A. A photoionization detector (PID) was used at the site to screen soil samples for the presence of volatile hydrocarbons. Boring logs are included in Appendix B. On 27, 28 and 29 of July 1990, thirteen soil samples were collected. The samples were subsequently stored and sent in a refrigerated environment under chain-of-custody to Groundwater Technologies Environmental Laboratory (GTEL) of C[illegible] California, a state-certified laboratory.

Figure 3 shows the locations of generalized hydrogeologic cross-sections X-X' and Y-Y'. Figures 4 and 5 show generalized hydrogeologic cross-sections X-X' and Y-Y' along and across the estimated

direction of groundwater flow, respectively. Groundwater was encountered under unconfined conditions in the borings at depths ranging from 5.12 ft to 6.39 ft below ground surface. Soil encountered during the drilling of borings B-6 and B-9 was generally characterized by silty clay of estimated low primary permeability extending from beneath the asphalt and concrete, through the unsaturated zone and the water bearing zone, to a depth of about 8.5 ft below ground surface. A higher secondary permeability is defined by the presence of root holes in the silty clay. This silty clay is underlain by silt of very low estimated permeability to the bottom of the boring at 12.0 ft below ground surface. Soil encountered during the drilling of boring B-7 was generally similarly to the soils encountered in borings B-6 and B-9. The soils in boring B-7 consisted of silty clay of estimated low permeability extending from beneath the asphalt and concrete through the unsaturated zone and into the water bearing zone to about a depth of 8.5 ft below ground surface. This material is underlain by gravelly sand of high estimated permeability from about a depth of 8.5 ft to the bottom of the water-bearing zone at a depth of 9.5 ft below ground surface. This material is underlain by silty clay of low estimated permeability in the lower unsaturated zone extending to the bottom of the boring at a depth of 12.0 ft below ground surface. Soil encountered during the drilling of boring B-8 was generally characterized by silty clay of low estimated permeability extending from beneath the asphalt and concrete, through the unsaturated zone, the water-bearing zone between a depth of 6 ft and 8 ft, and into the lower unsaturated zone to a depth of 14.0 ft below ground surface.

All soil cuttings were temporarily stored on-site in soil stockpiles along with soil from the on-site tank excavations pending aeration and laboratory analysis.

3.2 MONITOR WELL INSTALLATION AND DEVELOPMENT

The new monitor wells were installed and developed according to WGR standard operating procedure included in Appendix A. Soil borings B-6 through B-9 were completed as 2-inch diameter groundwater monitor wells MW-6 through MW-9, respectively, on 27 through 29 June 1990. Well construction details are included on the boring logs in Appendix B.

Figures 4 and 5 are generalized hydrogeologic cross sections, including screen and sand pack intervals of wells MW-1 through MW-7, estimated permeability of soils intersected by the well borings and static water levels in the completed wells. The screened interval of each well was chosen to conform with the saturated zone while avoiding penetration of the low-permeability unsaturated zone below. Below the well-casings, the borings were sealed with bentonite pellets. The new monitor wells MW-6 through MW-9 were constructed with 2.5 ft to 6 ft of screened interval. The tops of the well screens ranged from 4.5 ft to 6.0 ft below ground surface. The bottoms of the well screens ranged from 8.0 ft to 10.5 ft below ground surface.

Monitoring wells MW-7 through MW-9 were developed on 5 July 1990 by WGR environmental technicians until relatively silt- and sand-free water was produced. Development was performed using a combination of surge-block and bailing methods. Field development and sampling logs are included in Appendix C. The wells produced about 0.19 gallons-per-minute (gpm) to 0.35 gpm. Well MW-6 had an insufficient volume of water in the well-casing for proper development and was purged dry after only 0.01 gallon was removed, with an overnight recovery of only 0.36 ft of water in the casing.

A re-development of well MW-6 was performed on 19 July 1990. On the previous day, 1 gallon of 3% sodium triphosphate (TSP) solution in distilled water was injected into the well to help disaggragate clay minerals and improve hydraulic conductivity between the borehole annulus and the formation. This is a commonly used practice in the development of water production wells. The solution was left in the well overnight before re-development was performed using surge-block and jet air-lift methods. Because the well repeatedly purged dry, 3 additional gallons of distilled water were added. The re-development was not successful, as only 0.5 ft of water was present in the well-casing after overnight recovery. WGR believes that the recovery rate is limited by the very low permeability of the silty clay composing the saturated formation material.

3.3 GROUNDWATER SAMPLING

Groundwater samples were collected from monitor wells MW-1 through MW-9 by WGR environmental technicians on 5 June 1990, using dedicated bladder pumps for wells MW-1 through

MW-5 and steam-cleaned PVC bailers for wells MW-6 through MW-9 according to the WGR standard operating procedure for groundwater sampling (SOP-4) included in Appendix A. Groundwater sampling logs are included in Appendix C. Prior to collecting groundwater samples, wells MW-2, MW-7 and MW-9 were purged of three well-casing volumes of groundwater. Wells MW-1, MW-3, MW-4, MW-5 and MW-8 were purged dry before 3 well-casing volumes of groundwater could be removed and were sampled after recovering to 30%, 74%, 86%, 21% and 8.4% of static levels, respectively. A grab sample was collected from well MW-6 without purging because of the low recovery rate from development the previous day. A total of 90 gallons of purged groundwater from the well development and sampling processes were temporarily stored on-site in a portable liquid containment tank pending laboratory analysis. The refrigerated groundwater samples were sent under chain-of-custody to GTEL for analysis.

4 GROUNDWATER FLOW

4.1 WELL ELEVATION SURVEY

The new monitor wells MW-6 through MW-9 were surveyed for locations and top-of-casing (TOC) elevations above mean sea level to within 0.01 ft accuracy on 30 July 1990 by John E. Koch, a state-licensed land surveyor, of Oakland, California. Because of damage from the excavation, the previously installed on-site wells MW-1 through MW-5 were re-surveyed and found to have TOC elevations within 0.02 ft of the previous measurements. TOC elevations are included in Table 1.

4.2 GROUNDWATER FLOW

Groundwater elevation data are presented in Table 1. Figure 6 is potentiometric surface map of the shallow groundwater on 6 July 1990. Hydrographs are presented in Appendix D. Depth-to-water (DTW) measurements were taken of all wells at the site and ranged from 3.98 ft to 7.52 ft below TOC. The DTW measurement for well MW-9 (9.09 ft below TOC) was not used in contouring the potentiometric surface because the water level did not fully recover from development the previous day. The DTW for MW-6 had recovered to 7.01 ft below TOC on 18 July 1990 before re-development. The average direction of groundwater flow was to the west at a gradient of 2.3% on-site, steepening to 4.1% in the vicinity of the off-site wells to the south. There was a pronounced flattening of the gradient in the vicinity of on-site well MW-2. Sample

calculation A shows how the gradient was derived.[1] The direction of groundwater flow and gradient on-site has varied considerably between past sampling events due to tidal action caused by nearby Lake Merritt, which is an estuary of San Francisco Bay.

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[1] SAMPLE CALCULATION A: GROUNDWATER GRADIENT CALCULATION

From Figure 6; reference line a-a'

$$\text{Gradient} = \frac{h}{l} = \frac{2.0 \text{ ft}}{48.5 \text{ ft}} = 0.041$$

or 4.1%

h = 2.5 ft - 0.5 ft = 2 ft
l = 48.5 ft (distance along a-a')

5 ANALYTIC RESULTS

5.1 SOIL SAMPLES

Analytic results for soil samples are presented in Table 4. Chain-of-custody forms and laboratory analytical and quality assurance/quality control reports are included in Appendices E and F, respectively. Twelve of the soil samples were selected for analysis by GTEL for TPPH as gasoline by EPA Method 8015 and BTEX by EPA Method 8020; six of these samples were selected for analysis for analysis for halocarbons by EPA Method 8010; three of these samples (all from boring B-6) were selected for analysis for TPH as diesel by EPA Method 8015, oil and grease by EPA Method 413.2 and total Cd, Cr, Pb, and Zn by EPA Method 6010.

TPPH, TPH, benzene, toluene, total xylenes and halocarbons were not detected in any soil samples analyzed from borings B-6 through B-9. Ethylbenzene was detected at a concentration of 0.01 ppm in two soil samples collected from boring B-6 at depths of 5.5 ft and 8.7 ft. Total Cd, Cr, Pb and Zn were detected in soil samples from boring B-6 at maximum concentrations of 3 ppm, 29 ppm, 15 ppm and 51 ppm, respectively. These concentrations are all well below the State of California Department of Health Services (DHS) Total Threshold Limit Concentrations (TTLCs) for these elements.

5.2 GROUNDWATER SAMPLES

Analytic results for groundwater samples are presented in Tables 2 and 3. Chain-of-custody forms and laboratory analytical and quality assurance/quality control reports are included in Appendices E and F, respectively. TPPH and benzene distribution in shallow groundwater are indicated on Figures 7 and 8, respectively.

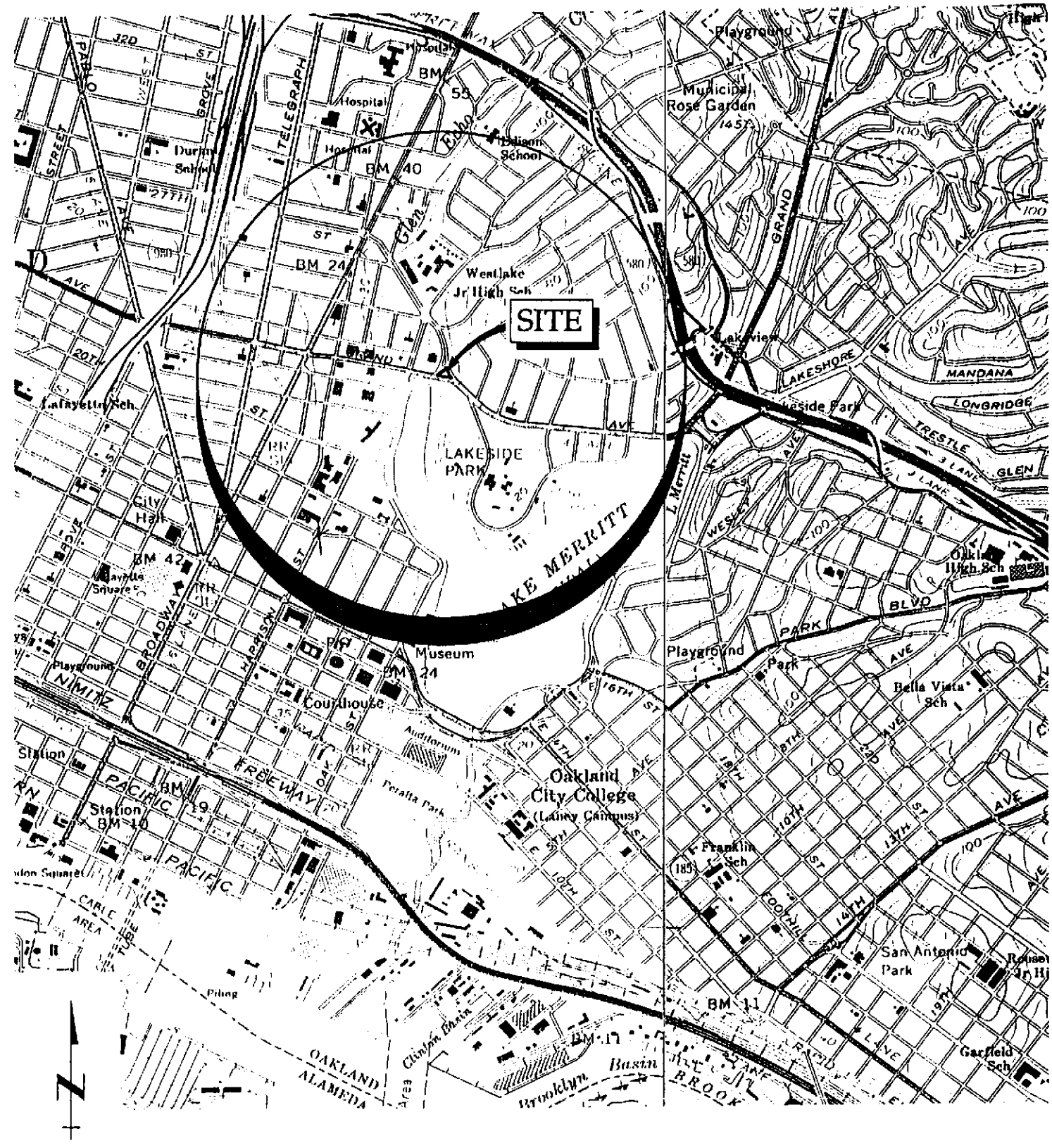
6 WELL SEARCH

A search of registered wells within one-half mile of the site was conducted by the County of Alameda Public Works Agency using their computer database and by WGR at the California Department of Water Resources offices in Sacramento. A total of 40 wells were located within a one-half mile radius of the site with an additional 18 wells just outside. The owners, well locations and uses are listed in Table 5 and locations of the wells are indicated on Figure 9.

7 DISCUSSION

Concentrations of TPPH and BTEX detected in laboratory analyses of ground water samples collected from the on-site wells have remained relatively constant since the March 1990 sampling. TPPH in groundwater samples from well MW-1 declined from 190 ppb to below the 50 ppb detection limit. Benzene concentrations in groundwater samples from well MW-4 declined from 50 ppb to 0.7 ppb. 1,2-DCA declined from 10 ppb to below the 0.5 ppb detection limit in groundwater samples from well MW-5. DCP was detected for the first time in groundwater samples from well MW-5. The presence of TPPH and aromatic hydrocarbons in the groundwater sample from well MW-6 indicates that the dissolved petroleum hydrocarbon plume has migrated down gradient from the site.

The direction of groundwater flow on-site was similar to the March 1990 sampling period, with a slight increase in gradient. Previous sampling events have shown significant differences in direction of groundwater flow and gradient due to tidal action from nearby Lake Merritt.

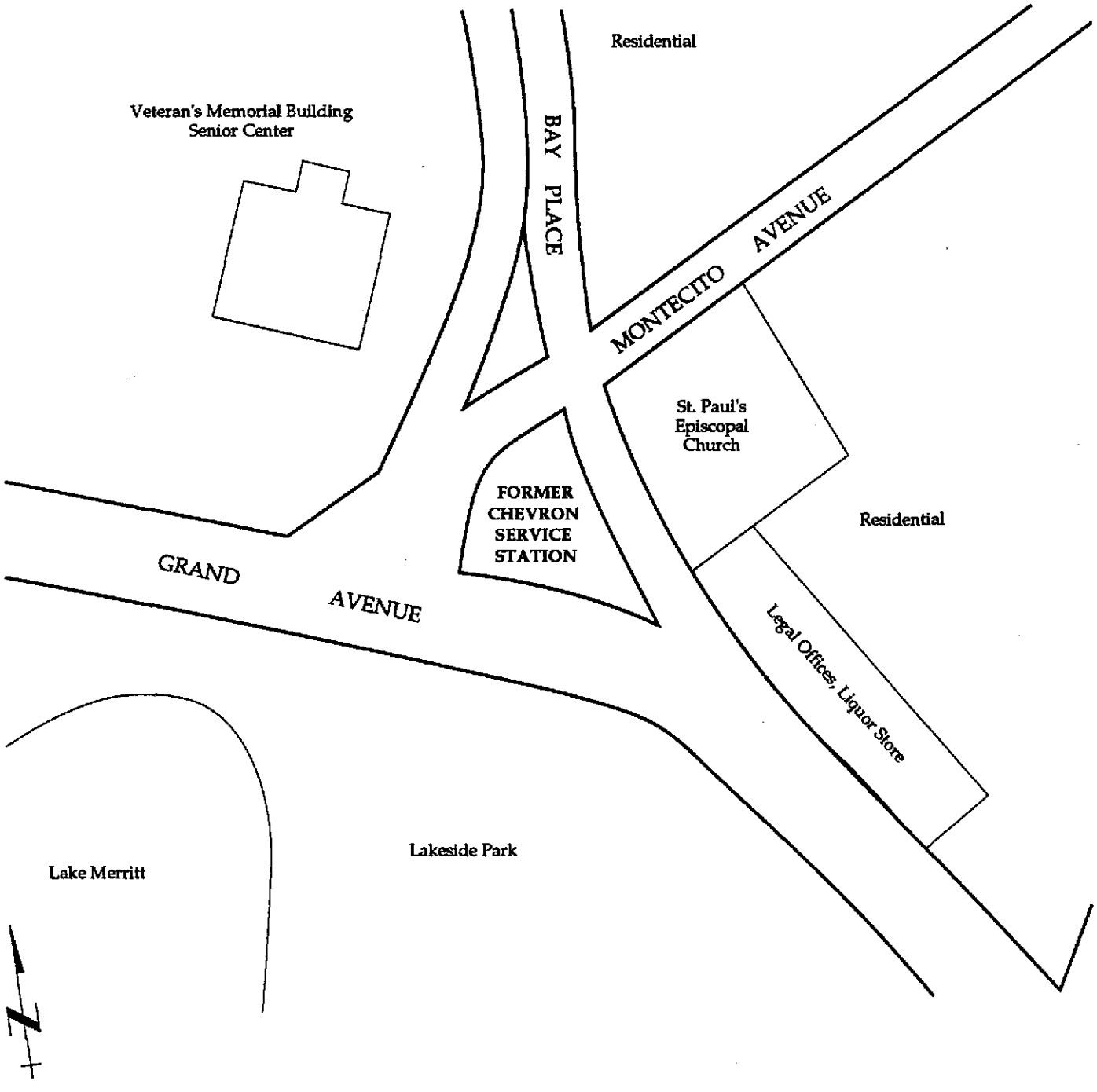


Reference: USGS Topo Map- Oakland West Quadrangle 8/90

Site Location Map
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

FIGURE
1

WESTERN GEOLOGIC RESOURCES, INC. 1-101.04

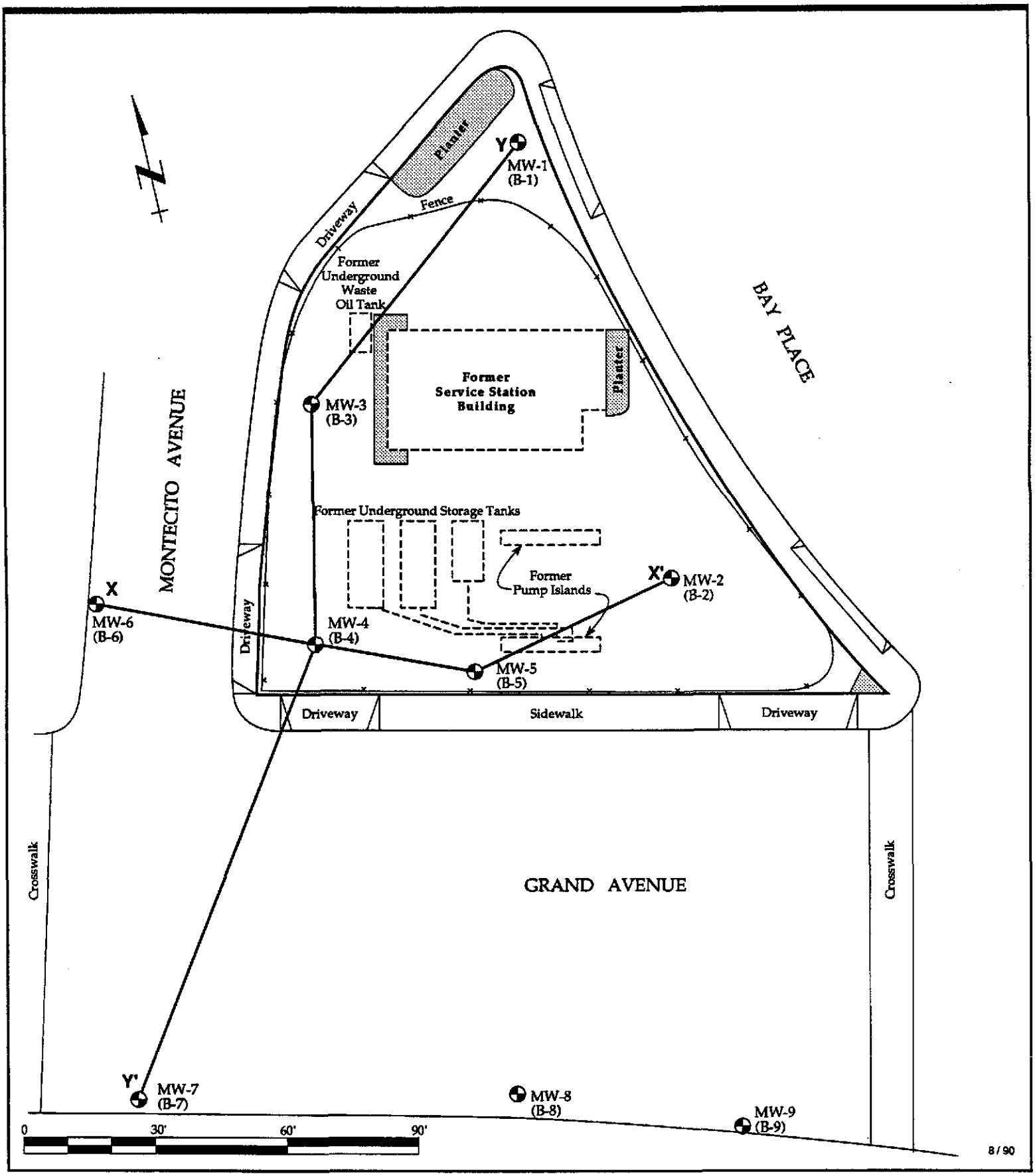


Vicinity Map
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

FIGURE
2

WESTERN GEOLOGIC RESOURCES, INC.

1-101.04



EXPLANATION

MW-7 (B-7) — Monitor Well (and Boring) location

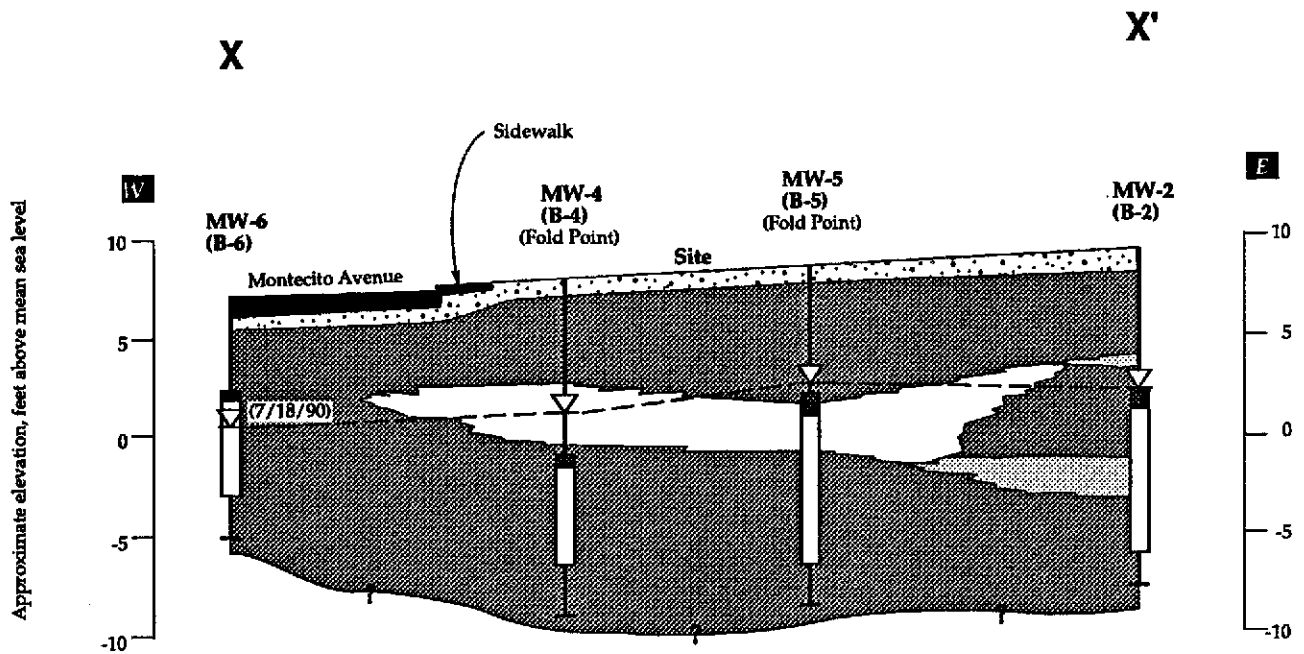
X — X' — Generalized hydrogeologic cross section line

Site Map with Monitor Well and Generalized Hydrogeologic Cross Section X-X' and Y-Y' Locations
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

FIGURE 3

WESTERN GEOLOGIC RESOURCES, INC.

1-101.04



0 30.0 ft.

Horizontal Scale
Vertical Scale 3X Exaggeration

8/90

EXPLANATION

- Asphalt/Concrete
- Fill
- Low estimated permeability soils; silty clay, clayey to sandy silt, silty sand
- Low-to-moderate estimated permeability soils; gravelly silt, silty gravel
- Moderate estimated permeability soils; silty sand/ silty gravel

MW-4 (B-4) Monitor Well location / Boring location

Sand pack
Screen interval
Boring

Static water level, 6 July 1990

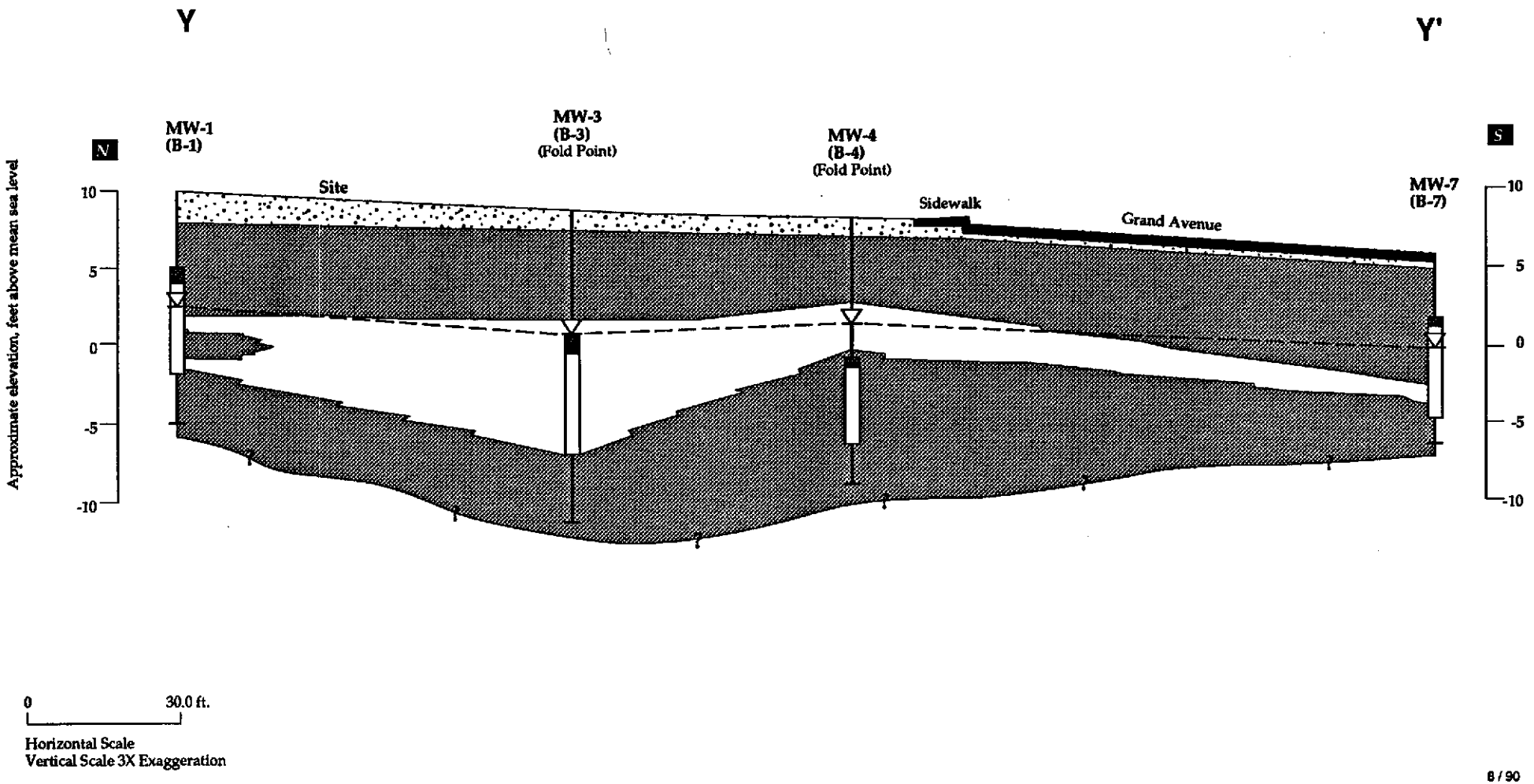
Potentiometric Surface

Generalized Hydrogeologic Cross Section X-X'
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

FIGURE
4

WESTERN GEOLOGIC RESOURCES, INC.

