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

AGS Job No. 87091-2

3/13/89

March 13, 1989
0313tros
AGS 87091-2

Mr. Tim Ross
UNOCAL Corporation
2175 North California Boulevard
Suite 650
Walnut Creek, California 94596

Subject: Letter report on quarterly ground-water monitoring at UNOCAL Service Station No. 5367, 500 Bancroft Avenue, San Leandro, California.

Mr. Ross:

This letter report summarizes the results of quarterly ground-water monitoring performed by Applied GeoSystems at the above-referenced site, as part of an ongoing monitoring program that UNOCAL Corporation has authorized. The site is located at the intersection of Bancroft Avenue and Dowling Boulevard in San Leandro, California. The location of the site is shown on the Site Vicinity Map, Plate P-1.

Work included subjectively inspecting water from four ground-water monitoring wells, purging the wells, and collecting water samples for laboratory analysis. Locations of the wells are shown on the Generalized Site Plan, Plate P-2. Monitoring well MW-1 was installed by Applied GeoSystems in September 1987 (AGS Report No. 87091-1, dated December 1987). Monitoring wells MW-2 through MW-4 were installed by Applied GeoSystems in September 1988 (AGS Report No. 87091-3, dated November 18, 1988). Quarterly ground-water monitoring was recommended by Applied GeoSystems after hydrocarbon contamination was detected in ground water at the site.

A geologist from Applied GeoSystems arrived at the site on January 27, 1989, to measure the depth to water and to collect water samples from the ground-water wells. Static water level in each well was measured to the nearest 0.01-foot, using a Solinst electric water-level sounder. Monitoring well MW-1 (which has a total depth of 36 feet) was dry. Initial water samples were collected from wells MW-2 through MW-4 and checked for floating product, sheen, and emulsion. Samples were collected by gently lowering approximately half the length of a clean Teflon bailer

past the air-water interface and collecting a sample from near the surface of the water in each well. The water in wells MW-2 through MW-4 showed no floating product, sheen, or emulsion. Cumulative results of subjective analysis are presented in Table 1.

After subjective analysis, wells were purged of approximately three well volumes of water and were allowed to recover to at least 80 percent of their static water levels. Purged water was placed in appropriately labeled 17E, 55-gallon, waste-liquid drums approved for this use by the Department of Transportation. Samples for laboratory analysis then were collected with a clean Teflon bailer. A sample from each well was collected from near the static water surface. The samples were transferred to laboratory-cleaned, 40-milliliter glass vials. Hydrochloric acid was added to the vials to discourage bacterial degradation of the samples.

Samples were sealed with Teflon-lined caps, stored on ice, and delivered to the Applied GeoSystems laboratory in Fremont, California. This laboratory is certified by the State of California to perform the requested tests. Each sample was analyzed for the hydrocarbon constituents benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) using modified Environmental Protection Agency (EPA) Method 602 and for total petroleum hydrocarbons (TPH) as gasoline using modified EPA Method 8015. Chain-of-custody protocol was observed throughout the process of handling the samples, and Chain of Custody Records initiated by the geologist are enclosed with this report. Results of these and previous analyses are presented in Table 2. Analyses performed in January are presented on the laboratory Analysis Reports enclosed with this report.

Ground-water depths were combined with wellhead elevations that were measured by Cross Land Surveying, Inc., on October 1988, to calculate the differences in water-level elevations. Ground-water elevations measured on January 27, 1989, are presented on Table 3. A graphical interpretation of the ground-water suface at the time of this measurement is shown on the Ground-Water Potentiometric Surface Map, Plate P-3. Ground-water gradient calculated from these measurements is 0.0014 (approximately 1 vertical foot per 700 horizontal feet) toward the west. The ground-water gradient and flow direction are approximately the same as those measured during the previous monitoring period in October 1988.

