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

AGS Job No. 87091-2

1/24/91

January 24, 1991
AGS 87091-2

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

Subject: Letter report on fourth quarter 1990 ground-water monitoring 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 P-1. Locations of the wells and site facilities are shown on the Generalized Site Plan, Plate P-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 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 (draft 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 November 30, 1990, 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 Direction

Ground-water depths and wellhead elevations were used to calculate differences in water-level elevations. Ground-water elevations measured on November 30, 1990, are presented in Table 2. A graphical interpretation of the ground-water surface elevation at the time of this measurement is shown on the Ground-Water Elevation Map, Plate P-3. The ground-water gradient calculated from these measurements is approximately 0.001 with a direction of flow toward the west to southwest. The ground-water gradient and flow direction are approximately the same as those measured during the previous monitoring period in August 1990.

Analytical Methods and Results

Ground-water samples collected on November 30, 1990, were analyzed for total petroleum hydrocarbons as gasoline (TPHg) using Environmental Protection Agency (EPA) modified Method 8015 and for benzene, ethylbenzene, toluene, and total xylenes (BETX) 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 BETX in the water samples from wells MW-3, MW-2, and MW-8, located west, south, and southwest respectively of the gasoline USTs. TPHg concentrations of 13,000 parts per billion (ppb) occur in the ground water from well MW-3. TPHg concentrations of 400 ppb and 570 ppb occur in ground water from wells MW-2, and MW-8 respectively; whereas, wells MW-4 through MW-7 show no detectable levels of TPHg or BETX. The distribution of TPHg in ground water is presented on Plate P-4. TPHg and BETX concentrations are similar to those detected in August 1990.

Conclusions and Recommendations

Elevated levels of TPHg and BTEX are present west and southwest of the gasoline USTs and of the service islands, respectively. 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. Because diesel fuel is currently being stored on site, we also recommend sampling well MW-1 (one time only) for total petroleum hydrocarbons as diesel.

A copy of this report will be sent to Mr. Lester Feldman of the California Regional Water Quality Control Board, San Francisco Bay Region, 1800 Harrison Street, Suite 700, Oakland, California 94612, and Mr. Joe Ferreira at the San Leandro Fire Department, 835 East 14th Street, San Leandro, California 94577.

Scheduling

The first quarter 1991 monitoring is scheduled for February 20, 1991.

Please call if you have any questions regarding the contents of this letter report.

Sincerely,
Applied GeoSystems

ORIGINAL SIGNED BY

William T. DeLon
Staff 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 P-1
Generalized Site Plan, Plate P-2
Ground-Water Elevation Map, Plate P-3
Concentration of TPHg in Ground Water, Plate P-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	--
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
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
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

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-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
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
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
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

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

TABLE 2
GROUND-WATER ELEVATION DATA
(November 30, 1990)

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	37.40	20.73
MW-3	57.92	37.17	20.75
MW-4	58.29	37.46	20.83
MW-5	58.50	37.74	20.76
MW-6	56.96	36.38	20.58
MW-7	57.25	36.68	20.57
MW-8	57.71	37.08	20.63

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.

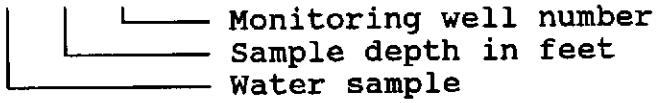
TABLE 3
RESULTS OF LABORATORY ANALYSES OF GROUND WATER
(Page 1 of 2)