1-101.04



EXPLANATION

- Asphalt/Concrete
- Fill
- Low estimated permeability soils; silty clay, clayey to sandy silt
- Moderate estimated permeability soils; silty sand, gravelly sand, silty gravel

MW-1 (B-1) Monitor Well location / Boring location

Sand pack
Screen interval
Boring

Static water level, 6 July 1990

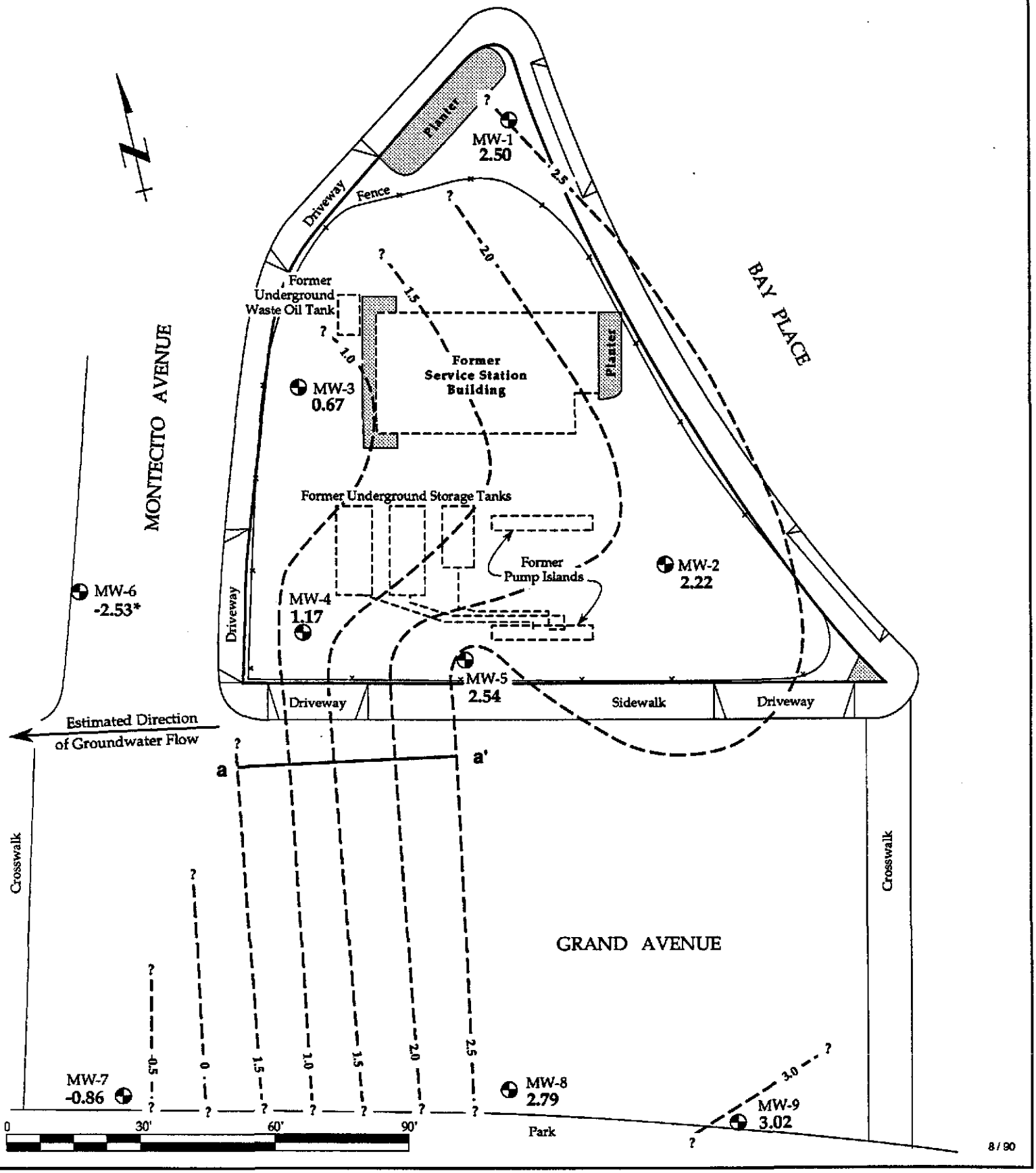
Potentiometric Surface

Generalized Hydrogeologic Cross Section Y-Y'
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

FIGURE
5

WESTERN GEOLOGIC RESOURCES, INC.

1-101.04



EXPLANATION

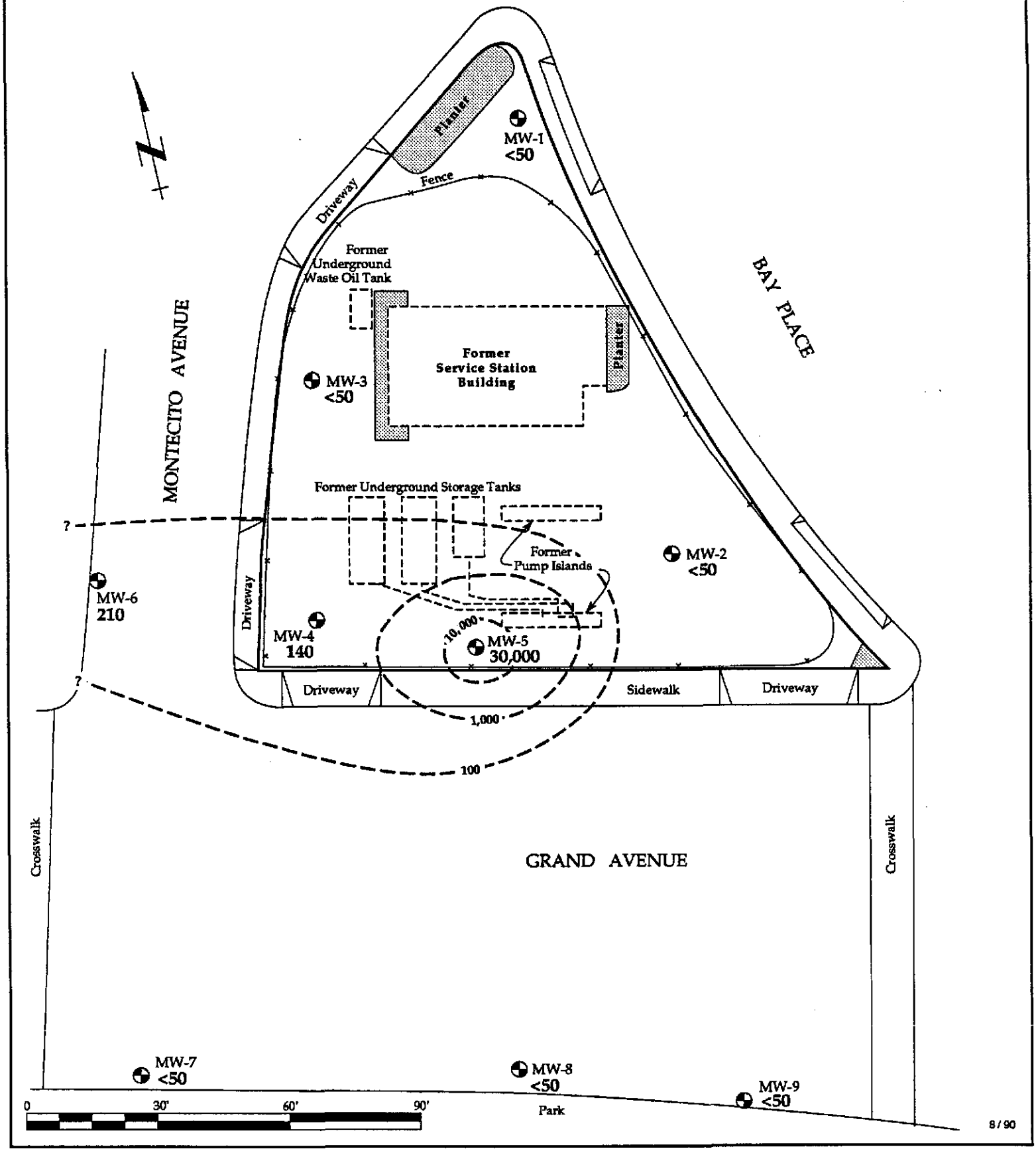
MW-8 2.79	Monitor Well Location and groundwater elevation, feet above mean sea level
2.5 — — — ?	Groundwater elevation contour, feet above mean sea level, dashed where inferred, queried where uncertain
a — a'	Reference line for gradient calculation
-2.53*	Anolmalous data, not used in contouring

Potentiometric Surface of Shallow Groundwater
6 July 1990
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

FIGURE
6

WESTERN GEOLOGIC RESOURCES, INC.

1-101.04



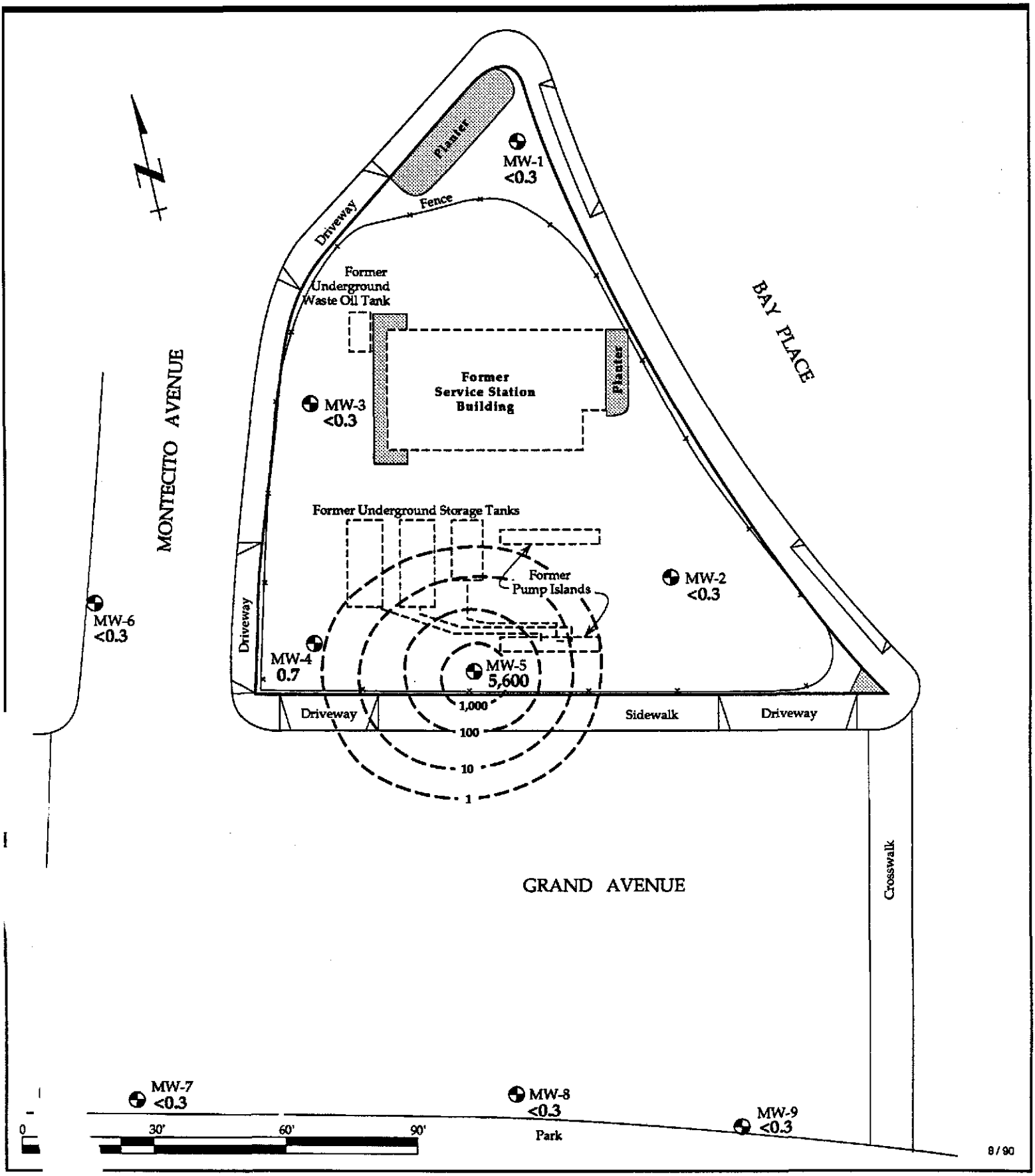
EXPLANATION

MW-7 <50 — Monitor Well location and TPPH concentration in parts-per-billion (ppb)

100 — — — ? — Isoconcentation contour for TPPH in ppb, dashed where inferred, queried where uncertain

Distribution of Total Purgeable Petroleum Hydrocarbons (TPPH) in Shallow Groundwater, 6 July 1990
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

FIGURE 7



EX L \TION

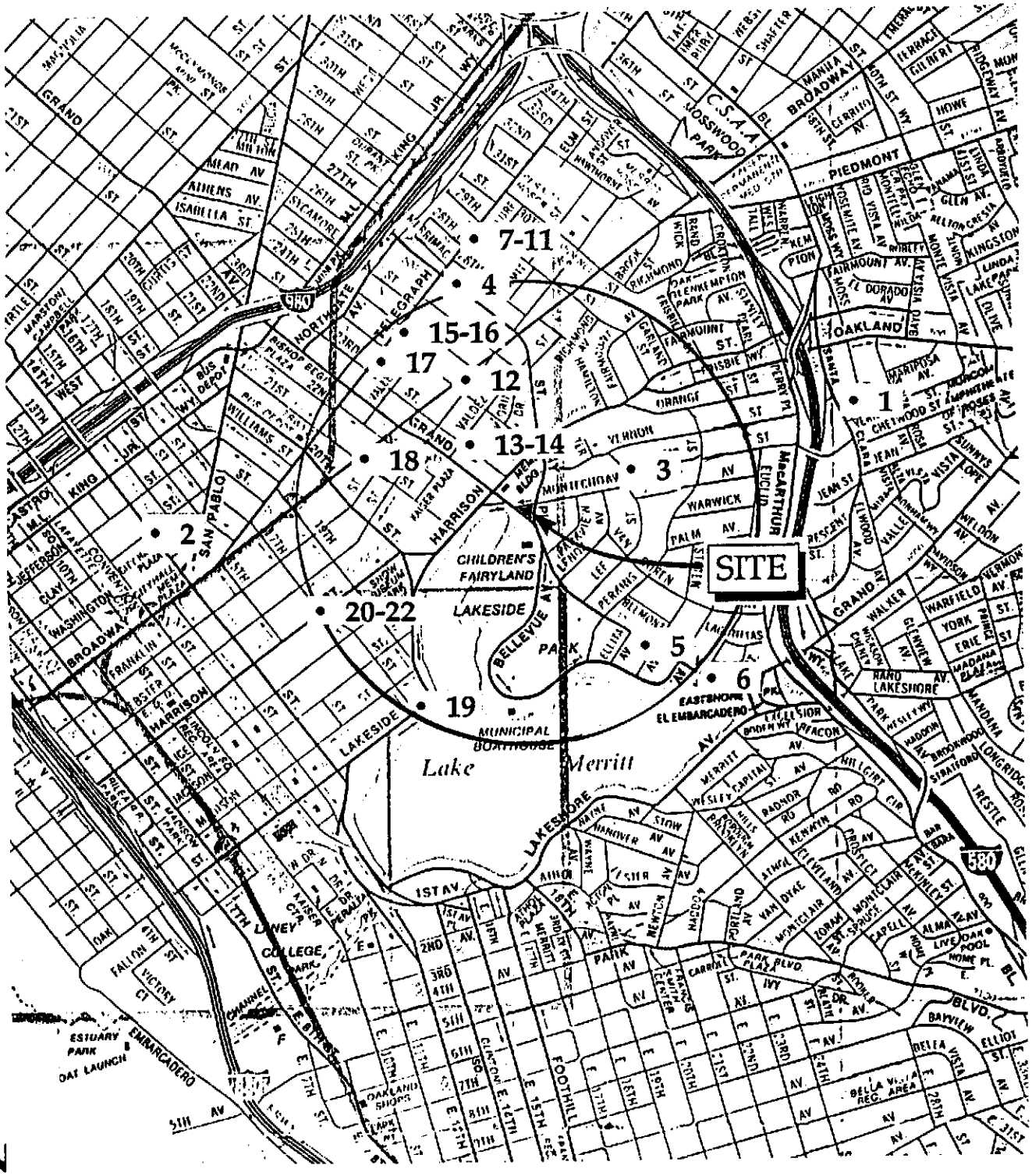
M
<C — Monitor Well location and benzene concentration in parts-per-billion (ppb)

100 — — Isoconcentation contour for benzene in ppb, dashed where inferred

Distribution of Benzene in Shallow Groundwater, 6 July 1990
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

FIGURE
8

1-101.04



8/90

Wells Located Within 1/2 Mile Radius of
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

FIGURE
9

Road Map Reference: CSAA map of Oakland, California

1-101.04

TABLE 1. Groundwater Elevation Data
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

Well ID #	Date	TOC	DTW	Elev.-W
		<----------ft---------->		
MW-1	14 Mar 89	9.63	6.74	2.89
MW-1	8 Jun 89	9.63	7.14	2.49
MW-1	14 Sep 89	9.63	7.21	2.42
MW-1	8 Dec 89	9.63	7.29	2.34
MW-1	19 Mar 90	9.63	7.00	2.63
MW-1	6 Jul 90	9.63	7.13	2.50
MW-2	14 Mar 89	8.99	6.08	2.91
MW-2	8 Jun 89	8.99	5.22	3.77
MW-2	14 Sep 89	8.99	5.95	3.04
MW-2	8 Dec 89	8.99	9.25	-0.26
MW-2	19 Mar 90	8.99	5.92	3.07
MW-2	6 Jul 90	9.01	6.79	2.22
MW-3	14 Mar 89	8.18	6.02	2.16
MW-3	8 Jun 89	8.18	5.88	2.30
MW-3	14 Sep 89	8.18	6.30	1.88
MW-3	8 Dec 89	8.18	9.52	-1.34
MW-3	19 Mar 90	8.18	6.17	2.01
MW-3	6 Jul 90	8.19	7.52	0.67
MW-4	14 Mar 89	7.60	5.52	2.08
MW-4	8 Jun 89	7.60	4.19	3.41
MW-4	14 Sep 89	7.60	4.80	2.80
MW-4	8 Dec 89	7.60	4.86	2.74
MW-4	19 Mar 90	7.60	4.65	2.95
MW-4	6 Jul 90	7.59	6.42	1.17
MW-5	14 Mar 89	8.35	6.98	1.37
MW-5	8 Jun 89	8.35	4.73	3.62
MW-5	14 Sep 89	8.35	5.37	2.98
MW-5	8 Dec 89	8.35	9.13	-0.78
MW-5	19 Mar 90	8.35	5.12	3.23
MW-5	6 Jul 90	8.35	5.81	2.54
MW-6	6 Jul 90	6.56	9.09*	-2.53*
MW-7	6 Jul 90	4.99	5.85	-0.86

TABLE 1. Groundwater Elevation Data (continued)
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

Well ID #	Date	TOC	DTW	Elev.-W
		<----------ft---------->		
MW-8	6 Jul 90	6.77	3.98	2.79
MW-9	6 Jul 90	7.63	4.61	3.02

NOTES:

DTW = Depth-to-Water
TOC = Top-of-Casing elevation, re-surveyed 30 July 1990
Elev.-W = Elevation of Water
Ft = Feet
* = Anomalous data, not used in contouring
Elevation Datum: Mean sea level

Table 2. Analytic Results: Groundwater Samples
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, CA

Well ID #	Date	TPPH/TPH	Benzene	Toluene	E-Benzene	Xylenes	Chlor	1,2-DCA	f113	TCA	O&G	Lab	EPA/CS Method
		<--------				ppb				-------->	<-ppm->		
MW-1	14 Mar 89	600	<0.2	<0.2	3.2	1.7	1.0	<0.2	<20.0	<0.2	<3.0	CCAS	8260/503E
MW-1	9 Jun 89	<50	<0.1	<0.5	<0.1	<0.2	<0.5	<0.1	<20.0	<0.1	---	CCAS	8260
MW-1	14 Sep 89	<50	<0.2	<1.0	<0.2	<0.4	<1.0	<0.2	<1.0	0.7	---	CCAS	8260
MW-1	8 Dec 89	<50	<0.3	<0.3	<0.3	<0.6	<0.5	<0.5	---	<0.5	---	GTEL	8015/8020/601
MW-1	19 Mar 90	190	0.8	<0.3	7	3	<0.5	<0.5	---	<0.5	---	GTEL	8015/8020/601
MW-1	6 Jul 90	<50	<0.3	<0.3	<0.3	<0.6	<0.5	<0.5	---	<0.5	---	GTEL	8015/8020/601
MW-2	14 Mar 89	<100	6.7	7.1	0.5	4.6	<1.0	0.7	<20.0	<0.2	<3.0	CCAS	8260/503E
MW-2	9 Jun 89	<100	<0.2	<1.0	<0.2	<0.4	<1.0	<0.2	<20.0	<0.2	---	CCAS	8260
MW-2	14 Sep 89	<50	<0.2	<1.0	<0.2	<0.4	<1.0	<0.2	<1.0	<0.2	---	CCAS	8260
MW-2	8 Dec 89	<50	<0.3	<0.3	<0.3	<0.6	<0.5	<0.5	---	<0.5	---	GTEL	8015/8020/601
MW-2	19 Mar 90	<50	<0.3	<0.3	<0.3	<0.6	<0.5	<0.5	---	<0.5	---	GTEL	8015/8020/601
MW-2	6 Jul 90	<50	<0.3	<0.3	<0.3	<0.6	<0.5	<0.5	---	<0.5	---	GTEL	8015/8020/601
MW-3	14 Mar 89	<100	2.1	0.8	<0.2	2.0	<1.0	3.0	<20.0	<0.2	<3.0	CCAS	8260/503E
MW-3	9 Jun 89	<100	<0.5	<1.0	<0.2	<0.4	<1.0	3.3	<20.0	<0.2	---	CCAS	8260
MW-3	14 Sep 89	<50	<0.2	<1.0	<0.2	<0.4	<1.0	2.2	<1.0	<0.2	---	CCAS	8260
MW-3	8 Dec 89	<50	<0.3	<0.3	<0.3	<0.6	<0.5	1.3	---	<0.5	---	GTEL	8015/8020/601
MW-3	19 Mar 90	<50	<0.3	<0.3	<0.3	<0.6	0.5	1.3	---	<0.5	---	GTEL	8015/8020/601
MW-3	6 Jul 90	<50	<0.3	<0.3	<0.3	<0.6	<0.5	<0.5	---	<0.5	---	GTEL	8015/8020/601

Table 2. Analytic Results: Groundwater Samples (continued)
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, CA

Well ID #	Date	TPPH/TPH	Benzene	Toluene	E-Benzene	Xylenes	Chlor	1,2-DCA	f113	TCA	O&G	Lab	EPA/CS Method
		<-ppb->									<-ppm->		
MW-4	14 Mar 89	3000	810.0	200.0	30.0	130.0	<20.0	<5.0	<20.0	<5.0	<3.0	CCAS	8260/503E
MW-4	9 Jun 89	900	440.0	13.0	22.0	40.0	<20.0	<5.0	60.0	<5.0	---	CCAS	8260
MW-4	14 Sep 89	540	220.0	2.0	6.1	9.3	<1.0	2.3	<1.0	<0.2	---	CCAS	8260
MW-4	8 Dec 89	150	18	<0.3	1.0	<0.6	<0.5	1.9	---	<0.5	---	GTEL	8015/8020/601
MW-4	19 Mar 90	270	50	<0.3	0.7	<0.6	<0.5	0.8	---	<0.5	---	GTEL	8015/8020/601
MW-4	6 Jul 90	140	0.7	<0.3	0.5	<0.6	<0.5	0.79	---	<0.5	---	GTEL	8015/8020/601
MW-5	14 Mar 89	20000	6600.0	1600.0	270.0	1100.0	<100.0	<20.0	<20.0	<20.0	<3.0	CCAS	8260/503E
MW-5	9 Jun 89	15000	>2800.0*	270.0	240.0	640.0	<20.0	28.0	<20.0	<5.0	---	CCAS	8260
MW-5D	9 Jun 89	12000	5100.0	300.0	240.0	700.0	<200.0	<50.0	<20.0	<50.0	---	CCAS	8260
MW-5	14 Sep 89	15000	>730.0*	>320.0*	>290.0	440.0	<10.0	<2.0	<20.0	<2.0	---	CCAS	8260
MW-5D	14 Sep 89	15000	3300	450	490	730	<100	<20	<100	<20	---	CCAS	8260
MW-5T	14 Sep 89	16000	3100	550	400	690	<50	<10	<50	<10	---	CCAS	8260
MW-5	8 Dec 89	20,000	4600	640	390	1300	<0.5	27	---	<0.5	---	GTEL	8015/8020/601
MW-5	19 Mar 90	25,000	6500	1200	450	2200	<0.5	10	---	0.7	---	GTEL	8015/8020/601
MW-5	6 Jun 90	30,000	5600	890	210	1400	<0.5	<0.5	---	<0.5	---	GTEL	8015/8020/601
MW-6	6 Jul 90	210	<0.3	<0.3	3	7	<0.5	<0.5	---	<0.5	---	GTEL	8015/8020/601
MW-7	6 Jul 90	<50	<0.3	<0.3	<0.3	<0.6	<0.5	<0.5	---	<0.5	<1	GTEL	8015/8020/601/413.2
MW-8	6 Jul 90	<50	<0.3	<0.3	<0.3	<0.6	<0.5	<0.5	---	<0.5	<1	GTEL	8015/8020/601/413.2
MW-9	6 Jul 90	<50	<0.3	<0.3	<0.3	<0.6	<0.5	<0.5	---	<0.5	<1	GTEL	8015/8020/601/413.2

Table 2. Analytic Results: Groundwater Samples (continued)
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, CA

Well ID #	Date	TPPH/TPH	Benzene	Toluene	E-Benzene	Xylenes	Chlor	1,2-DCA	f113	TCA	O&G	Lab	EPA/CS Method
		<-ppb->									<-ppm->		
TB	8 Dec 89	<100	<0.1	<0.2	<0.1	<0.2	<0.5	<0.1	---	<0.1	---	CCAS	8260
TB	9 Jun 89	<50	<0.5	<0.5	<0.1	<0.2	<0.5	<0.1	<20.0	<0.1	---	CCAS	8260
TB	14 Sep 89	<50	<0.1	<0.5	<0.1	<0.2	<0.5	<0.1	<0.5	<0.1	---	CCAS	8260
TB	8 Dec 89	<50	<0.3	<0.3	<0.3	<0.6	4.4	<0.5	---	1.9	---	GTEL	8015/8020/601
TB	19 Mar 90	<50	<0.3	<0.3	<0.3	<0.6	<0.5	<0.5	---	<0.5	---	GTEL	8015/8020
TB	6 Jul 90	<50	<0.3	<0.3	<0.3	<0.6	<0.5	<0.5	---	<0.5	---	GTEL	8015/8020/601

NOTES:

TPPH = Total Purgeable Petroleum Hydrocarbons characterized as gasoline
TPH = Total Petroleum Hydrocarbons as gasoline
E-benzene = Ethylbenzene
Chloro. = Chloroform
1,2-DCA = 1,2-Dichloroethane
f113 = Trichlorotrifluoroethane
TCA = 1,1,1-Trichloroethane
O&G = Oil and Grease
ppb = parts-per-billion
ppm = parts-per-million

D = Duplicate Analysis
T = Triplicate Analysis
--- = Not analyzed
* = Saturated Column
CCAS = Central Cost Analytic Services, San Luis Obispo, CA
GTEL = GTEL Environmental Laboratories, Inc., Concord, CA
1,2-Dichloropropane detected only in sample from MW-5 on 6 Jul 1990 at 1.2 ppb

TABLE 3. Analytic Results: Groundwater Samples - Metals
Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

Well ID #	Date	Cadmium	Chromium	Lead	Zinc
		<----------ppb---------->			
MW-6	---	---	---	---	---
MW-7	6 Jul 90	37	190	5	<40
MW-8	6 Jul 90	79	960	100	790
MW-9	6 Jul 90	<20	48	18	180

NOTES:

ppb = parts-per-billion
--- = Not analyzed
< = Less than listed detection limit
All samples analyzed by GTEL Environmental Laboartories, Inc., Concord, California
by EPA Method 3005/6010 for total threshold limit concentration in water.