The most recent laboratory analyses show a decrease since October 1988 in concentration of TPH in water from monitoring wells MW-2

and MW-3. No hydrocarbon contamination was detected in the sample collected from well MW-4. The level of benzene in well MW-2 and the level of BTEX in well MW-3 exceed their respective action levels of 0.0007-, 0.68-, 0.1-, and 0.62-part per million (ppm), recommended for these constituents in drinking water by the California Department of Health Services.

Because elevated levels of some constituents are present in the ground water, we recommend that ground-water sampling and analysis for hydrocarbon contamination be continued on a quarterly schedule to monitor changes in contaminant concentrations and ground-water flow. Applied GeoSystems presently is arranging to perform a supplemental subsurface enviromental investigation at the site to delineate the extent of contamination.

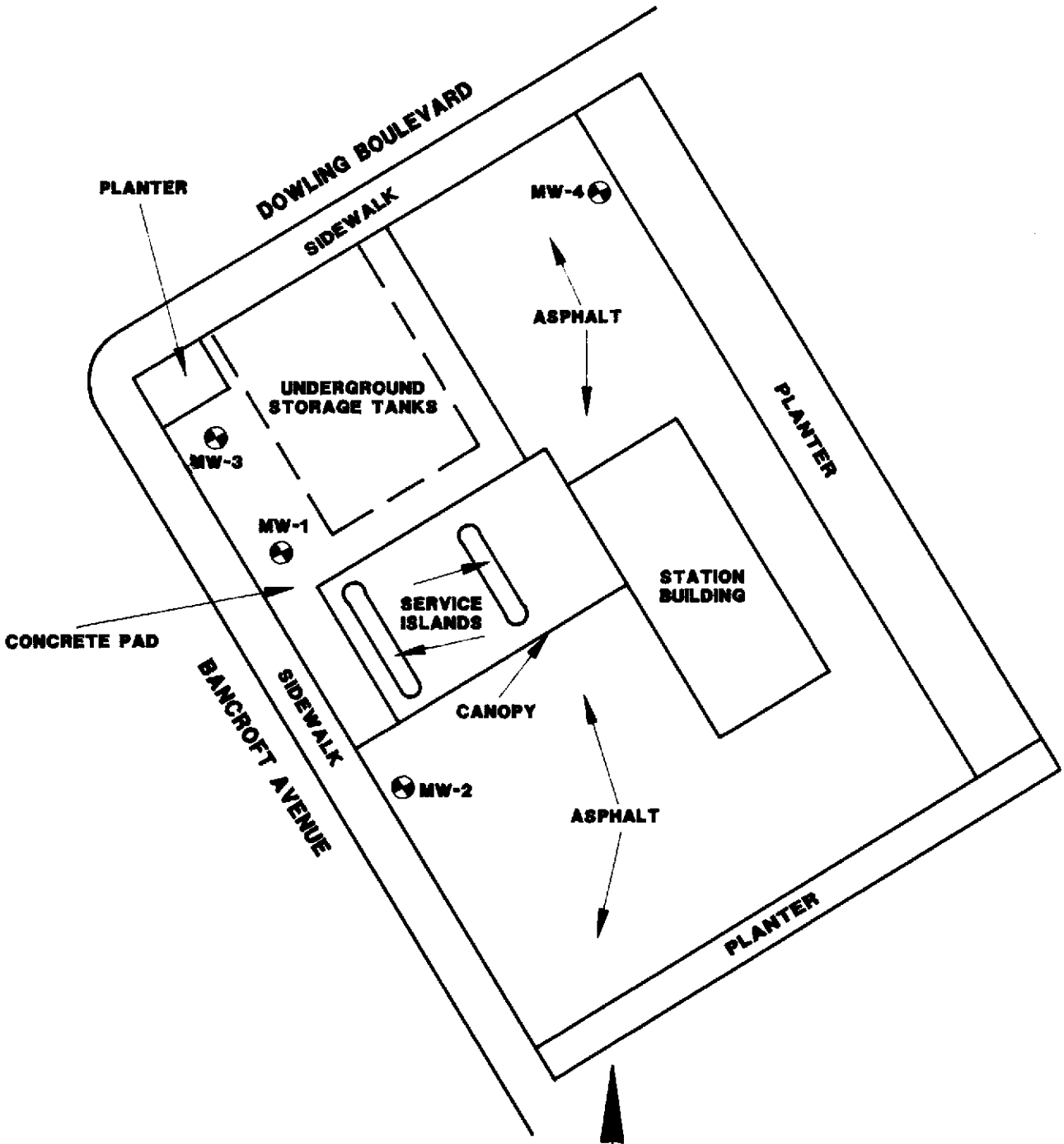
A copy of this report should be sent to Ms. Lisa McCann of the Regional Water Quality Control Board, San Francisco Bay Region, 1111 Jackson Street, Room 6040, Oakland, California 94607, and Mr. Joe Ferreira at the San Leandro Fire Department, 835 East 14th Street, San Leandro, California 94577. Please call if you have any questions regarding the contents of this letter report.

