TRANSMITTAL FORM

Applied GeoSystems
43255 Mission Boulevard Fremont, California 94539
(415) 651-1906
FAX (415) 651-8647

Date	Project No.
1/16/89	18061-2

Subject: Report on Quarterly Ground-Water Monitoring UNOCAL Station 5484 Castro Valley, CA.

TO Mr. Larry Seto
Hazardous Materials Specialist
Alameda County Health Care Services
470 27th Street, Third Floor
Oakland, California 94612

FROM Jon Luellen

TITLE Project Geologist

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REMARKS This report is being sent to you at the request of Mr Tim Ross of UNOCAL Corporation.

COPIES: 1 to AGS project file no. 18061-2
Tim Ross

LTR

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

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LETTER REPORT
QUARTERLY GROUND-WATER MONITORING
at
UNOCAL Service Station No. 5484
18950 Lake Chabot Road
Castro Valley, California

AGS Job No. 18061-2

January 6, 1989

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

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January 6, 1989
1229tros
18061-2

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

Subject: Letter Report No. 18061-2 regarding quarterly ground-water monitoring at UNOCAL Station No. 5484, 18950 Lake Chabot Road, Castro Valley, California.

Mr. Ross:

This letter report summarizes the results of quarterly ground-water monitoring performed to date by Applied GeoSystems at the above-referenced site. The reported work was performed with your authorization and this letter report is provided at your request. The site is located on the southeast corner of the intersection of Lake Chabot Road and Quail Avenue in Castro Valley, California. The site location is shown on the Site Vicinity Map, Plate P-1. The work included subjective inspection of ground water from three ground-water monitoring wells located on the site and purging and sampling water from two of the wells for laboratory analysis. The locations of the monitoring wells MW-1 through MW-3 are shown on the Generalized Site Plan, Plate P-2.

Monitoring wells MW-1 through MW-3 were installed by Applied GeoSystems on July 12 and 13, 1988, to monitor ground-water conditions downgradient of the locations of suspected leaks in the fiberglass adapter and the sub-pump swing joint of the underground unleaded product-storage tank. It is our understanding that appropriate repairs were made and the lines passed a precision pressure test. This quarterly monitoring program was recommended by Applied GeoSystems in Report No. 18061-1, dated August 30, 1988, to evaluate whether the

hydrocarbon contamination levels in the ground water are decreasing with time.

A geologist was present at the site on October 14, 1988, to sample and perform subjective analyses on the water from the three ground-water monitoring wells. The static water level in each well was measured to the nearest 0.01-foot using a Solinst electric water-level sounder. Samples of ground water were then collected from the air/fluid interface in the monitoring wells for subjective analysis. The samples were retrieved by gently lowering about half the length of a Teflon bailer past the air/water interface. Samples from each well were examined for floating product, sheen, and emulsion, if any. The water in wells MW-1 and MW-2 showed no floating product or emulsion. A slight sheen was present in the water from well MW-2. The water in well MW-3 contained 9 inches of brown-colored floating product.

On November 2, 1988, an Applied GeoSystems geologist revisited the site to measure depths to water in wells MW-1 through MW-3, to measure the thickness of floating product in well MW-3, and to bail product from MW-3. Wells MW-1 and MW-2 showed no visible evidence of hydrocarbon contamination; well MW-3 contained 11.5 inches of product. The cumulative results of these and previous subjective analyses are presented in Table 1.

Because of the increase in product thickness noted in monitoring well MW-3 between October and November, Applied GeoSystems revisited the site on November 9 and December 15, 1988, to perform subjective analyses of ground water in wells MW-1 through MW-3. On November 9, wells MW-1 and MW-2 showed no visible evidence of the presence of hydrocarbons, and well MW-3 contained 3/4-inch of floating product. On December 15, well MW-1 showed a slight sheen, well MW-2 contained no evidence of hydrocarbon contamination, and the thickness of floating product in well MW-3 was measured to be 6.7 inches. The cumulative results of these and previous subjective analyses are presented in Table 1.

After performing the subjective analyses on October 14, wells MW-1 and MW-2 were purged of approximately two to three well volumes of water and were allowed time to recover to approximately 80 percent of the static water level. Recharge rates into the wells were relatively low. Purge water from these sampling and bailing episodes was temporarily stored onsite in a Department of Transportation 17E 55-gallon waste-liquid drum for subsequent removal and consignment at UNOCAL's request.