TABLE 4. Analytic Results: Soil Samples
Former CHevron Service Station #90019
210 Grand Avenue
Oakland, California

Sample ID #	Date	Depth (ft)	TPPH/TPH	Benzene	Toluene	E-Benzene	Xylenes	O&G	Cd	Cr	Pb	Zn	EPA Methods
			<--------				ppm						-------->
MW-6-5.5	29 Jun 90	5.5	<10	<0.005	<0.005	0.01	<0.015	<5	1	29	6	22	8015/8020/8010/413.2/6010
MW-6-8.7	29 Jun 90	8.7	<10	<0.005	<0.005	0.01	<0.015	<5	3	26	15	46	8015/8020/8010/413.2/6010
MW-6-11.7	29 Jun 90	11.7	<10	<0.005	<0.005	<0.005	<0.015	<5	3	24	15	51	8015/8020/8010/413.2/6010
MW-7-4.5	27 Jun 90	4.5	<10	<0.005	<0.005	<0.005	<0.015	---	---	---	---	---	8015/8020
MW-7-6.5	27 Jun 90	6.5	<10	<0.005	<0.005	<0.005	<0.015	---	---	---	---	---	8015/8020/8010
MW-7-10.3	27 Jun 90	10.3	<10	<0.005	<0.005	<0.005	<0.015	---	---	---	---	---	8015/8020
MW-8-4.8	27 Jun 90	4.8	<10	<0.005	<0.005	<0.005	<0.015	---	---	---	---	---	8015/8020
MW-8-7.0	27 Jun 90	7.0	<10	<0.005	<0.005	<0.005	<0.015	---	---	---	---	---	8015/8020/8010
MW-8-12.0	27 Jun 90	12.0	<10	<0.005	<0.005	<0.005	<0.015	---	---	---	---	---	8015/8020
MW-9-5.0	28 Jun 90	5.0	<10	<0.005	<0.005	<0.005	<0.015	---	---	---	---	---	8015/8020
MW-9-6.8	28 Jun 90	6.8	<10	<0.005	<0.005	<0.005	<0.015	---	---	---	---	---	8015/8020/8010
MW-9-10.3	28 Jun 90	10.3	<10	<0.005	<0.005	<0.005	<0.015	---	---	---	---	---	8015/8020

NOTES:

TPPH/TPH = Total Purgeable Petroleum Hydrocarbons as gasoline/
Total Petroleum Hydrocarbons as gasoline, diesel and waste oil
E-Benzene = Ethylbenzene
O&G = Oil and Grease
Cd = Cadmium, total threshold limit concentration in soil
Cr = Chromium, total threshold limit concentraton in soil
Pb = Lead, total threshold limit concentration in soil
Zn = Zinc, total threshold limit concentration in soil
ppm = parts-per-million
< = Less than listed detection limit
--- = Not analyzed

1-101.04/S4AG0.WK1

TABLE 5. Wells Located Within One-Half Mile Radius
of Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

Map Location Number	Well Owner	Well Address	City	No. of Wells	Date Drilled	Use
1	Eagan & Co.	172 Santa Clara Street	Oakland	1	6/89	Mon.
2	Five City Center, City of Oakland	Crn of Clay & 14th Street	Oakland	3	9/88	Des.
3	PG&E	Adams & Lee Street	Oakland	1	8/74	Cat.
4	Ehler Contractors	225 27th Street	Oakland	3	6/89	Mon.
5	Quick Stop Mkts.	363 Grand Avenue	Oakland	4	11/88, 12/88	Mon.
6	Texaco Inc.	500 Grand Avenue	Oakland	2	3/89	Mon.
7	Shell Oil Co.	2800 Telegraph Avenue	Oakland	3	4/88	Mon.
8	Shell Oil Co.	2800 Telegraph Avenue	Oakland	4	10/88	Mon.
9	Shell Oil Co.	2800 Telegraph Avenue	Oakland	3	9/89	Mon.
10	Shell Oil Co.	2800 Telegraph Avenue	Oakland	3	7/89	Mon.
11	Shell Oil Co.	2800 Telegraph Avenue	Oakland	1	10/89	Mon.
12	Broadway VW	2740 Broadway	Oakland	3	1/89	Mon.
13	Oakland Tribune	23rd & Valdez	Oakland	3	8/88	Mon.
14	Morrison & Forestor	2302 Valdez Street	Oakland	4	8/89	Mon.
15	Texaco Station #62488000195	2225 Telegraph Avenue	Oakland	6	7/88	Mon.
16	Texaco Station #62488000195	2225 Telegraph Avenue	Oakland	6	12/88	Mon.
17	Carter-Hawley-Hale	1911 Telegraph Avenue	Oakland	1	3/88	Test
18	Bank of America	21st Street & Broadway	Oakland	1	11/88	Mon.
19	Lakeside Corp (Bechtel)	244 Lakeside	Oakland	1	77	Irr.
20	Chevron	17th & Harrison NW	Oakland	3	10/88	Mon.
21	Chevron	17th & Harrison NW	Oakland	4	6/90	Mon.
22	Chevron	17th & Harrison NW	Oakland	5	4/89	Mon.

TABLE 5. Wells Located Within One-Half Mile Radius (continued)
of Former Chevron Service Station #90019
210 Grand Avenue
Oakland, California

NOTES:

Wells = 40 in 1/2-mile radius
Total = 58
Mon. = Monitor well
Cat. = Cathodic Protection
Test = Test well
Irr. = Irrigation well
Des. = Destroyed

STANDARD OPERATING PROCEDURES
RE: SOIL SAMPLING
SOP-2

Soil samples for chemical analysis are collected in thin-walled brass tubes, 4-inches long by 2-inches outside diameter. Four of these tubes and a spacer tube are set in a 2-inch inside diameter 18-inch split-barrel sampler.

The split-barrel sampler is driven its entire length either hydraulically or using a 140-pound drop hammer. The sampler is extracted from the borehole and the brass tubes, containing the soil samples, are removed. Upon removal from the sampler, the selected brass tubes are immediately trimmed and capped with aluminum foil and plastic caps. They are then hermetically sealed with duct tape, labeled and refrigerated for delivery, under chain-of-custody, to the analytic laboratory. These procedures minimize the potential for cross-contamination and volatilization of volatile organic compounds (VOC) prior to chemical analysis.

One soil sample collected at each sampling interval is analyzed in the field using either a photoionization detector (PID), a flame ionization detector (FID), or an explosimeter. The purpose of this field analysis is to qualitatively determine the presence or absence of hydrocarbons and to establish which soil samples will be analyzed at the laboratory. The soil sample is sealed in a zip-lock plastic bag and placed in the sun to enhance volatilization of the hydrocarbons from the sample. The data is recorded on the drill logs at the depth corresponding to the sampling point.

Other soil samples are collected to document the stratigraphy and estimate relative permeability of the subsurface materials. All drilling and sampling equipment are steam-cleaned prior to use at each site and between boreholes to minimize the potential for cross-contamination.

STANDARD OPERATING PROCEDURES
RE: GROUNDWATER PURGING AND SAMPLING
SOP-4

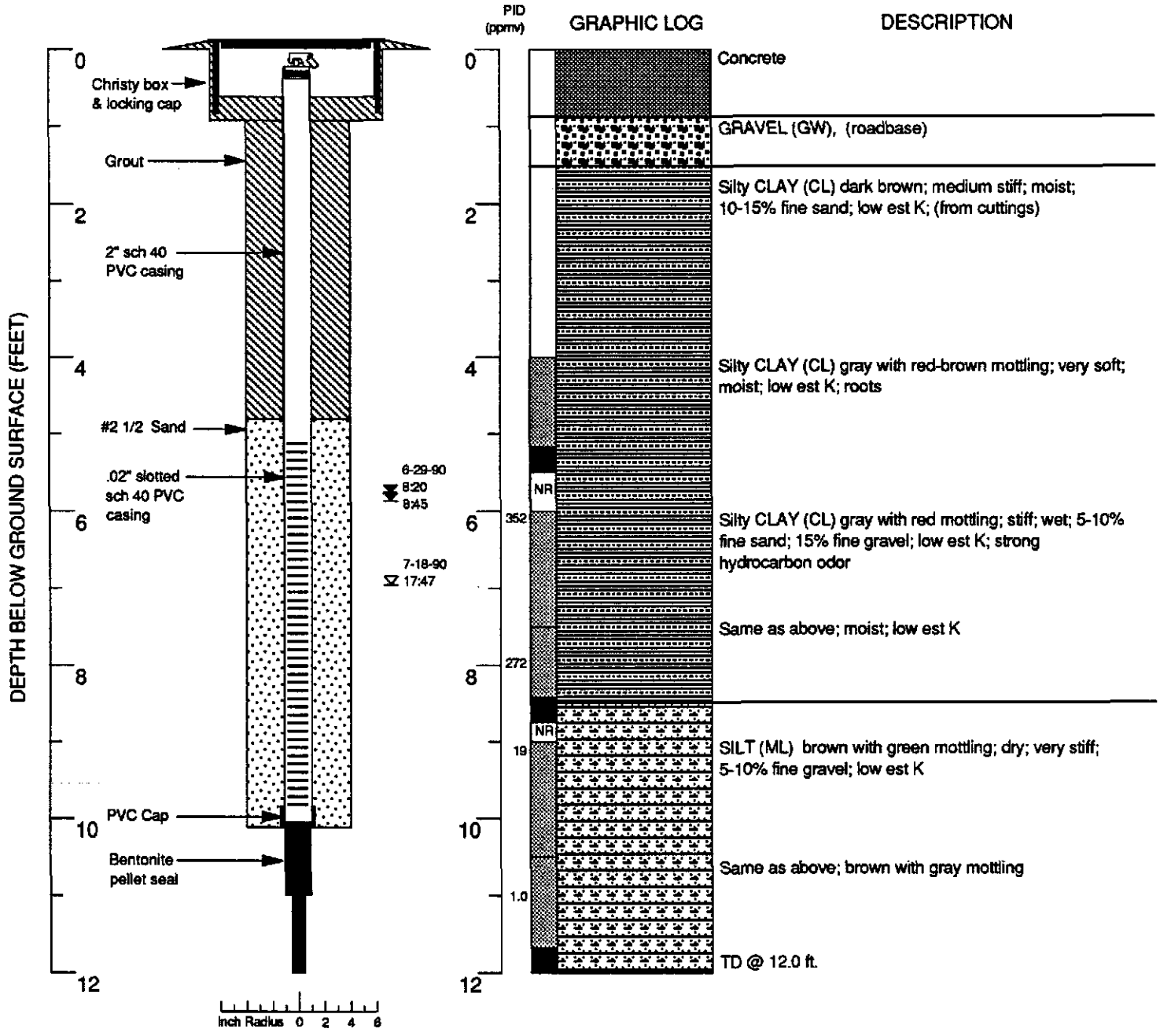
Prior to water sampling, each well is purged by evacuating a minimum of three well-casing volumes of groundwater or until the discharge water temperature, conductivity, and pH stabilize. The groundwater sample should be taken when the water level in the well recovers to 80% of its static level.

The sampling equipment used consists of either a teflon bailer or a stainless steel bladder pump with a teflon bladder. If the sampling system is dedicated to the well, then the bailer is made of teflon, but the bladder pump is PVC with a polypropylene bladder. Forty milliliter (ml) glass volatile-organic-analysis (VOA) vials, with teflon septa, are used as sample containers.

The groundwater sample is decanted into each VOA vial in such a manner that there is a meniscus at the top of the vial. The cap is quickly placed over the top of the vial and securely tightened. The VOA vial is then inverted and tapped to see if air bubbles are present. If none are present, the sample is labeled and refrigerated for delivery under chain-of-custody to the laboratory. Label information should include a sample identification number, job identification number, date, time, type of analysis requested, and the sampler's name.

For quality control purposes, a duplicate water sample is collected from each well. This sample is put on hold at the laboratory. A trip blank is prepared at the laboratory and placed in the transport cooler. It remains with the cooler and is analyzed by the laboratory along with the groundwater samples. A field blank is prepared in the field when sampling equipment is not dedicated. The field blank is prepared after a pump or bailer has been steam-cleaned, prior to use in a second well, and is analyzed along with the other samples. The field blank demonstrates the quality of in-field cleaning procedures to prevent cross-contamination.

To minimize the potential for cross-contamination between wells, all the well-development and water-sampling equipment that is not dedicated to a well is steam-cleaned between each well. As a second precautionary measure, wells will be sampled in order of least to highest concentrations as established by previous analyses.



Logged by:	Justin Power	Drilling Company:	B & F Drilling	Well Head Completion:	Christy box & locking cap
Project Mgr:	Len Niles	Drilling Method:	8" Hollow stem auger	Type of Sampler:	2" split barrel
Dates Drilled:	6/29/90	Driller:	Bruce Cox	TD (Total Depth):	12.0 ft.

EXPLANATION

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab sample

Contacts:
- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational

est K — Estimated permeability (hydraulic conductivity) 1K = primary 2K = secondary

NR — No recovery

Boring Log and Well Completion Details
MW-6 (Boring B-6)

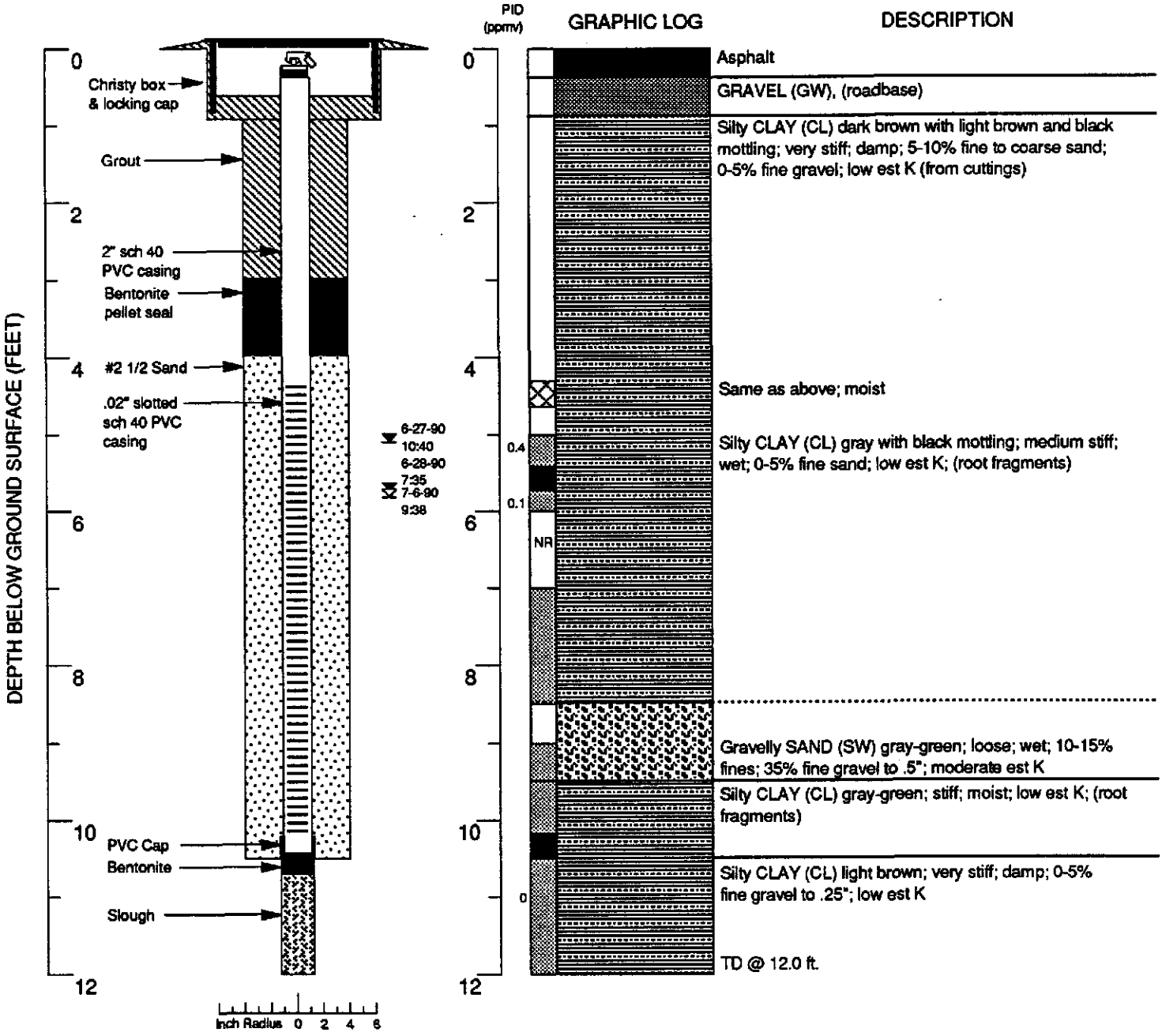
Chevron Service Station #90019
Oakland, California

MONITOR WELL

6

WESTERN GEOLOGIC RESOURCES, INC.

1-101.04



Logged by:	Justin Power	Drilling Company:	B & F Drilling	Well Head Completion:	Christy box & locking cap
Project Mgr:	Len Niles	Drilling Method:	8" Hollow stem auger	Type of Sampler:	2" split barrel
Dates Drilled:	6/27/90	Driller:	Bruce Cox	TD (Total Depth):	12.0 ft.

EXPLANATION

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab sample

Contacts:
- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational

- est K — Estimated permeability (hydraulic conductivity) 1K = primary 2K = secondary
- NR — No recovery

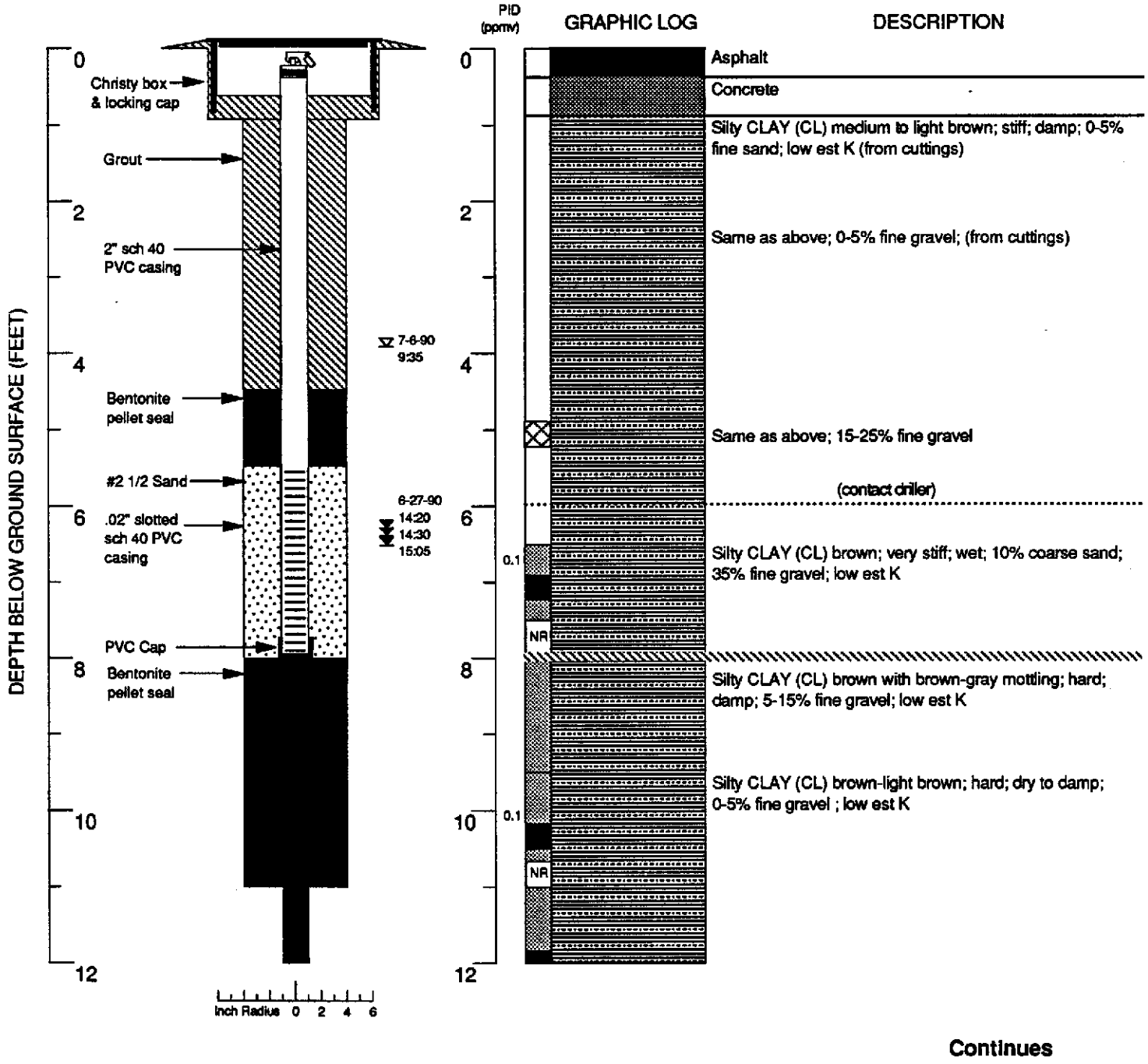
Boring Log and Well Completion Details
MW-7 (Boring B-7)

Chevron Service Station #90019
Oakland, California

MONITOR WELL
7

WESTERN GEOLOGIC RESOURCES, INC.

1-101.04



Continues

Logged by:	Justin Power	Drilling Company:	B & F Drilling	Well Head Completion:	Christy box & locking cap
Project Mgr:	Len Niles	Drilling Method:	8" Hollow stem auger	Type of Sampler:	2" split barrel
Dates Drilled:	6/27/90	Driller:	Bruce Cox	TD (Total Depth):	14.0 ft.

EXPLANATION

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab sample
- Contacts: Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational
- est K — Estimated permeability (hydraulic conductivity) 1K = primary 2K = secondary
- NR — No recovery

Boring Log and Well Completion Details
MW-8 (Boring B-8)

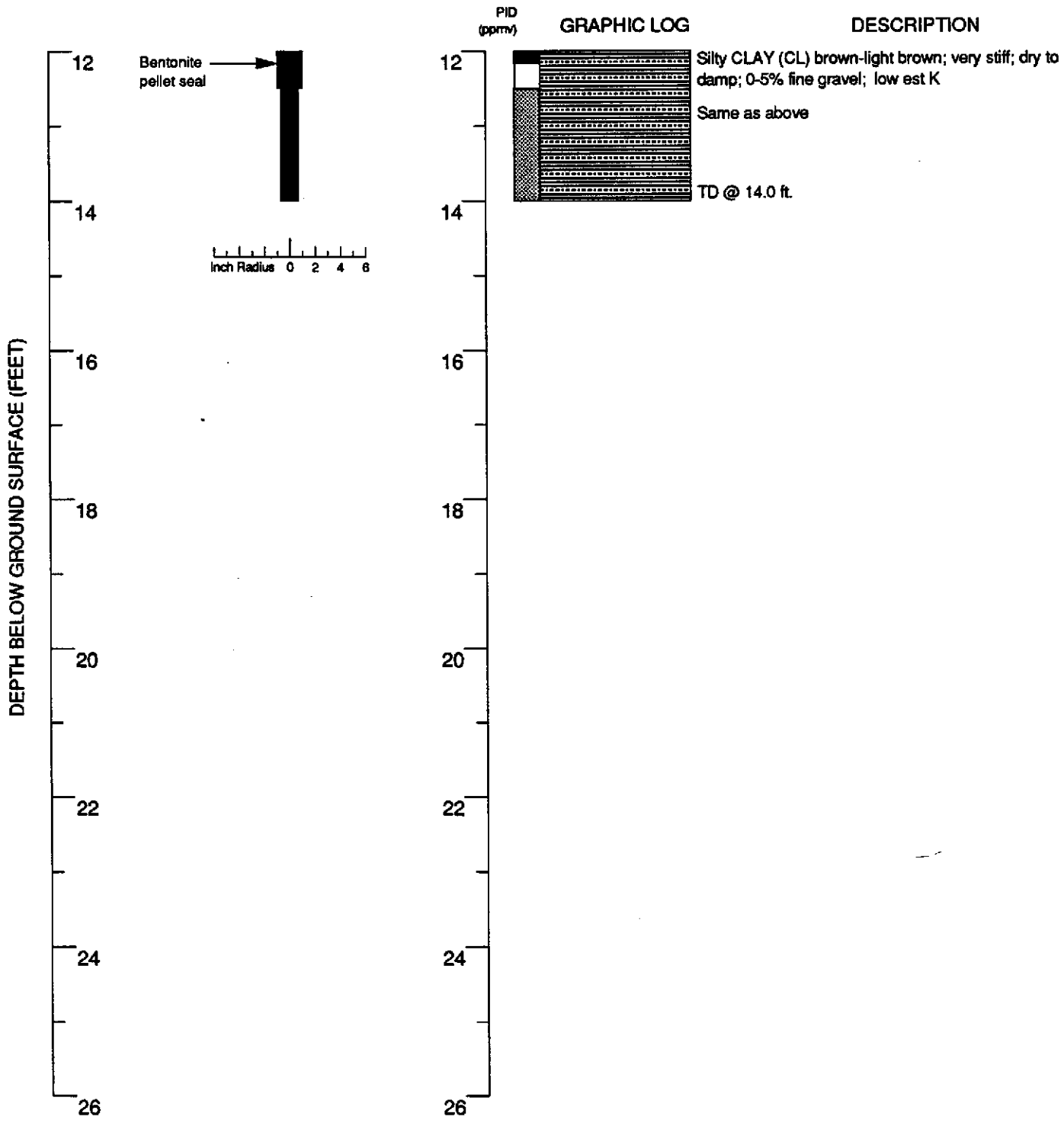
Chevron Service Station #90019
Oakland, California

MONITOR WELL

8

WESTERN GEOLOGIC RESOURCES, INC.