Sincerely,
Applied GeoSystems

John T. Lambert
Project Geologist

Gillian Holmes
G.E. 2023

Enclosures: Site Vicinity Map, Plate P-1
Generalized Site Plan, Plate P-2
Ground-Water Potentiometric Surface Map, Plate P-3
Results of Subjective Analyses, Table 1
Results of Laboratory Analyses, Table 2
Ground-Water Elevation Differences, Table 3
Chain of Custody Record
Analysis Reports (3 pages)



MW-4 ◓ = Monitoring well location

Source: Measured by tape and compass

Approximate Scale

30 15 0 30 60

feet

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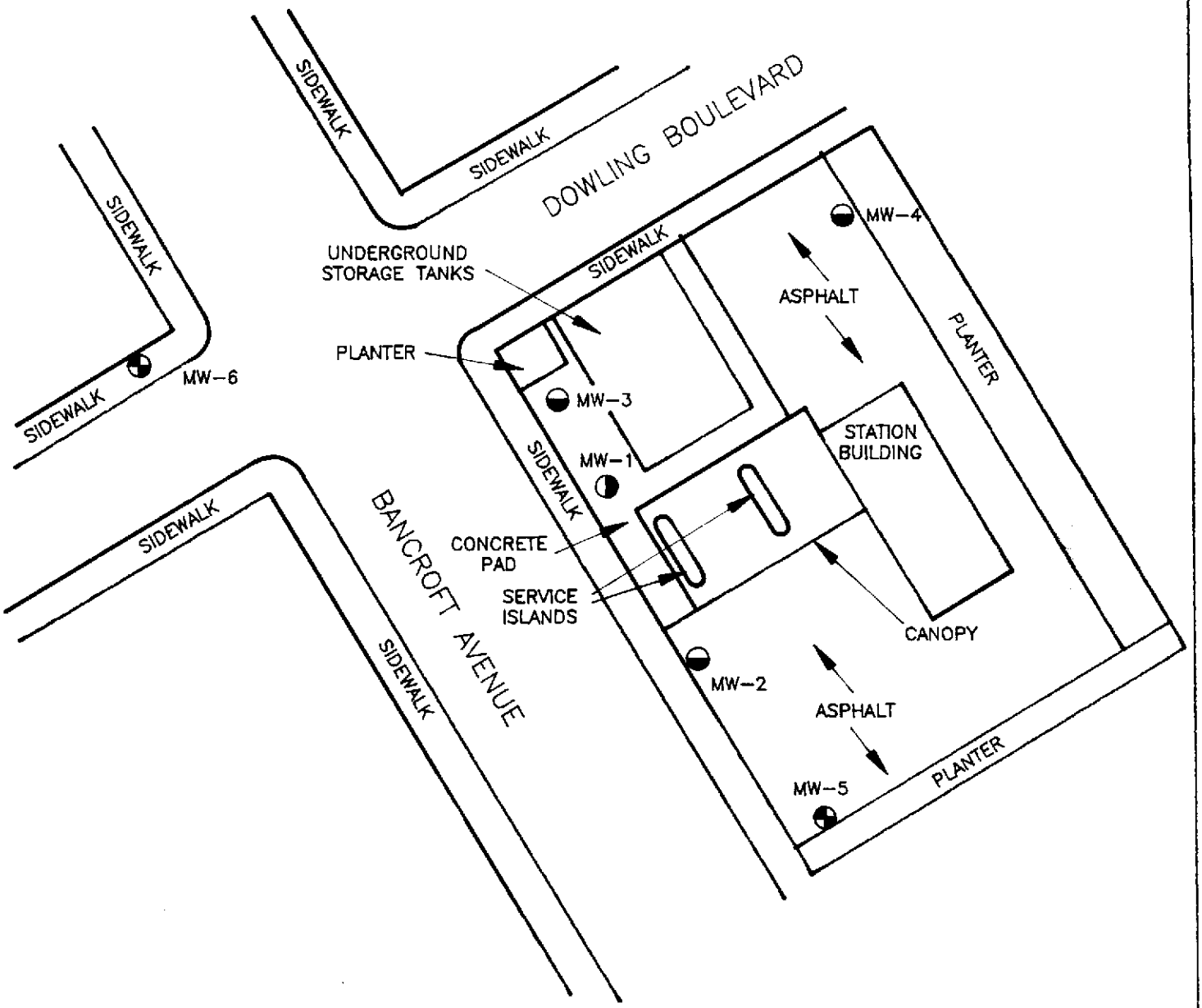
PROJECT NO. 87091-2

