

LETTER REPORT
GROUND-WATER MONITORING
FIRST QUARTER 1991
at Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California

AGS Job No. 87091-5

5/20/91

May 20, 1991
AGS 87091-5

Mr. Ron Bock
Unocal Corporation
2000 Crow Canyon Place, Suite 400
San Ramon, California 94583

Subject: Letter report on ground-water monitoring for **first quarter 1991** at Unocal Station No. 5367, 500 Bancroft Avenue, San Leandro, California.

Mr. Bock:

This letter report summarizes the results of quarterly ground-water monitoring performed by Applied GeoSystems (AGS) at the above-referenced site, as authorized by Unocal Corporation (Unocal). The site is located at the intersection of Bancroft Avenue and Dowling Boulevard in San Leandro, California, as shown on the Site Vicinity Map, Plate 1. Locations of the wells and site facilities are shown on Plate 2.

Background

At the request of Unocal, monitoring well MW-1 was installed by AGS in September 1987 (AGS Report No. 87091-1, dated December 16, 1987). Monitoring wells MW-2 through MW-4 were installed by AGS in September 1988 (AGS Report No. 87091-3, dated November 18, 1988). Wells MW-5 and MW-6, MW-7 and MW-8 were installed in May 1989 and February 1990, respectively (AGS Report No. 87091-4, dated August 10, 1990). Quarterly ground-water monitoring was recommended by AGS after elevated levels of hydrocarbons were detected in ground water at the site.

Sampling Procedures

The quarterly monitoring program conducted by AGS includes measuring depths to water, subjectively evaluating ground-water samples, and purging and sampling ground water from monitoring wells MW-2 through MW-8. Well MW-1 was dry, consequently, no water sample was collected. This quarterly monitoring was performed on February 6 and 7, 1991, according to the attached Field Procedures (Attachment I). Storage and disposal of purge water are also described in Attachment I.

Results of Subjective Evaluations

No evidence of floating product or sheen was observed in any of the wells. Cumulative results of subjective evaluations are presented in Table 1.

Ground-Water Gradient and Flow

Ground-water depths and wellhead elevations were used to calculate differences in water-level elevations. Ground-water elevations measured on February 6, 1991, are presented in Table 2. A graphical interpretation of the ground-water surface elevation at the time of this measurement is shown on Plate 2. The ground-water gradient calculated from these measurements is approximately 0.001, with a direction of flow toward the west. The ground-water gradient and flow direction are approximately the same as those measured during the previous monitoring period in November 1990. A hydrograph of depth to water (Plate 3) shows a general fall in the water level between February and November 1990, and a slight water level rise between November 1990 and February 1991. The water level dropped an average of 1.8 feet between February 1990 and February 1991.

Analytical Methods and Results

Ground-water samples collected on February 7, 1991, were analyzed for total petroleum hydrocarbons as gasoline (TPHg) using Environmental Protection Agency (EPA) modified Method 8015 and for benzene, toluene, ethylbenzene, and total xylenes (BTEX) using EPA Method 602. These analyses were conducted at the Applied Analytical laboratory in Fremont, California (Hazardous Waste Testing Laboratory, State Certification No. 1211). Copies of the Chain of Custody Record and the certified analysis reports are in Attachment II.

The results of laboratory analyses show the highest concentrations of TPHg and BTEX were detected in the water samples from wells MW-3, MW-2, and MW-8, which are located west, south, and southwest, respectively of the gasoline USTs. Concentrations of TPHg of 13,000 parts per billion (ppb) were detected in the ground-water sample from well MW-3, and 510 ppb and 630 ppb were detected in the ground-water samples from wells MW-2 and MW-8 respectively. Samples from wells MW-4 through MW-7 showed no detectable levels of TPHg or BTEX. The distribution of TPHg in ground water is presented on Plate 4. Concentrations of TPHg and BTEX are generally higher than those detected in November 1990.