1-101.04



EXPLANATION

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab sample

Contacts:
- Solid where certain
- ..... Dotted where approximate
- – – – Dashed where uncertain
- ////// Hachured where gradational

est K — Estimated permeability (hydraulic conductivity) 1K = primary 2K = secondary

NR — No recovery

Boring Log and Well Completion Details
MW-8 (Boring B-8)

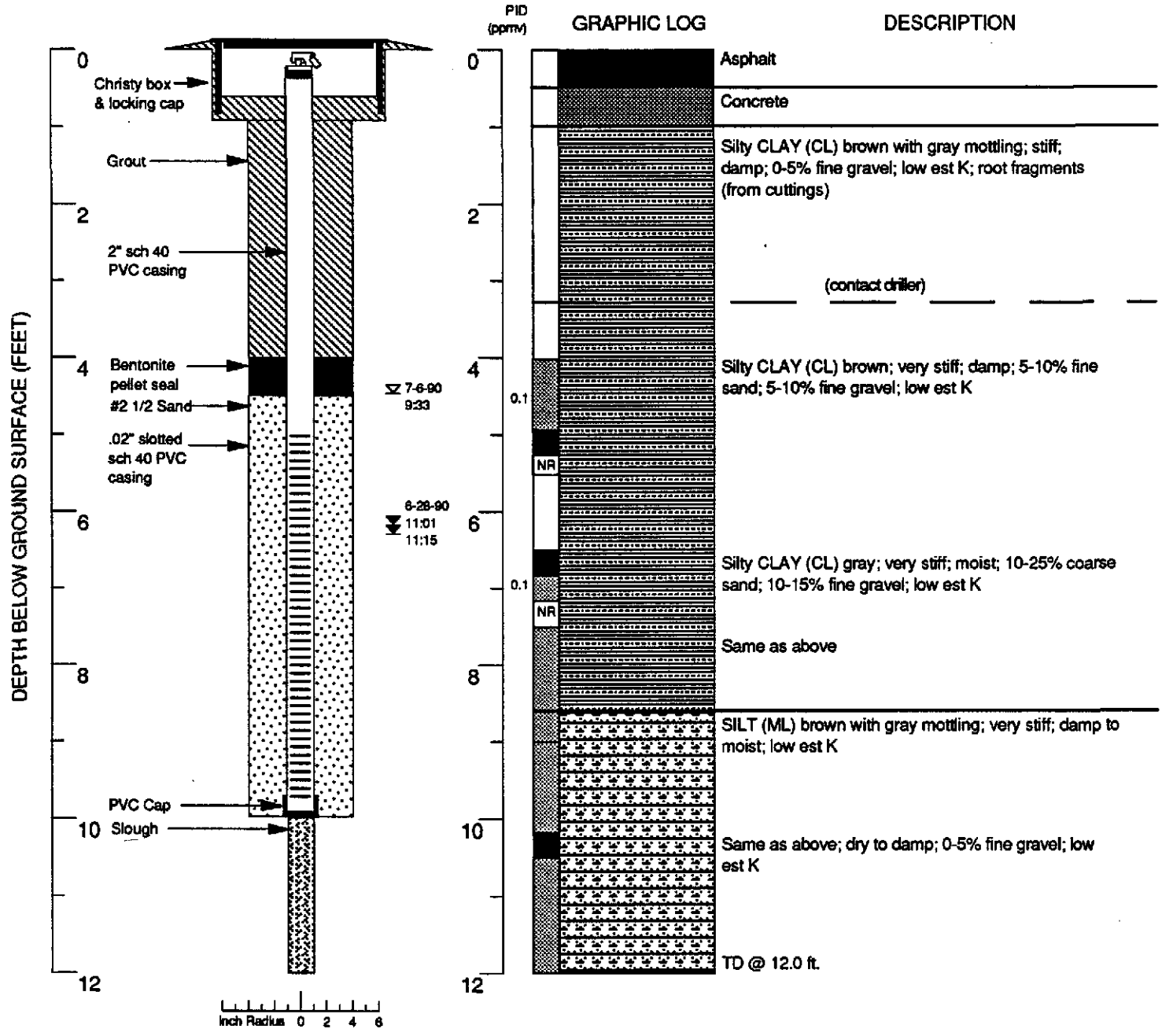
Chevron Service Station #90019
Oakland, California

MONITOR WELL

8

WESTERN GEOLOGIC RESOURCES, INC.

1-101.04



Logged by:	Justin Power	Drilling Company:	B & F Drilling	Well Head Completion:	Christy box & locking cap
Project Mgr:	Len Niles	Drilling Method:	8" Hollow stem auger	Type of Sampler:	2" split barrel
Dates Drilled:	6/28/90	Driller:	Bruce Cox	TD (Total Depth):	12.0 ft.

EXPLANATION

- Water level during drilling
- Water level in completed well
- Location of recovered drill sample
- Location of sample sealed for chemical analysis
- Sieve sample
- Grab sample

Contacts:
- Solid where certain
- Dotted where approximate
- Dashed where uncertain
- Hachured where gradational

est K — Estimated permeability (hydraulic conductivity) 1K = primary 2K = secondary

NR — No recovery

Boring Log and Well Completion Details
MW-9 (Boring B-9)

Chevron Service Station #90019
Oakland, California

MONITOR WELL
9

WESTERN GEOLOGIC RESOURCES, INC.

1-101.04

LIQUID-LEVEL DATA SHEET

Project No. 1-101.04 | Project Name OAK BAY + GRAND | Date 7-6-90 | Initials DB/ES

Well No.	HISTORIC DATA/DATE: DTLH	DTW	LHT	Sounded Depth	CURRENT DATA: DTLH	DTW	LHT	Sounded Depth	Method WLP / PB / IP	Time	Comments
TW4						4.61			1	9:33	
8						3.98				9:35	
7						5.85				9:38	
6						9.09		9.5		9:44	
5						5.81				9:50	
4						6.42				9:47	
3						7.52				9:55	
2						6.79				9:53	
1						7.13				9:58	

* WLP = Water-Level Probe
PB = Product Bailer
IP = Interface Probe

WELL DEVELOPMENT / WATER MONITORING DATA

Project No.	Project Name	Well No.	By	Date
1-101.04	OAKLAND BAY + GRAND	MW#6	B.R	7.5.11

Development Method	Depth to Water Before Development (ft.)	Sounded Depth (ft.)
BAIL / SURGE	9.04	9.45

Time	Depth to Water (ft.)	Gallons Pumped	Flow Rate (gpm)	Depth to Water (ft.)	Comments (water clarity, odor, methods, sounded depth, etc.)	FID Reading (ppm)
1127					START SURGE BLOCK	
1133					STOP " "	
1134					START BAILING - SILTY H2O	
1137		0.01		9.36	STOP BAILING	
1142				9.35		
1212	DRY					
1215					START BAILING	
1318		1 TBSP			STOP BAILING	
1412					START BAIL - LESS SILTY H2O	
1413		1 TBSP			STOP BAIL NO ODOR	

Well Development Summary

9.35	Depth to Water During Pumping (ft.)	3	Total Pumping Time (min.)	0.003	Average Pumping Rate (gpm)
9.34	Depth to Water After Development	0.01	Total Amount Evacuated (gals.)	-	Pumping Rate Range (gpm)
9.45	Sounded Depth After Development	0.01	Approximate Yield	0	Total Water Injected (gals.)

WELL DEVELOPMENT / WATER MONITORING DATA

Project No.	Project Name	Well No.	By	Date
1-101.54	OAKLAND	MW7	LHR	7/5/90

Development Method	Depth to Water Before Development (ft.)	Sounded Depth (ft.)
SURGE/BAIL	5.43'	9.89

Time	Depth to Water (ft.)	Gallons Pumped	Flow Rate (gpm)	Depth to Water (ft.)	Comments (water clarity, odor, methods, sounded depth, etc.)	FID Reading (ppm)
		INT/FNT				
10:47	5.43			5.43	9.89 SOUNDED MURKY GRAY	
[illegible]					START SURGE	
11:07					STOP SURGE	
[illegible]					START BAILING	
11:18		2.5/2.5		8.45	STOP BAIL (1)	
[illegible]				7.98	RECOVERY [illegible]	
[illegible]				7.59	RECOVERY [illegible]	
1200					START BAILING	
1210		2.5/6.0			BAILED DRY (2)	
1306					BAIL	
1315		1.5/7.5			BAILED DRY (3)	
1422					BAIL	
1430		2.0/9.5			BAILED DRY (4)	

Well Development Summary

7.59	Depth to Water During Pumping (ft.)	37	Total Pumping Time (min.)	0.256	Average Pumping Rate (gpm)
5.84	Depth to Water After Development	9.5	Total Amount Evacuated (gals.)	0.35 - 0.25	Pumping Rate Range (gpm)
9.89	Sounded Depth After Development	9.5	Approximate Yield	0	Total Water Injected (gals.)

WELL DEVELOPMENT / WATER MONITORING DATA

Project No.	Project Name	Well No.	By	Date
1-101.04	BAY + GRAND - JAIL	MW-8	KF	7.5.90

Development Method	Depth to Water Before Development (ft.)	Sounded Depth (ft.)
SURGE BLOCK + BAIL	4.700	7.65

Time	Depth to Water (ft.)	Gallons Pumped	Flow Rate (gpm)	Depth to Water (ft.)	Comments (water clarity, odor, methods, sounded depth, etc.)	FID Reading (ppm)
10:00	4.70			4.7	SILTY BOTTOM	
10:05	"				START SURGING	
10:15	"				STOP SURGING	
10:15					START BAILING	
10:20					BAIL DRY (1)	
10:23				7.5	RECOVERY FT = 2.50'	
10:38					RECOVERY FT = ~~5.79'~~	
10:33		1/1		7.12	EQUIPT FTW 7.12 RR = 0.0062	
11:27				6.41	RECOVERY 4.79' = 90% REC. 6.125 = 50% REC	
11:46				6.09	RECOVERY 55%	
12:12					BAIL - NO SURGE	
12:15		1/2			BAILED DRY (2)	
13:15					BAIL	
13:17		~~.5~~ 2.5			BAILED DRY (3)	
14:32					BAIL	
14:35					BAILED DRY (4)	

Well Development Summary

7.12	Depth to Water During Pumping (ft.)	1 ?	Total Pumping Time (min.)	0.19	Average Pumping Rate (gpm)
3.98	Depth to Water After Development	2.5	Total Amount Evacuated (gals.)	—	Pumping Rate Range (gpm)
7.65	Sounded Depth After Development	2.5	Approximate Yield	—	Total Water Injected (gals.)

WELL DEVELOPMENT / WATER MONITORING DATA

Project No. 1-101.04 | Project Name OAKLAND Bayer Grand | Well No. MW#9 | By BB | Date 7-5-90

Development Method 1-101.04

Depth to Water Before Development (ft.) 4.50 | Sounded Depth (ft.) 8.42

Time	Depth to Water (ft.)	Gallons Pumped Int/total	Flow Rate (gpm)	Depth to Water (ft.)	Comments (water clarity, odor, methods, sounded depth, etc.)	FID Reading (ppm)
1015					START SURGE BLOCK - CASING	
					BOTTOM FIRM, NO ODOR	
1023					STOP SURGE BLOCK - START BAIL	
					- WATER w/ SOME SILT (NOT MUCH)	
1027					WELL DRY - STOP BAIL	
1028				7.88		
1033		2.5/2.5		7.52	KR = 0.0117	
1115				6.55		
1203					START BAIL	
1207		1.5/4.0			STOP BAIL - DRY	
1307					START BAIL	
1312		1.0/5.0			STOP BAIL - DRY	
1418					START BAIL	
1422		1.0/6.0			STOP BAIL - H_2O FAIRLY CLEAN	

Well Development Summary

7.88	Depth to Water During Pumping (ft.)	17	Total Pumping Time (min.)	0.353	Average Pumping Rate (gpm)
7.53	Depth to Water After Development	6.0	Total Amount Evacuated (gals.)	0.625-0.2	Pumping Rate Range (gpm)
8.42	Sounded Depth After Development	6.0	Approximate Yield	0	Total Water Injected (gals.)

WESTERN GEOLOGIC RESOURCES, INC.

WGR

WATER SAMPLING DATA Well Name MW-1 Date 7-6-90 Time 1000
Job Name OAKLAND BAYFRONT Job Number 1-101.04 Initials DB
WELL DATA: Well type M (M=monitoring well; Describe _____)
Depth to Water 7.13 ft.
Well Depth 12 ft. (spec.) Sounded Depth _____ ft.
Well Diameter 4 in. Date _____ Time _____

EVACUATION: Sampling Equipment:
PVC Bailer: _____ in. Dedicated: Bladder Pump X ; Bailer _____
Sampling Port: Number _____ Rate _____ gpm. Volume _____ gal.
Other _____
Initial Height of Water in Casing 4.87 ft; Volume 3.18 gal.
Volume To Be Evacuated = 9.54 gal. (initial volume x3 X, x4 _____)

	Evacuated	Evacuated	Evacuated
Time: Stop	1014		
Start	10:06		
Total minutes	8		
Amount Evacuated			
Total Evacuated	7.0 gal.		
Evacuation Rate	0.88 gpm.		

Formulas / Conversions
r = well radius in ft
h = ht of water col in ft
vol. of col. = $\pi r^2 h$
7.48 gal/ft³
V_2" casing = 0.163 gal/ft
V_3" casing = 0.367 gal/ft
V_4" casing = 0.653 gal/ft
V_5" casing = 0.826 gal/ft
V_6" casing = 1.47 gal/ft
V_8" casing = 2.61 gal/ft

Depth to water during pumping — ft. — time
Pumped dry? YES After 7 gal. Recovery rate 0.017 gpm
Depth to water for 80% recovery 8.1 ft.

CHEMICAL DATA: Temp. Probe # ___ Ph Probe # ___ Cond. Probe # ___

Time		°C		umhos
	1			
	2			
	3			
	4			

SAMPLING: Point of collection: PE Hose ___; End of bailer ___; Other _____
Samples taken 14:20 time Depth to water 10.53 ft. Refrigerated: _____
Sample description: Water color Tan Odor None
Sediment/Foreign matter fine brown

Sample ID no.		Container (VOA)/ other	Preservative NaHSO₄/Azide/other	Analysis	Lab
070690-OA	40 ml	V	HCl	EPA 602/8015	GTEL
B	40 ml	V	↓	↓	
C	40 ml	V	—	EPA 601	
D	40 ml	V	—	↓	
E	1000 ml	B	H_2SO_4	503 E 06 G	
F	50 ml	P		Soluble Metals	
	ml				
	ml				

Container codes: P = plastic bottle; C or B = clear/brown glass; Describe

COMMENTS: Dry 10:14 11.54'
10:19 11.41'
11:51 10.89'
12:46 10.69

WGR 1 of 1

WATER SAMPLING DATA Well Name MW-2 Date 7-6-90 Time 1015
Job Name OAKLAND-Bay + GRAND Job Number 1-101-04 Initials ES
WELL DATA: Well type M (M=monitoring well; Describe —)
Depth to Water 6.79 ft.
Well Depth 15.0 ft. (spec.) Sounded Depth — ft.
Well Diameter 4 in. Date — Time —

EVACUATION: Sampling Equipment:
PVC Bailer: — in. Dedicated: Bladder Pump X ;Bailer —
Sampling Port: Number — Rate — gpm. Volume — gal.
Other —
Initial Height of Water in Casing 8.21 ft; Volume 5.36 gal.
Volume To Be Evacuated = 16.1 gal. (initial volume x3 16.1, x4)

	Evacuated	Evacuated	Evacuated
Time: Stop	11:25	~17 gal.	
Start	10:33		
Total minutes	52 min.		
Amount Evacuated			
Total Evacuated	17 gal.		
Evacuation Rate	0.33 gpm.		

Formulas / Conversions
r = well radius in ft
h = ht of water col in ft
vol. of col. = $\pi r^2 h$
7.48 gal/ft³
2" casing = 0.163 gal/ft
3" casing = 0.367 gal/ft
4" casing = 0.653 gal/ft
5" casing = 0.826 gal/ft
6" casing = 1.47 gal/ft
8" casing = 2.61 gal/ft

Depth to water during pumping 11.91 ft. 11:17 time
Pumped dry? No After — gal. Recovery rate —
Depth to water for 80% recovery — ft.

CHEMICAL DATA: Temp. Probe # — Ph Probe # — Cond. Probe # —

Time		°C		umhos
	1			
	2			
	3			
	4			

SAMPLING: Point of collection: PE Hose X; End of bailer —; Other —
Samples taken 1136 time Depth to water 13.47 ft. Refrigerated: X
Sample description: Water color TAN Odor None
Sediment/foreign matter Fine Brown Silt

Sample ID no.		Container VOA / other	Preservative NaHSO4/Azide/other	Analysis	Lab
070690CRA	40 ml		HCl	EPA 602/8015	G-TEL
B	ml		↓	↓	↓
C	ml		—	EPA 601	
↓	ml		—	↓	↓
	ml				
	ml				
	ml				
	ml				

Container codes: P = plastic bottle; C or B = clear/brown glass; Describe

COMMENTS: 10:33
11:17 11.91

WGR 6-12

WATER SAMPLING DATA Well Name MW 3 Date 8/6/90 Time 10:29
Job Name Bay and Grand Job Number 1-101.04 Initials QR
WELL DATA: Well type ___ (M=monitoring well; Describe ___)
Depth to Water 7.52 ft.
Well Depth 16.5 ft. (spec.) Sounded Depth ___ ft.
Well Diameter 4 in. Date ___ Time ___

EVACUATION: Sampling Equipment:
PVC Bailer: ___ in. Dedicated: Bladder Pump ✓ ;Bailer ___
Sampling Port:Number ___ Rate ___ gpm. Volume ___ gal.
Other ___
Initial Height of Water in Casing 8.48 ft; Volume 5.86 gal.
Volume To Be Evacuated = 17.59 gal. (initial volume x3 ✓, x4 ___)

	Evacuated	Evacuated	Evacuated
Time: Stop	10:51		
Start	10:36		
Total minutes	15		
Amount Evacuated	15		
Total Evacuated	___ gal.		
Evacuation Rate	1.0 gpm.		

Formulas / Conversions
r = well radius in ft
h = ht of water col in ft
vol. of col. = $\pi r^2 h$
7.48 gal/ft³
V,," casing = 0.163 gal/ft
~~V," casing = 0.367 gal/ft~~
V," casing = 0.653 gal/ft
V," casing = 0.826 gal/ft
V," casing = 1.47 gal/ft
V," casing = 2.61 gal/ft

Depth to water during pumping 11.79 ft. 12:43 time
Pumped dry? YES After 15 gal. Recovery rate .072 GPM
Depth to water for 80% recovery 9.32 ft.

CHEMICAL DATA: Temp. Probe # ___ Ph Probe # ___ Cond. Probe # ___

Time		°C	umhos
___	1	___	___
___	2	___	___
___	3	___	___
___	4	___	___

SAMPLING: Point of collection: PE Hose ✓; End of bailer ___; Other ___
Samples taken 1353 time Depth to water 9.87 ft. Refrigerated: YES
Sample description: Water color slightly murky Odor NONE
Sediment/Foreign matter slight sediment

Sample ID no.		Container VOA / other	Preservative $NaHSO_4$/Azide/other	Analysis	Lab
070690-03A	40 ml	V	HCl	EPA 602/8015	GTEC
B	40 ml	V	HCl	EPA 602/8015	GTEC
C	40 ml	V	-	EPA 601	GTEC
D	40 ml	V	-	EPA 601	GTEC
___	___ ml	___	___	___	___
___	___ ml	___	___	___	___
___	___ ml	___	___	___	___
___	___ ml	___	___	___	___

Container codes: P = plastic bottle; C or B = clear/brown glass; Describe

COMMENTS: DRY 10:51 15.71' > .55 1342 9.99'
10:59 15.16 > .39
11:04 14.77
1111 14.31
11:54 12.43

WGR

WATER SAMPLING DATA Well Name MW 4 Date 7/6/90 Time 11:21
Job Name Bay AND GRAND Job Number 1-101.04 Initials PB
WELL DATA: Well type ___ (M=monitoring well; Describe ___)
Depth to Water 6.42 ft.
Well Depth 14.5 ft. (spec.) Sounded Depth — ft.
Well Diameter 4 in. Date — Time —

EVACUATION: Sampling Equipment:
PVC Bailer: — in. Dedicated: Bladder Pump ✓ ;Bailer —
Sampling Port:Number — Rate — gpm. Volume — gal.
Other
Initial Height of Water in Casing 8.08 ft; Volume 5.27 gal.
Volume To Be Evacuated = 15.83 gal. (initial volume x3 X, x4 ___)

	Evacuated	Evacuated	Evacuated
Time: Stop	11:41		
Start	11:24		
Total minutes	17		
Amount Evacuated	10.5		

Total Evacuated ___ gal.
Evacuation Rate .63 gpm.

Formulas / Conversions
r = well radius in ft
h = ht of water col in ft
vol. of col. = $\pi r^2 h$
7.48 gal/ft³
V," casing = 0.163 gal/ft
V," casing = 0.367 gal/ft
V," casing = 0.653 gal/ft
V," casing = 0.826 gal/ft
V," casing = 1.47 gal/ft
V," casing = 2.61 gal/ft

Depth to water during pumping — ft. — time
Pumped dry? yes After 10.5 gal. Recovery rate .068 GPM
Depth to water for 80% recovery 8.04 ft.

CHEMICAL DATA: Temp. Probe # ___ Ph Probe # ___ Cond. Probe # ___

Time		°C		umhos
	1			
	2			
	3			
	4			

SAMPLING: Point of collection: PE Hose ✓ ; End of bailer — ; Other —
Samples taken 1324 time Depth to water 7.52 ft. Refrigerated: YES
Sample description: Water color Clear Odor NONE
Sediment/Foreign matter NONE

Sample ID no.		Container (VOA)/ other	Preservative NaHSO₄/Azide/other	Analysis	Lab
070790-04A	40 ml	✓	HCl	EPA 602/8015	GTEL
B	ml		↓	↓	
C	ml		—	EPA 601	
D	ml	↓	—	↓	
	ml				
	ml				
	ml				
	ml				
	ml				

Container codes: P = plastic bottle; C or B = clear/brown glass; Describe

COMMENTS:
11:41 13.57 > .52'
11:46 13.05
12.40 9.73
1.21 7.52

WGR

WATER SAMPLING DATA Well Name MW 5 Date 7/6/90 Time 12:05
Job Name BAY AND GRAND Job Number 1-101.04 Initials (PB)
WELL DATA: Well type M (M=monitoring well; Describe _____)
Depth to Water 5.81 ft.
Well Depth 15 ft. (spec.) Sounded Depth — ft.
Well Diameter 4 in. Date — Time —

EVACUATION: Sampling Equipment:
PVC Bailer: _____ in. Dedicated: Bladder Pump ✓ ;Bailer —
Sampling Port:Number — Rate — gpm. Volume — gal.
Other _____
Initial Height of Water in Casing 9.19 ft; Volume 6.00 gal.
Volume To Be Evacuated = 18.00 gal. (initial volume x3 —, x4 —)

	Evacuated	Evacuated	Evacuated
Time: Stop	12 28		
Start	12:12		
Total minutes	16		
Amount Evacuated	11		

Total Evacuated _____ gal.
Evacuation Rate .69 gpm.

Formulas / Conversions
r = well radius in ft
h = ht of water col in ft
vol. of col. = $\pi r^2 h$
7.48 gal/ft³
V_{1}" casing = 0.163 gal/ft
V_{2}" casing = 0.367 gal/ft
V_{4}" casing = 0.653 gal/ft
$V_{4.5}$" casing = 0.826 gal/ft
V_{6}" casing = 1.47 gal/ft
V_{8}" casing = 2.61 gal/ft

Depth to water during pumping — ft. — time
Pumped dry? YES After 11 gal. Recovery rate .0235 GPM
Depth to water for 80% recovery 7.65 ft.

CHEMICAL DATA: Temp. Probe # — Ph Probe # — Cond. Probe # —

Time		°C		umhos
	1			
	2			
	3			
	4			

SAMPLING: Point of collection: PE Hose ✓ ; End of bailer —; Other —
Samples taken 14:30 time Depth to water 13.03 ft. Refrigerated: yes
Sample description: Water color Clear Odor Slight
Sediment/Foreign matter very Small

Sample ID no.		Container VOA / other	Preservative NaHSO₄/Azide/other	Analysis	Lab
070790-05A	40 ml		HCl	EPA 602/8015	GTEL
B	ml			EPA 601	
C	ml		—		
D	ml		—		
	ml				
	ml				
	ml				
	ml				

Container codes: P = plastic bottle; C or B = clear/brown glass; Describe

COMMENTS:
12:28 14.14'
12:33 13.96'
13:06 13.56'
14:30 13.03'

WGR

2ND

WATER SAMPLING DATA Well Name MW-6 Date 7-6-90 Time 1155
Job Name OAKLAND · BAY · GRAV Job Number 1-101.04 Initials BJ
WELL DATA: Well type M (M=monitoring well; Describe _____)
Depth to Water 9.09 ft.
Well Depth _____ ft. (spec.) Sounded Depth 9.45 ft.
Well Diameter 2 in. Date 7.5.90 Time 1415

EVACUATION: Sampling Equipment:
PVC Bailer: 1½ in. Dedicated: Bladder Pump _____ ;Bailer _____
Sampling Port:Number _____ Rate _____ gpm. Volume _____ gal.
Other _____
Initial Height of Water in Casing 0.36 ft; Volume 0.059 gal.
Volume To Be Evacuated = 0.18 gal. (initial volume x3 X, x4 _____)

	Evacuated	Evacuated	Evacuated
Time: Stop			
Start	GRAB SAMPLE	*	
Total minutes			
Amount Evacuated	OVERNIGHT RECOVERY		
Total Evacuated	_____ gal.		
Evacuation Rate	_____ gpm.		

Formulas / Conversions
r = well radius in ft
h = ht of water col in ft
vol. of col. = $\pi r^2 h$
7.48 gal/ft³
2" casing = 0.163 gal/ft
3" casing = 0.367 gal/ft
4" casing = 0.653 gal/ft
5" casing = 0.826 gal/ft
6" casing = 1.47 gal/ft
8" casing = 2.61 gal/ft

Depth to water during pumping _____ ft. _____ time
Pumped dry? _____ After _____ gal. Recovery rate _____
Depth to water for 80% recovery _____ ft.

CHEMICAL DATA: Temp. Probe # ____ Ph Probe # ____ Cond. Probe # ____

Time		°C		umhos
_____	1	_____	_____	_____
_____	2	_____	_____	_____
_____	3	_____	_____	_____
_____	4	_____	_____	_____

SAMPLING: Point of collection: PE Hose —; End of bailer ^; Other _____
Samples taken 1202 time Depth to water 9.23 ft. Refrigerated: X
Sample description: Water color TAN Odor None
Sediment/Foreign matter FINE BROWN SILT

Sample ID no.	Container VOA / other	Preservative NaHSO₄/Azide/other	Analysis	Lab
070690.06A	40 ml	HCl	EPA 602/8015	CTEL
B	ml	"	"	"
C	ml	—	EPA 601	"
D	ml	—	"	"
	ml			
	ml			
	ml			
	ml			

Container codes: P = plastic bottle; C or B = clear/brown glass; Describe

COMMENTS: * WELL WAS BAILED DOWN TO DRY DURING DEVELOPMENT PROCESS YESTERDAY. SO THIS 9:24 DRY IS ACTUALLY AN OVERNIGHT

WGR

WATER SAMPLING DATA Well Name MW-7 Date 7.6.90 Time 1200
Job Name OAKLAND - BAY + GRAND Job Number 1-101.04 Initials ES
WELL DATA: Well type M (M=monitoring well; Describe)
Depth to Water 5.85 ft.
Well Depth — ft. (spec.) Sounded Depth 9.89 ft.
Well Diameter 2 in. Date 7-5-90 Time 1430

EVACUATION: Sampling Equipment:
PVC Bailer: ____ in. Dedicated: Bladder Pump ____ ;Bailer ____
Sampling Port:Number ____ Rate ____ gpm. Volume ____ gal.
Other
Initial Height of Water in Casing 4.04 ft; Volume 0.658 gal.
Volume To Be Evacuated = 1.98 gal. (initial volume x3 X, x4 ___)

	Evacuated	Evacuated	Evacuated
Time: Stop	12:11		
Start	1207		
Total minutes	4		
Amount Evacuated	[illegible]		
Total Evacuated	2 gal.		
Evacuation Rate	0.5 gpm.		

