REPORT ON SUPPLEMENTAL SUBSURFACE ENVIRONMENTAL INVESTIGATION AND FIRST QUARTER 1990 MONITORING

at

Unocal Station 5367
500 Bancroft Avenue
San Leandro, California

AGS Job 87091-4

Report prepared for

Unocal Corporation
2000 Crow Corporation
No. 400
San Ramon, California

by

Applied GeoSystems

ORIGINAL SIGNED BY

Ron C. Duncan
Project Geologist

ORIGINAL SIGNED BY

James A. Perkins
Project Manager
R.G. 4472

ORIGINAL SIGNED BY

Ashraf Mirza
Branch Manager

August 10, 1990

August 10, 1990
AGS 87091-4

Mr. Ron Bock
Unocal Corporation
2000 Crow Canyon Place
Suite 400
San Ramon, California 94538

Subject: Executive Summary of Report on Supplemental Subsurface Environmental Investigation and First Quarter 1990 Monitoring, at Unocal Station 5367, 500 Bancroft Avenue, San Leandro, California.

Mr. Bock:

This report presents the results of Applied GeoSystems' (AGS) supplemental subsurface environmental investigation and February 1990, quarterly ground-water monitoring conducted at Unocal Station 5367 in San Leandro, California. This work was performed at the request of Unocal Corporation (Unocal). The purpose of the investigation was to evaluate further the extent and concentrations of hydrocarbons in the soil and ground water.

The scope of work included drilling borings B-5 through B-8, installing four ground-water monitoring wells (designated MW-5 through MW-8), analyzing soil and water samples, evaluating field and laboratory data, and preparing a report. Soil and water samples were analyzed for total petroleum hydrocarbons as gasoline (TPHg), and the purgeable gasoline constituents benzene, ethylbenzene, toluene, and total xylene isomers (BTEX). A composite soil sample from the auger cuttings also was analyzed for total petroleum hydrocarbons as diesel (TPHd) and selected metals. One water sample was analyzed for general mineral analysis.

Except for low hydrocarbon concentrations detected in one soil sample from boring B-7 and two samples from boring B-8, the laboratory analyses did not detect hydrocarbons in the soil samples. The sample collected from boring B-7 at 26 feet below grade contained 0.092 parts per million (ppm) benzene. The sample collected from boring B-8 at 26 feet below grade contained 0.098 ppm benzene and that from 31 feet contained 90 ppm TPHg, 0.83 ppm ethylbenzene, and 3.9 ppm xylenes. These hydrocarbons may be residual hydrocarbons deposited at a time when the water level was higher.

No evidence of floating product, sheen, or emulsion were detected in the water samples during subjective evaluations. Laboratory results of ground-water samples from wells MW-2, MW-3, MW-5, and MW-8 indicate varying concentrations of TPHg and BTEX. TPHg concentrations in water samples from these wells ranged from 67 to 22,000 parts per billion (ppb) and benzene concentrations ranged from 0.51 to 710 ppb. Laboratory results of water samples from wells MW-4, MW-6, and MW-7 indicate nondetectable concentrations of TPHg and BTEX. Results of the general mineral analysis indicate the water is of relatively good quality.

Ground water is approximately 35 feet below grade. Ground-water data indicate flow is toward the west with a gradient of 0.001 (0.1 foot vertical per 100 feet horizontal).

Alameda County Water District records and a field search indicate at least 15 wells are within 1/2-mile of the site. Ground water within the vicinity of the site is dominantly used for irrigation. Five of the wells are downgradient and within approximately 600 feet of the site. One well is used for irrigation, one is abandoned, and records of the statuses of the other wells are not available to AGS.

The results of this and previous investigations indicate the presence of gasoline-related hydrocarbons beneath the site and offsite toward the southwest (well MW-8). Hydrocarbons in the soil and ground water have been delineated east of the USTs and west of the site; additional work may be necessary to delineate hydrocarbons in ground water north, southwest, and south of the site.

We recommend to continue quarterly ground-water monitoring at the site to evaluate further possible trends in dissolved hydrocarbon concentrations. After additional quarterly monitoring, analysis of data is recommended to evaluate if present delineation is adequate.

We also recommend copies of this report be forwarded 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 Ferrerira of the San Leandro Fire Department, 835 East 14th Street, San Leandro, California 94577.

Please call if you have questions regarding this report or the project in general.