GENERALIZED SITE PLAN

UNOCAL Station No. 5367
500 Bancroft Avenue
San Leandro, California

PLATE

P - 2



MW-6 = New monitoring well (Applied GeoSystems, May 1989)

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

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

Approximate Scale

40 20 0 40 80

feet

Source: Measured by tape and compass

Applied GeoSystems

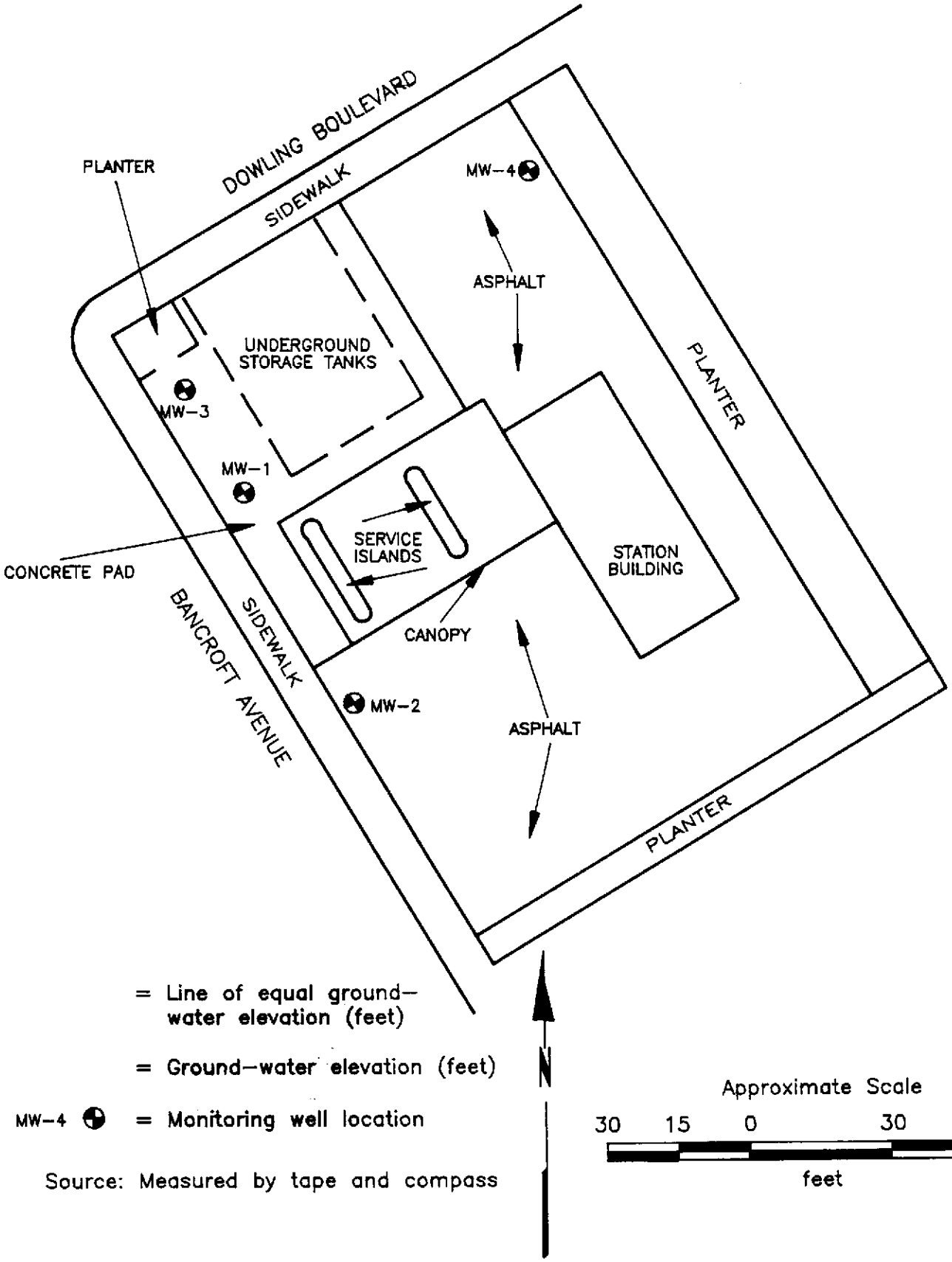
PROJECT NO. 87091-2

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

PLATE

P - 2

(23.43)
23.45
DOWNGRADIENT
DIRECTION OF
GROUND–WATER FLOW
January 27, 1989
(23.32)
(23.37)
23.35
23.40
23.45
(23.43)



Applied GeoSystems

PROJECT NO. 87091-2

GROUND-WATER POTENTIOMETRIC SURFACE MAP
UNOCAL Station No. 5367
500 Bancroft Avenue
San Leandro, California

PLATE
P - 3

TABLE 1
RESULTS OF SUBJECTIVE ANALYSES
UNOCAL Service Station No. 5367
500 Bancroft Avenue
San Leandro, California

Well	Date	Depth to Water	Floating Product	Sheen	Emulsion
MW-1	09/23/87	33.40	0.02	NA	NA
