LETTER REPORT
GROUNDWATER MONITORING
FOURTH QUARTER 1991
at Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California

RESNA Job No. 87091-5

2/21/92

February 21, 1992
RESNA 87091-5

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

Subject: Letter Report on Groundwater Monitoring for Fourth Quarter 1991 at Unocal Station No. 5367, 500 Bancroft Avenue, San Leandro, California.

Dear Mr. Boust:

This letter report summarizes the results of the fourth quarter groundwater monitoring performed by RESNA Industries (RESNA), formerly 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

This is an operating service station. 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 groundwater monitoring was begun by AGS after elevated levels of hydrocarbons were detected in groundwater at the site.

Sampling Procedures

The quarterly monitoring program conducted by RESNA includes measuring depths to water and subjectively evaluating groundwater samples from all monitoring wells, and purging and sampling groundwater from selected monitoring wells. Well MW-1 was not sampled because it was dry. Wells MW-4, MW-5, MW-6, and MW-7 were not sampled because they have lacked detectable TPHg or BTEX in 1991. This quarterly monitoring was performed

on December 27, 1991, in accordance with the Field Procedures in Attachment I. Disposal of purge water is 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.

Groundwater Flow, Gradient, and Depth

Groundwater depths from Table 1 and surveyed wellhead elevations were used to calculate differences in the water-level elevations in wells. Groundwater elevation data for December 27, 1991, are presented in Table 2. The groundwater flows toward the southwest with a gradient of approximately 0.001 as shown on Plate 2. The water levels fell an average of about one foot between September and December 1991. A hydrograph (Plate 3) shows relative changes in depth to water for selected wells since October 1988.

Analytical Methods and Results

Groundwater samples collected on December 27, 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 Applied Analytical Environmental 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-8, and MW-2 were 31,000, 1,600, and 170 parts per billion (ppb), respectively. Benzene concentrations in wells MW-3, MW-8, and MW-2 were 240, 15, and 3.9 ppb, respectively.

Conclusions and Recommendations

Elevated levels of TPHg and BTEX are present west and southwest of the gasoline USTs and service islands. Because elevated concentrations of TPHg and BTEX exist in groundwater samples from monitoring wells MW-2, MW-3, and MW-8, we recommend biannual sampling for all wells and quarterly sampling for MW-1 through MW-3 and MW-8.

We also recommend that copies of this report be sent to:

- Mr. Eddy So, California Regional Water Quality Control Board, San Francisco Bay Region, 2101 Webster Street, Suite 500, Oakland, California 94612; and

- Mr. Joe Ferreira, San Leandro Fire Department, 835 East 14th Street, San Leandro, California 94577.

Scheduling

The first quarter 1992 monitoring is scheduled for March 1992.

Please call if you have any questions.

Sincerely,
RESNA Industries

Dan Wynne, C.E.G. 1569
Project Manager

Enclosures: Results of Subjective Evaluations, Table 1
Groundwater Elevation Data, Table 2
Cumulative Results of Laboratory Analyses, Table 3
Site Vicinity Map, Plate 1
Generalized Site Plan and Groundwater 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
	09/27/91	---	Well dry	--
	12/27/91	---	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
	05/06/91	33.31	NONE	NONE
	09/27/91	36.86	NONE	NONE
	12/27/91	37.66	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
	09/27/91	36.64	NONE	NONE
	12/27/91	37.46	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
	09/27/91	36.90	NONE	NONE
	12/27/91	37.76	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
	09/27/91	37.23	NONE	NONE
	12/27/91	38.02	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
	09/27/91	35.87	NONE	NONE
	12/27/91	36.67	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
	09/27/91	36.18	NONE	NONE
	12/27/91	36.96	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
	09/27/91	36.55	NONE	NONE
	12/27/91	37.34	NONE	NONE

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

TABLE 2
GROUNDWATER ELEVATION DATA
(December 27, 1991)

Monitoring Well	Top of Casing Above MSL (C)	Depth to Water (W)	Water Level Above MSL (C-W)
MW-1	57.83	DRY	N/A
MW-2	58.13	37.66	20.47
MW-3	57.92	37.46	20.46
MW-4	58.29	37.76	20.53
MW-5	58.50	38.02	20.48
MW-6	56.96	36.67	20.29
MW-7	57.25	36.96	20.29
MW-8	57.71	37.34	20.37