Sincerely,
Applied GeoSystems

ORIGINAL SIGNED BY

James A. Perkins
Project Manager

CONTENTS

CONTENTS (CONTINUED)

TABLES

PLATES

APPENDICES

REPORT ON
SUPPLEMENTAL SUBSURFACE
ENVIRONMENTAL INVESTIGATION
AND FIRST QUARTER 1990 MONITORING
at
Unocal Station 5367
500 Bancroft Avenue
San Leandro, California

For Unocal Corporation

1.0 INTRODUCTION

At the request of Unocal Corporation (Unocal), Applied GeoSystems (AGS) conducted a supplemental subsurface investigation at Unocal Station 5367, 500 Bancroft Avenue in San Leandro, California. The purpose of the investigation was to provide additional information regarding the extent and concentrations of petroleum hydrocarbon constituents in soil and ground water at and near the site. Petroleum hydrocarbons were detected at the site during previous investigations.

The scope of work included:

- drilling four 8-inch-diameter borings and collecting soil samples from each boring;
- installing a 2-inch-diameter ground-water monitoring well in each boring and developing the newly constructed wells;
- purging and collecting water samples from the wells for subjective evaluations and laboratory analyses;

- o surveying the elevations of the well heads;
- o conducting a literature and a field search for wells within 1/2 mile of the site; and
- o evaluating the ground-water flow direction and ground-water gradient.

This report summarizes previous work, describes work performed during the present investigation, presents the results obtained from analyses of soil and water samples, and also includes interpretations, conclusions, and recommendations.

1.1 Site Description

The subject site is at the southeastern corner of the intersection of Bancroft Avenue and Dowling Boulevard in San Leandro, California, as shown on the Site Vicinity Map (Plate 1). The approximate locations of the station facilities and the monitoring wells are shown on the Generalized Site Plan (Plate 2). Facilities include a building, two gasoline-dispenser islands, and three underground gasoline-storage tanks (USTs) clustered northwest of the station building. The site is approximately 58 feet above mean sea level, and is bounded on all sides by residential property, except to the west across Bancroft Avenue where a commercial building is located.

1.2 Previous Investigations

Previous work performed at the site by AGS between 1987 and 1989 included installing monitoring wells, conducting a soil vapor survey, and ground-water monitoring.

1.2.1 First Phase of Investigation

At the request of Unocal, AGS conducted a limited subsurface environmental investigation in September 1987, which involved installing one ground-water monitoring well (MW-1), and collecting soil and water samples for subjective evaluations and laboratory analyses (AGS Report 87091-1, dated December 16, 1987). The purpose of the investigation was to evaluate potential hydrocarbons in soil and ground water. Floating product was detected in well MW-1. Laboratory results indicated detectable levels of hydrocarbons in soil and ground-water samples. The laboratory results of soil samples collected during drilling of boring B-1 (MW-1) are in Table 1.

1.2.2 Second Phase of Investigation (Soil Vapor Survey)

At the request of Unocal, AGS performed a soil vapor survey at the site on June 17, 1988, to assist in delineating the subsurface distribution of hydrocarbons (AGS Report 87091-2V, dated August 12, 1988). Vapor samples were collected from depths of 15 and 25 feet at seven locations. No hydrocarbon vapors were detected at the depths sampled.

1.2.3 Third Phase of Investigation

At the request of Unocal, AGS conducted an additional investigation at the site during September and October, 1988. The investigation included installing three ground-water monitoring wells (MW-2, MW-3, and MW-4), and collecting soil and water samples for subjective evaluations and laboratory analyses (AGS Report 87091-3, dated November 18, 1988).

The soil encountered during drilling consisted predominantly of silty clay with some lenses of sand and fine gravel. The depth to static ground water was approximately 36 feet below grade.

Laboratory results of soil samples from the borings indicated hydrocarbons were present in soil between 30 and 36 feet, west and south of the tank pit. Analyses of water samples showed elevated levels of hydrocarbons in wells MW-2 and MW-3. Laboratory soil and water results are summarized in Table 2.

