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

AGS Job No. 87091-5

9/4/91

September 4, 1991
AGS 87091-5

Mr. Bob Boust
Unocal Corporation
2000 Crow Canyon Place, Suite 400
San Ramon, California 94583

Subject: Letter Report on Ground-Water Monitoring for Second Quarter 1991 at Unocal Station No. 5367, 500 Bancroft Avenue, San Leandro, California.

Mr. Boust:

This letter report summarizes the results of the second quarter 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, and 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 and subjectively evaluating ground-water samples from monitoring wells MW-2 through MW-8, and purging and sampling ground water from monitoring wells MW-2, MW-3, and MW-8. Wells MW-4, MW-5, MW-6, and MW-7, which have shown no detectable gasoline hydrocarbons, were not sampled during this event because they are sampled semiannually. Well MW-1 had only 1-1/2 feet of water and could not be adequately purged, consequently,

no water sample was collected. This quarterly monitoring was performed on May 6, 1991, in accordance with the Field Procedures in 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 the water-level elevations in wells. Ground-water elevations measured on May 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 0.002, 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 February 1991. A hydrograph of depth to water (Plate 3) shows a rise of over 2 feet in the water level between July 1990 and May 1991. The water level rose an average of 3.93 feet between February and May 1991.

Analytical Methods and Results

Ground-water samples collected on May 6, 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 Certification No. 1211). Copies of the Chain of Custody Record and the certified analysis report are in Attachment II.

The results of laboratory analyses show the highest concentrations of TPHg and BTEX were detected in the water sample from well MW-3, which is located west of the gasoline USTs. Concentrations of TPHg in wells MW-3, MW-2, and MW-8 were 39,000, 14,000, and 2,300 parts per billion (ppb), respectively. Benzene concentrations in wells MW-3, MW-2, and MW-8 were 1,000, 150, and 80 ppb, respectively. Concentrations of TPHg and BTEX are higher than those detected in February 1991.

Conclusions and Recommendations

Elevated levels of TPHg and BTEX are present west and southwest of the gasoline USTs and service islands. Because of increased concentrations in TPHg and BTEX in ground-water monitoring wells MW-2, MW-3, and MW-8, we recommend that ground-water sampling and analyses for hydrocarbon compounds in these wells be continued on a quarterly schedule to monitor changes in hydrocarbon concentrations. Because diesel fuel is currently stored on site, we also recommend sampling well MW-1 once, when ground water is present in sufficient quantities for total petroleum hydrocarbons as diesel.

We also 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.

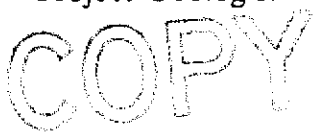
Scheduling

The third quarter 1991 monitoring is scheduled for August 1991.

Please call if you have any questions.

Sincerely,
Applied GeoSystems

Clark A. Robertson
Project Geologist



Rodger C. Witham
Project Manager

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

Attachment I: Field Procedures
Attachment II: Chain of Custody Record and Certified Analysis Report

TABLE 1
RESULTS OF SUBJECTIVE EVALUATIONS
(Page 1 of 3)

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	--
	05/06 91	33.00	NONE	NONE
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
	05/06/91	33.31	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
	05/06/91	33.11	NONE	NONE

See notes on page 3 of 3

TABLE 1
RESULTS OF SUBJECTIVE EVALUATIONS
(Page 2 of 3)

Well	Date	Depth to Water	Floating Product	Sheen
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
	08/24/90	36.35	NONE	NONE
	11/30/90	37.46	NONE	NONE
	02/06/91	37.40	NONE	NONE
	05/06/91	33.39	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
	05/06/91	33.67	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
	05/06/91	32.41	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
	05/06/91	32.69	NONE	NONE

See notes on page 3 of 3

TABLE 1
RESULTS OF SUBJECTIVE EVALUATIONS
(Page 3 of 3)

Well	Date	Depth to Water	Floating Product	Sheen
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
	05/06/91	33.03	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
(May 6, 1991)