Ground-water samples for laboratory analyses were then collected with a clean Teflon bailer. Samples from each well were collected immediately below the surface of the water column. The samples were then slowly transferred to laboratory-cleaned 40-milliliter glass vials. Hydrochloric acid was added to the vials to minimize bacterial degradation of the samples. A Chain of Custody Record and Analysis Reports for the samples are included in this report.

The ground-water samples were analyzed by Applied GeoSystems' Laboratory in Fremont for total petroleum hydrocarbons (TPH) as gasoline and the hydrocarbon constituents benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) by Modified EPA Methods 8015 and EPA Method 602, respectively. Results of these and previous analyses are summarized in Table 2.

The results of the analyses indicate that detectable amounts of BTEX are present in monitoring wells MW-1 and MW-2. The concentration of benzene in each of the wells was above the maximum concentration for drinking water (0.0007 ppm) recommended by the California Department of Health Services (DHS) with the highest level (0.080 ppm) occurring in well MW-2. Toluene concentrations were below the DHS recommended maximum drinking-water concentration (0.100 ppm) in water samples from both wells MW-1 and MW-2; the highest concentration of toluene (0.010 ppm) was found in water from well MW-2. The DHS recommended maximum concentrations for total xylene isomers (0.620ppm) and concentrations of eythylbenzene (0.680ppm) were not exceeded in water samples collected from either of the monitored wells.

The measured ground-water depths were combined with well-head elevations surveyed by Applied GeoSystems on November 12, 1987, to calculate the differences in water-level elevation. Table 3 presents the tabulated results of the survey using ground-water measurements taken on July 14, October 14, and November 2, 1988. Plate P-3 presents a graphical interpretation of the ground-water table at the time of the July 1988 measurements. The ground-water gradient calculated from the above measurements is approximately 0.125 (about 12.5 feet in vertical distance per 100 feet in horizontal distance), and the direction of flow is approximately south 55 degrees west.

Ground-water gradients were calculated using the October and November 2, 1988, field data, by applying a correction factor of 0.8 (to correct for differences in specific gravities of gasoline and water) to the measured thickness of product in monitoring well MW-3, and then subtracting this number from the measured depth to water. The interpreted ground-water gradients for October 14 and November 2, 1988, are approximately 0.108, with a ground-water flow direction oriented south 40 degrees west, and approximately 0.128, with ground-water flow oriented approximately south 48 degrees west, respectively. These ground-water gradients are depicted graphically in Plates P-4 and P-5.

We recommend that quarterly monitoring of ground-water conditions in monitoring wells MW-1 through MW-3 be continued and the thickness of any floating product in well MW-3 be monitored and the product be removed on a bi-weekly basis. We also recommend that additional work be performed at the site to delineate the extent of free-phase and dissolved hydrocarbon contamination. The water samples collected during quarterly monitoring should be analyzed for total petroleum hydrocarbons (TPH) and for benzene, toluene, ethylbenzene, and total xylene isomers (BTEX).

We recommend that UNOCAL submit a copy of this report to Mr. Larry Seto, Hazardous Materials Specialist, Alameda County Health Care Services, 470 27th Street, Third Floor, Oakland, California 94612, and Ms. Lisa McCann, Water Quality Control Board, San Francisco Bay Region, 1111 Jackson Street, Room 6040, Oakland, California 94607.

Sincerely,
Applied GeoSystems

James A. Orr
Staff Geologist

Jon R. Luellen
Project Geologist

Gillian S. Holmes
G.E. 2023

Enclosures: Site Vicinity Map, Plate P-1
Generalized Site Plan, Plate P-2
Ground-Water Potentiometric Surface Map, July 14, 1988, Plate P-3
Ground-Water Potentiometric Surface Map, October 14, 1988, Plate P-4
Ground-Water Potentiometric Surface Map, November 2, 1988, Plate P-5
Results of Subjective Analyses, Table 1
Results of Laboratory Analyses, Table 2
Ground-Water Elevation Differences, Table 3
Chain of Custody Record
Analysis Reports and Analysis Data Sheets (2 pages)