Measurements are in feet.
Depth to 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
CUMULATIVE RESULTS OF LABORATORY ANALYSES
(Page 1 of 3)

Date	Sample Number	TPHg	B	T	E	X
WELL MW-1						
10/88	Well dry					
01/89	Well dry					
02/90	Well dry					
05/90	Well dry					
08/90	Well dry					
11/90	Well dry					
02/91	Well dry					
05/91	Insufficient water to sample					
09/91	Well dry					
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
09/91	W-36-MW2	110	2.6	<0.5	5.6	5.1
12/91	W-37-MW2	170	3.9	<0.5	7.3	60
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
09/91	W-36-MW3	4,000	160	84	180	560
12/91	W-37-MW3	31,000	240	280	400	1,600
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

See notes on page 3 of 3

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES
(Page 2 of 3)

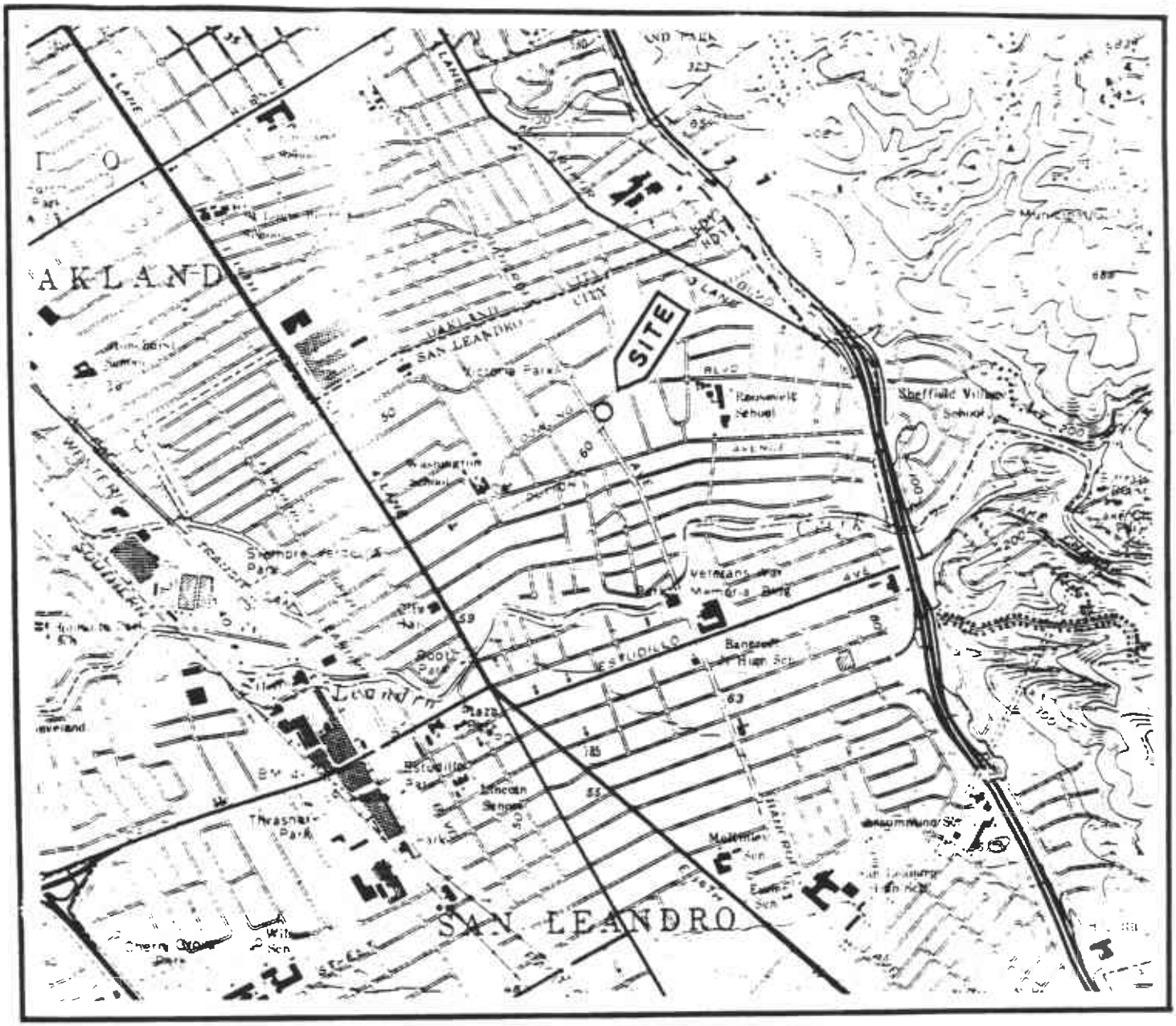
Date	Sample Number	TPHg	B	T	E	X
WELL MW-4						
05/90	W-36-MW4	<20	<0.5	<0.5	0.68	1.4
08/90	W-36-MW4	<20	<0.5	<0.5	<0.5	<0.5
11/90	W-37-MW4	<50	<0.5	<0.5	<0.5	1.2
02/91	W-37-MW4	<50	<0.5	<0.5	<0.5	<0.5
05/91		Not Sampled				
09/91	W-36-MW4	<50	<0.5	<0.5	<0.5	<0.5
12/91		Not Sampled				
WELL MW-5						
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				
09/91	W-37-MW5	<50	<0.5	<0.5	<0.5	<0.5
12/91		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				
09/91	W-35-MW6	<50	<0.5	<0.5	<0.5	<0.5
12/91		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				
09/91	W-38- MW7	<50	<0.5	<0.5	<0.5	<0.5
12/91		Not Sampled				

