October 30, 1989
1030~~rbac~~ trr
AGS 87091-2

Mr. Tim Ross
Unocal Corporation
2175 North California Boulevard
Suite 605
Walnut Creek, California 94596

Subject: Letter report on second quarter ground-water monitoring at Unocal 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 authorized. The site is 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 analyzing water from six ground-water monitoring wells, purging the wells, and collecting water samples for laboratory analysis. Locations of the wells are on the Generalized Site Plan (Plate P-2). Applied GeoSystems installed monitoring well MW-1 in September 1987 (Applied GeoSystems Report No. 87091-1, December 16, 1987), and monitoring wells MW-2 through MW-4 in September 1988 (Applied GeoSystems Report No. 87091-3, November 18, 1988). We installed monitoring wells MW-5 and MW-6 in May 1989 (report in preparation). Applied GeoSystems recommended quarterly ground-water monitoring after hydrocarbon contamination was detected in ground water at the site.

A geologist from Applied GeoSystems visited the site on May 18, 1989, to measure depths to water and to collect water samples from wells MW-5 and MW-6 for both subjective and laboratory analysis. On July 6, 1989, an Applied GeoSystems geologist returned to the site to measure depths to water in wells MW-1 through MW-6 and to collect water samples from wells MW-1 through MW-4. The static water level in each well was measured to the nearest 0.01 foot, using a Solinst electric water-level sounder. Initial water samples were collected from the wells 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 geologist observed no subjective evidence of hydrocarbon contamination in water from wells MW-2 through MW-6 and a sheen on the water from well MW-1. Cumulative results of subjective analysis are in Table 1.

After subjective analysis each well, except well MW-1, was purged of approximately 3 well volumes of water and allowed to recover to at least 80 percent of its static water level. Monitoring well MW-1 contained only enough water for the subjective analysis and not a sufficient quantity for purging and collecting water samples for laboratory analysis. Purged water was placed in appropriately labeled Department of Transportation 17E, 55-gallon, waste-liquid drums for subsequent removal and consignment at Unocal's request.

Samples for laboratory analysis then were collected with a clean Teflon bailer. Samples were 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 as a preservative. The samples were sealed promptly with Teflon-lined caps, stored on ice, and delivered to the Applied GeoSystems laboratory in Fremont, California for analysis. This laboratory is certified by the State of California to perform the requested tests (Hazardous Waste Testing Laboratory No. 153). The geologist initiated a Chain of Custody Record and a copy is enclosed with this letter report.

Each sample was analyzed for total petroleum hydrocarbons (TPH) as gasoline using modified EPA Method 8015 and the purgeable gasoline constituents benzene, ethylbenzene, toluene, and total xylene isomers (BETX) using modified Environmental Protection Agency (EPA) Method 602. Results of these and previous laboratory analyses are presented in Table 2. Copies of laboratory Analysis Reports for the May and July 1989 sampling episodes are enclosed with this letter report.

The most recent laboratory analysis of water samples from wells MW-2 and MW-3 indicate about the same concentrations of hydrocarbon constituents as detected in the previous analysis. The levels of TPH as gasoline detected in water samples from wells MW-2 and MW-3 range from below the detection limit of 0.002 to 53 parts per million (ppm). No hydrocarbon contamination was detected in the samples collected from wells MW-4, MW-5, or MW-6. Concentrations of benzene detected in water samples from wells MW-2 and MW-3 exceeded the Maximum Contaminant Level (MCL) promulgated in Title 22 of the California Administrative Code (CAC) for benzene in drinking water (0.001 ppm). Concentrations of ethylbenzene and total xylene isomers detected in water samples from well MW-3 exceeded CAC Title 22 MCL (0.680 and 1.750 ppm, respectively). The concentration of toluene detected in a water sample from well MW-3 exceeded the recommended maximum drinking water concentration established for toluene by the State of California Department of Health Services (0.100 ppm).

The direction of ground-water flow across the site has been evaluated. Ground-water depth measurements were combined with wellhead elevations, which were surveyed by the licensed surveying company Cross Land Surveying, Inc. of San Jose, California, in October 1988, to calculate the water-level elevations. The data on water-level elevations was used to evaluate the ground-water gradient beneath the site. Wells MW-5 and MW-6 have not been surveyed, and therefore could not be used to evaluate the gradient. These wells will be surveyed after additional proposed monitoring wells have been installed in the vicinity of the site (see below). Well MW-1 contained insufficient water to obtain a reliable water-level measurement.

A graphic interpretation of the ground-water flow direction and gradient on July 7, 1989, is shown on the Ground-Water Gradient Map (Plate P-3). The ground-water flow direction at this time was approximately west 20 degrees south and the gradient was approximately 0.002 (approximately 1 vertical foot per 500 horizontal feet). The interpreted ground-water flow direction is slightly more southward than observed in the previous monitoring period.