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

N

Approximate Scale

2000 1000 0 2000 4000

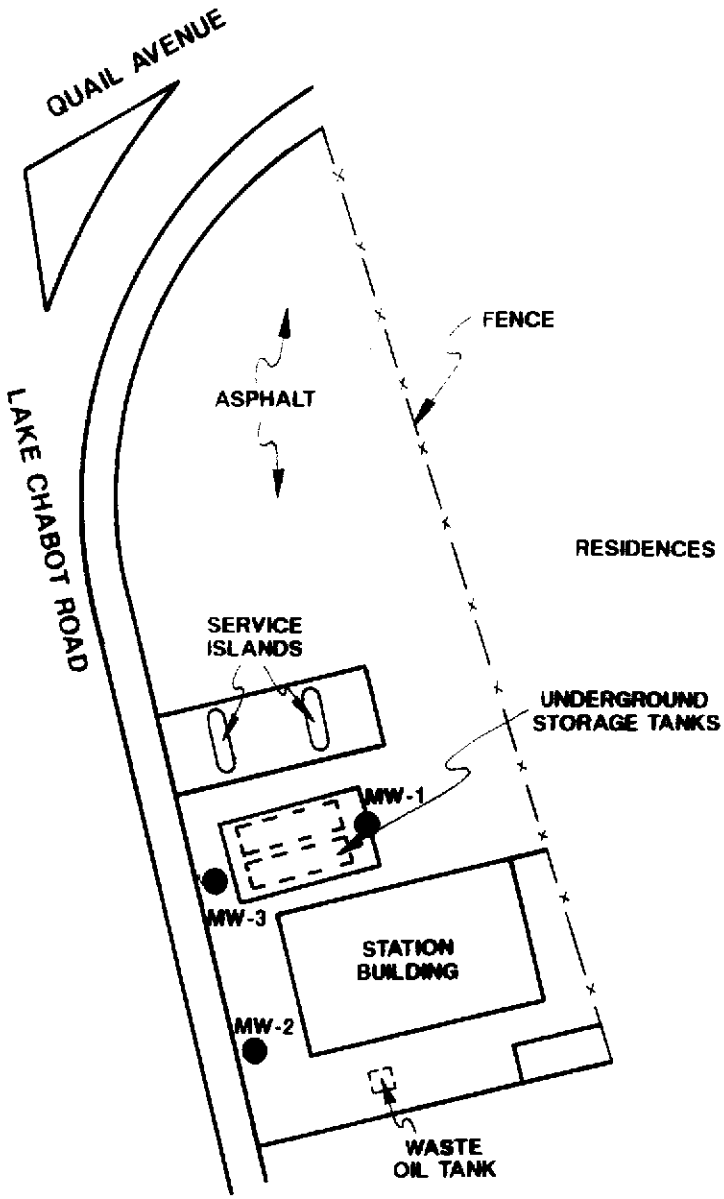
feet

Applied GeoSystems

PROJECT NO. 018061-2

SITE VICINITY MAP
UNOCAL Station No. 5484
18950 Lake Chabot Road
Castro Valley, California