	09/24/87	33.24	0.01	NA	NA
	10/06/87	33.39	0.01	NA	NA
	11/05/87	34.14	0.31	NA	NA
	11/13/87	34.15	0.38	NA	NA
	11/19/87	33.89	0.06	NA	NA
	04/27/88	32.40	0.01	NA	NA
	09/07/88		Well dry		
	10/03/88		Well dry		
	01/27/89		Well dry		
MW-2	10/03/88	36.04	NONE	NONE	NONE
	01/27/89	34.77	NONE	NONE	NONE
MW-3	10/03/88	35.86	NONE	NONE	NONE
	01/27/89	34.60	NONE	NONE	NONE
MW-4	10/03/88	36.12	NONE	NONE	NONE
	01/27/89	34.87	NONE	NONE	NONE

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

TABLE 2
RESULTS OF LABORATORY ANALYSES
UNOCAL Service Station No. 5367
500 Bancroft Avenue
San Leandro, California

Date	Sample Number	TPH	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					
WELL MW-2						
10/88	W-37-MW2	1.76	0.0478	0.0209	0.0074	0.0816
01/89	W-35-MW2	0.51	0.0580	0.0226	0.0087	0.0203
WELL MW-3						
10/88	W-37-MW2	61	1.06	1.52	3.38	8.72
01/89	W-35-MW3	39	1.57	1.25	2.83	7.07
WELL MW-4						
10/88	W-37-MW4	<0.02	<0.0005	<0.0005	<0.0005	<0.0005
01/89	W-35-MW3	<0.02	<0.0005	<0.0005	<0.0005	<0.0005