Monitoring Well	Top of Casing Above MSL (C)	Static Water Level (W)	Water Level Above MSL (C-W)
MW-1	57.83	33.00	24.83
MW-2	58.13	33.31	24.82
MW-3	57.92	33.11	24.81
MW-4	58.29	33.39	24.90
MW-5	58.50	33.67	24.83
MW-6	56.96	32.41	24.55
MW-7	57.25	32.69	24.56
MW-8	57.71	33.03	24.68

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)

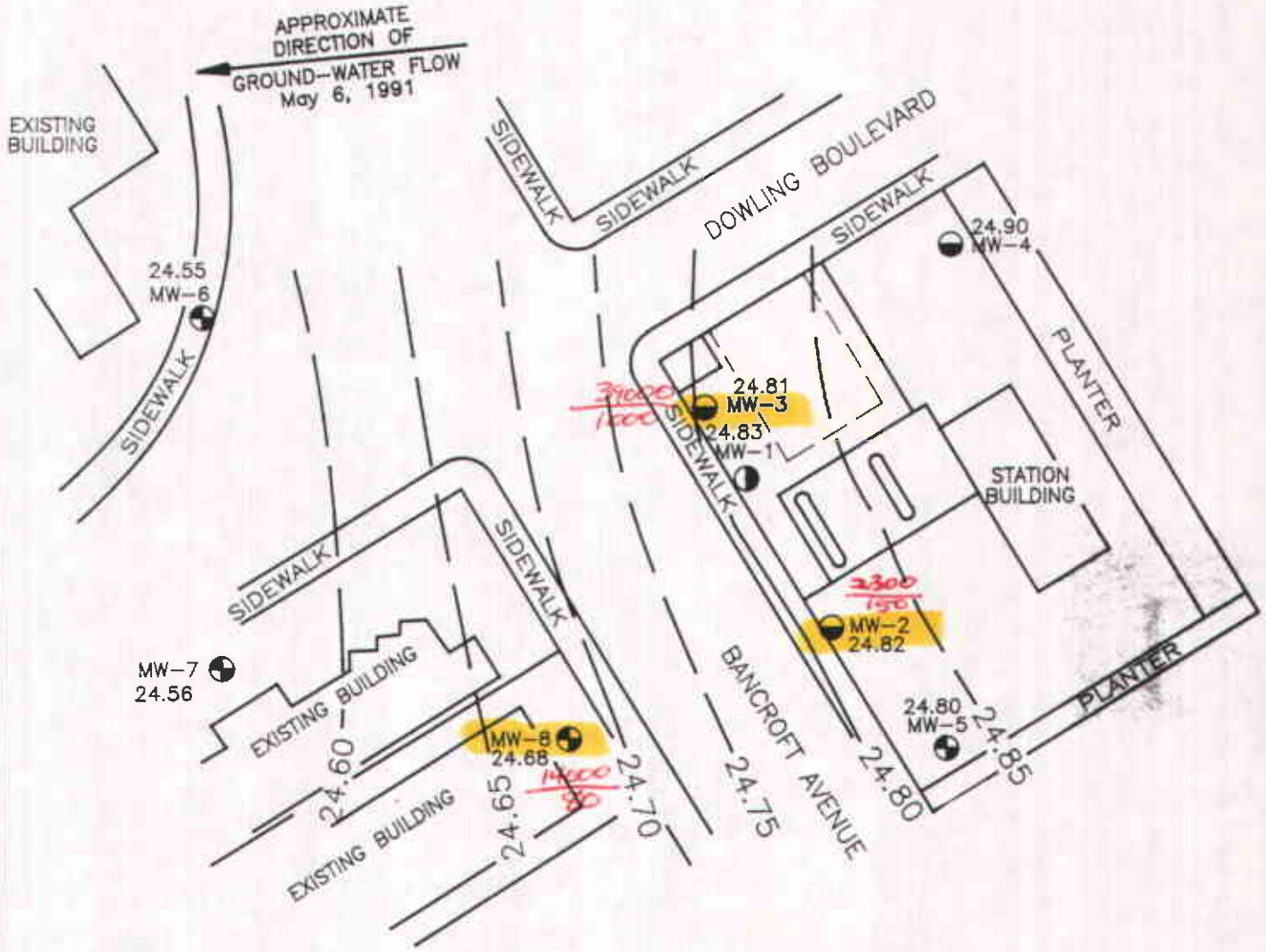
Date	Sample Number	TPHg	B	T	E	X
WELL MW-1						
10/88	Well dry therefore water sample not collected					
01/89	Well dry therefore water sample not collected					
02/90	Well dry therefore water sample not collected					
05/90	Well dry therefore water sample not collected					
08/90	Well dry therefore water sample not collected					
11/90	Well dry therefore water sample not collected					
02/91	Well dry therefore water sample not collected					
05/91	Insufficient water to purge and sample well					
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
05/91	W-33-MW2	2,300	150	10	52	110
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
05/91	W-33-MW3	39,000	1,000	570	930	3,900
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
05/91	Not Sampled					