Conclusions and Recommendations

Elevated levels of TPHg and BTEX are present west and southwest of the gasoline USTs and service islands. Because elevated levels of some constituents are present in the ground water, we recommend that ground-water sampling and analysis for hydrocarbon compounds be continued on a quarterly schedule to monitor changes in hydrocarbon concentrations and ground-water flow for monitoring wells MW-2, MW-3, and MW-8. We recommend semiannual sampling of MW-4 through MW-7 because TPHg or BTEX have been at trace levels or below detection limits for the last four quarters. Because diesel fuel is currently being stored on site, we also recommend sampling well MW-1 when ground water is present (one time only) for total petroleum hydrocarbons as diesel.

We recommend that copies of this report be sent to Mr. Lester Feldman of the California Regional Water Quality Control Board, San Francisco Bay Region, 2101 Webster Street, Suite 500, Oakland, California 94612, and Mr. Joe Ferreira at the San Leandro Fire Department, 835 East 14th Street, San Leandro, California 94577.

Scheduling

The second quarter 1991 monitoring is scheduled for May 1991.

First Quarter 1991 Ground-Water Monitoring
Unocal Station No. 5367, San Leandro, California

May 20, 1991
AGS 87091-5

Please call if you have any questions.

Sincerely,
Applied GeoSystems

ORIGINAL SIGNED BY

Clark A. Robertson
Project Geologist

ORIGINAL SIGNED BY

Joan E. Tiernan
Registered Civil Engineer
No. 044600

Enclosures: Results of Subjective Evaluations, Table 1
Ground-Water Elevation Data, Table 2
Results of Laboratory Analyses of Ground Water, Table 3
Site Vicinity Map, Plate 1
Generalized Site Plan and Ground-Water Elevation Map, Plate 2
Hydrograph, Plate 3
Concentration of TPHg in Ground Water, Plate 4

Attachment I: Field Procedures

Attachment II: Chain of Custody Record and Certified Analysis Reports

TABLE 1
 RESULTS OF SUBJECTIVE EVALUATIONS
 (Page 1 of 2)

Well	Date	Depth to Water	Floating Product	Sheen
MW-1	09/23/87	33.40	0.02	NA
	09/24/87	33.24	0.01	NA
	10/06/87	33.39	0.01	NA
	11/05/87	34.14	0.31	NA
	11/13/87	34.15	0.38	NA
	11/19/87	33.89	0.06	NA
	04/27/88	32.40	0.01	NA
	09/07/88	---	Well dry	--
	10/03/88	---	Well dry	--
	01/27/89	---	Well dry	--
	02/16/90	---	Well dry	--
	07/19/90	---	Well dry	--
	08/24/90	---	Well dry	--
	11/30/90	---	Well dry	--
	02/06/91	---	Well dry	--
MW-2	10/03/88	36.04	NONE	NONE
	01/27/89	34.77	NONE	NONE
	02/16/90	34.50	NONE	NONE
	07/19/90	35.72	NONE	NONE
	08/24/90	36.30	NONE	NONE
	11/30/90	37.40	NONE	NONE
	02/07/91	37.27	NONE	NONE
MW-3	10/03/88	35.86	NONE	NONE
	01/27/89	34.60	NONE	NONE
	02/16/90	35.23	NONE	NONE
	07/19/90	35.50	NONE	NONE
	08/24/90	36.08	NONE	NONE
	11/30/90	37.17	NONE	NONE
	02/06/91	37.07	NONE	NONE
MW-4	10/03/88	36.12	NONE	NONE
	01/27/89	34.87	NONE	NONE
	02/16/90	35.60	NONE	NONE
	07/19/90	35.78	NONE	NONE

See notes on page 2 of 2

TABLE 1
 RESULTS OF SUBJECTIVE EVALUATIONS
 (Page 2 of 2)

Well	Date	Depth to Water	Floating Product	Sheen
MW-4	08/24/90	36.35	NONE	NONE
	11/30/90	37.46	NONE	NONE
	02/06/91	37.40	NONE	NONE
MW-5	02/16/90	35.89	NONE	NONE
	07/19/90	36.10	NONE	NONE
	08/24/90	36.67	NONE	NONE
	11/30/90	37.74	NONE	NONE
	02/06/91	37.62	NONE	NONE
MW-6	02/16/90	34.50	NONE	NONE
	07/19/90	34.74	NONE	NONE
	08/24/90	35.32	NONE	NONE
	11/30/90	36.38	NONE	NONE
	02/06/91	36.27	NONE	NONE
MW-7	02/16/90	35.75	NONE	NONE
	07/19/90	35.03	NONE	NONE
	08/24/90	35.64	NONE	NONE
	11/30/90	36.68	NONE	NONE
	02/06/91	36.55	NONE	NONE
MW-8	02/16/90	35.10	NONE	NONE
	07/19/90	35.41	NONE	NONE
	08/24/90	36.00	NONE	NONE
	11/30/90	37.08	NONE	NONE
	02/06/91	36.92	NONE	NONE