1.2.4 Monitoring Phase of Investigation

At the request of Unocal, AGS initiated a quarterly ground-water monitoring program to evaluate trends in the concentrations of hydrocarbons in the ground-water with time (AGS Letter Reports No. 87091-2, dated March 13, 1989, September 18, 1989, October 30, 1989, and January 29, 1990). Cumulative results of ground-water analyses are in Table 3. Water from wells MW-2 and MW-3, which are near the dispenser islands and gasoline USTs, historically have contained the higher concentrations of hydrocarbons, relative to water from the other wells. TPHg concentrations range from 510 to 61,000 ppb in water from wells MW-2 and MW-3 and from <20 to 66 ppb in water from wells MW-4, MW-5, and MW-6. Minor fluctuations of hydrocarbons concentrations have occurred, but the concentrations generally have remained relatively constant.

Floating product was noted in well MW-1 on seven occasions from September 1987 to April 1988. Except for one monitoring event, no water has been observed in MW-1 since April 1988. No floating product was noted on water from MW-1 on that occasion, but a sheen

and emulsion were observed. No free product, sheen, or emulsion have been observed on water from the other wells.

1.3 Regional Geology and Hydrogeology

Sediments in the vicinity of the site consist of alluvial deposits of gravel, sand, silt, and clay of Pleistocene age, deposited by San Leandro Creek (Hickenbottom and Muir, 1988). Three confined saturated zones generally are recognized in the area. The upper confined saturated zone lies between the ground surface and approximately 150 feet in depth. The second zone lies between approximately 150 and 200 feet in depth, and the top of a third zone starts at about 300 feet in depth. The regional ground-water gradient is toward the west. Several shallow saturated zones (less than 50 feet in depth) of limited areal extent also exist in the vicinity of the site.

The shallow saturated zones and the upper confined saturated zone do not yield large volumes of water. The two deeper confined saturated zones have much larger yields and are sources of water for commercial irrigation.

1.4 Wells Within 1/2-Mile Radius of the Site

AGS reviewed the public records of the Alameda County Water District (ACWD) and performed a field search to locate wells within a 1/2-mile radius of the site and evaluate ground-water usage in the area. The ACWD records contain information on 11 wells located within approximately 1/2-mile radius of the site. Four additional wells were observed during the field search. The approximate location of the wells are shown on Plate 3.

According to the ACWD records, one well is for cathodic protection, nine are for irrigation and the use of one well is unknown. The statuses of the four wells discovered during the field search were not determined. The locations, total depths, and uses of the 15 wells are presented in Table 4.

2.0 FIELD INVESTIGATION

Field work performed on behalf of Unocal followed the procedures described in Appendix A (Operating Procedures). Field work was conducted in accordance with AGS's Site Safety Plan developed specifically for the work performed at the site. Appendix A contains more information on the Site Safety Plan.

Before drilling began, Groundwater Protection Ordinance Permits for well construction were acquired from the Alameda County Flood Control and Water Conservation District. Permission was obtained from the appropriate parties to install the offsite wells and Underground Service Alert was contacted to locate public utility lines in the site area. A copy of the well permits (Permit Nos. 89236 and 90043) are in Appendix B.

2.1 Borehole Drilling

Borings B-5 and B-6 were drilled on May 15, 1989 and B-7 and B-8 were drilled on February 6 and 7, 1990. The total depths of borings B-5 through B-8 were 46-1/2, 46-1/2, 44, and 44 feet, respectively. HEW Drilling Company, Inc. of Palo Alto, California, drilled the borings with a CME-55 hollow stem auger rig.

Borings B-6, B-7, and B-8 were located offsite 70 to 120 feet west of and in the inferred hydraulic downgradient direction of the USTs. Boring B-5 was located onsite approximately 70 feet south of the USTs and in the inferred hydraulic cross-gradient direction. The boring locations are shown in Plate 2. Ground water was first encountered between approximately 35 and 38 feet below grade. The static water level was approximately 35 feet below grade.

2.2 Soil Sampling

Soil samples from the borings were collected at 5-foot intervals from the ground surface to total depth of the borings. Samples were subjectively evaluated for the presence of hydrocarbons using an organic vapor meter (OVM). The Unified Soil Classification System was used to classify soils encountered in the boring. A copy of this classification system is presented in Plate 4. Descriptions of the earth materials encountered in the boring are presented on the Logs of Boring (Plates 5 through 12), which also show the OVM readings under the column entitled "P.I.D." (photoionization detector).