Formulas / Conversions
r = well radius in ft
h = ht of water col in ft
vol. of col. = $\pi r^2 h$
7.48 gal/ft³
V_2" casing = 0.163 gal/ft
V_3" casing = 0.367 gal/ft
V_4" casing = 0.653 gal/ft
$V_{4.5}$" casing = 0.826 gal/ft
V_6" casing = 1.47 gal/ft
V_8" casing = 2.61 gal/ft

Depth to water during pumping — ft. — time
Pumped dry? NO After. — gal. Recovery rate ____
Depth to water for 80% recovery ____ ft.

CHEMICAL DATA: Temp. Probe # ____ Ph Probe # ____ Cond.Probe # ____

Time		°C		umhos
	1			
	2			
	3			
	4			

SAMPLING: Point of collection: PE Hose —; End of bailer X; Other —
Samples taken 1345 time Depth to water 7.73 ft. Refrigerated: X
Sample description: Water color TAN Odor NONE
Sediment/Foreign matter fine brown

Sample ID no.		Container VOA / other	Preservative NaHSO4/Azide/other	Analysis	Lab
070690-07A	40ml	↓	HCl	EPA 602/8015	G-TEL
↓	B ml	↓	↓	↓	↓
↓	C ml	↓	—	EPA 601	↓
↓	D ml	↓	—	↓	↓
↓	2 1000 ml	B	H_2SO_4	503 E&F	↓
↓	F 500 ml	B	—	Soluble metals	↓
	ml				
	ml				

Container codes: P = plastic bottle; C or B = clear/brown glass; Describe

COMMENTS:

WGR

WATER SAMPLING DATA Well Name MW 8 Date 7-6-90 Time 1215
Job Name OAKLAND BAY + GRAND Job Number 1-101.04 Initials ES
WELL DATA: Well type — (M=monitoring well; Describe —)
Depth to Water 3.98 ft.
Well Depth 7.65 ft. (spec.) Sounded Depth 7.65 ft.
Well Diameter 2 in. Date — Time —

EVACUATION: Sampling Equipment:
PVC Bailer: 1/2 in. Dedicated: Bladder Pump — ;Bailer —
Sampling Port: Number — Rate — gpm. Volume — gal.
Other —
Initial Height of Water in Casing 3.67 ft; Volume .60 gal.
Volume To Be Evacuated = 1.8 gal. (initial volume x3 X, x4 —)

	Evacuated	Evacuated	Evacuated
Time: Stop			
Start	12:25		
Total minutes	12:28 3.0		
Amount Evacuated			
Total Evacuated	0.5 gal.		
Evacuation Rate	gpm.		

Formulas / Conversions
r = well radius in ft
h = ht of water col in ft
vol. of col. = $\pi r^2 h$
7.48 gal/ft³
V," casing = 0.163 gal/ft
V," casing = 0.367 gal/ft
V," casing = 0.653 gal/ft
V," casing = 0.826 gal/ft
V," casing = 1.47 gal/ft
V," casing = 3.61 gal/ft

Depth to water during pumping — ft. — Time
Pumped dry? Yes After — gal. Recovery rate —
Depth to water for 80% recovery 0.17 ft.

CHEMICAL DATA: Temp. Probe # — Ph Probe # — Cond. Probe # —

Time		°C		umhos
	1			
	2			
	3			
	4	14.7		

SAMPLING: Point of collection: PE Hose —; End of bailer X; Other —
Samples taken ~~BTEX~~ time Depth to water ~~BTEX~~ ft. Refrigerated: ~
Sample description: Water color ~~BTEX~~ BROWN Odor NONE
Sediment/Foreign matter fine brown silt

Sample ID no.		Container VOA / other	Preservative NaHSO4/Azide/other	Analysis	Lab
706080BA	40 ml		HCl	EPA 602/8015	G-TSL
B	ml				
C	ml			EPA 601	
D	ml				
E	1000 ml	B	H2SO4	503 E 046	
F	500 ml	P		Soluble Metals by AA	
	ml				
	ml				

Container codes: P = plastic bottle; C or B = clear/brown glass; Describe

COMMENTS: Sand @ 7.6' @ 12:38 depth @ 7.49
14:06 7.34
"E" SAMPLES COLLECTED AS

WGR

WATER SAMPLING DATA Well Name MW-9 Date 2-6-90 Time 1220

Job Name Oakland [illegible] Job Number 6-101.04 Initials BB

WELL DATA: Well type M (M=monitoring well; Describe ______)

Depth to Water 4.61 ft.

Well Depth ______ ft. (spec.)

Well Diameter 2 in.

Sounded Depth 8.42 ft.

Date 2-5-90 Time 1425

EVACUATION: Sampling Equipment:

PVC Bailer: 1 1/2 in.

Sampling Port:Number ______ Dedicated: Bladder Pump ______ ;Bailer ______

Other ______ Rate ______ gpm. Volume ______ gal.

Initial Height of Water in Casing 3.81 ft; Volume 0.62 gal.

Volume To Be Evacuated = 1.86 gal. (initial volume x3 ______, x4 ______)

	Evacuated	Evacuated	Evacuated
Time: Stop	1232		
Start	1227		
Total minutes	5		
Amount Evacuated			
Total Evacuated			
Evacuation Rate	2.0 gal.		
	0.4 gpm.		

Formulas / Conversions
r = well radius in ft
h = ht of water col in ft
vol. of col. = πr²h
7.48 gal/ft³
V_2" casing = 0.163 gal/ft
V_3" casing = 0.367 gal/ft
V_4" casing = 0.653 gal/ft
$V_{4.5}$" casing = 0.826 gal/ft
V_6" casing = 1.47 gal/ft
V_8" casing = 2.61 gal/ft

Depth to water during pumping ______ ft. ______ time ______

Pumped dry? NO After ______ gal.

Depth to water for 80% recovery ______ ft. Recovery rate ______

CHEMICAL DATA: Temp. Probe # ____ Ph Probe # ____ Cond.Probe # ____

Time		°C		umhos
	1			
	2			
	3			
	4			

SAMPLING: Point of collection: PE Hose ______; End of Bailer X; Other ______

Samples taken 1319 time Depth to water 7.28 ft. Refrigerated: X

Sample description: Water color TAN Odor NONE

Sediment/foreign matter Gray brown silt

Sample no.		Container VOA / other	Preservative NaHSO₄/Azide/other	Analysis	Lab
0690-094 A	40 ml	VOA	HCl	EPA 602/8015	G-TEL
B	ml	↓	↓	↓	
C	ml	↓	—	EPA 601	
D	ml		—	↓	
E	1000 ml	B	—	503 E O&G	
F	500 ml	B	H_2SO_4	Solvent extractable	↓
	ml				
	ml				

Container codes: P = plastic bottle; C or B = clear/brown glass; Describe

COMMENTS: 13.09 = 6.58

WGR

TRAVEL

WATER SAMPLING DATA Well Name BLANCS Date 7.6.90 Time _____
Job Name Oak Bay Job Number 1-101.04 Initials BB
WELL DATA: Well type _____ (M=monitoring well; Describe _____)
Depth to Water 3.98 ft.
Well Depth _____ ft. (spec.) Sounded Depth _____ ft.
Well Diameter ___ in. Date _____ Time _____

EVACUATION: Sampling Equipment:
PVC Bailer: _____ in. Dedicated: Bladder Pump _____ ;Bailer _____
Sampling Port:Number _____ Rate _____ gpm. Volume _____ gal.
Other _____
Initial Height of Water in Casing _____ ft; Volume _____ gal.
Volume To Be Evacuated = _____ gal. (initial volume x3 ___, x4 ___)

	Evacuated	Evacuated	Evacuated
Time: Stop			
Start			
Total minutes			
Amount Evacuated			

Total Evacuated _____ gal.
Evacuation Rate _____ gpm.

Formulas / Conversions
r = well radius in ft
h = ht of water col in ft
vol. of col. = $\pi r^2 h$
7.48 gal/ft³
V_1" casing = 0.163 gal/ft
V_2" casing = 0.367 gal/ft
V_4" casing = 0.653 gal/ft
$V_{4.5}$" casing = 0.826 gal/ft
V_6" casing = 1.47 gal/ft
V_8" casing = 2.61 gal/ft

Depth to water during pumping ____ ft. ____ time
Pumped dry? _____ After _____ gal. Recovery rate _____
Depth to water for 80% recovery _____ ft.

CHEMICAL DATA: Temp. Probe # ____ Ph Probe # ____ Cond.Probe # ____

Time		°C		umhos
_____	1 _____		_____	_____
_____	2 _____		_____	_____
_____	3 _____		_____	_____
_____	4 _____		_____	_____

SAMPLING: Point of collection: PE Hose ___; End of bailer ___; Other _____
Samples taken _____ time Depth to water _____ ft. Refrigerated: _____
Sample description: Water color _____ Odor _____
Sediment/Foreign matter _____

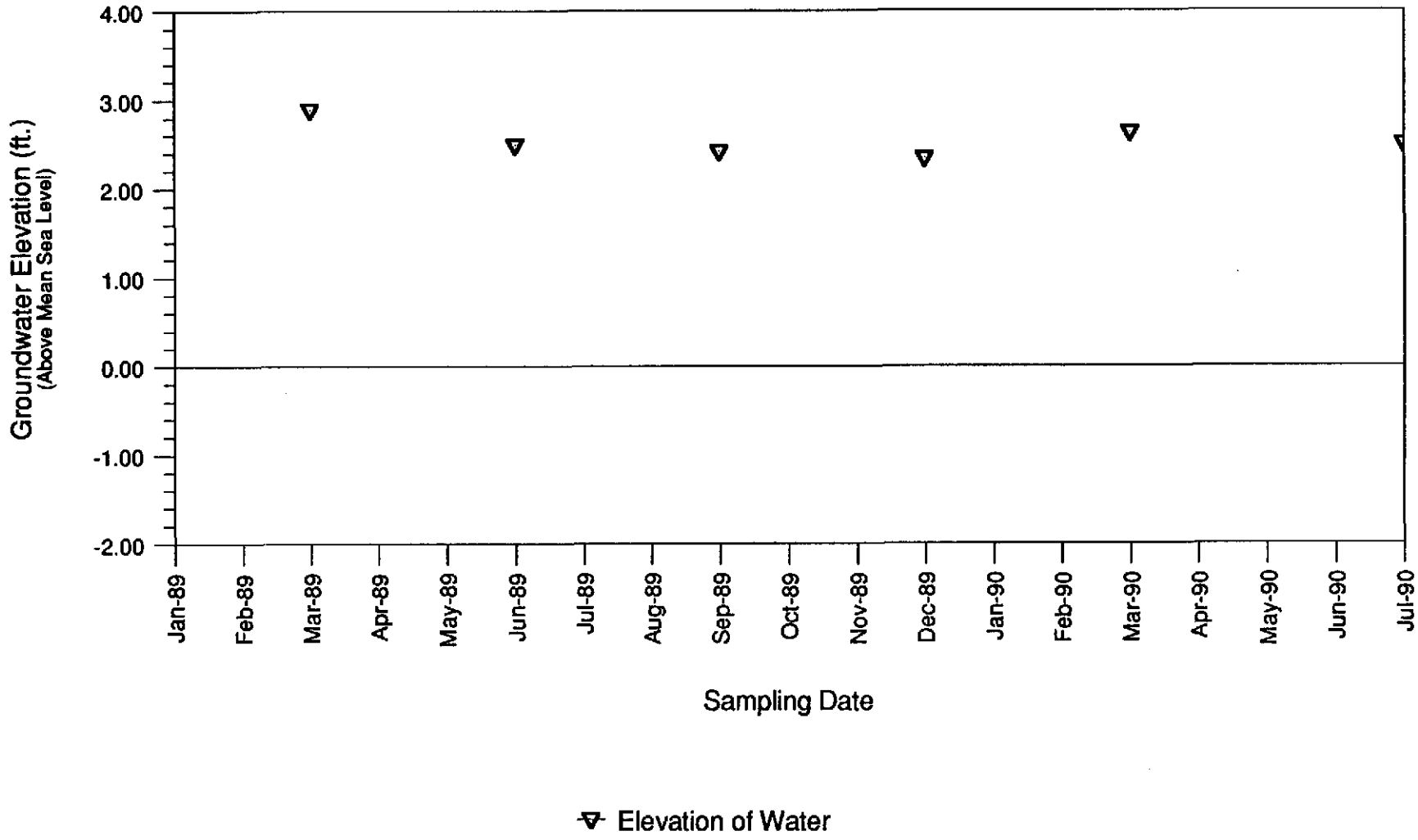
Sample ID no.		Container	Preservative	Analysis	Lab
		VOA / other	NaHSO$_4$/Azide/other		
070690.104	40 ml	VOA	HCl	EPA 602/8015	G-T-E-L
V B	1 ml	V	V	EPA 601	L
	ml				
	ml				
	ml				
	ml				
	ml				
	ml				

Container codes: P = plastic bottle; C or B = clear/brown glass; Describe

COMMENTS: _____

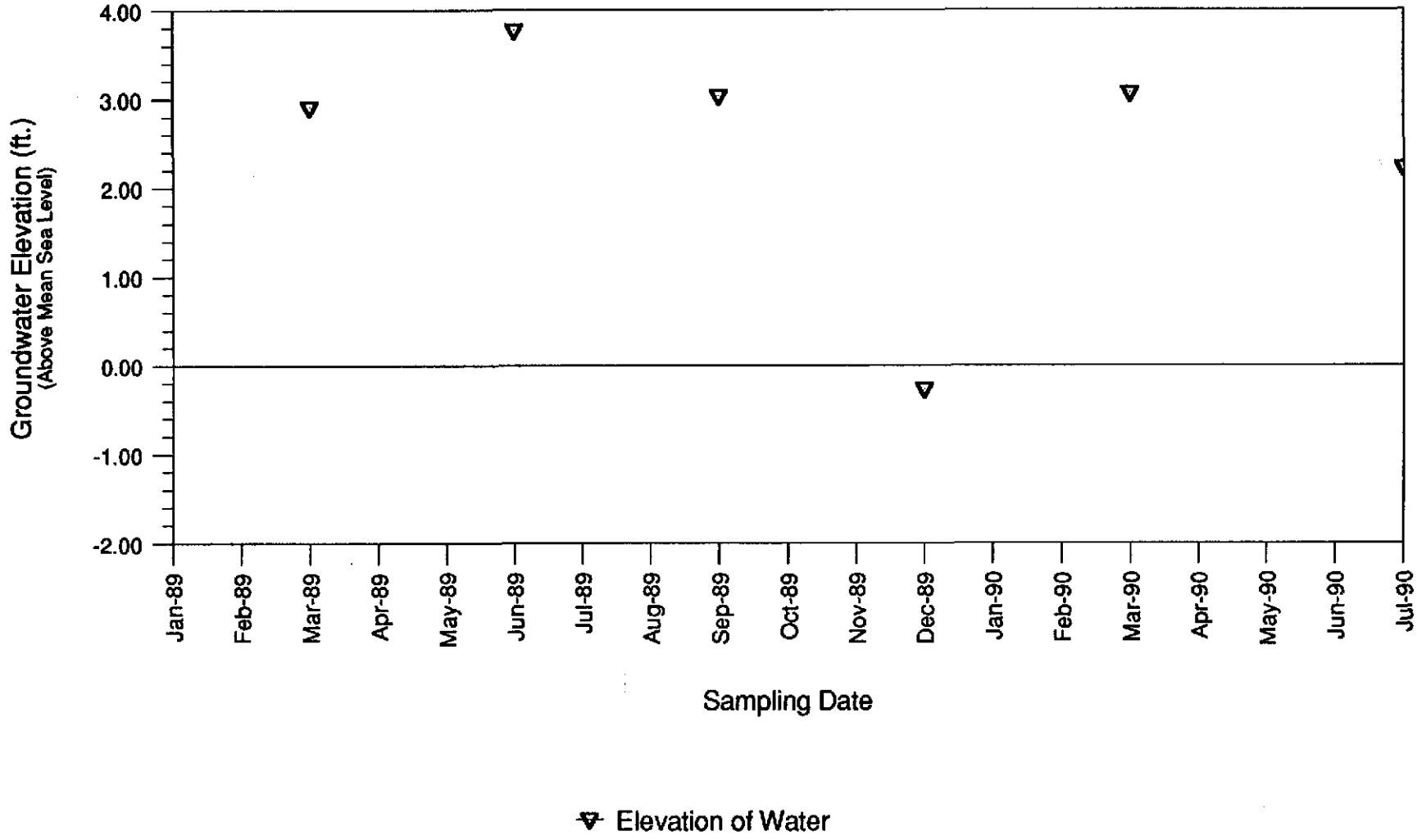
GROUNDWATER MONITOR WELL MW-1

Former Chevron Service Station #90019 210 Grand Ave., Oakland, California



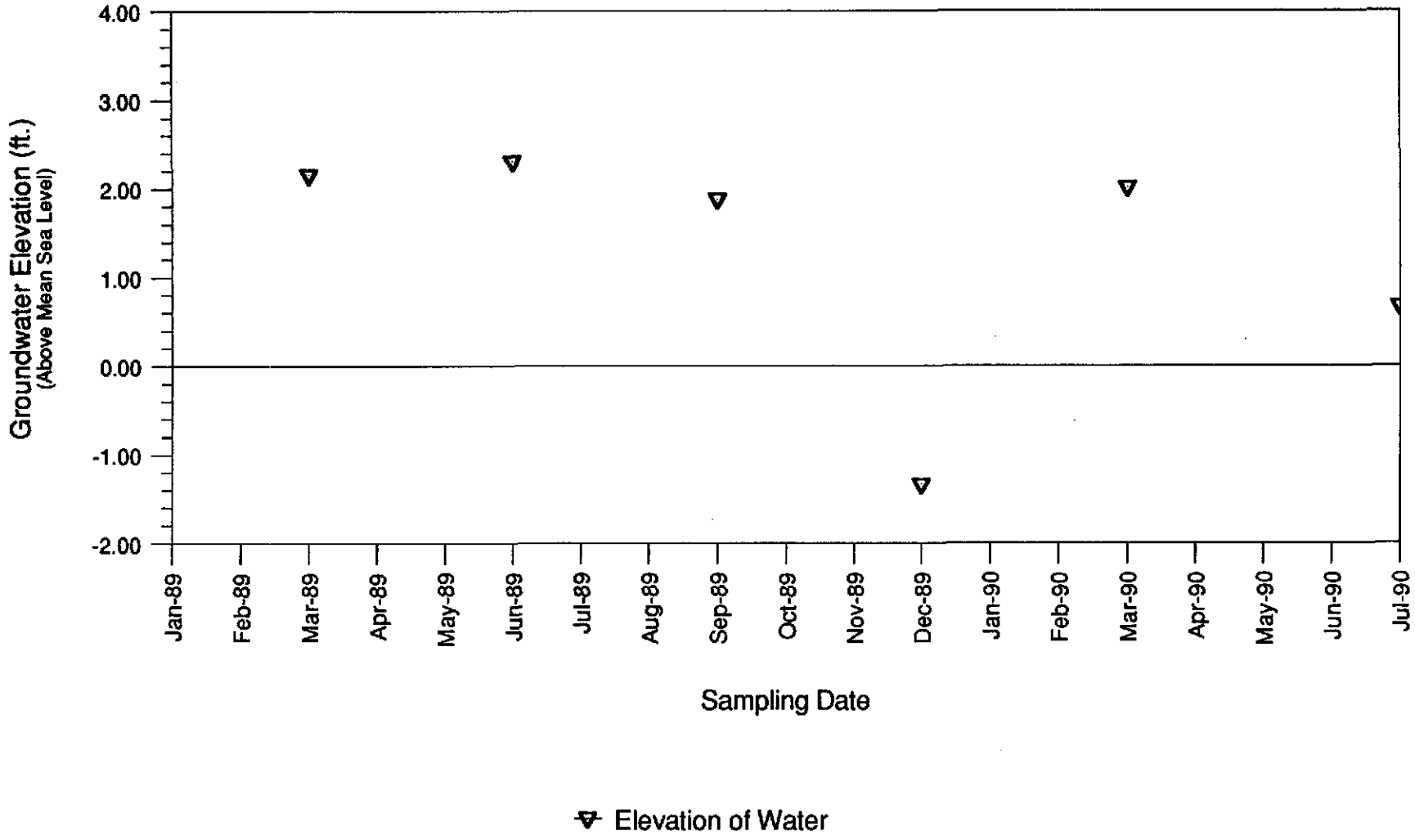
GROUNDWATER MONITOR WELL MW-2

Former Chevron Service Station #90019 210 Grand Ave., Oakland, California



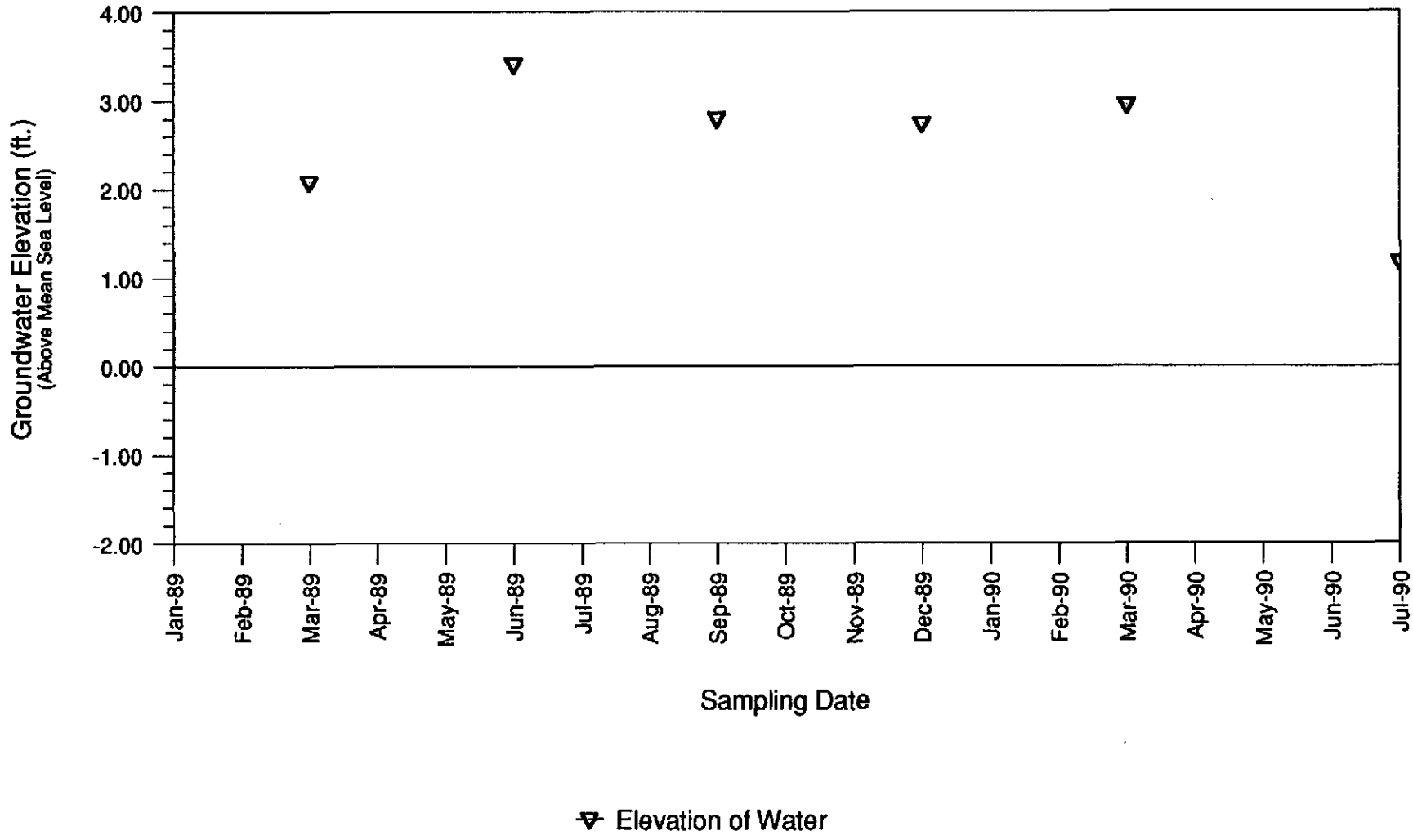
GROUNDWATER MONITOR WELL MW-3

Former Chevron Service Station #90019 210 Grand Ave., Oakland, California



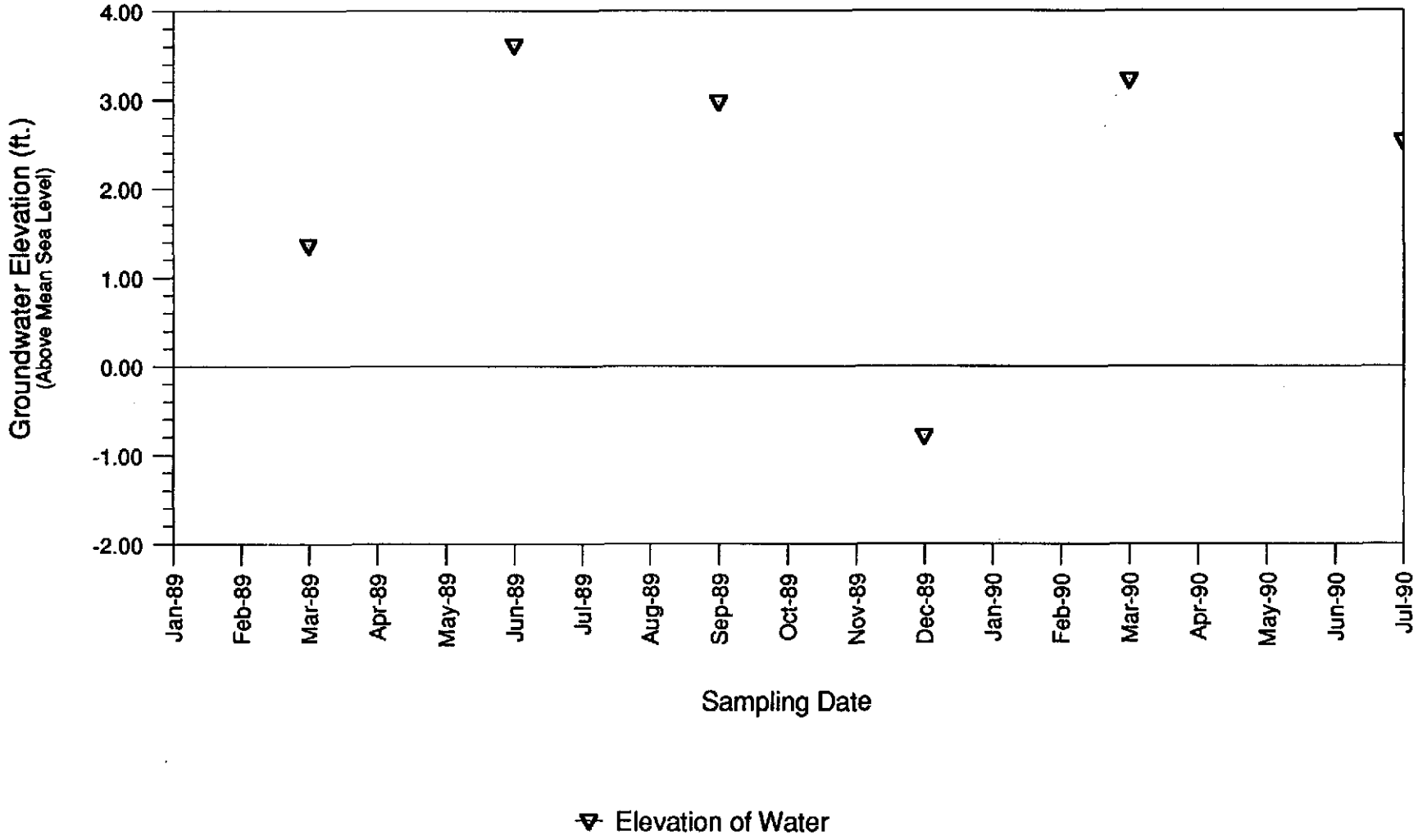
GROUNDWATER MONITOR WELL MW-4

Former Chevron Service Station #90019 210 Grand Ave., Oakland, California



GROUNDWATER MONITOR WELL MW-5

Former Chevron Service Station #90019 210 Grand Ave., Oakland, California



Chain-of-Custody Record

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

Chevron Facility Number 90019
Consultant Release Number 2449510 Consultant Project Number 1-101.04
Consultant Name Western Geologic Resources
Address 2169 E. Francisco Blvd, Suite ~~A~~ B
Fax Number (415)457-8521
Project Contact (Name) Leonard Niles
(Phone) (415) 457-7595

Chevron Contact (Name) Nancy Vukelich
(Phone) (415) 842-9581
Laboratory Name GTEL
Contract Number 3522720
Samples Collected by (Name) Justin Power/Dave Reichard
Collection Date 6-27-90, 6-28-90, 6-29-90
Signature Justin Power

pg 1 of 2

Sample Number	Lab Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite	Time	Sample Preservation	Iced	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline + Diesel	503 Oil and Grease	Arom. Volatiles - BTXE Soil: 8020/Wtr.: 602	Arom. Volatiles - BTXE Soil: 8240/Wtr.: 624	Total Lead DHS-Luft	EDB DHS-AB 1803	Halocarbons EPA 8010	Cd, Cr, Zn EPA 6010 ICP	Remarks
MW6-5.5		1	S				X	X	X	X	X		X		X	X	
MW-6 8.7		1	↓				↓	X	X	X	X		X		X	X	
MW-6 11.7		1	↓				↓	X	X	X	X		X		X	X	
MW-7 4.5		1	S				X	X			X						
↓ 6.5		1	↓				↓	X			X				X		
↓ 10.3		1	↓				↓	X			X						
MW-8 4.8		1	S				X	X			X						
7.0		1	↓				↓	X			X				X		
10.5		1	↓				↓										Hold
↓ 12.0		1	↓				↓	X			X						

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Justin Power	WGR	7/2/90 10:00		Concord Couri	7/2 10:18
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
			Kathy Brun		7/2/90 11:00

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

Printed in U.S.A.