PLATE
P - 1



MW-3● = Approximate location of boring and monitoring well

Source: Measured by tape and compass

N

Approximate Scale

40 20 0 40 80

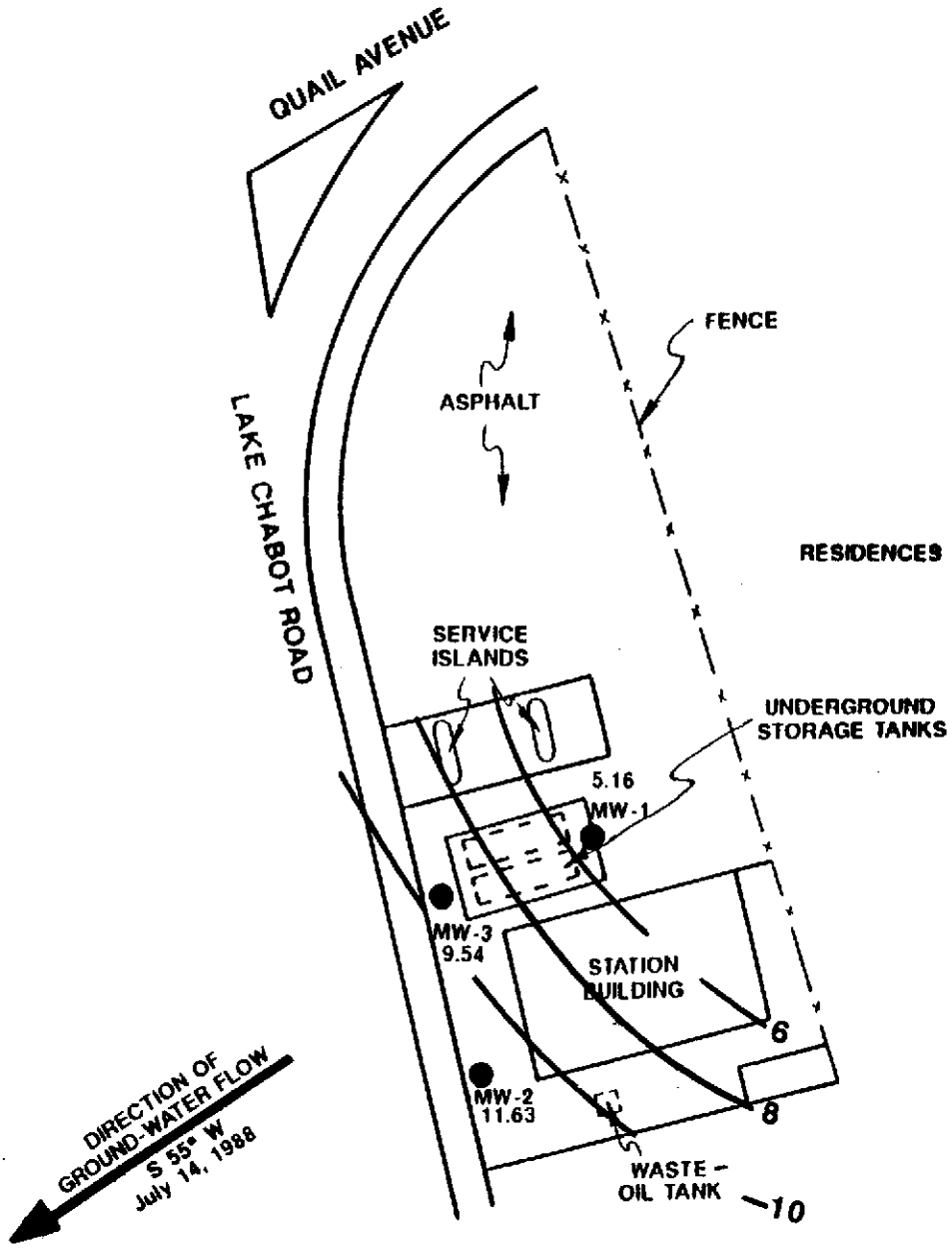
feet

Applied GeoSystems

PROJECT NO. 018061-2

GENERALIZED SITE PLAN
UNOCAL Station No. 5484
18950 Lake Chabot Road
Castro Valley, California

PLATE
P - 2



Approximate ground-water gradient = 12.5ft./100ft.