See notes on page 3 of 3

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES
(Page 3 of 3)

Date	Sample Number	TPHg	B	T	E	X
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
09/91	W-36-MW8	720	13	4.3	26	26
12/91	W-37-MW8	1,600	15	2.9	40	49

Results in micrograms/liter (μg/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 = Water sample
37 = Monitoring well number

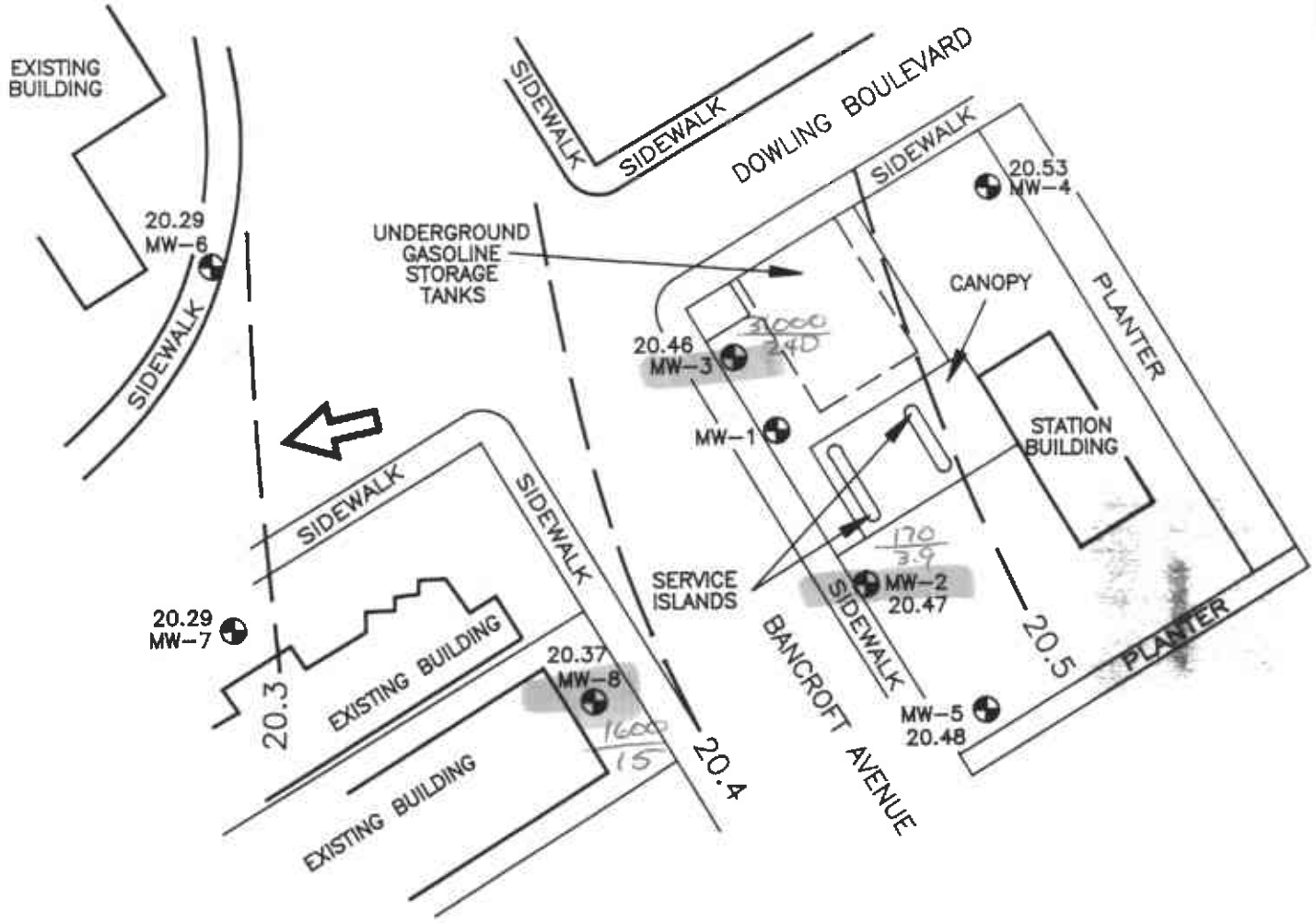


Source: U.S. Geological Survey
7.5-Minute Quadrangle
San Leandro, California
Photorevised 1980