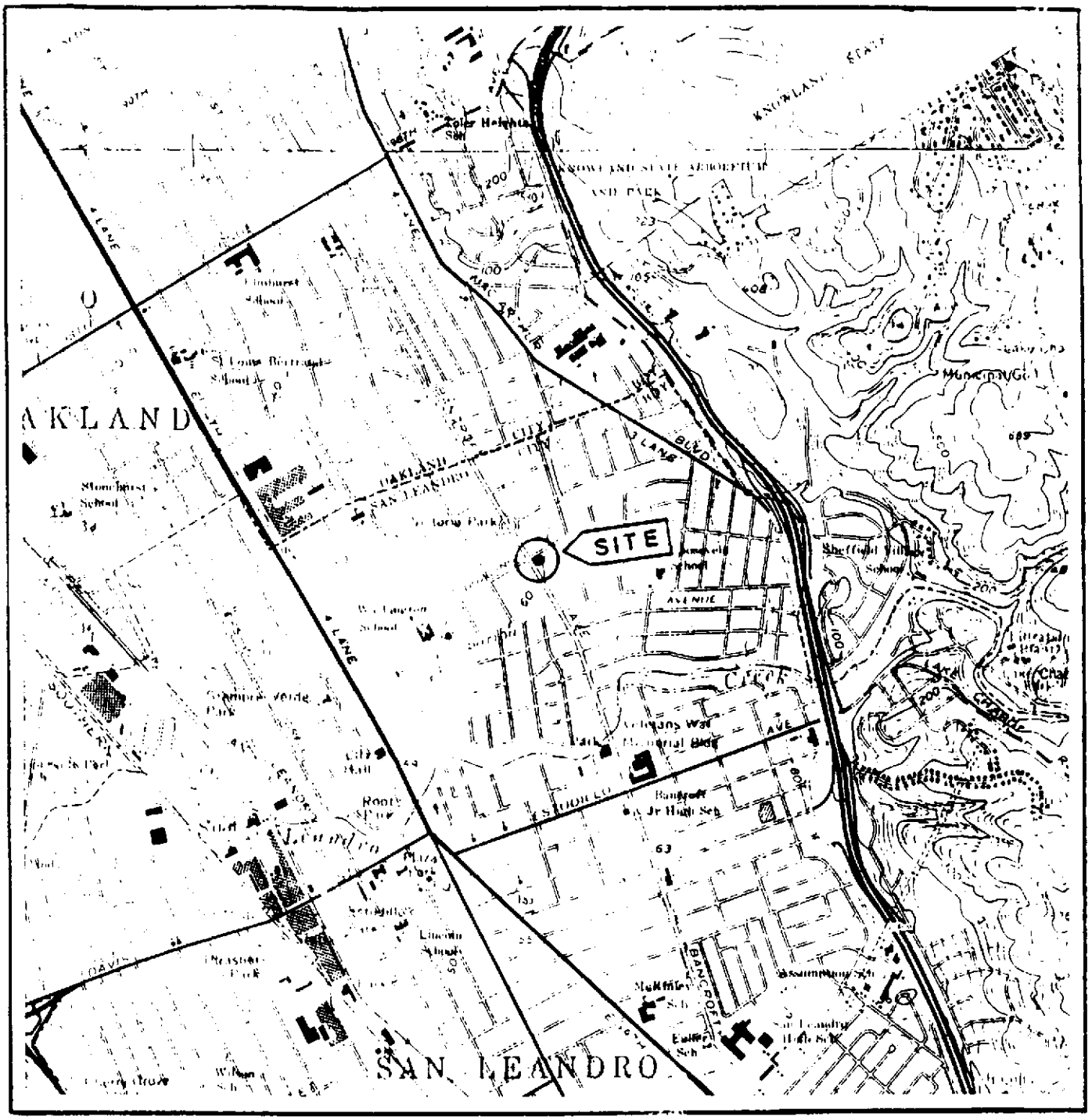
Date	Sample Number	TPHg	B	E	T	X
WELL MW-1						
10/88	Well dry therefore water sample not collected					
01/89	Well dry therefore water sample not collected					
02/90	Well dry therefore water sample not collected					
05/90	Well dry therefore water sample not collected					
08/90	Well dry therefore water sample not collected					
11/90	Well dry therefore water sample not collected					
WELL MW-2						
10/88	W-37-MW2	1,760	47.8	20.9	7.4	81.6
01/89	W-35-MW2	510	58.0	22.6	8.7	20.3
02/90	W-36-MW2	840	50.0	28.0	0.5	44.0
05/90	W-36-MW2	1,000	39.0	32.0	<0.5	52.0
08/90	W-36-MW2	330	17	19	<0.5	20
11/90	W-37-MW2	**400**	**41**	**39**	**<0.5**	**37**
WELL MW-3						
10/88	W-37-MW3	61,000	1,060	1,520	3,380	8,720
01/89	W-35-MW3	39,000	1,570	1,250	2,830	7,070
02/90	W-36-MW3	22,000	710	6,900	4,100	33,000
05/90	W-36-MW3	19,000	330	310	170	1,500
08/90	W-36-MW3	19,000	480	510	160	1,500
11/90	W-37-MW3	**13,000**	**390**	**410**	**81**	**1,000**
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	0.68	<0.5	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**
WELL MW-5						
02/90	W-36-MW5	67	0.51	2.9	1.6	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	<0.5	**0.7**	<0.5