10 = Line of equal depth in feet to ground water

MW-3 ● = Monitoring well location

Source: Measured by tape and compass

N

Approximate Scale

40 20 0 40 80

feet

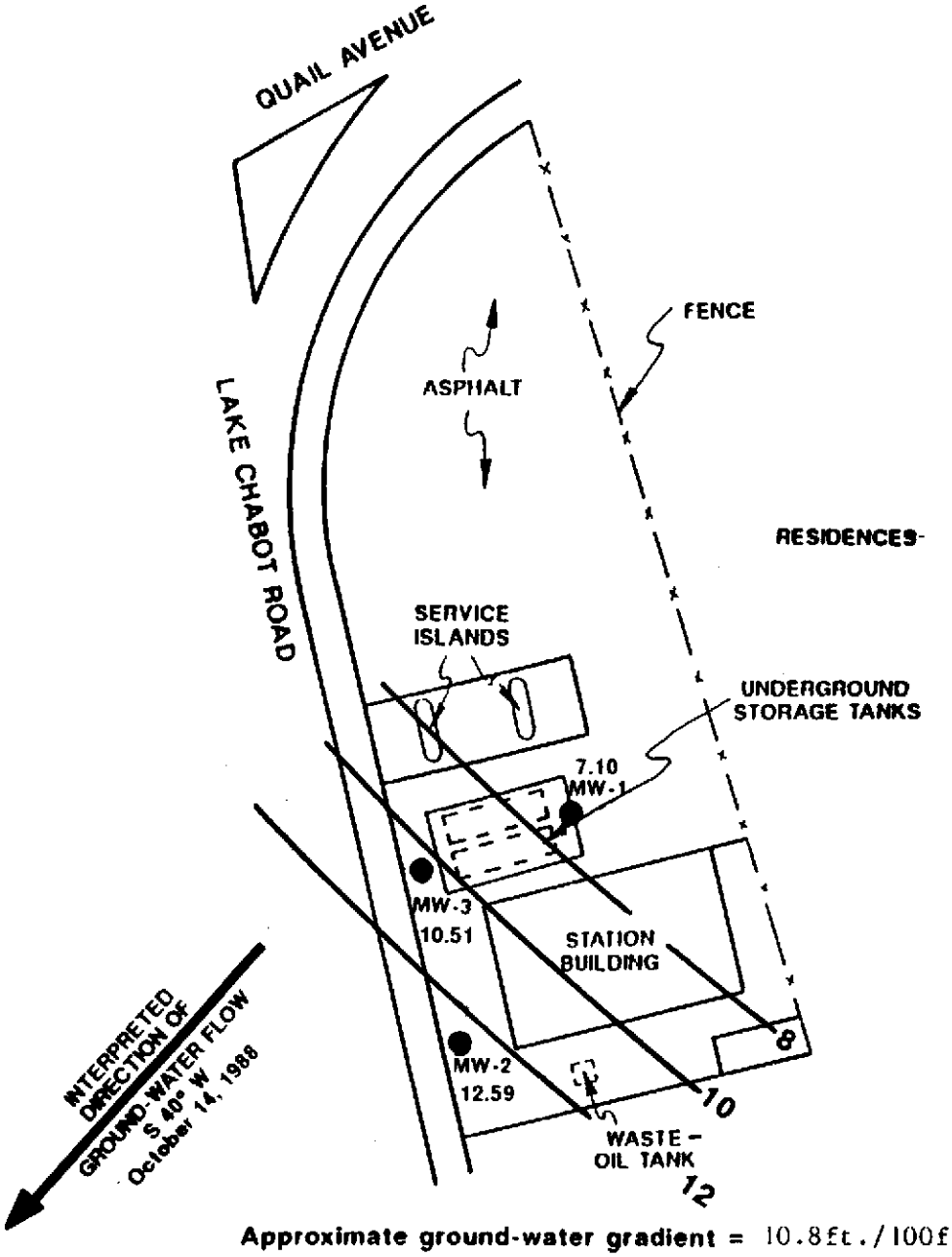
Applied GeoSystems

PROJECT NO. 018061-2

GROUND-WATER POTENTIOMETRIC SURFACE MAP
UNOCAL Station No. 5484
18950 Lake Chabot Road
Castro Valley, California

PLATE

P - 3



Approximate ground-water gradient = 10.8ft./100ft.