Two soil samples were selected from borings B-5, B-6, and B-7 and three from boring B-8 for laboratory analyses. The nine samples were handled following chain of custody (COC) protocol initiated by the field geologist. Copies of the completed COC forms for soil samples are in Appendix C. Soil samples were delivered to AGS laboratory in Fremont, California, for analyses. This laboratory is certified by the State of California, to perform the required tests (Hazardous Waste Testing Laboratory Certificate No. 153).

One soil sample from the stockpiled cuttings from each boring (B-5 through B-8) was collected and composited in the laboratory for analyses. Soil samples were delivered to Sequoia Analytical laboratory in Redwood City, California, for analyses. This laboratory is certified by the State of California, to perform the required tests (Hazardous Waste Testing Laboratory Certificate No. 145).

2.3 Monitoring Well Construction

Monitoring wells MW-5 through MW-8 were constructed to monitor ground-water conditions south, west, and northwest of the existing USTs. Well screens were set from depths of approximately 44 to 45 feet to approximately 24 to 25 feet below the ground surface. Unperforated PVC casing was set from the top of the screened casing to a few inches below the ground surface. The annular space of each well was backfilled with No. 2 sorted sand from the bottom of each well to approximately 1-1/2 feet above the top of each screen. A bentonite plug, approximately 2-feet thick, was placed above the sand and the remaining annulus was backfilled with neat cement to a few inches below the ground surface. A graphic representation of each well is shown on the right column of the Logs of Borings (Plates 5 through 12).

2.4 Well Development and Ground-Water Sampling

Monitoring wells MW-5 and MW-6 were developed on May 18, 1989, and monitoring wells MW-7 and MW-8 were developed on February 13 and 14, 1990. The neat cement seal was allowed to set at least 72 hours prior to developing the wells. A surge-pumping technique was used to evacuate approximately 45 gallons of water from each well. The development equipment was steam-cleaned prior to each use.

Ground-water samples were then collected from the newly and previously installed monitoring wells. Sampling of wells MW-7 and MW-8 was performed in conjunction with quarterly monitoring of wells MW-2 through MW-6.

3.0 FINDINGS OF INVESTIGATION

This section contains the findings of our investigation and the first quarter 1990 ground-water monitoring event.

3.1 Subsurface Materials

Geologic materials encountered during drilling at the site consist dominantly of silty clay to a depth of approximately 48 feet. On the east side of the station property at approximately 12 below grade, a 1- to 4-foot-thick silty to gravelly sand lens is present. An approximately 6-foot-thick clayey sand lens was encountered beneath the silty to gravelly lens. Silt lenses also were found at varying depths in the borings. Geologic cross sections are illustrated on Plates 13 and 14. Plate 2 shows the reference lines for the cross sections.

3.2 Soil Samples

Hydrocarbon vapor concentrations (OVM readings) emitted by the soil samples from borings B-5, B-6, B-7, and B-8 were less than 11 ppm. A total of nine soil samples collected from borings B-5 through B-8 were analyzed for TPHg using modified Environmental Protection Agency (EPA) Method 8015 and for BTEX using EPA Method 8020. The laboratory results of soil samples are in Table 5 and the laboratory analyses reports are in Appendix B.

Except for one soil sample from boring B-7 and two samples from boring B-8, the laboratory analyses did not detect hydrocarbons in the soil samples. The sample collected from boring B-7 at 26 feet below grade contained 0.092 ppm benzene. The sample collected from boring

B-8 at 26 below grade contained 0.098 ppm benzene and that from 31 feet below grade contained 90 ppm TPHg, 0.83 ppm ethylbenzene, and 3.9 ppm xylenes. The hydrocarbons detected in the samples from MW-7 and MW-8 indicate possible residual hydrocarbons deposited during times when the ground-water level was higher than it is presently.

Analyses of the composite soil sample collected from auger cuttings showed no TPHd, cadmium, selenium, or silver, but low levels of TPHg BTEX, arsenic, barium, chromium, lead, and mercury were detected. The levels of arsenic, barium, chromium, lead, and mercury are below their Total Threshold Limit Concentration (TTLC) values. The TTLC is a criterion for evaluating whether or not a solid waste is hazardous. Laboratory results of the soil sampling of the auger cuttings are summarized in Table 6 and the laboratory analyses are in Appendix C.