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

Date	Sample Number	TPHg	B	E	T	X
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
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	0.74	<0.5	1.7
08/90	W-35-MW7	<20	<0.5	<0.5	<0.5	<0.5
11/90	W-37-MW7	<50	<0.5	**0.6**	<0.5	**1.5**
WELL MW-7 BLANK						
02/90	W-BLANK-MW7	<20	<0.5	<0.5	<0.5	<0.5
WELL MW-8						
02/90	W-35-MW8	1,900	11	52	<0.5	55
05/90	W-36-MW8	770	6.5	20	<0.5	32
08/90	W-36-MW8	990	13	48	<0.5	66
11/90	W-37-MW8	**570**	**13**	**45**	<0.5	**36**

Results in ~~milli~~micrograms/liter (µg/l) = parts per billion (ppb)
TPHg: Total petroleum hydrocarbons as gasoline
BETX: Benzene, ethylbenzene, toluene, total xylene isomers
<: Less than the detection limit for the method of analysis.
Sample designation: W-37-MW2





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

N

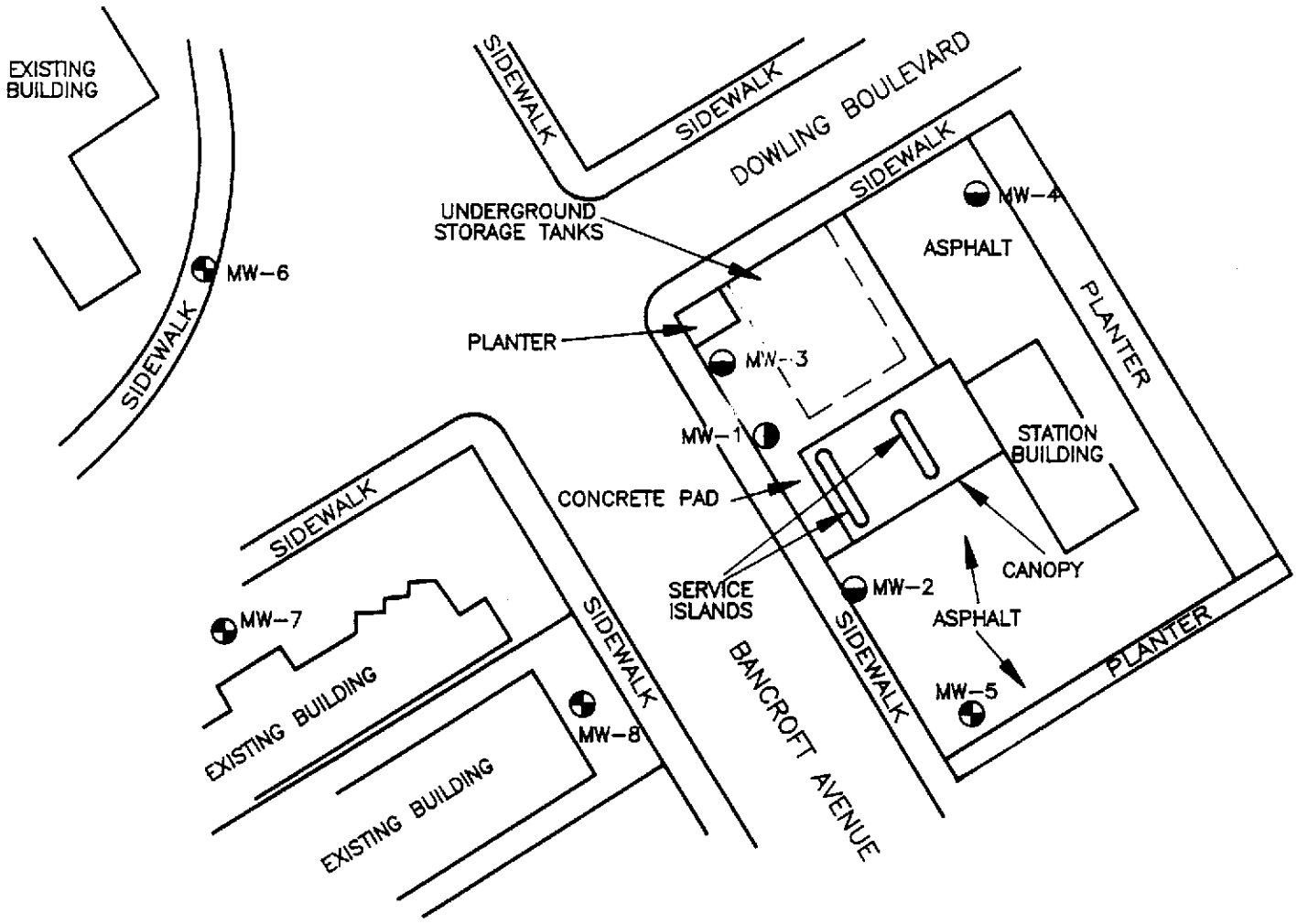
Approximate Scale
2000 1000 0 2000 4000
feet