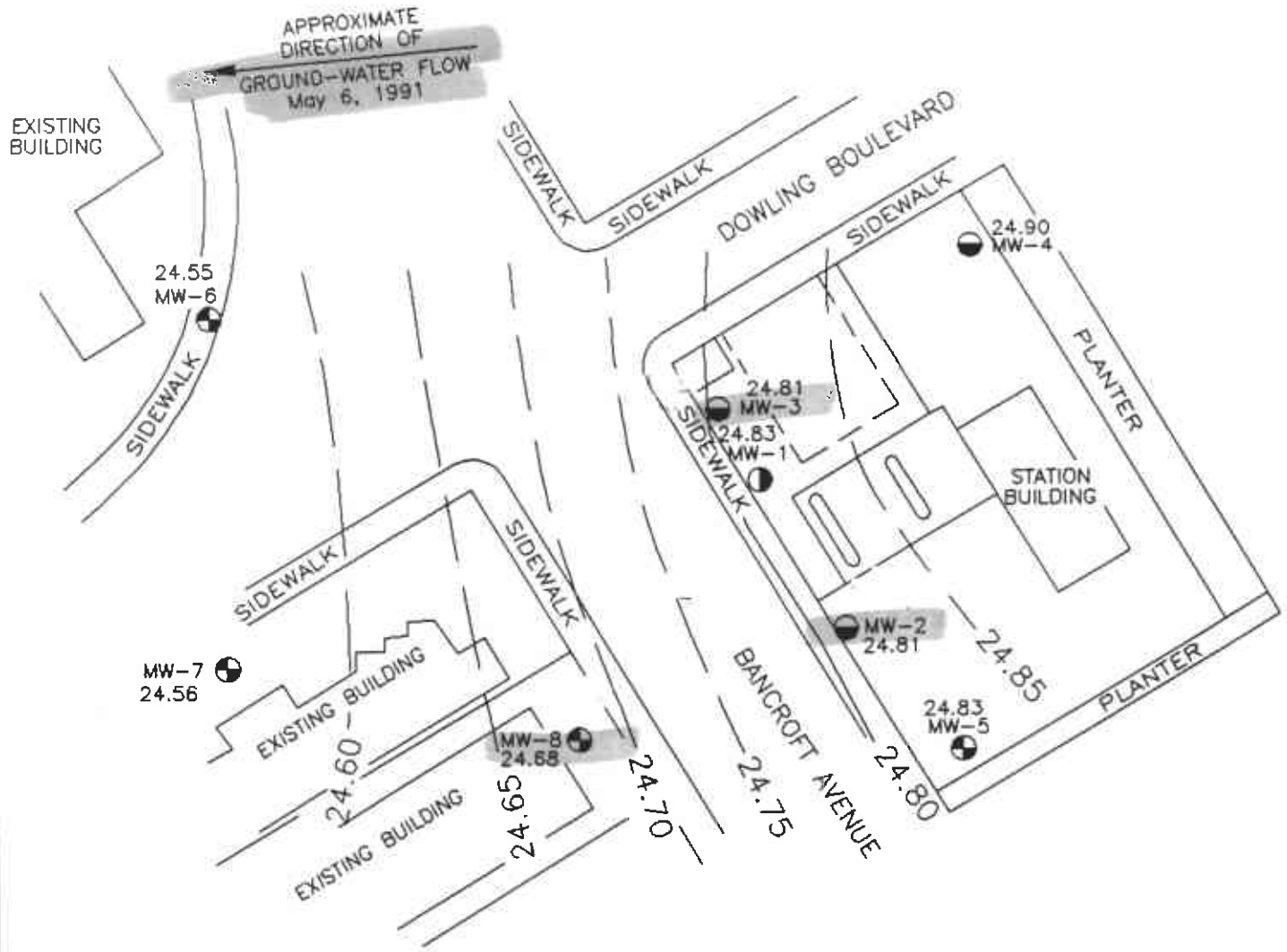
N

Approximate Scale
2000 1000 0 2000 4000
feet

RESNA	SITE VICINITY MAP Unocal Station No. 5367 500 Bancroft Avenue San Leandro, California	PLATE 1
PROJECT NO. 87091-5		



RESNA	GENERALIZED SITE PLAN AND GROUNDWATER ELEVATION MAP Unocal Station No. 5367 500 Bancroft Avenue San Leandro, California	PLATE 2
PROJECT NO. 87091-5		



24.85 = Line of equal ground-water elevation in feet

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

Unocal
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Current Status

Quarterly and Semiannual Monitoring
submitted on May 20, 1991. Field work fo

Technical Concerns

Extent of hydrocarbons in ground waater is
gradient of MW-3. Increase of concentrati
a result of a rise in the water level.

Regulatory Concerns

None.

Schedule

Complete second quarter draft report by late

Proposed Additional Work in 1991

None.

Second Quarter 1991 Ground-Water M
Unocal Station No. 5367, San Leandro,