Depth to water measured in feet below top of casing.
 Product thickness measured in feet.
 NA = Not applicable

TABLE 2
GROUND-WATER ELEVATION DATA
(February 6, 1991)

Monitoring Well	Top of Casing Above MSL (C)	Static Water Level (W)	Water Level Above MSL (C-W)
MW-1	53.83	DRY	DRY
MW-2	58.13	37.27	20.86
MW-3	57.92	37.07	20.85
MW-4	58.29	37.40	20.89
MW-5	58.50	37.62	20.88
MW-6	56.96	36.27	20.69
MW-7	57.25	36.55	20.70
MW-8	57.71	36.92	20.79

Measurements are in feet.

Static water level was measured in feet below top of casing. Datum is mean sea level based on City of San Leandro datum at the southeastern corner of the intersection of Dowling Boulevard and Bancroft Avenue, next to the storm inlet.

TABLE 3
 RESULTS OF LABORATORY ANALYSES OF GROUND WATER
 (Page 1 of 2)

Date	Sample Number	TPHg	B	T	E	X
WELL MW-1						
10/88	Well dry	therefore	water	sample	not	collected
01/89	Well dry	therefore	water	sample	not	collected
02/90	Well dry	therefore	water	sample	not	collected
05/90	Well dry	therefore	water	sample	not	collected
08/90	Well dry	therefore	water	sample	not	collected
11/90	Well dry	therefore	water	sample	not	collected
02/91	Well dry	therefore	water	sample	not	collected
WELL MW-2						
10/88	W-37-MW2	1,760	47.8	7.4	20.9	81.6
01/89	W-35-MW2	510	58.0	8.7	22.6	20.3
02/90	W-36-MW2	840	50.0	0.5	28.0	44.0
05/90	W-36-MW2	1,000	39.0	<0.5	32.0	52.0
08/90	W-36-MW2	330	17	<0.5	19	20
11/90	W-37-MW2	400	41	<0.5	39	37
02/91	W-37-MW2	510	40	<0.5	29	44
WELL MW-3						
10/88	W-37-MW3	61,000	1,060	3,380	1,520	8,720
01/89	W-35-MW3	39,000	1,570	2,830	1,250	7,070
02/90	W-36-MW3	22,000	710	4,100	6,900	33,000
05/90	W-36-MW3	19,000	330	170	310	1,500
08/90	W-36-MW3	19,000	480	160	510	1,500
11/90	W-37-MW3	13,000	390	81	410	1,000
02/91	W-37-MW3	13,000	310	150	380	1,200
WELL MW-4						
10/88	W-37-MW4	<20	<0.5	<0.5	<0.5	<0.5
01/89	W-35-MW4	<20	<0.5	<0.5	<0.5	<0.5
02/90	W-36-MW4	<20	<0.5	<0.5	<0.5	<0.5
05/90	W-36-MW4	<20	<0.5	<0.5	0.68	1.4
08/90	W-36-MW4	<20	<0.5	<0.5	<0.5	<0.5
11/90	W-37-MW4	<50	<0.5	<0.5	<0.5	1.2
02/91	W-37-MW4	<50	<0.5	<0.5	<0.5	<0.5