See notes on page 2 of 2

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
05/91		Not Sampled				
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
05/91		Not Sampled				
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
05/91		Not Sampled				
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
05/91	W-33-MW8	14,000	80	<0.5	250	550

Results in micrograms/liter (g/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-37-MW8 — Monitoring well number
- W-37-MW8 — Sample depth in feet
- W-37-MW8 — Water sample



24.85 = Line of equal ground-water elevation in feet above mean sea level

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)

N

Approximate Scale

50 25 0 50 100

feet

Applied GeoSystems

PROJECT NO. 87091-5

GENERALIZED SITE PLAN AND GROUND-WATER ELEVATION MAP
Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California

PLATE 2

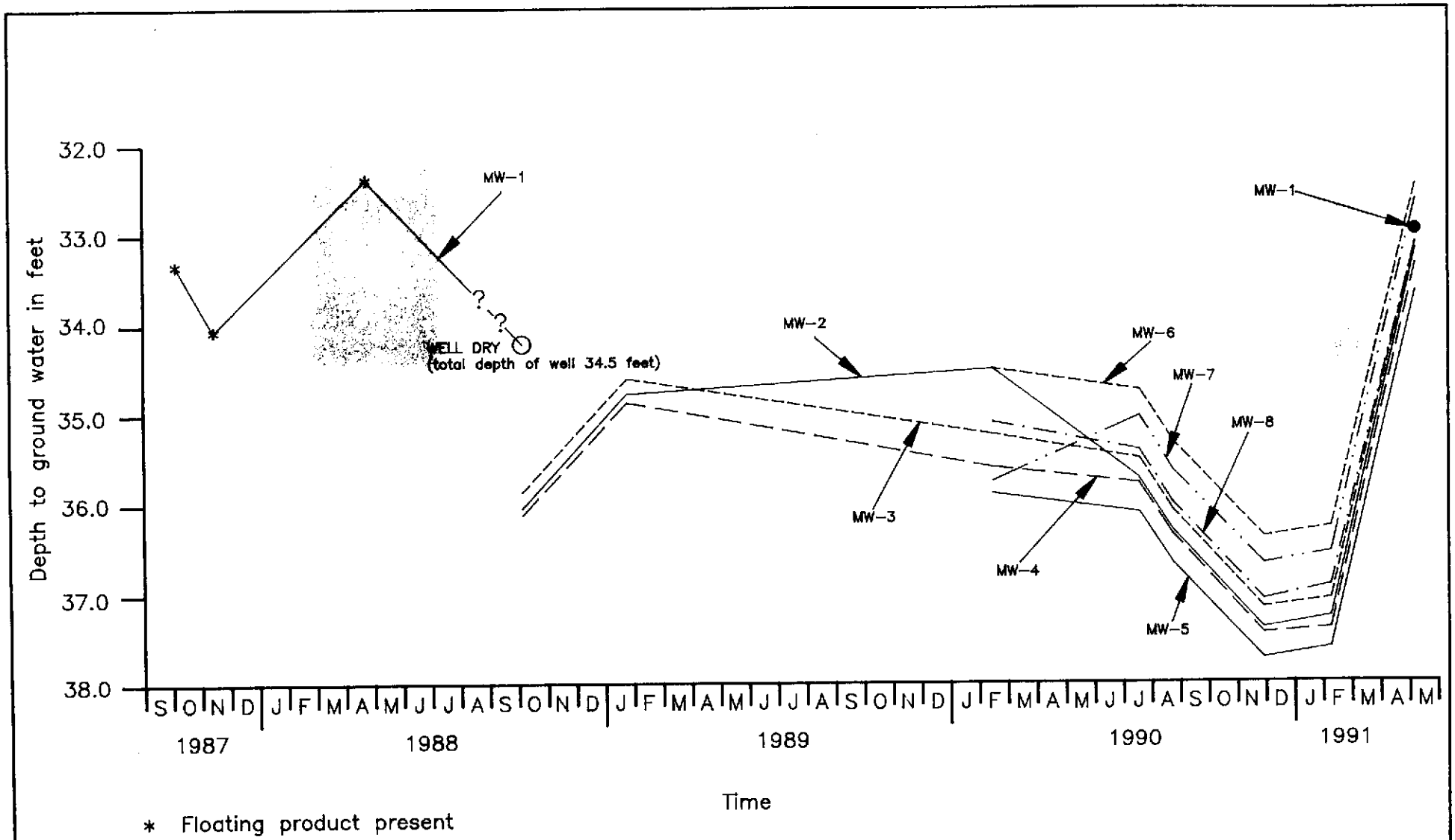
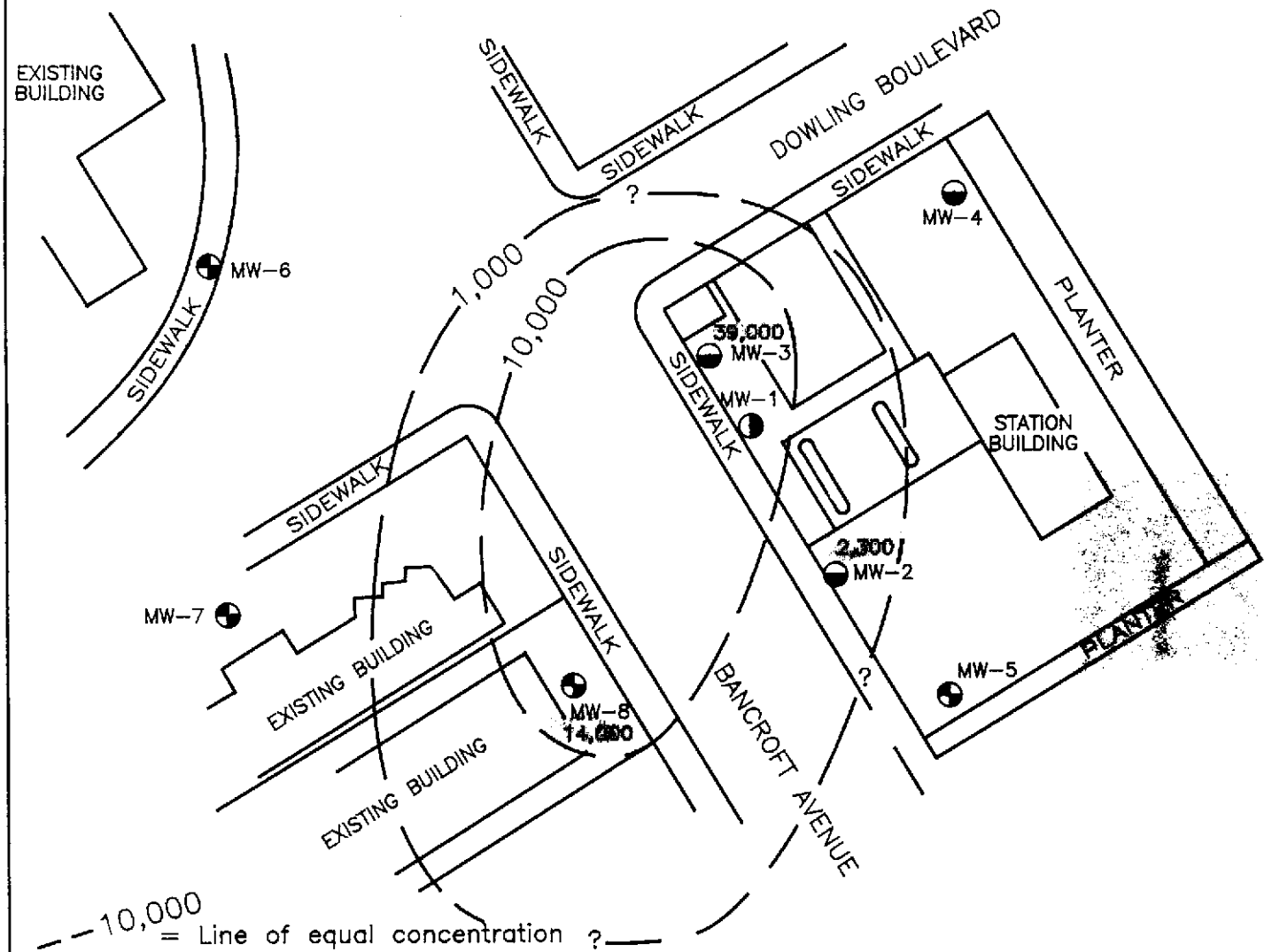