Results in milligrams/liter (mg/l) = parts per million (ppm)
TPH: Total petroleum hydrocarbons
BETX: Benzene, ethylbenzene, toluene, total xylene isomers
<: Less than the detection limit for the method of analysis.
Sample designation: W-37-MW2

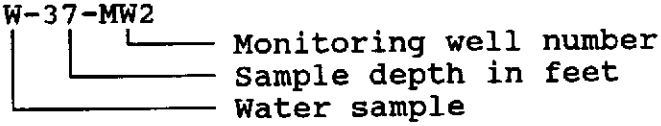
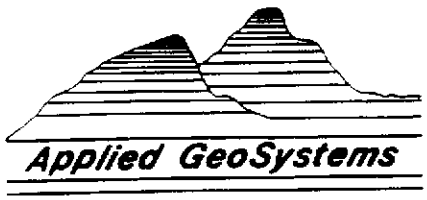


TABLE 3
GROUND-WATER ELEVATION DIFFERENCES
UNOCAL Service Station No. 5367
500 Bancroft Avenue
San Leandro, California
(measured on January 27, 1989)

Monitoring Well Number	Top of Casing (C)	Static Water Depth (W)	Water Level Elevation (C - W)
MW-1	57.84	Dry	--
MW-2	58.14	34.77	23.37
MW-3	57.92	34.60	23.32
MW-4	58.30	36.87	23.43

Measurements are in feet.
Static water level measured in feet below top of casing.
Elevation referenced to National Vertical Geodetic Datum.

CHAIN OF CUSTODY RECORD



43255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-1906

SAMPLER (signature): [signature]

Phone: 651 - 1906

LABORATORY: APPLIED GEOSYSTEMS, FREMONT, CA

TURNAROUND TIME: 2- WEEKS

Project Leader: JOHN LAMBERT

Phone No. 651 - A06

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
[signature]		1-30-89	0900
	Received for laboratory by: [signature]	1-30-89	0900

LABORATORY SHOULD SIGN UPON RECEIPT AND RETURN A COPY OF THIS FORM WITH THE LABORATORY RESULTS

Sample No.	Site Identification	Date Sampled	Analyses Requested	Sample Condition Upon Receipt
W-35-MW2	87091-2	1-27-89	TPH as gas, BTEX	ICED & ACIDIFIED
W-35-MW3				
M-35-MW4	LB	LB	LB	LB

Applied GeoSystems 43255 Mission Boulevard, Fremont, CA 94539 (415) 651-1906

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ANALYSIS REPORT

0212lab.frm

Report Prepared for:
Applied GeoSystems
43255 Mission Blvd.
Fremont, CA 94539
Attention: John T. Lambert

Date Received: 01-30-89
Laboratory Number: 90147W01
Project: 87091-2
Sample: W-35-MW2
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		0.51		0.02	02-02-89	
TEH as Diesel						NR
Benzene		0.0580		0.0005	02-02-89	
Toluene		0.0087		0.0005	02-02-89	
Ethylbenzene		0.0226		0.0005	02-02-89	
Total Xylenes		0.0203		0.0005	02-02-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

02-09-89
Date Reported

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ANALYSIS REPORT

0212lab.frm

Report Prepared for:
Applied GeoSystems
43255 Mission Blvd.
Fremont, CA 94539
Attention: John T. Lambert

Date Received: 01-30-89
Laboratory Number: 90147W02
Project: 87091-2
Sample: W-35-MW3
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		39		1	02-02-89	
TEH as Diesel						NR
Benzene		1.57		0.05	02-02-89	
Toluene		2.83		0.05	02-02-89	
Ethylbenzene		1.25		0.05	02-02-89	
Total Xylenes		7.07		0.05	02-02-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

02-09-89
Date Reported

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ANALYSIS REPORT

0212lab.frm

Report Prepared for:
Applied GeoSystems
43255 Mission Blvd.
Fremont, CA 94539
Attention: John T. Lambert

Date Received: 01-30-89
Laboratory Number: 90147W03
Project: 87091-2
Sample: W-35-MW4
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		ND		0.02	02-02-89	
TEH as Diesel						NR
Benzene		ND		0.0005	02-02-89	
Toluene		ND		0.0005	02-02-89	
Ethylbenzene		ND		0.0005	02-02-89	
Total Xylenes		ND		0.0005	02-02-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
mg/L = milligrams per liter = ppm.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not required.