White / Project File Canary / Sampler Pink / Lab

Chain-of-Custody Record

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

Chevron Facility Number 90019
Consultant Release Number 2449510
Consultant Project Number 1-101.04
Consultant Name Western Geologic Resources
Address 2169 E. Francisco Blvd, Suite B
Fax Number (415) 457-8521
Project Contact (Name) Leonard Niles
(Phone) (415) 457-7595

Chevron Contact (Name) Nancy Vukelich
(Phone) (415) 842-9581
Laboratory Name GTEL
Contract Number 3522720
Samples Collected by (Name) Justin Power / Dave Reichard
Collection Date 6-28-90
Signature Justin Power

Sample Number	Lab Number	Number of Containers	Matrix S = Soil W = Water A = Air C = Charcoal	Type G = Grab C = Composite	Time	Sample Preservation	Iced	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline + Diesel	503 Oil and Grease	Arom. Volatiles - BTXE Soil: 8020/Wtr.: 602	Arom. Volatiles - BTXE Soil: 8240/Wtr.: 624	Total Lead DHS-Luft	EDB DHS-AB 1803	halocarbons EPA 8010			Remarks
MW9-5.0		1	S				X	X				X			X			pg 282
6.8		1						X				X						
10.3		1						X				X						

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Justin Power	WGR	7/2/90 10:00	[illegible]	Concord Courier	7/2 10:15
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
			Kathy Blair		7/2/90 10:00

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

Printed in U.S.A.

White / Project File Canary / Sampler Pink / Lab

Project SFB 175 0204!F2

Chain-of-Custody Record

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

Chevron Facility Number: 90019
Consultant Release Number:
Consultant Project Number: 1-101.04
Consultant Name: WESTERN GEOLOGIC RESOURCES
Address: 2169 E FRANCISCO SAN RAFAEL
Fax Number: 415 457 8521
Project Contact (Name): LEN NILES
(Phone): 415 457 7595

Chevron Contact (Name): NANCY VUKULIC
(Phone): 842
Laboratory Name: GTEL
Contract Number: ~~355~~ 3522720
Samples Collected by (Name): D BRADY; E STEVENS; B BHL
Collection Date: 7-6-90
Signature: BB

Sample Number	Lab Number	Number of Containers	Matrix S = Soil A = Air W = Water C = Charcoal	Type G = Grab C = Composite	Time	Sample Preservation	Iced	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline	Modified EPA 8015 Total Petro. Hydrocarb. as Gasoline + Diesel	503 Oil and Grease A+E	Arom. Volatiles - BTXE Soil: 8020/Wtr.: 602	Arom. Volatiles - BTXE Soil: 8240/Wtr.: 624	Total Lead DHS-Luft	EDB DHS-AB 1803	Soluble Metals by A/A: Pb Zn Cd			Remarks
070690.01 ABCD	01	4	W		1420	AB - HCl	X	X			X							please
070690.02 ABCD	02	↓	↓		1136	CD - NONE	↓	↓			↓							filter &
070690.03 ABCD	03				1353	E - H_2SO_4												preserve
070690.04 ABCD	04				1324	F - NON												metals
070690.05 ABCD	05				1430	↓												samples
070690.06 ABCD	06	↓			1202													per Beverly
070690.07 ABCDEF	07	5			1345					X					X			from WGR
070690.08 ABCDEF	08	↓			1427					↓					↓			
070690.09 ABCDEF	09	↓			1319	↓				↓					↓			
070690.10 AB	10	2	↓		—	AB	↓	↓			↓							

I BOX

9/10/CH 2P

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
BB	WGR	7/6/90 1700	MKE	WGR	7-6-90 17:00
MKE	WGR	7-7-90 11:30			
			Received For Laboratory By (Signature): Richard Haines 11:30 AM		7/7/90

Turn Around Time (Circle Choice)
24 Hrs
48 Hrs
5 Days
10 Days (circled)

GTEL
ENVIRONMENTAL
LABORATORIES, INC.

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

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007090, C007091, C007092, C007093, C007094, C007095, C007096, C007097
Report Issue Date: July 20, 1990

Leonard Niles
Western Geologic REsources
2169 E. Francisco Blvd. Suite B
San Rafael, CA 94901

Dear Mr. Niles:

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories on 07/02/90.

A formal quality control/quality assurance program is maintained by GTEL, which is designed to meet or exceed the EPA requirements. Analytical work for this project met QA/QC criteria unless otherwise stated in the footnotes.

GTEL is certified by the California State Department of Health Services to perform analyses for drinking water, wastewater, and hazardous waste materials according to approved protocols.

If you have any questions concerning this analysis, or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,

GTEL Environmental Laboratories, Inc.

Emma P. Popek

Emma P. Popek
Laboratory Director

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007090
Report Issue Date: July 17, 1990

Table 1

ANALYTICAL RESULTS

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8020/8015[1]

GTEL Sample Number		01	02	03	04
Client Identification		MW6-5.5	MW6-8.7	MW6-11.7	MW7-4.5
Date Sampled		6/27-29/90	6/27-29/90	6/27-29/90	6/27-29/90
Date Extracted		07/11/90	07/11/90	07/11/90	07/11/90
Date Analyzed		07/12/90	07/12/90	07/12/90	07/12/90
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Benzene	0.005	<0.005	<0.005	<0.005	<0.005
Toluene	0.005	<0.005	<0.005	<0.005	<0.005
Ethylbenzene	0.005	0.01	0.01	<0.005	<0.005
Xylene (total)	0.015	<0.015	<0.015	<0.015	<0.015
TPH as Gasoline	10	<10	<10	<10	<10

GTEL Sample Number		05	06	07	08
Client Identification		MW7-6.5	MW7-10.3	MW8-4.8	MW8-7.0
Date Sampled		6/27-29/90	6/27-29/90	6/27-29/90	6/27-29/90
Date Extracted		07/11/90	07/11/90	07/11/90	07/11/90
Date Analyzed		07/12/90	07/12/90	07/12/90	07/12/90
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Benzene	0.005	<0.005	<0.005	<0.005	<0.005
Toluene	0.005	<0.005	<0.005	<0.005	<0.005
Ethylbenzene	0.005	<0.005	<0.005	<0.005	<0.005
Xylene (total)	0.015	<0.015	<0.015	<0.015	<0.015
TPH as Gasoline	10	<10	<10	<10	<10

1 = Extraction by EPA Method 5030

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007090
Report Issue Date: July 17, 1990

Table 1(continued)

ANALYTICAL RESULTS

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8020/8015[1]

GTEL Sample Number		09	10	11	12
Client Identification		MW8-12.0	MW9-5.0	MW9-6.8	MW9-10.3
Date Sampled		06/29/90	06/28/90	06/28/90	06/28/90
Date Extracted		07/11/90	07/11/90	07/11/90	07/11/90
Date Analyzed		07/12/90	07/12/90	07/12/90	07/12/90
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Benzene	0.005	<0.005	<0.005	<0.005	<0.005
Toluene	0.005	<0.005	<0.005	<0.005	<0.005
Ethylbenzene	0.005	<0.005	<0.005	<0.005	<0.005
Xylene (total)	0.015	<0.015	<0.015	<0.015	<0.015
TPH as Gasoline	10	<10	<10	<10	<10

1 = Extraction by EPA Method 5030

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007090
Report Issue Date: July 17, 1990

QA Conformance Summary

Purgeable Aromatics and Total Petroleum Hydrocarbons as Gasoline in Soil EPA Method 8020/8015

1.0 Blanks

Five of 5 target compounds were below detection limits in the reagent water blank and reagent methanol blank as shown in Tables 2a and 2b.

2.0 Independent QC Check Sample

The control limits were met for 4 out of 4 QC check compounds as shown in Table 3.

3.0 Surrogate Compound Recoveries

Percent recovery limits were met for the surrogate compound (naphthalene) for all samples as shown in Table 4.

4.0 Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Accuracy and Precision

4.1 Percent recovery limits were met for 4 of 4 compounds in the MS and MSD as shown in Table 5.

4.2 Relative percent difference (RPD) criteria was met for 4 of 4 analytes in the MS and MSD as shown in Table 5.

5.0 Sample Handling

5.1 Sample handling and holding time criteria were met for all samples.

5.2 There were no exceptional conditions requiring dilution of samples.

Table 2a

REAGENT WATER BLANK DATA

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8020/8015

Date of Analysis: 07/12/90

Analyte	Concentration, ug/L
Benzene	<0.3
Toluene	<0.3
Ethylbenzene	<0.3
Xylene (total)	<0.6
Gasoline	<50

<# = Not detected at the indicated detection limit.

Table 2b

REAGENT METHANOL BLANK DATA

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8020/8015

Date of Analysis: 07/12/90

Analyte	Concentration, mg/Kg
Benzene	<0.005
Toluene	<0.005
Ethylbenzene	<0.005
Xylene (total)	<0.015
Gasoline	<10

<# = Not detected at the indicated detection limit.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007090
Report Issue Date: July 17, 1990

Table 3

INDEPENDENT QC CHECK SAMPLE RESULTS

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8020/8015

Date of Analysis: 06/29/90

Analyte	Expected Result, ug/L	Observed Result, ug/L	Recovery, %	Acceptability Limits, %
Benzene	50	52	104	85-115
Toluene	50	48	96	85-115
Ethylbenzene	50	51	102	85-115
Xylene (total)	150	158	102	85-115

Table 3a

INDEPENDENT QC CHECK SAMPLE SOURCE

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8020/8015

Analyte	Lot Number	Source
Benzene	LA18042	Supelco
Toluene	LA18042	Supelco
Ethylbenzene	LA18042	Supelco
Xylene (total)	LA18042	Supelco

Table 4

SURROGATE COMPOUND RECOVERY

Naphthalene

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8020/8015

Acceptability Limits[1]: 60 - 130 %

GTEL No.	Expected Result, ug/L	Surrogate Result, ug/L	Surrogate Recovery, %
Water Blank	200	230	115
MeOH Blank	200	196	98
01	200	186	93
02	200	184	92
03	200	167	84
04	200	160	80
05	200	164	82
06	200	142	71
07	200	137	69
08	200	141	71
09	200	151	76
10	200	158	79
11	200	167	84
12	200	167	86
MS	200	226	113
MSD	200	168	84

MS = Matrix Spike
MSD = Matrix Spike Duplicate
1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007090
Report Issue Date: July 17, 1990

Table 5

MATRIX SPIKE (MS) AND MATRIX SPIKE DUPLICATE (MSD) RECOVERY
AND RELATIVE PERCENT DIFFERENCE (RPD) REPORT

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8020/8015

Date of Analysis: 07/12/90
Sample Used: C007090-06
Client ID: MW7-10.3
Units: mg/Kg

Analyte	Sample Result	Concentration Added	MS Result	MS, % Recovery	MSD Result	MSD, % Recovery
Benzene	<0.005	2.86	1.94	68	1.70	59
Toluene	<0.005	2.86	1.99	70	1.75	61
Ethylbenzene	<0.005	2.86	2.10	73	1.85	65
Xylene (total)	<0.015	8.58	6.42	75	5.7	66

Analyte	RPD, %	Maximum RPD, %	Acceptability Limits[1] % Recovery
Benzene	14	30	50 - 112
Toluene	14	30	50 - 108
Ethylbenzene	12	30	50 - 113
Xylene (total)	13	30	50 - 114

< # = Not Detected at the indicated detection limit
1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number 90019
Work Order Number: D007091
Report Issue Date: July 13, 1990

Table 1

ANALYTICAL RESULTS

Total Petroleum Hydrocarbons as Gasoline, Diesel, and Waste Oil in Soil
Modified EPA Method 8015

GTEL Sample Number		01	02	03	
Client Identification		MW6-5.5	MW6-8.7	MW6-11.7	
Date Sampled		06/27-29/90	06/27-29/90	06/27-29/90	
Date Extracted		07/06/90	07/06/90	07/06/90	
Date Analyzed		07/09/90	07/09/90	07/09/90	
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Gasoline	10	<10	<10	<10	
Diesel	10	<10	<10	<10	

GTEL ENVIRONMENTAL LABORATORIES, INC.

QA Conformance Summary

Total Petroleum Hydrocarbons as Gasoline, Diesel, and Waste Oil in Soil
Modified EPA Method 8015

1.0 Blanks

The Reagent blank was below the detection limit as shown in Table 2.

2.0 Surrogate Compound Recoveries

Percent recovery limits were met for the surrogate compound (Octadecane) for all samples as shown in Table 3.

3.0 Matrix Spike (MS) Accuracy

Percent recovery limits were met for diesel in the MS as shown in Table 4.

4.0 Sample Duplicate Precision

Relative percent difference (RPD) criterion was met for all analytes in the sample duplicate as shown in Table 5.

5.0 Sample Handling

5.1 Sample handling and holding time criteria were met for all samples.

5.2 There were no exceptional conditions requiring dilution of samples.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number 90019
Work Order Number: D007091
Report Issue Date: July 13, 1990

Table 2

REAGENT BLANK DATA

Total Petroleum Hydrocarbons as Gasoline, Diesel, and Waste Oil in Soil
Modified EPA Method 8015

Date of Analysis: 07/09/90

Analyte	Concentration, mg/Kg
Gasoline	< 10
Diesel	< 10

<# = Not detected at the indicated detection limit.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number 90019
Work Order Number: D007091
Report Issue Date: July 13, 1990

Table 3

SURROGATE COMPOUND RECOVERY

Octadecane

Total Petroleum Hydrocarbons as Gasoline, Diesel, and Waste Oil in Soil
Modified EPA Method 8015

Acceptability Limits[1]: 70 - 130 %

GTEL No.	Expected Result, mg/Kg	Surrogate Result, mg/Kg	Surrogate Recovery, %
Blank	100	97	97
01	100	83	83
02	100	84	84
02 Dup	100	89	89
03	100	88	88
MS	100	90	90

MS = Matrix Spike Sample
1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number 90019
Work Order Number: D007091
Report Issue Date: July 13, 1990

Table 4

MATRIX SPIKE (MS) RECOVERY REPORT

Total Petroleum Hydrocarbons as Gasoline, Diesel, and Waste Oil in Soil
Modified EPA Method 8015

Date of Analysis: 07/09/90 Client ID: MW6-11.7
Sample Spiked: D007091-03 Units: mg/Kg

Analyte	Sample Result	Amount Added	Expected Result	MS Result	MS, % Recovery	Acceptability Limits, %[1]
Diesel	<10	500	500	478	95	63 - 127

1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

<# = Not detected at the indicated detection limit.

Table 5

LABORATORY DUPLICATE SAMPLE RESULTS
AND RELATIVE PERCENT DIFFERENCE (RPD) REPORT

Total Petroleum Hydrocarbons as Gasoline, Diesel, and Waste Oil in Soil
Modified EPA Method 8015

Date of Analysis: 07/09/90 Client ID: MW6-8.7
Sample Used: D007091-02 Units: mg/Kg

Analyte	Sample Result	Duplicate Result	RPD, %	Maximum RPD, %
Gasoline	<10	<10	NA	30
Diesel	<10	<10	NA	30

NA = Not Applicable

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007092
Report Issue Date: July 10, 1990

Table 1

ANALYTICAL RESULTS

Total Recoverable Oil and Grease in Soil by Infrared
MODIFIED EPA Method 413.2

Sample Identification		Date Sampled	Date Extracted	Date Analyzed	Concentration, mg/Kg[1]
GTEL No.	Client ID				
01	MW6-5.5	06/27-29/90	07/05/90	07/05/90	<5
02	MW6-8.7	06/27-29/90	07/05/90	07/05/90	<5
03	MW6-11.7	06/27-29/90	07/05/90	07/05/90	<5

1 = Method detection limit = 5.0 mg/Kg; analyte below this level would not be detected.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007092
Report Issue Date: July 10, 1990

QA Conformance Summary

Total Recoverable Oil and Grease in Soil by Infrared
MODIFIED EPA Method 413.2

1.0 Blanks

The method blank was below the detection limit as shown in Table 2.

2.0 Initial Instrument Calibration

The range of concentrations of the initial instrument calibration are shown in Table 3.

3.0 Calibration Verification Standards

3.1 The control limits were met for the initial calibration verification standard (ICVS) as shown in Table 4.

3.2 The control limits were met for the continuing calibration verification standard (CCVS) as shown in Table 4.

4.0 Matrix Spike (MS) Accuracy

The control limits were met for the reference oil in the MS as shown in Table 5.

5.0 Sample Duplicate Precision

Relative percent difference (RPD) criterion was met for the sample duplicate as shown in Table 6.

Table 2

METHOD BLANK DATA

Total Recoverable Oil and Grease in Soil by Infrared
MODIFIED EPA Method 413.2

Date of Analysis: 07/05/90

Analyte	Concentration, mg/Kg
Oil and Grease	<5

< # = Not detected at the indicated detection limit.

Table 3

INITIAL CALIBRATION STANDARDS DATA

Total Recoverable Oil and Grease in Soil by Infrared
MODIFIED EPA Method 413.2

Date of Analysis: 07/05/90

Standard Number	Concentration, mg/L
1	1.0
2	5.1
3	10.2
4	50.9
5	101.7

Table 4

INITIAL AND CONTINUING CALIBRATION
VERIFICATION STANDARDS RESULTS

Total Recoverable Oil and Grease in Soil by Infrared
MODIFIED EPA Method 413.2

Date of Analysis: 07/05/90

Initial Calibration Verification Standard				
Analyte	Expected Result, mg/L	Observed Result, mg/L	Recovery, %	Acceptability Limits, %[1]
Oil and Grease	5.0	4.4	88	80 - 120
Continuing Calibration Verification Standard				
Analyte	Expected Result, mg/L	Observed Result, mg/L	Recovery, %	Acceptability Limits, %[1]
Oil and Grease	5.1	4.9	96	80 - 120

1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

Table 4a

INITIAL AND CONTINUING CALIBRATION
VERIFICATION STANDARDS SOURCE

Total Recoverable Oil and Grease in Soil by Infrared
MODIFIED EPA Method 413.2

Initial Calibration Verification Standard		
Analyte	Lot Number	Source
Oil and Grease	RO7/STK 7	GTEL
Continuing Calibration Verification Standard		
Analyte	Lot Number	Source
Oil and Grease	R06/STK 5	GTEL

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007092
Report Issue Date: July 10, 1990

Table 5

MATRIX SPIKE (MS) RECOVERY REPORT

Total Recoverable Oil and Grease in Soil by Infrared
MODIFIED EPA Method 413.2

Date of Analysis: 07/05/90
Sample Spiked: EM Science
Lot # 9236 CAS 14808-60-7
Units: mg/Kg

Analyte	MS Result	Sample Result	Amount Recovered	Amount Added	MS, % Recovery	Acceptability Limits, %[1]
Oil and Grease	46.6	0	46.6	49.9	93	70 - 130

Table 6

LABORATORY DUPLICATE SAMPLE RESULTS
AND RELATIVE PERCENT DIFFERENCE (RPD) REPORT

Total Recoverable Oil and Grease in Soil by Infrared
MODIFIED EPA Method 413.2

Date of Analysis: 07/05/90
Sample Used: D007092-01
Client ID: MW6-5.5
Units: mg/Kg

Analyte	Sample Result	Duplicate Result	RPD, %	Maximum RPD, %
Oil and Grease	<5	<5	0	20

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007093
Report Issue Date: July 20, 1990

Table 1

ANALYTICAL RESULTS

Total Lead in Soil by ICP
EPA Method 6010[1]

Sample Identification		Date Sampled	Date Extracted	Date Analyzed	Concentration, mg/Kg [2]
GTEL No.	Client ID				
01	MW6-5.5	06/27-29/90	07/11/90	07/16/90	6
02	MW6-8.7	06/27-29/90	07/11/90	07/16/90	15
03	MW6-11.7	06/27-29/90	07/11/90	07/16/90	15

1 = Extraction by EPA Method 3050
2 = Method detection limit = 5 mg/Kg; analyte below this level would not be detected.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007093
Report Issue Date: July 20, 1990

QA Conformance Summary

Total Lead in Soil by ICP
EPA Method 6010

1.0 Blanks

The method blank was below the detection limit as shown in Table 2.

2.0 Initial Instrument Calibration

The range of concentrations of the initial instrument calibration are shown in Table 3.

3.0 Calibration Verification Standards

3.1 The control limits were met for the initial calibration verification standard (ICVS) as shown in Table 4.

3.2 If applicable, the control limits were met for the continuing calibration verification standard (CCVS) as shown in Table 4.

4.0 Matrix Spike (MS) Accuracy

The control limits were met for 1 of 1 elements in the MS as shown in Table 5.

5.0 Sample Duplicate Precision

Relative percent difference criterion was met for the sample duplicate as shown in Table 6.

6.0 Sample Handling

6.1 Sample handling and holding time criteria were met for all samples.

6.2 There were no exceptional conditions requiring dilution of samples.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007093
Report Issue Date: July 20, 1990

Table 2

METHOD BLANK DATA

Total Lead in Soil by ICP
EPA Method 6010

Date of Analysis: 07/16/90

Analyte	Concentration, mg/Kg
Total Lead	< 5

<# = Not detected at the indicated detection limit.