Because elevated levels of some hydrocarbon 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. At the request of Unocal, Applied GeoSystems is arranging to install additional wells at the site to evaluate further the extent of contamination.

We recommend that copies of this report be sent to Mr. Scott Hugenburger of the California 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 questions regarding this letter report.

Sincerely,
Applied GeoSystems

Ron C. Duncan
Project Geologist

Walter H. Howe
R.G. 730

Enclosures: Site Vicinity Map, Plate P-1
Generalized Site Plan, Plate P-2
Ground-Water Gradient 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 Records (2 pages)
Analysis Reports (5 pages)

TABLE 1
RESULTS OF SUBJECTIVE ANALYSES
Unocal 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		
	07/06/89	33.93	0.00	YES	NONE
MW-2	10/03/88	36.04	NONE	NONE	NONE
	01/27/89	34.77	NONE	NONE	NONE
	07/06/89	34.32	NONE	NONE	NONE
MW-3	10/03/88	35.86	NONE	NONE	NONE
	01/27/89	34.60	NONE	NONE	NONE
	07/06/89	34.12	NONE	NONE	NONE
MW-4	10/03/88	36.12	NONE	NONE	NONE
	01/27/89	34.87	NONE	NONE	NONE
	07/06/89	34.35	NONE	NONE	NONE
MW-5	05/18/89	33.34	NONE	NONE	NONE
	07/06/89	34.68	NONE	NONE	NONE
MW-6	05/18/89	32.07	NONE	NONE	NONE
	07/06/89	33.39	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 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					
07/89	Not sufficient water to collect sample					
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
07/89	W-35-MW2	0.73	0.055	0.024	0.00064	0.010
WELL MW-3						
10/88	W-37-MW3	61	1.06	1.52	3.38	8.72
01/89	W-35-MW3	39	1.57	1.25	2.83	7.07
07/89	W-35-MW3	53	1.4	1.2	1.3	4.6
WELL MW-4						
10/88	W-37-MW4	<0.02	<0.0005	<0.0005	<0.0005	<0.0005
01/89	W-35-MW4	<0.02	<0.0005	<0.0005	<0.0005	<0.0005
07/89	W-35-MW4	<0.02	<0.0005	<0.0005	<0.0005	<0.0005
WELL MW-5						
05/89	W-35-MW5	<0.02	<0.0005	<0.0005	<0.0005	<0.0005
WELL MW-6						
05/89	W-33-MW6	<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-33-MW6

- W — Water sample
- 33 — Sample depth in feet
- MW6 — Monitoring well number

TABLE 3
GROUND-WATER ELEVATION DIFFERENCES
Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California
(measured on July 6, 1989)

Monitoring Well Number	Top of Casing (C)	Static Water Depth (W)	Water Level Elevation (C - W)
MW-1	57.84	33.93	23.91
MW-2	58.14	34.32	23.82
MW-3	57.92	34.12	23.80
MW-4	58.30	34.35	23.95
MW-5	NS	34.68	NA
MW-6	NS	33.39	NA

Measurements are in feet.
Static water level measured in feet below top of casing.
Elevation referenced to National Vertical Geodetic Datum.
NS = Not surveyed.
NA = Not applicable.

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

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Ron Duncan

Date Received: 07-07-89
Laboratory Number: 90706W01
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		0.73		0.020	07-10-89	
TEH as Diesel						NR
Benzene		0.055		0.00050	07-10-89	
Toluene		0.00064		0.00050	07-10-89	
Ethylbenzene		0.024		0.00050	07-10-89	
Total Xylenes		0.010		0.00050	07-10-89	

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

07-12-89
Date Reported

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

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Ron Duncan

Date Received: 07-07-89
Laboratory Number: 90706W02
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		53		1.0	07-10-89	
TEH as Diesel						NR
Benzene		1.4		0.050	07-10-89	
Toluene		1.3		0.050	07-10-89	
Ethylbenzene		1.2		0.050	07-10-89	
Total Xylenes		4.6		0.050	07-10-89	

mg/kg = milligrams per kilogram = parts per million (ppm).
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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.

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Tia Tran, Laboratory Supervisor

07-12-89
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Applied GeoSystems 43255 Mission Boulevard, Fremont, CA 94539 (415) 651-1906

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ANALYSIS REPORT

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Report Prepared for:
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Attention: Ron Duncan

Date Received: 07-07-89
Laboratory Number: 90706W03
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		0.020	07-10-89	
TEH as Diesel						NR
Benzene		ND		0.00050	07-10-89	
Toluene		ND		0.00050	07-10-89	
Ethylbenzene		ND		0.00050	07-10-89	
Total Xylenes		ND		0.00050	07-10-89	

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.

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Date Reported