PROCEDURES

TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization detector (PID) and a flame-ionization detector (FID) in series. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

TEH--Total extractable hydrocarbons (high boiling points) are measured by extraction according to EPA Method 3550 for soils or EPA Method 3510 for water followed by a modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Tia Tran, Laboratory Supervisor

02-09-89
Date Reported

May 16, 1988
0516tros
87091-2

Mr. Tim Ross
UNOCAL Corporation
2175 North California Boulevard, Suite 650
Walnut Creek, California 94596

Subject: Letter Report No. 87091-2 regarding subjective ground-water analyses at UNOCAL Station No. 5367, 500 Bancroft Avenue, San Leandro, California.

Mr. Ross:

This letter report summarizes the results of ground-water monitoring by Applied GeoSystems at the above-referenced site. The site is located on the southeast corner of the intersection of Dowling Boulevard and Bancroft Avenue in San Leandro, as shown on the Site Vicinity Map, Plate P-1. UNOCAL requested that Applied GeoSystems monitor ground water at the site after floating product was detected in the well. The monitoring well was constructed in September 1987 (Applied GeoSystems Report, dated December 13, 1987).

A geologist from Applied GeoSystems arrived at the site on April 27, 1988, to collect a water sample and subjectively analyze the water from monitoring well MW-1. The location of the well is shown on the Generalized Site Plan, Plate P-2. A water sample was collected from the well to check for visual evidence of hydrocarbon contamination. The total depth of the well is 35.04 feet, and the depth to the water table is 32.40 feet below the top of the well casing. The sample was collected by gently lowering a portion of a cleaned Teflon bailer past the air/water interface and collecting a sample from the surface of the water in the well. Subjective analysis of the water sample showed approximately 0.01-foot of floating product in the well. Cumulative results of this and previous monitoring events are presented in Table 1.

We recommend that 1) a soil vapor survey be conducted in the vicinity of the contamination and 2) that three or more boreholes be drilled and ground-water monitoring wells installed in the boreholes. The locations of the wells should be selected based on the results of the soil vapor survey. These wells are necessary to characterize the vertical and lateral extent of the soil and ground-water contamination, establish the lateral extent of hydrocarbon contamination, and evaluate a local ground-water gradient. Ground water in the existing well should be sampled fortnightly to monitor the thickness of the floating product. We also recommend that local ground-water use be studied and neighboring wells be identified and located.

Copies of this report should be forwarded to Mr. Joe Ferreira at the San Leandro Fire Department, 835 East 14th Street, San Leandro, California 94577, and to Mr. Greg Zentner at the California Regional Water Quality Control Board, San Francisco Bay Region, 1111 Jackson Street, Room 6040, Oakland, California 94607. Please do not hesitate to contact us if you have any questions regarding the contents of this letter.