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Date	Sample Number	TPHg		
WELL MW-1				
10/88	Well dry therefore			
01/89	Well dry therefore			
02/90	Well dry therefore			
05/90	Well dry therefore			
08/90	Well dry therefore			
11/90	Well dry therefore			
02/91	Well dry therefore			
05/91	Insufficient water			
WELL MW-2				
10/88	W-37-MW2	1,760		4
01/89	W-35-MW2	510		5
02/90	W-36-MW2	840		5
05/90	W-36-MW2	1,000		3
08/90	W-36-MW2	330		1
11/90	W-37-MW2	400		4
02/91	W-37-MW2	510		4
05/91	W-33-MW2	2,300		1
WELL MW-3				
10/88	W-37-MW3	61,000	1,060	
01/89	W-35-MW3	39,000	1,570	
02/90	W-36-MW3	22,000	710	
05/90	W-36-MW3	19,000	330	
08/90	W-36-MW3	19,000	480	
11/90	W-37-MW3	13,000	390	
02/91	W-37-MW3	13,000	310	
05/91	W-33-MW3	39,000	1,000	
WELL MW-4				
10/88	W-37-MW4	<20	<0.5	
01/89	W-35-MW4	<20	<0.5	
02/90	W-36-MW4	<20	<0.5	
05/90	W-36-MW4	<20	<0.5	
08/90	W-36-MW4	<20	<0.5	
11/90	W-37-MW4	<50	<0.5	
02/91	W-37-MW4	<50	<0.5	
05/91			Not Sampled	