Applied GeoSystems

PROJECT NO. 87091-2

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

PLATE
P - 1



MW-8 ◒ = New monitoring well (Applied GeoSystems, May 1989 and February 1990)

MW-4 ◒ = Existing monitoring well (Applied GeoSystems, September 1988)

MW-1 ◑ = Existing monitoring well (Applied GeoSystems, September 1987)

N

Approximate Scale

50 25 0 50 100

feet

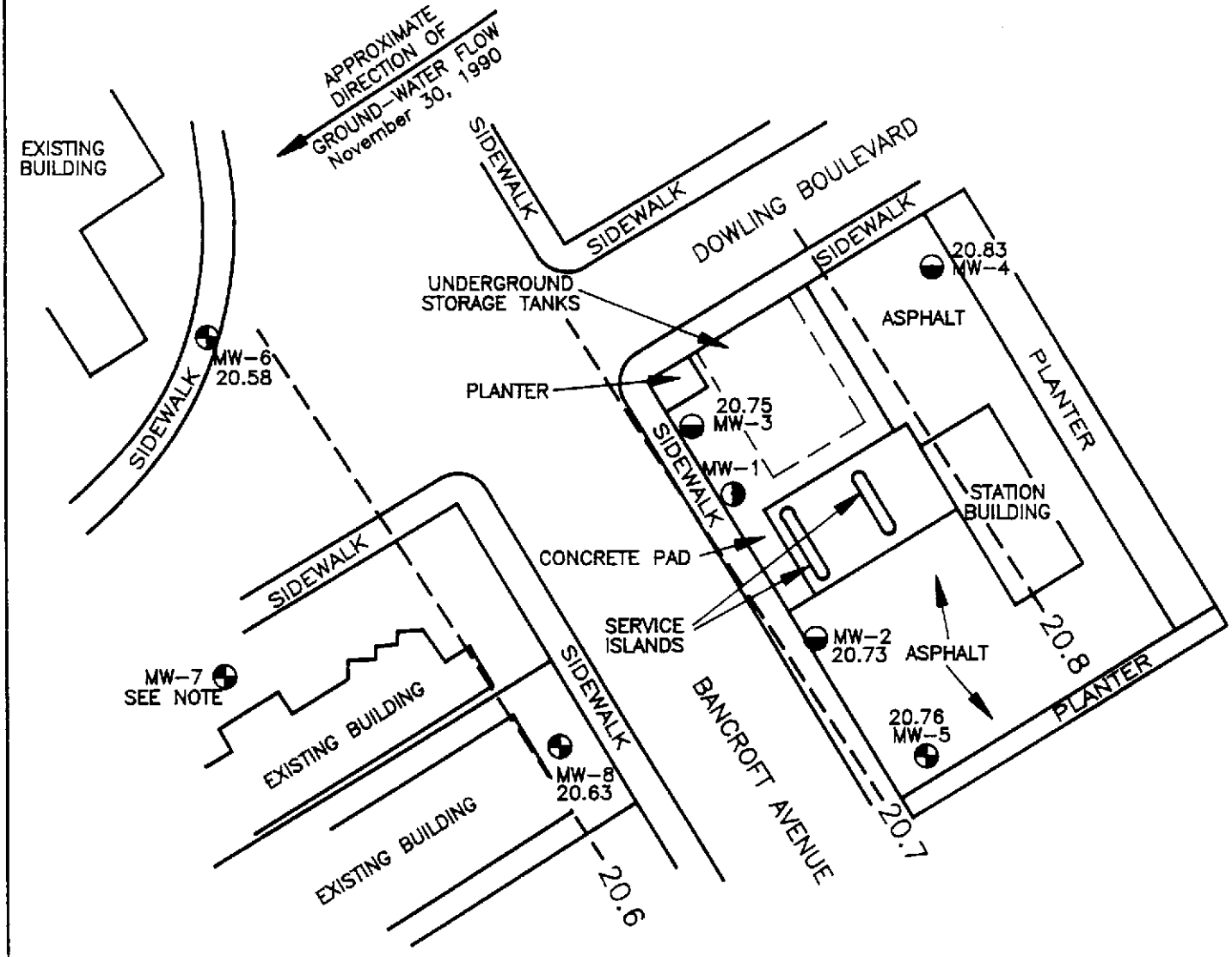
Applied GeoSystems

PROJECT NO. 87091-2

GENERALIZED SITE PLAN
Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California

PLATE

P - 2



20.8 = Line of equal ground-water elevation in feet

MW-8 = New monitoring well (Applied GeoSystems, May 1989 and February 1990)

MW-4 = Existing monitoring well (Applied GeoSystems, September 1988)

MW-1 = Existing monitoring well (Applied GeoSystems, September 1987)