12 = Line of equal depth in feet to ground water

MW-3 = Monitoring well location

Source: Measured by tape and compass

N

Approximate Scale

40 20 0 40 80

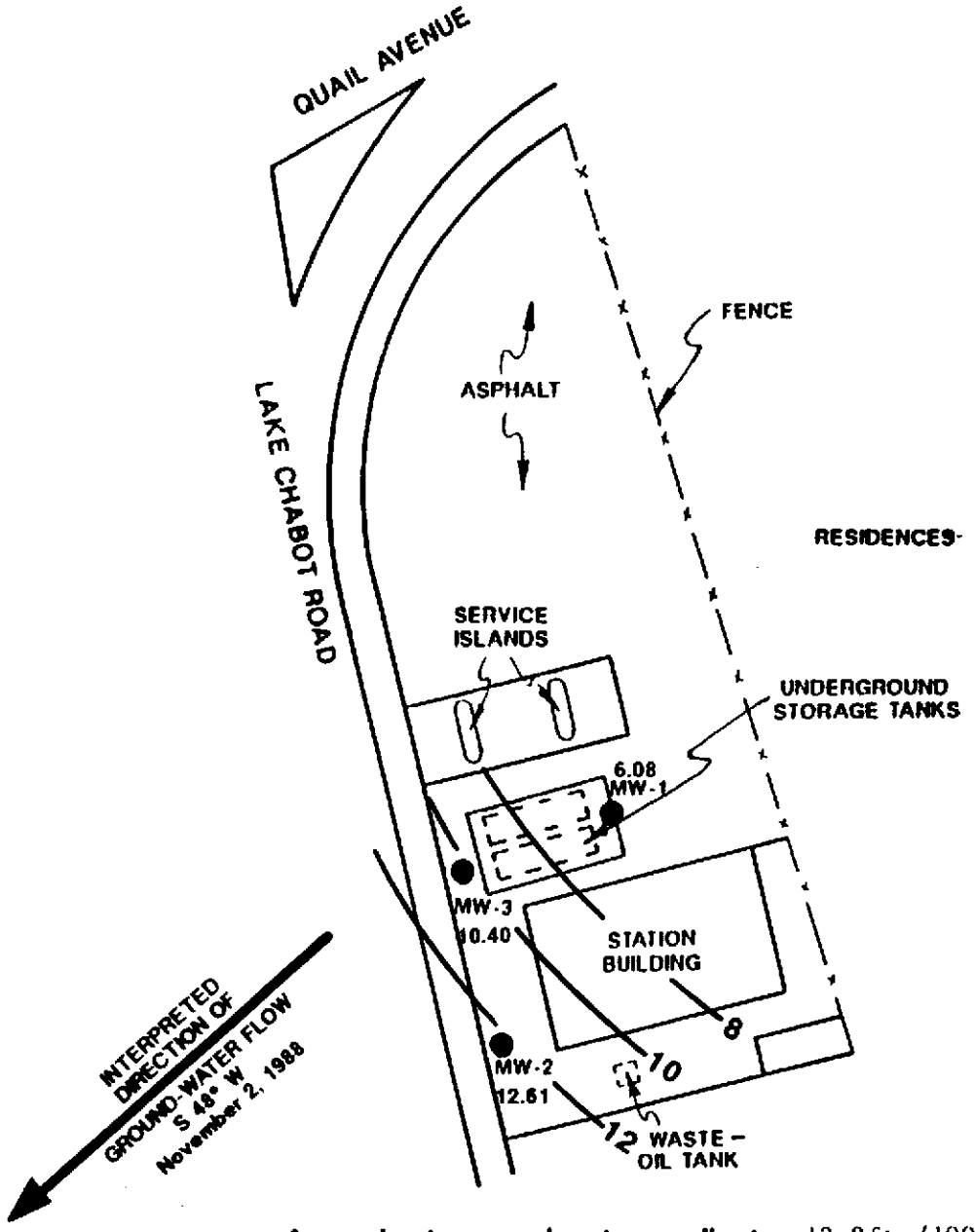
feet

Applied GeoSystems

PROJECT NO. 018061-2

GROUND-WATER POTENTIOMETRIC SURFACE MAP
UNOCAL Station No. 5484
18950 Lake Chabot Road
Castro Valley, California

PLATE
P - 4



Approximate ground-water gradient = 12.8ft./100ft.

12 = Line of equal depth in feet to ground water

MW-3 ● = Monitoring well location

Source: Measured by tape and compass

N

Approximate Scale

40 20 0 40 80

feet

Applied GeoSystems

PROJECT NO. 018061-2

GROUND-WATER POTENTIOMETRIC SURFACE MAP

UNOCAL Station No. 5484
18950 Lake Chabot Road
Castro Valley, California

PLATE P - 5

TABLE 1
CUMULATIVE RESULTS OF SUBJECTIVE ANALYSES
OF WATER IN WELLS
UNOCAL Service Station No. 5484
18950 Lake Chabot Road
Castro Valley California

Well	Date	Depth to Water*	Inches of Floating Product	Sheen	Emulsion
MW-1	7/88	5.16	NONE	NONE	NONE
	10/88	7.10	NONE	NONE	NONE
	11/2/88	6.08	NONE	NONE	NONE
	11/9/88	6.14	NONE	NONE	NONE
	12/15/88	6.51	NONE	SLIGHT	NONE
MW-2	7/88	6.85	NONE	NONE	NONE
	10/88	7.81	NONE	SLIGHT	NONE
	11/2/88	7.83	NONE	NONE	NONE
	11/9/88	7.98	NONE	NONE	NONE
	12/15/88	7.89	NONE	NONE	NONE
MW-3	7/88	7.49	NONE	NONE	NONE
	10/88	9.06	9.0	NA	NA
	11/2/88	9.12	11.5	NA	NA
	11/9/88	7.60	0.75	NA	NA
	12/15/88	7.97	6.72	NA	NA