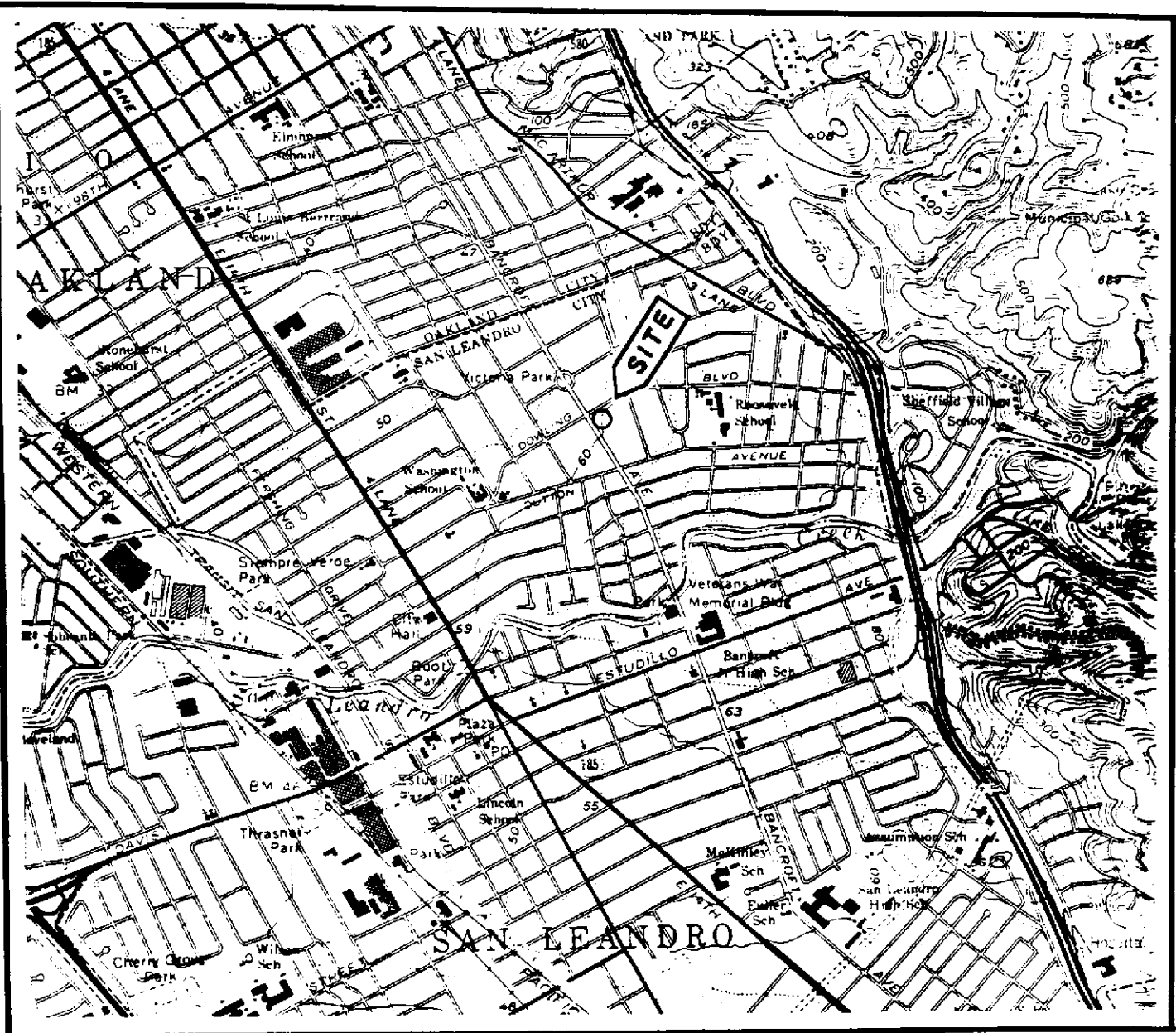
TABLE 3
 RESULTS OF LABORATORY ANALYSES OF GROUND WATER
 (Page 2 of 2)