3.3 Water Samples

No evidence of floating product, sheen, or emulsion was detected in the water samples during subjective evaluations (Table 7). Ground-water samples from monitoring wells MW-2 through MW-8 were analyzed for TPHg using modified EPA Method 8015 and for BTEX using EPA Method 602. A water sample from well MW-4 also was analyzed for general mineral analysis. Well MW-1 was dry, thus no water sample was collected. The results of the laboratory analyses of water samples are presented in Table 8, and the laboratory analyses reports are in Appendix C.

Laboratory results of ground-water samples from wells MW-2, MW-3, MW-5, and MW-8 detected varying concentrations of TPHg and BTEX. Concentrations of TPHg in water samples from these wells ranged from 67 to 22,000 ppb and benzene concentrations ranged

from 0.51 to 710 ppb. Laboratory results of water samples from wells MW-4, MW-6, and MW-7 indicated nondetectable concentrations of TPHg and BTEX.

A water sample was collected in March 1990 from well MW-4 for general mineral analysis. Results of the analysis show each parameter was below the Maximum Contaminant Level for Secondary Drinking Water Standards established by Title 22, Section 64445.1 of the California Code of Regulations. Five parameters, however, were above the lower limit of concentration of significance (COS) as defined by Heath (1983). The general mineral analysis indicates the water is of relatively good quality. The results of the general mineral analysis are summarized in Table 9, and the laboratory reports are in Appendix C.

3.4 Ground-Water Flow Direction

On March 27, 1990, the elevations of the tops of the well casings of wells MW-1 through MW-8 were surveyed to a local benchmark by Ron Archer Civil Engineer, Inc., of Pleasanton, California. The results are presented in a report and survey map from Ron Archer dated March 27, 1990; copies of the report and survey map are included in Appendix D. Depths to ground water, measured on February 16, 1990, were used with the survey data to calculate the water-level elevation in the wells. Tabulated results of the ground-water elevation data are in Table 10.

The water level indicates a ground-water flow direction toward the west, with a gradient of 0.001 (0.1 feet vertical per 100 feet horizontal). Interpretation of the ground-water surface, as indicated by the data collected on February 16, 1990, is shown on Plate 15. The depth to water and water-level elevation in well MW-7 was at variance with data from other wells; therefore, it was not used to construct the ground-water surface map. The ground-water

flow direction and gradient are similar to those evaluated during previous quarterly monitoring events at the site.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

The following conclusions are based on the information obtained during this and previous investigations:

- Ground water is approximately 35 feet below grade in a shallow unconfined silty clay that lies above deeper confined ground-water zones. The general flow direction in the shallow unconfined zone is toward the west.

- Results of analyses of water and soil samples indicate the presence of gasoline-related hydrocarbons in the ground water and soil beneath the site and offsite toward the west.

- Hydrocarbons in soil and ground water have been delineated east of the USTs and west of the site; additional work may be necessary to delineate hydrocarbons in the ground water north, southwest and south of the site.

4.2 Recommendations

AGS recommends:

- Quarterly ground-water monitoring be continued at the site to evaluate possible trends in concentrations of dissolved hydrocarbons.

- After additional quarterly monitoring, evaluate if present delineation is adequate.

We also recommend copies of this report be forwarded to:

- Mr. Lester Feldman at the California Regional Water Quality Control Board, San Francisco Bay Region, 1800 Harrison Street, Suite 700, Oakland, California 94612; and

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

5.0 LIMITATIONS

This report was prepared in accordance with generally accepted standards of environmental geological practice in the State of California at the time this investigation was performed. This investigation was conducted solely for the purpose of evaluating environmental conditions of the soil and first encountered ground water with respect to hydrocarbons in the vicinity of the subject property. No soil engineering or geotechnical recommendations are implied or should be inferred. Evaluation of the geologic conditions at the site for the purpose of this investigation is made from a limited number of observation points. Subsurface conditions may vary away from the data points available. Additional work, including further subsurface investigation, can reduce the inherent uncertainties associated with this type of investigation.

6.0 REFERENCES

Applied GeoSystems. December 16, 1987. Report Subsurface Environmental Investigation at Unocal Station No. 5367, San Leandro, California. Job 87091-1.

Applied GeoSystems. August 12, 1988. Report Soil Vapor Survey at Unocal Station No. 5367, San Leandro, California. Job 87091-2V.

Applied GeoSystems. November 18, 1988. Report Subsurface Environmental Investigation at Unocal Station No. 5367, San Leandro, California. Job 87091-3.