Table 3

INITIAL CALIBRATION STANDARDS DATA

Total Lead in Soil by ICP
EPA Method 6010

Date of Analysis: 07/16/90

Standard Number	Concentration, mg/L
1	0
2	10

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007093
Report Issue Date: July 20, 1990

Table 4

INITIAL AND CONTINUING CALIBRATION
VERIFICATION STANDARDS RESULTS

Total Lead in Soil by ICP
EPA Method 6010

Date of Analysis: 07/16/90

Initial Calibration Verification Standard				
Analyte	Expected Result, mg/L	Observed Result, mg/L	Recovery, %	Acceptability Limits, %
Total Lead	5.00	5.34	107	80 - 120
Continuing Calibration Verification Standard				
Analyte	Expected Result, mg/L	Observed Result, mg/L	Recovery, %	Acceptability Limits, %
Total Lead	5.00	5.13	103	80 - 120

Table 4a

INITIAL AND CONTINUING CALIBRATION
VERIFICATION STANDARDS SOURCE

Total Lead in Soil by ICP
EPA Method 6010

Initial Calibration Verification Standard		
Analyte	Lot Number	Source
Total Lead	3-83-VS	Spex
Continuing Calibration Verification Standard		
Analyte	Lot Number	Source
Total Lead	2-1-MD	Spex

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007093
Report Issue Date: July 20, 1990

Table 5

MATRIX SPIKE (MS) RECOVERY REPORT

Total Lead in Soil by ICP
EPA Method 6010

Date of Analysis: 07/16/90
Sample Spiked: D007093-02
Client ID: MW6-8.7
Units: mg/Kg

Analyte	MS Result	Sample Result	Amount Recovered	Amount Added	MS, % Recovery	Acceptability Limits, %
Total Lead	616	15	601	500	120	80 - 120

Table 6

LABORATORY DUPLICATE SAMPLE RESULTS
AND RELATIVE PERCENT DIFFERENCE (RPD) REPORT

Total Lead in Soil by ICP
EPA Method 6010

Date of Analysis: 07/16/90
Sample Used: D007093-02
Client ID: MW6-8.7
Units: mg/Kg

Analyte	Sample Result	Duplicate Result	RPD, %	Maximum RPD, %
Total Lead	616	626	2	20

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007095
Report Issue Date: July 20, 1990

Table 1

ANALYTICAL RESULTS

Total Threshold Limit Concentration in Soil[1]

GTEL Sample Number		01	02	03	
Client Identification		MW6-5.5	MW6-8.7	MW6-11.7	
Date Sampled		6/27-29/90	6/27-29/90	6/27-29/90	
Date Extracted		07/11/90	07/11/90	07/11/90	
Date Analyzed		07/16/90	07/16/90	07/16/90	
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Cadmium	1	1	3	3	
Chromium	1	29	26	24	
Zinc	2	22	46	51	

1 = EPA Method 3050/6010.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.82
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007226
Report Issue Date: July 13, 1990

Table 5

MATRIX SPIKE (MS) RECOVERY REPORT

Total Recoverable Oil and Grease in Water by Infrared
EPA Method 413.2

Date of Analysis: 07/10/90
Sample Spiked: D.I. WATER Units: mg/L

Analyte	MS Result	Sample Result	Amount Recovered	Amount Added	MS, % Recovery	Acceptability Limits, %[1]
Oil and Grease	4.7	0	4.7	5.0	94	70 - 130

1 = Arbitrary limits, pending experimental determination.
<# = Not detected at the indicated detection limit.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007239
Report Issue Date: July 20, 1990

Table 1 (continued)

ANALYTICAL RESULTS

Purgeable Halocarbons in Water
EPA Method 601

		MW-5	MW-6	MW-7	MW-8
Date Sampled		07/06/90	07/06/90	07/06/90	07/06/90
Date Analyzed		07/11/90	07/11/90	07/11/90	07/11/90
Client Identification		070690.05 A,B,C,D	070690.06 A,B,C,D	070690.07 ABCDEF	070690.08 ABCDEF
GTEL Sample Number		05	06	07	08
Analyte	Detection Limit, ug/L	Concentration, ug/L			
Chloromethane	0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	0.5	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	1	<1	<1	<1	<1
Chloroethane	0.5	<0.5	<0.5	<0.5	<0.5
Methylene chloride	0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	0.2	<0.2	<0.2	<0.2	<0.2
1,1-Dichloroethane	0.5	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethene	0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5	1.2	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.5	<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinyl ether	1	<1	<1	<1	<1
Bromoform	0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	0.5	<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5	<0.5	<0.5	<0.5	<0.5

1 = Extraction by EPA Method 5030

Project Number: SFB-175-0204.72
Consultant Project Number 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007239
Report Issue Date: July 20, 1990

Table 1

ANALYTICAL RESULTS

Purgeable Halocarbons in Water
EPA Method 601

		MW-1	MW-2	MW-3	MW-4
Date Sampled		07/06/90	07/06/90	07/06/90	07/06/90
Date Analyzed		07/11/90	07/11/90	07/11/90	07/11/90
Client Identification		070690.01 A,B,C,D	070690.02 A,B,C,D	070690.03 A,B,C,D	070690.04 A,B,C,D
GTEL Sample Number		01	02	03	04
Analyte	Detection Limit, ug/L	Concentration, ug/L			
Chloromethane	0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	0.5	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	1	<1	<1	<1	<1
Chloroethane	0.5	<0.5	<0.5	<0.5	<0.5
Methylene chloride	0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	0.2	<0.2	<0.2	<0.2	<0.2
1,1-Dichloroethane	0.5	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethene	0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5	<0.5	<0.5	<0.5	0.79
1,1,1-Trichloroethane	0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethene	0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.5	<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinyl ether	1	<1	<1	<1	<1
Bromoform	0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	0.5	<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5	<0.5	<0.5	<0.5	<0.5

1 = Extraction by EPA Method 5030

Project Number: SFB-175-0204.72
Consultant Project Number 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007239
Report Issue Date: July 20, 1990

Table 1 (continued)

ANALYTICAL RESULTS

Purgeable Halocarbons in Water
EPA Method 601

			MW-9	TB		
	Date Sampled		07/06/90	07/06/90		
	Date Analyzed		07/11/90	07/11/90		
	Client Identification		070690.09 ABCDEF	070690.10 A,B		
	GTEL Sample Number		09	10		
Analyte	Detection Limit, ug/L	Concentration, ug/L				
Chloromethane	0.5	<0.5	<0.5			
Bromomethane	0.5	<0.5	<0.5			
Dichlorodifluoromethane	0.5	<0.5	<0.5			
Vinyl chloride	1	<1	<1			
Chloroethane	0.5	<0.5	<0.5			
Methylene chloride	0.5	<0.5	<0.5			
Trichlorofluoromethane	0.5	<0.5	<0.5			
1,1-Dichloroethene	0.2	<0.2	<0.2			
1,1-Dichloroethane	0.5	<0.5	<0.5			
trans-1,2-Dichloroethene	0.5	<0.5	<0.5			
Chloroform	0.5	<0.5	<0.5			
1,2-Dichloroethane	0.5	<0.5	<0.5			
1,1,1-Trichloroethane	0.5	<0.5	<0.5			
Carbon tetrachloride	0.5	<0.5	<0.5			
Bromodichloromethane	0.5	<0.5	<0.5			
1,2-Dichloropropane	0.5	<0.5	<0.5			
trans-1,3-Dichloropropene	0.5	<0.5	<0.5			
Trichloroethene	0.5	<0.5	<0.5			
Dibromochloromethane	0.5	<0.5	<0.5			
1,1,2-Trichloroethane	0.5	<0.5	<0.5			
cis-1,3-Dichloropropene	0.5	<0.5	<0.5			
2-Chloroethylvinyl ether	1	<1	<1			
Bromoform	0.5	<0.5	<0.5			
1,1,2,2-Tetrachloroethane	0.5	<0.5	<0.5			
Tetrachloroethene	0.5	<0.5	<0.5			
Chlorobenzene	0.5	<0.5	<0.5			
1,3-Dichlorobenzene	0.5	<0.5	<0.5			
1,2-Dichlorobenzene	0.5	<0.5	<0.5			
1,4-Dichlorobenzene	0.5	<0.5	<0.5			

1 = Extraction by EPA Method 5030

QA Conformance Summary

Purgeable Halocarbons in Water
EPA Method 601

1.0 Blanks

Zero of 29 target compounds found in Reagent blank as shown in Table 2.

2.0 Independent QC Check Sample

The control limits were met for 8 out of 8 QC check compounds as shown in Table 3.

3.0 Surrogate Compound Recoveries

Percent recovery limits were met for the surrogate compound (Bromofluorobenzene) for all samples as shown in Table 4.

4.0 Matrix Spike (MS) Accuracy

Percent recovery limits were met for 3 of 3 compounds in the MS as shown in Table 5.

5.0 Reagent Water Spike (WS) and Reagent Water Spike Duplicate (WSD) Precision

Relative percent difference (RPD) criteria was met for 3 of 3 compounds in the WS and WSD as shown in Table 6.

6.0 Sample Handling

6.1 Sample handling and holding time criteria were met for all samples.

6.2 There were no exceptional conditions requiring dilution of samples.

Table 2

REAGENT BLANK DATA

Purgeable Halocarbons in Water
EPA Method 601

Date of Analysis: 07/11/90

Analyte	Observed Result, ug/L
Chloromethane	<0.5
Bromomethane	<0.5
Dichlorodifluoromethane	<0.5
Vinyl chloride	<1
Chloroethane	<0.5
Methylene chloride	<0.5
Trichlorofluoromethane	<0.5
1,1-Dichloroethene	<0.2
1,1-Dichloroethane	<0.5
trans-1,2-Dichloroethene	<0.5
Chloroform	<0.5
1,2-Dichloroethane	<0.5
1,1,1-Trichloroethane	<0.5
Carbon tetrachloride	<0.5
Bromodichloromethane	<0.5
1,2-Dichloropropane	<0.5
trans-1,3-Dichloropropene	<0.5
Trichloroethene	<0.5
Dibromochloromethane	<0.5
1,1,2-Trichloroethane	<0.5
cis-1,3-Dichloropropene	<0.5
2-Chloroethylvinyl ether	<1
Bromoform	<0.5
1,1,2,2-Tetrachloroethane	<0.5
Tetrachloroethene	<0.5
Chlorobenzene	<0.5
1,3-Dichlorobenzene	<0.5
1,2-Dichlorobenzene	<0.5
1,4-Dichlorobenzene	<0.5

<# = Not Detected at the indicated detection limit.

Table 3

INDEPENDENT QC CHECK SAMPLE RESULTS

Purgeable Halocarbons in Water
EPA Method 601

Date of Analysis: 07/03/90

Analyte	Expected Result, ug/L	Observed Result, ug/L	Recovery, %	Acceptability Limits, %
Vinyl Chloride	50	56	112	85 - 115
Chloroethane	50	55	110	85 - 115
Benzene	50	52	104	85 - 115
1,2-Dichloroethane	50	51	102	85 - 115
T-1,2-Dichloroethene	50	53	106	85 - 115
1,1-Dichloroethane	50	54	108	85 - 115
Trichloroethene	50	53	106	85 - 115
1,2-Dichloropropane	50	52	104	85 - 115

Table 3a

INDEPENDENT QC CHECK SAMPLE SOURCE

Purgeable Halocarbons in Water
EPA Method 601

Analyte	Lot Number	Source
Vinyl Chloride	LA 21062	Supelco Purgeable Mix C
Chloroethane	LA 21062	Supelco Purgeable Mix C
Benzene	LA 20674	Supelco Purgeable Mix B
1,2-Dichloroethane	LA 20674	Supelco Purgeable Mix B
T-1,2-Dichloroethene	LA 20674	Supelco Purgeable Mix B
1,1-Dichloroethane	LA 21173	Supelco Purgeable Mix A
Trichloroethene	LA 21173	Supelco Purgeable Mix A
1,2-Dichloropropane	LA 21173	Supelco Purgeable Mix A

Table 4

SURROGATE COMPOUND RECOVERY

Bromofluorobenzene

Purgeable Halocarbons in Water
EPA Method 601

Acceptability Limits[1]: 63 - 131 %

GTEL No.	Expected Result, ug/L	Surrogate Result, ug/L	Surrogate Recovery, %
Blank	50	51	102
01	50	44	88
02	50	44	88
03	50	44	88
04	50	42	84
05	50	50	100
06	50	55	110
07	50	59	118
08	50	61	122
09	50	61	122
10	50	55	110
MS	50	50	100
WS	50	51	102
WSD	50	47	94

MS = Matrix Spike
WS = Reagent Water Spike
WSD = Reagent Water Spike Duplicate
1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

Project Number: SFB-175-0204.72
Consultant Project Number 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007239
Report Issue Date: July 20, 1990

Table 5

MATRIX SPIKE (MS) RECOVERY REPORT

Purgeable Halocarbons in Water
EPA Method 601

Date of Analysis: 07/13/90
Sample Spiked: C007255-02

Units: ug/L

Analyte	Sample Result	MS Result	Concentration Added	MS, % Recovery	Acceptability Limits, %[1]
1,1-Dichloroethene	< 0.2	37.5	50	75	64 - 114
Chlorobenzene	< 0.5	43.5	50	87	58 - 123
Trichloroethene	< 0.5	47.9	50	96	66 - 120

<# = Not detected at the indicated detection limit.
1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007095
Report Issue Date: July 20, 1990

QA Conformance Summary

Total Threshold Limit Concentration in Soil

1.0 Blanks

The method blank was below the detection limit for all analytes as shown in Table 2.

2.0 Laboratory Control Sample (LCS)

The control limits were met for all analytes in the aqueous LCS as shown in Table 3.

3.0 Calibration Verification Standards

The control limits were met for all analytes in the initial calibration verification standard (ICVS) as shown in Table 5.

4.0 Matrix Spike (MS) Accuracy

Percent recovery limits were met for all analytes in the MS as shown in Table 6.

5.0 Sample Duplicate Precision

Relative percent difference criteria were met for the sample duplicate as shown in Table 7.

6.0 Sample Handling

6.1 Sample handling and holding time criteria were met for all samples.

6.2 There were no exceptional conditions requiring dilution of samples.

Table 2

REAGENT BLANK DATA

Total Threshold Limit Concentration in Soil

Date of Analysis: 07/16/90

Analyte	Concentration, mg/Kg
Cadmium	ND
Chromium	ND
Zinc	ND

ND = Not detected above the detection limit.

Table 3

LABORATORY CONTROL SAMPLE RESULTS

Total Threshold Limit Concentration in Soil

Date of Analysis: 07/16/90

Analyte	Expected Result, mg/L	Observed Result, mg/L	Recovery, %	Acceptability Limits, %
Cadmium	10	11.4	114	80 - 120
Chromium	10	11.3	113	80 - 120
Zinc	10	11.3	113	80 - 120

Table 3a

LABORATORY CONTROL SAMPLE SOURCE

Total Threshold Limit Concentration in Soil

Analyte	Lot Number	Source
Cadmium	1-83-VS	Spex
Chromium	1-83-VS	Spex
Zinc	1-83-VS	Spex

Table 4

INITIAL CALIBRATION STANDARDS DATA

Total Threshold Limit Concentration in Soil

Standard ID	3-83-VS Spex				
Date of Analysis	07/16/90				
Analyte	Standard Concentration, mg/L				
Cadmium	0	10			
Chromium	0	10			
Zinc	0	10			

GTEL ENVIRONMENTAL LABORATORIES, INC.

Table 5

INITIAL CALIBRATION VERIFICATION STANDARDS RESULTS

Total Threshold Limit Concentration in Soil

Date of Analysis: 07/16/90

Analyte	Expected Result, mg/L	Observed Result, mg/L	Recovery, %	Acceptability Limits, %
Cadmium	5.00	5.4	108	80 - 120
Chromium	5.00	5.3	106	80 - 120
Zinc	5.00	5.4	108	80 - 120

Table 5a

INITIAL CALIBRATION VERIFICATION STANDARDS SOURCE

Total Threshold Limit Concentration in Soil

Analyte	Lot Number	Source
Cadmium	3-83-VS	Spex
Chromium	3-83-VS	Spex
Zinc	3-83-VS	Spex

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007095
Report Issue Date: July 20, 1990

Table 6

MATRIX SPIKE (MS) RECOVERY REPORT

Total Threshold Limit Concentration in Soil

Date of Analysis: 07/16/90
Sample Spiked: D007095-02
Client ID: MW6-8.7
Units: mg/Kg

Analyte	MS Result	Sample Result	Recovered	Expected	MS, % Recovery	Acceptability Limits, %
Cadmium	611	3	608	500	122	80 - 120
Chromium	614	26	588	500	118	80 - 120
Zinc	639	46	593	500	118	80 - 120

Table 7

LABORATORY DUPLICATE SAMPLE RESULTS
AND RELATIVE PERCENT DIFFERENCE (RPD) REPORT

Total Threshold Limit Concentration in Soil

Date of Analysis: 07/16/90
Sample Used: D007095-02
Client ID: MW6-8.7
Units: mg/Kg

Analyte	Sample Result	Duplicate Result	RPD, %	Maximum RPD, %
Cadmium	611	619	1	20
Chromium	614	626	2	20
Zinc	639	655	3	20

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007094
Report Issue Date: July 13, 1990

Table 1

ANALYTICAL RESULTS

Purgeable Halocarbons in Soil
EPA Method 8010[1]

Date Sampled		06/27 TO 06/29/90	06/27 TO 06/29/90	06/27 TO 06/29/90	06/27 TO 06/29/90
Date Extracted		07/09/90	07/09/90	07/09/90	07/09/90
Date Analyzed		07/09/90	07/09/90	07/09/90	07/09/90
Client Identification		MW6-5.5	MW6-8.7	MW6-11.7	MW7-6.5
GTEL Sample Number		01	02	03	04
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Chloromethane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromomethane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorodifluoromethane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl chloride	1	< 1	< 1	< 1	< 1
Chloroethane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Methylene chloride	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorofluoromethane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1-Dichloroethene	0.2	< 0.2	< 0.2	< 0.2	< 0.2
1,1-Dichloroethane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
trans-1,2-Dichloroethene	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform	0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloroethane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,1-Trichloroethane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Carbon tetrachloride	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloropropane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
trans-1,3-Dichloropropene	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethene	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2-Trichloroethane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
cis-1,3-Dichloropropene	0.5	< 0.5	< 0.5	< 0.5	< 0.5
2-Chloroethylvinyl ether	1	< 1	< 1	< 1	< 1
Bromoform	0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,1,2,2-Tetrachloroethane	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethene	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chlorobenzene	0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,3-Dichlorobenzene	0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichlorobenzene	0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,4-Dichlorobenzene	0.5	< 0.5	< 0.5	< 0.5	< 0.5

1 = Extraction by EPA Method 5030

Project Number: SFB-175-0204.72
Consultant Project Number 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007094
Report Issue Date: July 13, 1990

Table 1 (Continued)

ANALYTICAL RESULTS

Purgeable Halocarbons in Soil
EPA Method 8010[1]

Date Sampled		06/27 TO 06/29/90	06/27 TO 06/29/90		
Date Extracted		07/09/90	07/09/90		
Date Analyzed		07/09/90	07/09/90		
Client Identification		MW8-7.0	MW9-6.8		
GTEL Sample Number		05	06		
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Chloromethane	0.5	< 0.5	< 0.5		
Bromomethane	0.5	< 0.5	< 0.5		
Dichlorodifluoromethane	0.5	< 0.5	< 0.5		
Vinyl chloride	1	< 1	< 1		
Chloroethane	0.5	< 0.5	< 0.5		
Methylene chloride	0.5	< 0.5	< 0.5		
Trichlorofluoromethane	0.5	< 0.5	< 0.5		
1,1-Dichloroethene	0.2	< 0.2	< 0.2		
1,1-Dichloroethane	0.5	< 0.5	< 0.5		
trans-1,2-Dichloroethene	0.5	< 0.5	< 0.5		
Chloroform	0.5	< 0.5	< 0.5		
1,2-Dichloroethane	0.5	< 0.5	< 0.5		
1,1,1-Trichloroethane	0.5	< 0.5	< 0.5		
Carbon tetrachloride	0.5	< 0.5	< 0.5		
Bromodichloromethane	0.5	< 0.5	< 0.5		
1,2-Dichloropropane	0.5	< 0.5	< 0.5		
trans-1,3-Dichloropropene	0.5	< 0.5	< 0.5		
Trichloroethene	0.5	< 0.5	< 0.5		
Dibromochloromethane	0.5	< 0.5	< 0.5		
1,1,2-Trichloroethane	0.5	< 0.5	< 0.5		
cis-1,3-Dichloropropene	0.5	< 0.5	< 0.5		
2-Chloroethylvinyl ether	1	< 1	< 1		
Bromoform	0.5	< 0.5	< 0.5		
1,1,2,2-Tetrachloroethane	0.5	< 0.5	< 0.5		
Tetrachloroethene	0.5	< 0.5	< 0.5		
Chlorobenzene	0.5	< 0.5	< 0.5		
1,3-Dichlorobenzene	0.5	< 0.5	< 0.5		
1,2-Dichlorobenzene	0.5	< 0.5	< 0.5		
1,4-Dichlorobenzene	0.5	< 0.5	< 0.5		

1 = Extraction by EPA Method 5030

Project Number: SFB-175-0204.72
Consultant Project Number 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007094
Report Issue Date: July 13, 1990

QA Conformance Summary

Purgeable Halocarbons in Soil
EPA Method 8010

1.0 Blanks

Zero of 29 target compounds found in Reagent blank as shown in Table 2.

2.0 Independent QC Check Sample

The control limits were met for 8 out of 8 QC check compounds as shown in Table 3.

3.0 Surrogate Compound Recoveries

Percent recovery limits were met for the surrogate compound (Bromofluorobenzene) for all samples as shown in Table 4.

4.0 Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Accuracy and Precision

4.1 Percent recovery limits were met for 3 of 3 compounds in the MS and MSD as shown in Table 5.

4.2 Relative percent difference (RPD) criteria were met for 3 of 3 compounds in the MS and MSD as shown in Table 5.

5.0 Sample Handling

5.1 Sample handling and holding time criteria were met for all samples.

5.2 There were no exceptional conditions requiring dilution of samples.

Table 2

REAGENT BLANK DATA

Purgeable Halocarbons in Soil
EPA Method 8010

Date of Analysis: 07/09/90

Analyte	Observed Result, mg/Kg
Chloromethane	<0.5
Bromomethane	<0.5
Dichlorodifluoromethane	<0.5
Vinyl chloride	<1
Chloroethane	<0.5
Methylene chloride	<0.5
Trichlorofluoromethane	<0.5
1,1-Dichloroethene	<0.2
1,1-Dichloroethane	<0.5
trans-1,2-Dichloroethene	<0.5
Chloroform	<0.5
1,2-Dichloroethane	<0.5
1,1,1-Trichloroethane	<0.5
Carbon tetrachloride	<0.5
Bromodichloromethane	<0.5
1,2-Dichloropropane	<0.5
trans-1,3-Dichloropropene	<0.5
Trichloroethene	<0.5
Dibromochloromethane	<0.5
1,1,2-Trichloroethane	<0.5
cis-1,3-Dichloropropene	<0.5
2-Chloroethylvinyl ether	<0.5
Bromoform	<1
1,1,2,2-Tetrachloroethane	<0.5
Tetrachloroethene	<0.5
Chlorobenzene	<0.5
1,3-Dichlorobenzene	<0.5
1,2-Dichlorobenzene	<0.5
1,4-Dichlorobenzene	<0.5

<# = Not detected at the indicated detection limit.

Table 3

INDEPENDENT QC CHECK SAMPLE RESULTS

Purgeable Halocarbons in Soil
EPA Method 8010

Date of Analysis: 07/03/90

Analyte	Expected Result, ug/L	Observed Result, ug/L	Recovery, %	Acceptability Limits, %
Vinyl Chloride	50	56	112	85 - 115
Chloroethane	50	55	110	85 - 115
1,2-Dichloroethane	50	51	102	85 - 115
t-1,2-Dichloroethene	50	53	106	85 - 115
1,1,2,2-Tetrachloroethane	50	51	102	85 - 115
Chloroform	50	50	100	85 - 115
Trichloroethene	50	53	106	85 - 115
1,2-Dichloropropane	50	52	104	85 - 115

Table 3a

INDEPENDENT QC CHECK SAMPLE SOURCE

Purgeable Halocarbons in Soil
EPA Method 8010

Analyte	Lot Number	Source
Vinyl Chloride	LA 21062	Purgeable C Supelco
Chloroethane	LA 21062	Purgeable C Supelco
1,2-Dichloroethane	LA 20674	Purgeable B Supelco
t-1,2-Dichlorethene	LA 20674	Purgeable B Supelco
1,1,2,2-Tetrachloroethane	LA 20674	Purgeable B Supelco
Chloroform	LA 21173	Purgeable A Supelco
Trichlorethene	LA 21173	Purgeable A Supelco
1,2-Dichloropropane	LA 21173	Purgeable A Supelco

Table 4

SURROGATE COMPOUND RECOVERY

Bromofluorobenzene

Purgeable Halocarbons in Soil
EPA Method 8010

Acceptability Limits[1]: 55 - 110 %

GTEL No.	Expected Result, ug/L	Surrogate Result, ug/L	Surrogate Recovery, %
Blank	50	45.5	91
MeOH Blank	50	47.5	95
01	50	44	88
02	50	44	88
03	50	46	92
04	50	42	84
05	50	44	88
06	50	44	88
MS	50	44.5	89
MSD	50	46	92

MS = Matrix Spike
MSD = Matrix Spike Duplicate
1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

Project Number: SFB-175-0204.72
Consultant Project Number 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007094
Report Issue Date: July 13, 1990

Table 5

MATRIX SPIKE (MS) AND MATRIX SPIKE DUPLICATE (MSD) RECOVERY
AND RELATIVE PERCENT DIFFERENCE (RPD) REPORT

Purgeable Halocarbons in Soil
EPA Method 8010

Date of Analysis: 07/09/90
Sample Spiked: D007094-03
Client ID: MW6-11.7
Units: mg/Kg

Analyte	Sample Result	Concentration Added	MS Result	MSD Result	MS, % Recovery	MSD, % Recovery
1,1-Dichloroethene	< 0.2	2.5	1.5	1.8	60	72
Chlorobenzene	< 0.5	2.5	1.7	1.8	68	72
Trichloroethene	< 0.5	2.5	1.9	2.0	76	80

Analyte	RPD, %	Maximum RPD, %	Acceptability Limits[1] % Recovery
1,1-Dichloroethene	18	30	60 - 110
Chlorobenzene	6	30	60 - 110
Trichloroethene	5	30	60 - 110

<# = Not detected at the indicated detection limit.
1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-02024.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007096
Report Issue Date: July 19, 1990

Table 1

ANALYTICAL RESULTS

Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8015[1]

GTEL Sample Number		01	02	03	
Client Identification		MW9-5.0	MW9-6.8	WM9-10.3	
Date Sampled		06/28/90	06/28/90	06/28/90	
Date Extracted		07/11/90	07/11/90	07/11/90	
Date Analyzed		07/14/90	07/14/90	07/14/90	
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Gasoline	10	<10	<10	<10	

1 = Extraction by EPA Method 5030

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-02024.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007096
Report Issue Date: July 19, 1990

QA Conformance Summary

Total Petroleum Hydrocarbons as Gasoline in Soil EPA Method 8015

1.0 Blanks

One of 1 target compound were below detection limits in the reagent water blank and reagent methanol blank as shown in Tables 2a and 2b.

2.0 Independent QC Check Sample

The control limits were met for 1 out of 1 QC check compound as shown in Table 3.

3.0 Surrogate Compound Recoveries

Percent recovery limits were met for the surrogate compound (naphthalene) for all samples as shown in Table 4.

4.0 Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Accuracy and Precision

4.1 Percent recovery limits were met for 4 of 4 compounds in the MS and MSD as shown in Table 5.

4.2 Relative percent difference (RPD) criteria was met for 4 of 4 analytes in the MS and MSD as shown in Table 5.

5.0 Sample Handling

5.1 Sample handling and holding time criteria were met for all samples.

5.2 There were no exceptional conditions requiring dilution of samples.

Table 2a

REAGENT WATER BLANK DATA

Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8015

Date of Analysis: 07/14/90

Analyte	Concentration, ug/L
Gasoline	<50

<# = Not detected above the indicated detection limit.

Table 2b

REAGENT METHANOL BLANK DATA

Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8015

Date of Analysis: 07/14/90

Analyte	Concentration, mg/Kg
Gasoline	<10

<# = Not detected above the indicated detection limit.