N

Approximate Scale

50 25 0 50 100

feet

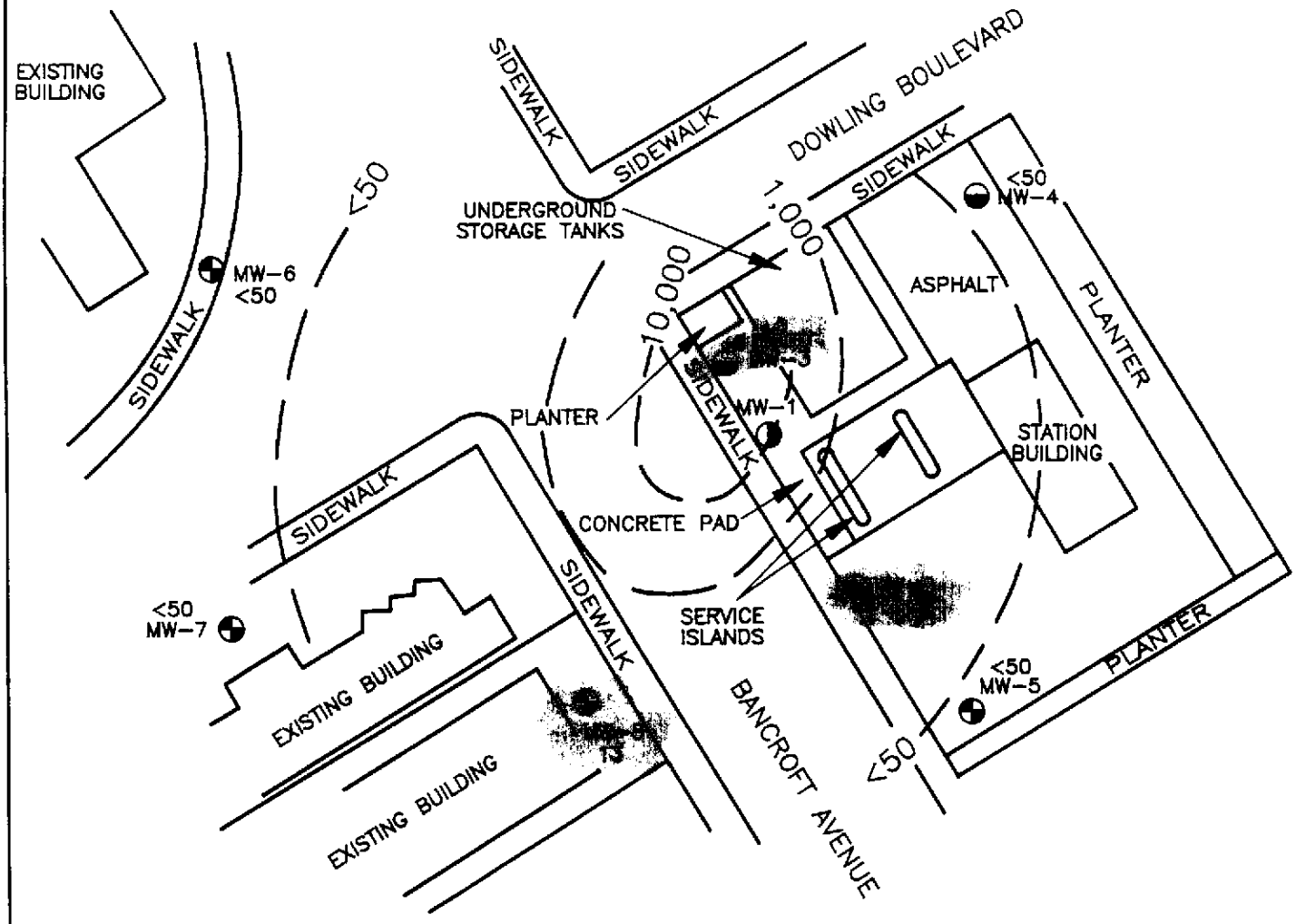
Applied GeoSystems

PROJECT NO. 87091-2

GROUND-WATER ELEVATION MAP
November 30, 1990
Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California

PLATE

P - 3



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

13,000 = Concentration in parts per million

MW-8 = New monitoring well (Applied GeoSystems, May 1989 and February 1990)

MW-4 = Existing monitoring well (Applied GeoSystems, September 1988)

MW-1 = Existing 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. 87091-2

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

PLATE

P - 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 and collecting 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 four 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. A completed copy of this record is attached to this letter report.

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 January 13, 1990 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 California Code of 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 with 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. Keith McVicker
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87091-2

Date Sampled: 11-30-90
Date Received: 11-30-90
BTEX Analyzed: 12-13-90
TPHg Analyzed: 12-13-90
TPHd Analyzed: NR
Matrix: Water

	Benzene ppb	Toluene ppb	Ethyl-benzene ppb	Total Xylenes ppb	TPHg ppb	TPHd ppb
Detection Limit:	0.5	0.5	0.5	0.5	50	100
SAMPLE Laboratory Identification						
W-37-MW2 W1011447	41	ND	39	37	400	NR
W-37-MW3 W1011448	390	81	410	1000	13000	NR
W-37-MW4 W1011449	ND	ND	ND	1.2	ND	NR
W-38-MW5 W1011450	ND	0.7	ND	ND	ND	NR
W-36-MW6 W1011451	ND	ND	ND	ND	ND	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

December 14, 1990
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)

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. Keith McVicker
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87091-2

Date Sampled: 11-30-90
Date Received: 11-30-90
BTEX Analyzed: 12-13-90
TPHg Analyzed: 12-13-90
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-37-MW7 W1011452	ND	ND	0.6	1.5	ND	NR
W-37-MW8 W1011453	13	ND	45	36	570	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.

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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

December 14, 1990
Date Reported

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