Sincerely,
Applied GeoSystems

John T. Lambert
Project Geologist

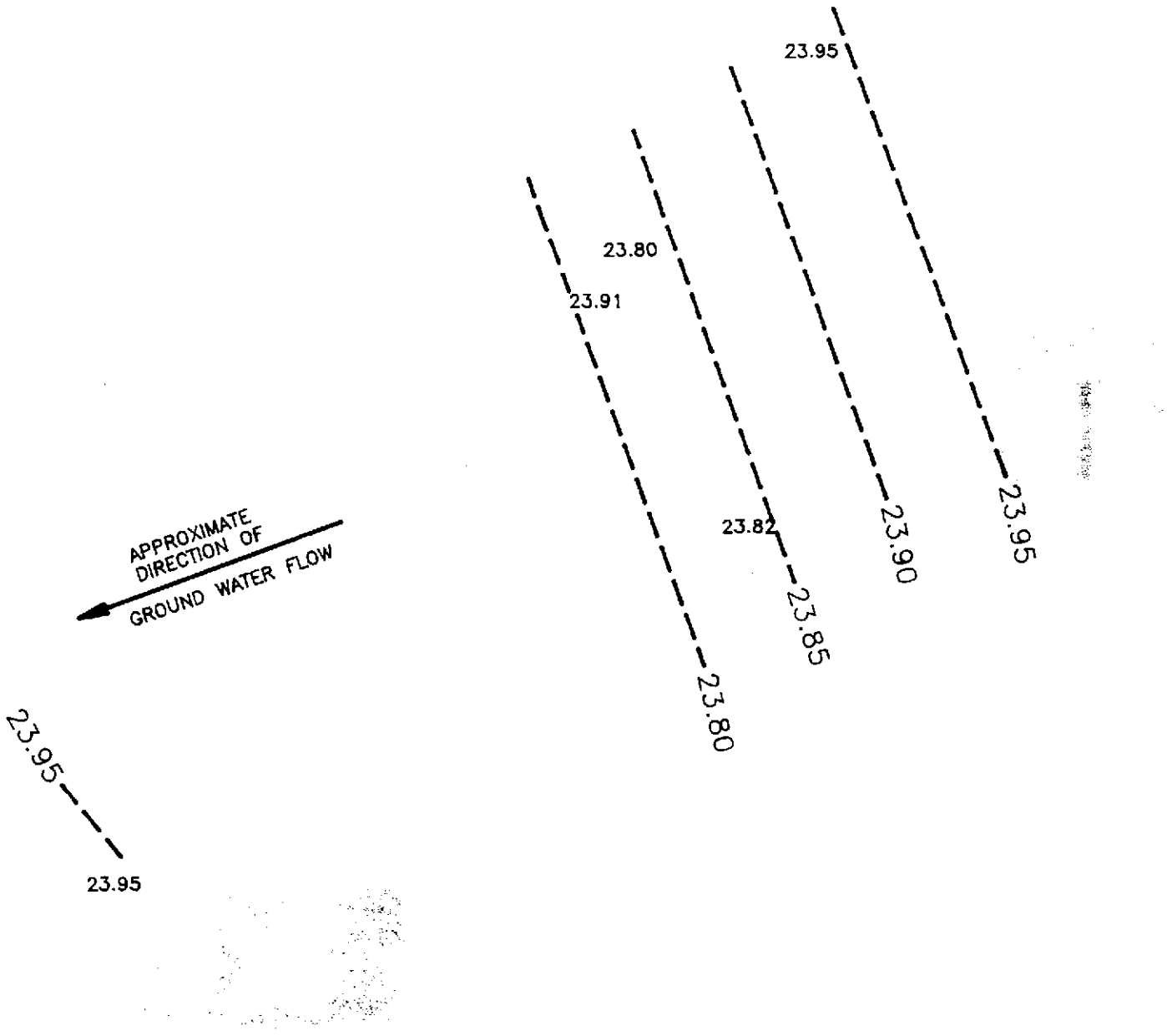
Gillian S. Holmes
G.E. 2023

Enclosures: Site Vicinity Map, Plate P-1
Generalized Site Plan, Plate P-2
Cumulative Results of Ground-Water Monitoring, Table 1

TABLE 1
CUMULATIVE RESULTS OF GROUND-WATER MONITORING
UNOCAL Station No. 5367
500 Bancroft Avenue
San Leandro, California

Date	Product Thickness
9/23/87	0.02
9/25/87	0.01
10/6/87	0.01
11/5/87	0.31
11/13/87	0.38
11/19/87	0.06
4/27/88	0.01

Product thickness is reported in feet.


23.95
23.90
23.85
23.80
23.91
23.80
23.82
APPROXIMATE
DIRECTION OF
GROUND WATER FLOW
23.95
23.95