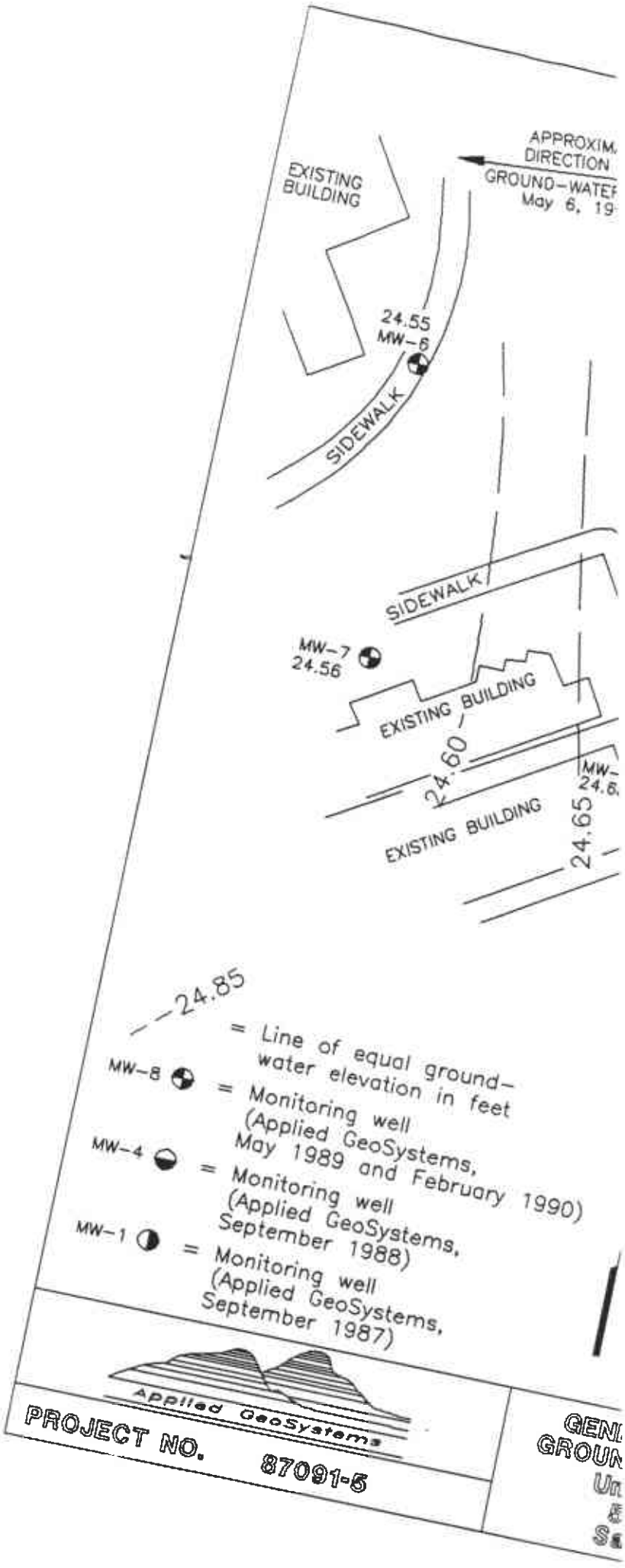
See notes on page 2 of 2

Second Quarter 1991 Gr
Unocal Station No. 5367

RESULTS O

Date	Sample Number	
WELL MW-5		
02/90	W-36-MW5	
05/90	W-36-MW5	
08/90	W-35-MW5	
11/90	W-38-MW5	
02/91	W-38-MW5	
05/91		
WELL MW-6		
02/90	W-35-MW6	
05/90	W-37-MW6	
08/90	W-35-MW6	
11/90	W-36-MW6	
02/91	W-36-MW6	
05/91		
WELL MW-7		
02/90	W-36-MW7	
05/90	W-35-MW7	
08/90	W-35-MW7	
11/90	W-37-MW7	<
02/91	W-37-MW7	<
05/91		<
WELL MW-8		
02/90	W-35-MW8	1,90
05/90	W-36-MW8	77(
08/90	W-36-MW8	99(
11/90	W-37-MW8	57(
02/91	W-37-MW8	63(
05/91	W-33-MW8	14,000

Results in micrograms/lite
TPHg = Total petroleum hyd
BTEX = Benzene, ethylbenze
< = Less than the detec
analysis.
Sample designation: W-37-M


APPROXIM.
DIRECTION
GROUND-WATEF
May 6, 19
EXISTING
BUILDING
24.55
MW-6
SIDEWALK
SIDEWALK
MW-7
24.56
EXISTING BUILDING
24.60
MW-
24.6
EXISTING BUILDING
24.65
24.85
= Line of equal ground-water elevation in feet
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)
Applied GeoSystems
PROJECT NO. 87091-5
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