Project Number: SFB-175-02024.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007096
Report Issue Date: July 19, 1990

Table 3

INDEPENDENT QC CHECK SAMPLE RESULTS

Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8015

Date of Analysis: 07/16/90

Analyte	Expected Result, ug/L	Observed Result, ug/L	Recovery, %	Acceptability Limits, %
Gasoline	1040	1092	105	85 - 115

Table 3a

INDEPENDENT QC CHECK SAMPLE SOURCE

Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8015

Analyte	Source
Gasoline	Shell

Table 4

SURROGATE COMPOUND RECOVERY

Naphthalene

Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8015

Acceptability Limits[1]: 60 - 130 %

GTEL No.	Expected Result, ug/L	Surrogate Result, ug/L	Surrogate Recovery, %
Water Blank	200	156	78
MeOH Blank	200	125	63
01	200	190	95
02	200	239	120
03	200	221	111
MS	200	169	85
MSD	200	134	67

MS = Matrix Spike
MSD = Matrix Spike Duplicate
1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

Project Number: SFB-175-02024.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007096
Report Issue Date: July 19, 1990

Table 5

MATRIX SPIKE (MS) AND MATRIX SPIKE DUPLICATE (MSD) RECOVERY
AND RELATIVE PERCENT DIFFERENCE (RPD) REPORT

Total Petroleum Hydrocarbons
as Gasoline in Soil
EPA Method 8015

Date of Analysis: 07/16/90
Sample Used: C007096-02

Units: mg/Kg
Client ID MW9-6.8

Analyte	Sample Result	Concentration Added	MS Result	MS, % Recovery	MSD Result	MSD, % Recovery
Benzene	<0.005	2.86	2.44	85	2.39	84
Toluene	<0.005	2.86	2.44	85	2.39	84
Ethylbenzene	<0.005	2.86	2.49	87	2.47	86
Xylene (total)	<0.015	8.58	7.48	87	7.45	87

Analyte	RPD, %	Maximum RPD, %	Acceptability Limits[1] % Recovery
Benzene	1	30	50 - 112
Toluene	1	30	50 - 108
Ethylbenzene	1	30	50 - 113
Xylene (total)	0	30	50 - 114

<# = Not detected at the indicated detection limit.
1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: D007097
Report Issue Date: July 12, 1990

Table 1

ANALYTICAL RESULTS

Purgeable Hydrocarbons in Soil
EPA Method 8240

Date Sampled		06/28/90	06/28/90	06/28/90	
Date Analyzed		07/09/90	07/09/90	07/09/90	
Client Identification		MW9-5.0	MW9-6.8	MW9-10.3	
GTEL Sample Number		01	02	03	
Analyte	Detection Limit, ug/Kg	Concentration, ug/Kg			
Chloromethane	10	<10	<10	<10	
Bromomethane	10	<10	<10	<10	
Vinyl Chloride	10	<10	<10	<10	
Chloroethane	10	<10	<10	<10	
Methylene Chloride	5	<5	<5	<5	
Acetone	100	<100	<100	<100	
Carbon Disulfide	5	<5	<5	<5	
1,1-Dichloroethene	5	<5	<5	<5	
1,1-Dichloroethane	5	<5	<5	<5	
trans-1,2-Dichloroethene	5	<5	<5	<5	
Chloroform	5	<5	<5	<5	
1,2-Dichloroethane	5	<5	<5	<5	
2-Butanone	100	<100	<100	<100	
1,1,1-Trichloroethane	5	<5	<5	<5	
Carbon Tetrachloride	5	<5	<5	<5	
Vinyl Acetate	50	<50	<50	<50	
Bromodichloromethane	5	<5	<5	<5	
1,2-Dichloropropane	5	<5	<5	<5	
cis-1,3-Dichloropropene	5	<5	<5	<5	
Trichloroethene	5	<5	<5	<5	
Dibromochloromethane	5	<5	<5	<5	
1,1,2-Trichloroethane	5	<5	<5	<5	
Benzene	5	<5	<5	<5	
trans-1,3-Dichloropropene	5	<5	<5	<5	
2-Chloroethylvinylether	10	<10	<10	<10	

Table 1 (continued)

ANALYTICAL RESULTS

Purgeable Hydrocarbons in Soil
EPA Method 8240

Date Sampled		06/28/90	06/28/90	06/28/90	
Date Analyzed		07/09/90	07/09/90	07/09/90	
Client Identification		MW9-5.0	MW9-6.8	MW9-10.3	
GTEL Sample Number		01	02	03	
Analyte	Detection Limit,ug/Kg	Concentration, ug/Kg			
Bromoform	5	<5	<5	<5	
4-Methyl-2-Pentanone	50	<50	<50	<50	
2-Hexanone	50	<50	<50	<50	
Tetrachloroethene	5	<5	<5	<5	
1,1,2,2-Tetrachloroethane	5	<5	<5	<5	
Toluene	5	<5	<5	<5	
Chlorobenzene	5	<5	<5	<5	
Ethylbenzene	5	<5	<5	<5	
Styrene	5	<5	<5	<5	
1,2-Dichlorobenzene	5	<5	<5	<5	
1,3-Dichlorobenzene	5	<5	<5	<5	
1,4-Dichlorobenzene	5	<5	<5	<5	
Xylene (total)	5	<5	<5	<5	
Trichlorofluoromethane	5	<5	<5	<5	

QA Conformance Summary

Purgeable Hydrocarbons in Soil
EPA Method 8240

1.0 Blanks

Zero of 39 target compounds found in Reagent water blank and as shown in Table 2.

2.0 Independent QC Check Sample

The control limits were met for 8 of 8 QC check compounds in the aqueous QC check sample as shown in Table 3.

3.0 Surrogate Compound Recoveries

Recovery limits were met for all three surrogate compounds for all samples as shown in Tables 4a, 4b, and 4c.

4.0 Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Accuracy and Precision

4.1 Accuracy:

Percent recovery limits were met for 10 of 10 compounds in the MS and MSD as shown in Table 5.

4.2 Precision:

Relative Percent Difference (RPD) criteria were met for 5 of 5 compounds in the MS and MSD as shown in Table 5.

5.0 Sample Handling

5.1 Sample handling and holding time criteria were met for all samples.

5.2 There were no exceptional conditions requiring dilution of samples.

Table 2

REAGENT WATER BLANK DATA

Purgeable Hydrocarbons in Soil
EPA Method 8240

Date of Analysis: 07/09/90

Analyte	Observed Result, ug/Kg
Chloromethane	ND
Bromomethane	ND
Vinyl Chloride	ND
Chloroethane	ND
Methylene Chloride	ND
Acetone	ND
Carbon Disulfide	ND
1,1-Dichloroethene	ND
1,1-Dichloroethane	ND
trans-1,2-Dichloroethene	ND
Chloroform	ND
1,2-Dichloroethane	ND
2-Butanone	ND
1,1,1-Trichloroethane	ND
Carbon Tetrachloride	ND
Vinyl Acetate	ND
Bromodichloromethane	ND
1,2-Dichloropropane	ND
cis-1,3-Dichloropropene	ND
Trichloroethene	ND
Dibromochloromethane	ND
1,1,2-Trichloroethane	ND
Benzene	ND
trans-1,3-Dichloropropene	ND
2-Chloroethylvinylether	ND

Table 2 (continued)

REAGENT WATER BLANK DATA

Purgeable Hydrocarbons in Soil
EPA Method 8240

Analyte	Observed Result, ug/Kg
Bromoform	ND
4-Methyl-2-Pentanone	ND
2-Hexanone	ND
Tetrachloroethene	ND
1,1,2,2-Tetrachloroethane	ND
Toluene	ND
Chlorobenzene	ND
Ethylbenzene	ND
Styrene	ND
1,2-Dichlorobenzene	ND
1,3-Dichlorobenzene	ND
1,4-Dichlorobenzene	ND
Xylene (total)	ND
Trichlorofluoromethane	ND

ND = Not detected above the statistical detection limit.

Table 3

INDEPENDENT QC CHECK SAMPLE RESULTS

Purgeable Hydrocarbons in Soil
EPA Method 8240

Date of Analysis: 05/31/90

Analyte	Expected Result, ug/L	Observed Result, ug/L	Recovery, %	Acceptability Limits, %
Trichloroethylene	50	50	100	60-140
Carbon Tetrachloride	50	57	114	80-120
1,1,1-Trichloroethane	50	60	120	60-140
1,1,2-Trichloroethane	50	49	98	60-140
Vinyl Chloride	50	51	102	60-140
Benzene	50	52	104	60-140
1,1-Dichloroethylene	50	63	126	60-140
1,2-Dichlorobenzene	50	48	96	60-140

Table 3a

INDEPENDENT QC CHECK SAMPLE SOURCE

Purgeable Hydrocarbons in Soil
EPA Method 8240

Analyte	Lot Number	Source
Trichloroethylene	LA19682	Purgeable A Supelco
Carbon Tetrachloride	LA19682	Purgeable A Supelco
1,1,1-Trichloroethane	LA18769	Purgeable B Supelco
1,1,2-Trichloroethane	LA18769	Purgeable B Supelco
Vinyl Chloride	LA20078	Purgeable C Supelco
Benzene	LA18769	Purgeable B Supelco
1,1-Dichloroethylene	LA19682	Purgeable A Supelco
1,2-Dichlorobenzene	LA19682	Purgeable A Supelco

Table 4a

SURROGATE COMPOUND RECOVERY

d8-Toluene

Purgeable Hydrocarbons in Soil
EPA Method 8240

Recovery Acceptability Limits[1]: 81 - 117 %

GTEL No.	Expected Result, ug/L	Surrogate Result, ug/L	Surrogate Recovery, %
Water Blank	50	50	100
MeOH Blank	50	51	102
01	50	51	102
02	50	50	100
03	50	50	100
MS	50	50	100
MSD	50	50	100

MS = Matrix spike sample
MSD = Matrix spike duplicate sample
1 = Acceptability limits are derived from USEPA Contract Laboratory Program (CLP) requirements.

Table 4b

SURROGATE COMPOUND RECOVERY

Bromofluorobenzene

Purgeable Hydrocarbons in Soil
EPA Method 8240

Recovery Acceptability Limits[1]: 74 - 121 %

GTEL No.	Expected Result, ug/L	Surrogate Result, ug/L	Surrogate Recovery, %
Water Blank	50	49	98
MeOH Blank	50	49	98
01	50	48	96
02	50	48	96
03	50	48	96
MS	50	47	94
MSD	50	48	96

MS = Matrix spike sample
MSD = Matrix spike duplicate sample
1 = Acceptability limits are derived from USEPA Contract Laboratory Program (CLP) requirements.

Table 4c

SURROGATE COMPOUND RECOVERY

d4-1,2-Dichloroethane

Purgeable Hydrocarbons in Soil
EPA Method 8240

Recovery Acceptability Limits[1]: 70 - 121 %

GTEL No.	Expected Result, ug/L	Surrogate Result, ug/L	Surrogate Recovery, %
Water Blank	50	50	100
MeOH Blank	50	52	104
01	50	52	104
02	50	51	102
03	50	51	102
MS	50	52	104
MSD	50	51	102

MS = Matrix spike sample
MSD = Matrix spike duplicate sample
1 = Acceptability limits are derived from USEPA Contract Laboratory Program (CLP) requirements.

Table 5

MATRIX SPIKE (MS) AND MATRIX SPIKE DUPLICATE (MSD)
RECOVERY AND RELATIVE PERCENT DEVIATION (RPD)
REPORT

Purgeable Hydrocarbons in Soil
EPA Method 8240

Date of Analysis: 07/09/90
Sample Spiked: D007097-02
Client ID: MW9-6.8
Units: ug/Kg

Analyte	Sample Result	Amount Added	MS Result	MSD Result
1,1-Dichloroethene	ND	50	44	48
Trichloroethene	ND	50	40	44
Benzene	ND	50	44	47
Toluene	ND	50	42	44
Chlorobenzene	ND	50	41	44

Analyte	MS, % Recovery	MSD, % Recovery	RPD, %	Acceptability Limits[1]	
				Maximum RPD, %	% Recovery
1,1-Dichloroethene	88	96	9	22	59-172
Trichloroethene	80	88	10	24	62-137
Benzene	88	94	6	21	66-142
Toluene	84	88	5	21	59-139
Chlorobenzene	82	88	7	21	60-133

ND = Not Detected above the statistical detection limit
1 = Acceptability limits are derived from USEPA Contract Laboratory Program (CLP) requirements.

INVOICE # 72- 9133

DATE: 07/20/90

SUPERVISOR APP.: _____

JOB NO.: SFB-175-0204.72

JOB NAME: Chevron/90019

C.O.C.# _____

TO: Chevron U.S.A. Inc.
P.O. Box 5004
San Ramon, CA 94583
Attn: Accounts Payable

GTEL ENVIRONMENTAL LABORATORIES, INC.

Northwest Region
4080-C Pike Ln.
Concord, CA 94520
(415) 685-7852
FAX (415) 825-0720

PLEASE REMIT TO:
GTEL Environmental Laboratories, Inc.
P.O. Box 4795
Boston, MA 02212-4795
Terms: Net 30 Days

LABORATORY ANALYSIS CHARGES

TEST	LAB NO.	DATE RECEIVED	NUMBER OF SAMPLES	CHARGE/ SAMPLE	AMOUNT
1. BTEX/TPH/EPA 8020/8015	C007090-12	7/2/90	12 soil		
2. TPH/Diesel/Gasoline/W-Oil	C007091-03	7/2/90	03 soil		
3. TOG/EPA 413.2	C007092--03	7/2/90	03 soil		
4. Total Lead	C007093-03	7/2/90	03 soil		
5. Acid Digestion					
6. EPA 8010	C007094-06	7/2/90	06 soil		
7. TTLC/EPA 6010	C007095-03	7/2/90	03 soil		
8. Digestion					
9. TPH/gasoline /EPA 8015	C007096-03	7/2/90	03 soil		
10. EPA 8240	C007097-03	7/2/90	03 soil		

11. Level 1 10 day TAT

SHIPPING CH

Item number 7 & 8 not in contract see GTEL fee schedule on page 10.

NOTES:

Lab Release#: 3522720

Contract#: N46CWC0244-9-X

Facility#: 90019

Consultant: Western Geologic Resources

Chevron Contact: Nancy Vukelich

GTEL
ENVIRONMENTAL
LABORATORIES, INC.

Western Region
4080-C Pike Ln., Concord, CA 94520
(415) 685-7852
In CA: (800) 544-3422
Outside CA: (800) 423-7143

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007220, C007222, C007226, C007239
Report Issue Date: August 3, 1990

Len Nices
Western Geologic Resources
2169 E. Francisco Blvd.
San Rafael, CA 94901

Dear Mr. Nices:

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories on 07/07/90.

A formal quality control/quality assurance program is maintained by GTEL, which is designed to meet or exceed the EPA requirements. Analytical work for this project met QA/QC criteria unless otherwise stated in the footnotes.

GTEL is certified by the California State Department of Health Services to perform analyses for drinking water, wastewater, and hazardous waste materials according to approved protocols.

If you have any questions concerning this analysis, or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,

GTEL Environmental Laboratories, Inc.

Emma P. Popek
Laboratory Director

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007220
Report Issue Date: July 26, 1990

Table 1

ANALYTICAL RESULTS

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Water
EPA Method 8020/8015[1]

		MW-1	MW-2	MW-3	MW-4
GTEL Sample Number		01	02	03	04
Client Identification		070690-01 ABCD	070690-02 ABCD	070690-03 ABCD	070690-01 ABCD ← 04
Date Sampled		07/06/90	07/06/90	07/06/90	07/06/90
Date Analyzed		07/17/90	07/17/90	07/17/90	07/17/90
Analyte	Detection Limit, ug/L	Concentration, ug/L			
Benzene	0.3	<0.3	<0.3	<0.3	0.7
Toluene	0.3	<0.3	<0.3	<0.3	<0.3
Ethylbenzene	0.3	<0.3	<0.3	<0.3	0.5
Xylene (total)	0.6	<0.6	<0.6	<0.6	<0.6
TPH as Gasoline	50	<50	<50	<50	140

		MW-5	MW-6	MW-7	MW-8
GTEL Sample Number		05	06	07	08
Client Identification		070690-05 ABCD	070690-06 ABCD	070690-07 ABCDEF	070690-08 ABCDEF
Date Sampled		07/06/90	07/06/90	07/06/90	07/06/90
Date Analyzed		07/17/90	07/17/90	07/17/90	07/17/90
Analyte	Detection Limit, ug/L	Concentration, ug/L			
Benzene	0.3	5600	<0.3	<0.3	<0.3
Toluene	0.3	890	<0.3	<0.3	<0.3
Ethylbenzene	0.3	210	3	<0.3	<0.3
Xylene (total)	0.6	1400	7	<0.6	<0.6
TPH as Gasoline	50	30000	210	<50	<50

1 = Extraction by EPA Method 5030

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007220
Report Issue Date: July 25, 1990

Table 1 (continued)

ANALYTICAL RESULTS

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Water
EPA Method 8020/8015[1]

MW-9 TB

GTEL Sample Number		09	10		
Client Identification		070690-09 ABCDEF	070690-10 AB		
Date Sampled		07/06/90	07/06/90		
Date Analyzed		07/17/90	07/17/90		
Analyte	Detection Limit, ug/L	Concentration, ug/L			
Benzene	0.3	<0.3	<0.3		
Toluene	0.3	<0.3	<0.3		
Ethylbenzene	0.3	<0.3	<0.3		
Xylene (total)	0.6	<0.6	<0.6		
TPH as Gasoline	50	<50	<50		

1 = Extraction by EPA Method 5030

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007220
Report Issue Date: July 25, 1990

QA Conformance Summary

Purgeable Aromatics and Total Petroleum Hydrocarbons as Gasoline in Water EPA Method 8020/8015

1.0 Blanks

Five of 5 target compounds were below detection limits in the reagent blank as shown in Table 2.

2.0 Independent QC Check Sample

The control limits were met for 4 out of 4 QC check compounds as shown in Table 3.

3.0 Surrogate Compound Recoveries

Percent recovery limits were met for the surrogate compound (naphthalene) for all samples as shown in Table 4.

4.0 Matrix Spike (MS) Accuracy

Percent recovery limits were met for 4 of 4 compounds in the MS as shown in Table 5.

5.0 Reagent Water Spike (WS) and Reagent Water Spike (WSD) Duplicate Precision

Relative percent difference (RPD) criteria was met for 4 of 4 analytes in the WS and WSD as shown in Table 6.

6.0 Sample Handling

6.1 Sample handling and holding time criteria were met for all samples.

6.2 There were no exceptional conditions requiring dilution of samples.

Table 2

REAGENT BLANK DATA

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Water
EPA Method 8020/8015

Date of Analysis: 07/17/90

Analyte	Concentration, ug/L
Benzene	<0.3
Toluene	<0.3
Ethylbenzene	<0.3
Xylene (total)	<0.6
Gasoline	<50

< # = Not detected at the indicated detection limit.

Table 3

INDEPENDENT QC CHECK SAMPLE RESULTS

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Water
EPA Method 8020/8015

Date of Analysis: 07/16/90

Analyte	Expected Result, ug/L	Observed Result, ug/L	Recovery, %	Acceptability Limits, %
Benzene	50	54	108	85 - 115
Toluene	50	54	108	85 - 115
Ethylbenzene	50	57	114	85 - 115
Xylene (total)	150	172	114	85 - 115

Table 3a

INDEPENDENT QC CHECK SAMPLE SOURCE

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Water
EPA Method 8020/8015

Analyte	Lot Number	Source
Benzene	LA18042	Supelco
Toluene	LA18042	Supelco
Ethylbenzene	LA18042	Supelco
Xylene (total)	LA18042	Supelco

Table 4

SURROGATE COMPOUND RECOVERY

Naphthalene

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Water
EPA Method 8020/8015

Acceptability Limits[1]: 70 - 130 %

GTEL No.	Expected Result, ug/L	Surrogate Result, ug/L	Surrogate Recovery, %
Blank	200	162	81
01	200	172	86
02	200	191	96
03	200	207	104
04	200	155	78
05	200	329	164*
06	200	207	104
07	200	140	70
08	200	160	80
09	200	155	78
10	200	163	82
MS	200	163	81
WS	200	170	85
WSD	200	181	90

WS = Reagent Water Spike
WSD = Reagent Water Spike Duplicate
1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.
* Surrogate recovery high due to matrix interferences.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007220
Report Issue Date: July 25, 1990

Table 5

MATRIX SPIKE (MS) RECOVERY REPORT

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Water
EPA Method 8020/8015

Date of Analysis: 07/17/90
Sample Spiked: C007265-01

Client ID: MW-5
Units: ug/L

Analyte	Sample Result	Concentration Added	Concentration Recovered	MS Result	MS, % Recovery	Acceptability Limits[1], %
Benzene	<0.3	25	23.8	23.8	95	71 - 123
Toluene	<0.3	25	22.7	22.7	91	69 - 120
Ethylbenzene	<0.3	25	22.0	22.0	88	72 - 121
Xylene (total)	<0.6	75	73.5	73.5	98	75 - 123

<# = Not detected at the indicated detection limit.
1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007220
Report Issue Date: July 25, 1990

Table 6

REAGENT WATER SPIKE (WS) AND REAGENT WATER SPIKE DUPLICATE (WSD)
RECOVERY AND RELATIVE PERCENT DIFFERENCE (RPD) REPORT

Purgeable Aromatics and Total Petroleum Hydrocarbons
as Gasoline in Water
EPA Method 8020/8015

Date of Analysis: 07/17/90 Units: ug/L

Analyte	Concentration Added	WS Result	WS, % Recovery	WSD Result	WSD, % Recovery
Benzene	25	24.1	96	24.4	98
Toluene	25	23	92	23.1	92
Ethylbenzene	25	23.7	95	23.8	95
Xylene (total)	75	75.4	101	75.5	101

Analyte	RPD, %	Maximum RPD, %	Acceptability Limits[1] % Recovery
Benzene	2	30	76 - 120
Toluene	0	30	72 - 117
Ethylbenzene	0	30	73 - 123
Xylene (total)	0	30	81 - 125

1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007222
Report Issue Date: August 2, 1990

Table 1

ANALYTICAL RESULTS

Total Threshold Limit Concentration in Water[1]

GTEL Sample Number		01	02	03	
Client Identification		070690.07 ABCDEF	070690.08 ABCDEF	070690.09 ABCDEF	
Date Sampled		07/06/90	07/06/90	07/06/90	
Date Extracted		07/12/90	07/12/90	07/12/90	
Date Analyzed		7/26-30/90	7/26-30/90	7/26-30/90	
Analyte	Detection Limit, ug/L	Concentration, ug/L			
Cadmium	20	37	79	<20	
Chromium	20	190	960	48	
Lead	5	5	100	18	
Zinc	40	<40	790	180	

1 = EPA Method 3005/6010.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Project Number: SFB-175-0204.72
Consultant Project Number: 1-101.04
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007222
Report Issue Date: August 2, 1990

QA Conformance Summary

Total Threshold Limit Concentration in Water

1.0 Blanks

The method blank was not below the detection limit for Zn analyte as shown in Table 2.

2.0 Laboratory Control Sample (LCS)

The control limits were met for all analytes in the aqueous LCS as shown in Table 3.

3.0 Calibration Verification Standards

The control limits were met for all analytes in the initial calibration verification standard (ICVS) as shown in Table 5.

4.0 Matrix Spike (MS) Accuracy

Percent recovery limits were met for all analytes in the MS as shown in Table 6.

5.0 Sample Duplicate Precision

Relative percent difference criteria were met for the sample duplicate as shown in Table 7.

6.0 Sample Handling

6.1 Sample handling and holding time criteria were met for all samples.

6.2 There were no exceptional conditions requiring dilution of samples.

Table 2

REAGENT BLANK DATA

Total Threshold Limit Concentration in Water

Date of Analysis: 07/26-30/90

Analyte	Concentration, ug/L
Cadmium	ND
Chromium	ND
Lead	ND
Zinc	138*

ND = Not detected above the detection limit.
* The blank was contaminated from glassware during prep.

Table 3

LABORATORY CONTROL SAMPLE RESULTS

Total Threshold Limit Concentration in Water

Date of Analysis: 07/26-30/90

Analyte	Expected Result, ug/L	Observed Result, ug/L	Recovery, %	Acceptability Limits, %
Cadmium	1000	1000	100	80 - 120
Chromium	1000	1000	100	80 - 120
Lead	1000	967	97	80 - 120
Zinc	983	1000	98	80 - 120

Table 3a

LABORATORY CONTROL SAMPLE SOURCE

Total Threshold Limit Concentration in Water

Analyte	Lot Number	Source
Cadmium	Spex 3-83-VS	Spex
Chromium	Spex 3-83-VS	Spex
Lead	Spex 3-83-VS	Spex
Zinc	Spex 3-83-VS	Spex

Table 4

INITIAL CALIBRATION STANDARDS DATA

Total Threshold Limit Concentration in Water

Standard ID	WS101CV				
Date of Analysis	7/26-30/90				
Analyte	Standard Concentration, ug/L				
Cadmium	5000				
Chromium	5000				
Lead	5000				
Zinc	5000				

Table 5

INITIAL CALIBRATION VERIFICATION STANDARDS RESULTS

Total Threshold Limit Concentration in Water

Date of Analysis: 07/26-30/90

Analyte	Expected Result, ug/L	Observed Result, ug/L	Recovery, %	Acceptability Limits, %
Cadmium	5000	5042	101	80 - 120
Chromium	5000	5020	100	80 - 120
Lead	50	55	110	80 - 120
Zinc	5000	5143	103	80 - 120

Table 5a

INITIAL CALIBRATION VERIFICATION STANDARDS SOURCE

Total Threshold Limit Concentration in Water

Analyte	Lot Number	Source
Cadmium	Spex 2-57-VS	Spex
Chromium	Spex 2-57-VS	Spex
Lead	Spex 3-83-VS	Spex
Zinc	Spex 2-57-VS	Spex

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Contract Number: N46CWC0244-9-X
Facility Number: 90019
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Table 6

MATRIX SPIKE (MS) RECOVERY REPORT

Total Threshold Limit Concentration in Water

Date of Analysis: 07/26-30/90
Sample Spiked: C007222-03
Client ID: 070690 ABCDE 03
Units: ug/L

Analyte	MS Result	Sample Result	Recovered	Expected	MS, % Recovery	Acceptability Limits, %
Cadmium	1027	12	1015	1000	102	80 - 120
Chromium	1041	48	993	1000	99	80 - 120
Lead	995	21	974	1000	97	80 - 120
Zinc	953	180	773	1000	77	80 - 120

< # = Not detected at the indicated detection limit.

Table 7

LABORATORY DUPLICATE SAMPLE RESULTS
AND RELATIVE PERCENT DIFFERENCE (RPD) REPORT

Total Threshold Limit Concentration in Water

Date of Analysis: 07/26-30/90
Sample Used: C007222-03
Client ID: 070690 ABCDE 03
Units: ug/L

Analyte	Sample Result	Duplicate Result	RPD, %	Maximum RPD, %
Cadmium	1027	1041	1	20
Chromium	1041	1052	1	20
Lead	995	1020	2	20
Zinc	1091	1127	3	20

Project Number: SFB-175-0204.82
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007226
Report Issue Date: July 13, 1990

Table 1

ANALYTICAL RESULTS

Total Recoverable Oil and Grease in Water by Infrared
EPA Method 413.2

Sample Identification		Date Sampled	Date Extracted	Date Analyzed	Concentration, mg/L[1]
GTEL No.	Client ID				
01	070690.07 A,B,C,D,E,F	07/06/90	07/10/90	07/10/90	<1
02	070690.08 A,B,C,D,E,F	07/06/90	07/10/90	07/10/90	<1
03	070690.09 A,B,C,D,E,F	07/06/90	07/10/90	07/10/90	<1

1 = Method detection limit = 1.0 mg/L; analyte below this level would not be detected.

GTEL ENVIRONMENTAL LABORATORIES, INC.

QA Conformance Summary

Total Recoverable Oil and Grease in Water by Infrared
EPA Method 413.2

1.0 Blanks

The method blank was below the detection limit as shown in Table 2.

2.0 Initial Instrument Calibration

The range of concentrations of the initial instrument calibration are shown in Table 3.

3.0 Calibration Verification Standards

3.1 The control limits were met for the initial calibration verification standard (ICVS) as shown in Table 4.

3.2 The control limits were met for the continuing calibration verification standard (CCVS) as shown in Table 4.

4.0 Matrix Spike (MS) Accuracy

The control limits were met for the reference oil in the MS as shown in Table 5.

Table 2

METHOD BLANK DATA

Total Recoverable Oil and Grease in Water by Infrared
EPA Method 413.2

Date of Analysis: 07/10/90

Analyte	Concentration, mg/L
Oil and Grease	<1

<# = Not detected at the indicated detection limit.

Table 3

INITIAL CALIBRATION STANDARDS DATA

Total Recoverable Oil and Grease in Water by Infrared
EPA Method 413.2

Date of Analysis: 07/10/90

Standard Number	Concentration, mg/L
1	1.0
2	5.0
3	10.0
4	50.1
5	100.3

Project Number: SFB-175-0204.82
Contract Number: N46CWC0244-9-X
Facility Number: 90019
Work Order Number: C007226
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Table 4

INITIAL AND CONTINUING CALIBRATION
VERIFICATION STANDARDS RESULTS

Total Recoverable Oil and Grease in Water by Infrared
EPA Method 413.2

Date of Analysis: 07/10/90

Initial Calibration Verification Standard				
Analyte	Expected Result, mg/L	Observed Result, mg/L	Recovery, %	Acceptability Limits, %[1]
Oil and Grease	5.0	5.0	100	80 - 120
Continuing Calibration Verification Standard				
Analyte	Expected Result, mg/L	Observed Result, mg/L	Recovery, %	Acceptability Limits, %[1]
Oil and Grease	5.0	4.4	89	80 - 120

1 = Acceptability limits are derived from the 99% confidence interval of all samples during the previous quarter.

Table 4a

INITIAL AND CONTINUING CALIBRATION
VERIFICATION STANDARDS SOURCE

Total Recoverable Oil and Grease in Water by Infrared
EPA Method 413.2

Initial Calibration Verification Standard		
Analyte	Lot Number	Source
Oil and Grease	RO7/STK8	GTEL
Continuing Calibration Verification Standard		
Analyte	Lot Number	Source
Oil and Grease	RO6/STK5	GTEL