* = Depth measured in feet below top of casing
NA = Not applicable

TABLE 2
RESULTS OF LABORATORY ANALYSES
UNOCAL Service Station No. 5484
18950 Lake Chabot Road
Castro Valley, California

SAMPLE	DATE	B	T	E	X	TPH
W-7-MW1	7/88	0.0061	0.0827	0.0356	0.1803	0.540
W-8-MW1	10/88	0.0132	0.0041	0.1638	0.0581	1.420
W-9-MW2	7/88	0.072	0.139	0.033	0.1570	1.080
W-9-MW2	10/88	0.080	0.010	0.025	0.0260	1.140
W-9-MW3	7/88	0.385	0.640	0.369	2.258	7.800
	10/88	Well not sampled				

Results in parts per million (ppm)
BTEX = Benzene, Ethylbenzene, Toluene, and Total Xylene
TPH = Total Petroleum Hydrocarbons as gasoline
Sample designation: W-15-MW1

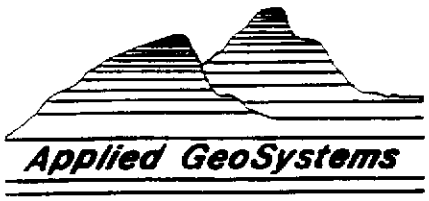
- W — Water sample
- 15 — Approximate depth of sample
- MW1 — Monitoring well (MW) well number

TABLE 3
GROUND-WATER ELEVATION DIFFERENCES
UNOCAL Service Station No. 5484
18950 Lake Chabot Road
Castro Valley, California

Monitoring Well Number	Top of Casing Below Datum (c)	Static Water Level (w)	Water Level Below Datum (c + w)
July 14, 1988			
MW-1	0.000	5.16	5.16
MW-2	4.780	6.85	11.63
MW-3	2.046	7.49	9.54
October 14, 1988			
MW-1	0.000	7.10	7.10
MW-2	4.780	7.81	12.59
MW-3	2.046	8.46*	10.51*
November 2, 1988			
MW-1	0.000	6.08	6.08
MW-2	4.780	7.83	12.61
MW-3	2.046	8.35*	10.40*

Measurements in feet.
Static water level measured in feet below top of casing.
Datum is an arbitrary elevation equal to the top of the highest well casing (MW-1).
* = Water levels corrected for presence of floating product : (w[measured]-0.8x(product thickness in feet))

CHAIN OF CUSTODY RECORD



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

SAMPLER (signature): Dan Kirkman

Phone: 651-1906

LABORATORY: APPLIED GEOSYSTEMS

TURNAROUND TIME: 2 WK

Project Leader: DREW GILPIN

Phone No. 415-651-1906

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
Dan Kirkman			
	Received for laboratory by:	10-20-98	1700

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-8-MW1	19061-2	10-14-98	TPH AND BTEX	ICED
W-9-MW2	19061-2	10-14-98	" " "	"

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ANALYSIS REPORT

02121ab.frm

Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Andrew J. Gilpin

Date Received: 10-20-88
Laboratory Number: 10031W01
Project: 18061-2
Sample: W-8-MW1
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		1.42		0.02	10-25-88	
TEH as Diesel						NR
Benzene		0.0132		0.0005	10-25-88	
Toluene		0.0041		0.0005	10-25-88	
Ethylbenzene		0.1638		0.0005	10-25-88	
Total Xylenes		0.0581		0.0005	10-25-88	

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

11-01-88
Date Reported

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ANALYSIS REPORT

0212lab.frm

Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Andrew J. Gilpin

Date Received: 10-20-88
Laboratory Number: 10031W02
Project: 18061-2
Sample: W-9-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		1.14		0.02	10-25-88	
TEH as Diesel						NR
Benzene		0.080		0.002	10-25-88	
Toluene		0.010		0.002	10-25-88	
Ethylbenzene		0.025		0.002	10-25-88	
Total Xylenes		0.026		0.002	10-25-88	

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

11-01-88
Date Reported