Date	Sample Number	TPHg	B	T	E	X
WELL MW-5						
02/90	W-36-MW5	67	0.51	1.6	2.9	7.5
05/90	W-36-MW5	<20	<0.5	<0.5	<0.5	<0.5
08/90	W-35-MW5	<20	<0.5	<0.5	<0.5	<0.5
11/90	W-38-MW5	<50	<0.5	0.7	<0.5	<0.5
02/91	W-38-MW5	<50	<0.5	<0.5	<0.5	<0.5
WELL MW-6						
02/90	W-35-MW6	<20	<0.5	<0.5	<0.5	<0.5
05/90	W-37-MW6	<20	<0.5	<0.5	<0.5	<0.5
08/90	W-35-MW6	<20	<0.5	<0.5	<0.5	<0.5
11/90	W-36-MW6	<50	<0.5	<0.5	<0.5	<0.5
02/91	W-36-MW6	<50	<0.5	<0.5	<0.5	<0.5
WELL MW-7						
02/90	W-36-MW7	<20	<0.5	<0.5	<0.5	<0.5
05/90	W-35-MW7	24	<0.5	<0.5	0.74	1.7
08/90	W-35-MW7	<20	<0.5	<0.5	<0.5	<0.5
11/90	W-37-MW7	<50	<0.5	<0.5	0.6	1.5
02/91	W-37-MW7	<50	<0.5	<0.5	<0.5	<0.5
WELL MW-8						
02/90	W-35-MW8	1,900	11	<0.5	52	55
05/90	W-36-MW8	770	6.5	<0.5	20	32
08/90	W-36-MW8	990	13	<0.5	48	66
11/90	W-37-MW8	570	13	<0.5	45	36
02/91	W-37-MW8	630	9.6	<0.5	35	36

Results in micrograms/liter ($\mu\text{g}/\text{l}$) = parts per billion (ppb)
 TPHg = Total petroleum hydrocarbons as gasoline
 BTEX = Benzene, ethylbenzene, toluene, total xylene isomers
 < = Less than the detection limit for the method of analysis.

Sample designation: W-37-MW8

W — Monitoring well number
37 — Sample depth in feet
MW8 — Water sample



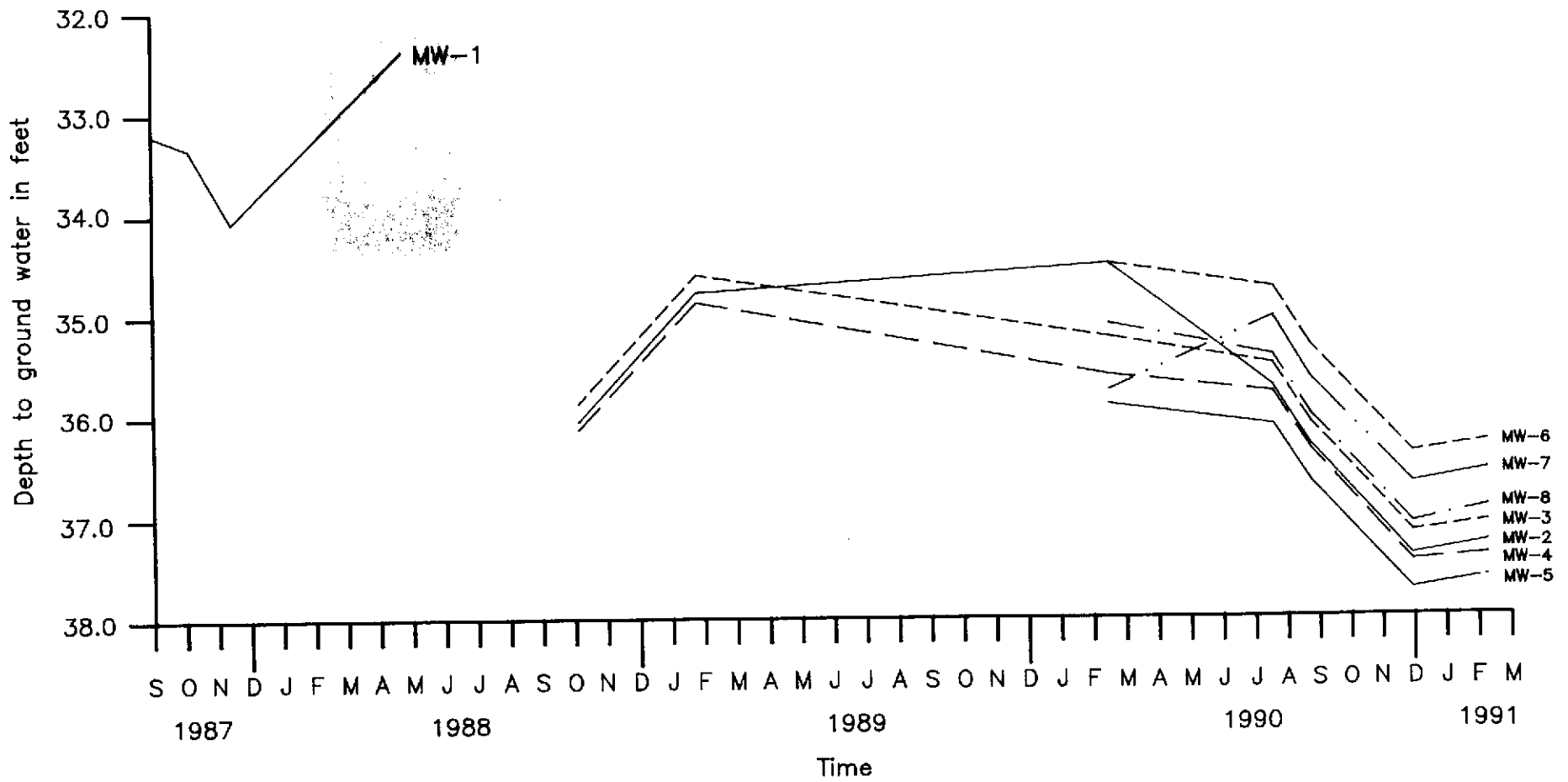
Source: U.S. Geological Survey
 7.5-Minute Quadrangle
 San Leandro, California
 Photorevised 1980