PLATE	HYDROGRAPH	
3	Unocal Station No. 5367 500 Bancroft Avenue San Leandro, California	Applied GeoSystems PROJECT NO. 87091-5

87091T05



10,000 = Line of equal concentration in parts per billion

13,000 = Concentration in parts per billion (May 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

N

Approximate Scale

50 25 0 50 100

feet

Applied GeoSystems

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 May 21, 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 REPORT

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO.	PROJECT NAME
870915	UNOCAL-SAN LEANDRO
P.O. NO.	SAMPLERS (Signature)

DATE MM/DD/YY	TIME		No. of Containers	TPHgasoline (8015)	BTEX (602/8020)	TPHdiesel (8015)					Preserved?	REMARKS	LABORATORY I.D. NUMBER
5/6/91		W-33-MW8	3	/	/						HCl/ICE		
〃		W-33-MW3	3	/	/						〃		
〃		W-33-MW2	3	/	/						〃		

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature): 5-6-91 1605

Laboratory: APPLIED ANALYTICAL

Turn Around: 2 wk

SEND RESULTS TO:
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
(415) 651-1906

Proj. Mgr.: Clarke Robertson

APPLIED ANALYTICAL

Environmental Laboratories

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

ANALYSIS REPORT

rpts

Attention:	Mr. Clark Robertson	Date Sampled:	05-06-91
	Applied GeoSystems	Date Received:	05-06-91
	42501 Albrae Street	BTEX Analyzed:	05-13-91
	Fremont, CA 94538	TPHg Analyzed:	05-13-91
Project:	AGS 87091-5	TPHd Analyzed:	NR
		Matrix:	Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppm
Detection Limit:	0.5	0.5	0.5	0.5	50	100
SAMPLE Laboratory Identification						
W-33-MW8 W1105082	80	ND	250	550	14000	NR
W-33-MW3 W1105083	1000	570	930	3900	39000	NR
W-33-MW2 W1105084	150	10	52	110	2300	NR

ppb = parts per billion = µg/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

May 15, 1991
Date Reported

APPLIED ANALYTICAL LABORATORY IS CERTIFIED BY THE STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES AS A HAZARDOUS WASTE TESTING LABORATORY
(Certification No. 1211)