PROJECT NO. 87091-5

SITE VICINITY MAP
 Unocal Station No. 5367
 500 Bancroft Avenue
 San Leandro, California

PLATE
 1



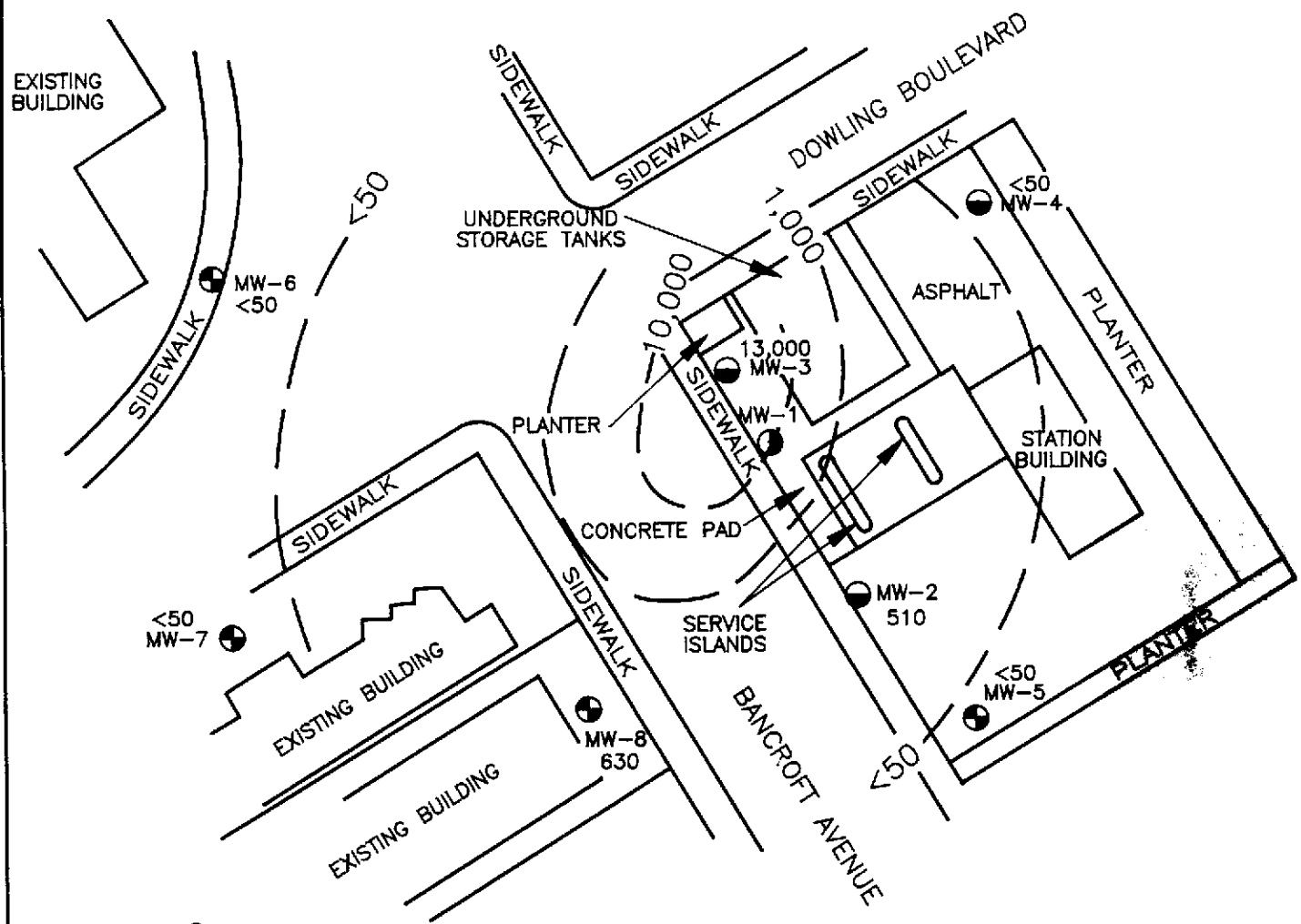
PLATE

3

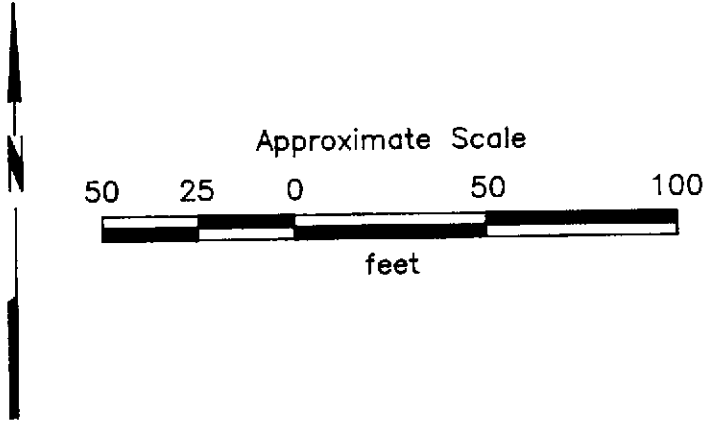
HYDROGRAPH
Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California



PROJECT NO. 87091-5



- 10,000 = Line of equal concentration in parts per billion
- 13,000 = Concentration in parts per billion (February 1991)
- MW-8 ● = Monitoring well (Applied GeoSystems, May 1989 and February 1990)
- MW-4 ● = Monitoring well (Applied GeoSystems, September 1988)
- MW-1 ● = Monitoring well (Applied GeoSystems, September 1987)
- TPHg = Total petroleum hydrocarbons as gasoline



PROJECT NO. 87091-5

**CONCENTRATION OF TPHg
IN GROUND WATER
Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California**

**PLATE
4**

ATTACHMENT I
FIELD PROCEDURES

FIELD PROCEDURES

Ground-Water Monitoring

Static water level was measured to the nearest 0.01 foot with a Solinst water-level indicator. After the static ground-water level was recorded, an initial sample was collected from each well and checked for floating product and sheen. The samples were collected by gently lowering approximately half the length of a Teflon bailer past the air-water interface to collect a sample from near the surface of the water in each well. The bailer was cleaned with Alconox and deionized water after each use.

Ground-Water Sampling

The wells were purged of at least 3 well volumes of water and allowed to recover to their approximate static water levels. Samples for laboratory analysis then were collected from the static water surface with a Teflon bailer that was thoroughly cleaned with Alconox (a commercial, biodegradable detergent) and water. The samples were transferred to laboratory-cleaned, 40-milliliter glass vials. Hydrochloric acid was added to the vials as a preservative. The samples were sealed with Teflon-lined caps, labeled, and stored on ice. The sampler initiated a Chain of Custody Record and it accompanied the samples to the State-certified analytical laboratory.

Water Storage and Disposal

The water purged from the wells was temporarily stored onsite in labelled, sealed 17E 55-gallon liquid-waste drums approved for this use by the Department of Transportation. The purge water was removed from the site for disposal on February 22, 1991, by H & H Environmental of San Francisco, California.

Ground-Water Reporting

Concentrations of hydrocarbon constituents in ground-water samples are reported by the laboratory in units of parts per billion (ppb). The Maximum Contaminant Levels listed in Title 22 of the Code of California Regulations for benzene, ethylbenzene, and total xylene isomers are 1.0, 680, and 1,750 ppb, respectively. The action level established for toluene by the California Department of Health Services is 100 ppb. To conform to the laboratory reports we report ground-water chemical data in units of ppb.

**ATTACHMENT II
CHAIN OF CUSTODY RECORD
AND
LABORATORY ANALYSIS REPORTS**

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Clark Robertson
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87091-4

Date Sampled: 02-07-91
Date Received: 02-07-91
BTEX Analyzed: 02-21-91
TPHg Analyzed: 02-21-91
TPHd Analyzed: NR
Matrix: Water

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.5	0.5	0.5	0.5	50	100

SAMPLE Laboratory Identification

W-36-MW6 W1102105	ND	ND	ND	ND	ND	NR
W-37-MW4 W1102106	ND	ND	ND	ND	ND	NR
W-38-MW5 W1102107	ND	ND	ND	ND	ND	NR
W-37-MW7 W1102108	ND	ND	ND	ND	ND	NR
W-37-MW2 W1102109	40	ND	29	44	510	NR

ppb = parts per billion = $\mu\text{g/L}$ = micrograms per liter.

ND = Not detected. Compound(s) may be present at concentrations below the detection limit.

NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg-- Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd-- Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.



Laboratory Representative

February 21, 1991

Date Reported

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Clark Robertson
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87091-4

Date Sampled: 02-07-91
Date Received: 02-07-91
BTEX Analyzed: 02-21-91
TPHg Analyzed: 02-21-91
TPHd Analyzed: NR
Matrix: Water

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>
Detection Limit:	0.5	0.5	0.5	0.5	50	100

SAMPLE

Laboratory Identification

W-37-MW8 W1102110	9.6	ND	35	36	630	NR
W-37-MW3 W1102111	310	150	380	1200	13000	NR

ppb = parts per billion = $\mu\text{g/L}$ = micrograms per liter.

ND = Not detected. Compound(s) may be present at concentrations below the detection limit.

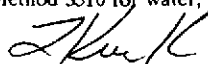
NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg-Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd-Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.


Laboratory Representative

February 21, 1991

Date Reported



CHAIN-OF-CUSTODY RECORD

PROJ. NO. 87091-4		PROJECT NAME UNOCAL SAN LEANDRO		No. of Containers	ANALYSIS							REMARKS	LABORATORY I.D. NUMBER
P.O. NO.		SAMPLERS (Signature) LOUIS R WICK			TPH Gasoline (8015)	BTEX (802/8020)	TPH Aesel (8015)						
DATE MM/DD/YY	TIME												
2/7/91	12:30	W-36 - MW 6		3	✓	✓					No/IE		
	12:40	W-37 - MW 4		3	✓	✓							
	12:50	W-38 - MW 5		3	✓	✓							
	1:00	W-31 - MW 7		3	✓	✓							
	1:10	W-37 - MW 2		3	✓	✓							
	1:20	W-37 - MW 8		3	✓	✓							
✓	1:30	W-37 - MW 3		3	✓	✓					✓		

RELINQUISHED BY (Signature): <i>LOUIS R WICK</i>	DATE / TIME 2/7/91 15:15	RECEIVED BY (Signature):		Laboratory: <i>APPLIED ANALYTICAL</i>	SEND RESULTS TO: Applied GeoSystems 42501 Albrae Street Fremont, CA 94538 (415) 651-1906 Proj. Mgr.: <i>CLARK ROBERTSON</i>
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):			
RELINQUISHED BY (Signature):	DATE / TIME 2/7/91 15:15	RECEIVED FOR LABORATORY BY (Signature): <i>U. G. G. G.</i>			
				Turn Around: 2 WK	