Applied GeoSystems. September 11, 1989. Letter Report Second Quarter Ground-Water Monitoring at Unocal Station No. 5367, San Leandro, California. Job 87091-2.

Applied GeoSystems. January 29, 1990. Letter Report Fourth Quarter Ground-Water Monitoring at Unocal Station No. 5367, San Leandro, California. Job 87091-2.

Heath, R. C., 1983, Basic Ground-Water Hydrology. U. S. Geological Survey Water Supply Paper 2220, 84 p.

Hickenbottom Kelvin and Muir, Kenneth. June 1988. Geohydrology and Groundwater Quality Overview, East Bay Plain Area, Alameda County, California, 205(J) Report. Alameda County Flood Control and Water Conservation District.

TABLE 1
LABORATORY RESULTS OF SOIL SAMPLES FROM PHASE 1 INVESTIGATION
Unocal Station 5367
500 Bancroft Avenue
San Leandro, California
(September 1987)

Soil Sample	TVH	B	E	T	X
S-20-B1	20.04	<0.05	0.65	1.24	3.93
S-35-B1	587.3	22.12	9.72	0.5	167.1

Results in parts per million (ppm)
TVH: Total volatile hydrocarbons
<: less than the detection limit indicated
Sample designation: S-35-B1

- B1 — Boring number
- 35 — Sample depth in feet
- S — Soil sample

TABLE 2
LABORATORY RESULTS OF SOIL AND WATER SAMPLES
FROM PHASE 3 INVESTIGATION
Unocal Station 5367
500 Bancroft Avenue
San Leandro, California
(September and October 1988)

Sample Number	TPHg	B	E	T	X
Soil					
S-10.5-B2	<2	<0.05	<0.05	<0.05	<0.05
S-30.5-B2	52	0.17	1.52	<0.05	5.11
S-26-B3	7	0.1	0.3	0.45	1.67
S-36-B3	3,692	8	65	129	394
S-11-B4	<2	<0.05	<0.05	<0.05	<0.05
S-30.5-B4	<2	<0.05	<0.05	<0.05	<0.05
Water					
W-37-MW2	1,760	47.8	20.9	0.74	81.6
W-37-MW3	61,000	1,060	1,520	3,380	8,720
W-37-MW4	<0.5	<0.5	<0.5	<0.5	<20

Soil results in parts per million (ppm)
Water results in parts per million (ppb)
TPHg: Total petroleum hydrocarbons as gasoline
<: less than the detection limit indicated
Sample designation: S-37-MW3

- S-37-MW3
  - Boring or monitoring well number
  - Sample depth in feet
  - Sample matrix (W = water, S = Soil)

TABLE 3
LABORATORY RESULTS FROM QUARTERLY MONITORING
Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California

Date	Sample Number	TPHg	B	E	T	X
WELL MW-1						
10/88	Well dry					
01/89	Well dry					
07/89	Not sufficient water to collect sample					
10/89	Well dry					
WELL MW-2						
10/88	W-37-MW2	1,760	4.78	20.9	7.40	81.6
01/89	W-35-MW2	510	58.00	22.6	8.70	20.3
07/89	W-35-MW2	730	55.00	24.0	0.64	10.0
10/89	W-38-MW2	660	31.00	18.0	<0.5	30.0
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
07/89	W-35-MW3	53,000	1,400	1,200	1,300	4,600
10/89	W-38-MW3	22,000	520	480	330	1,700
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
07/89	W-35-MW4	<20	<0.5	<0.5	<0.5	<0.5
10/89	W-38-MW4	66	<0.5	1.5	<0.5	1.9
WELL MW-5						
05/89	W-35-MW5	<20	<0.5	<0.5	<0.5	<0.5
10/89	W-38-MW5	<20	<0.5	<0.5	<0.5	0.58
WELL MW-6						
05/89	W-33-MW6	<20	<0.5	<0.5	<0.5	<0.5
10/89	W-37-MW6	<20	1.1	<0.5	<0.5	0.51

Results in 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-33-MW-6

TABLE 4
RECORDED AND OBSERVED WELLS WITHIN 1/2-MILE OF SITE
Unocal Station 5367
500 Bancroft Avenue
San Leandro, California

Well Location	Total Depth	Use / Status
2S/3W-23J1	105	Cathodic Protection
2S/3W-23R2	80	Irrigation
2S/3W-24M1	58	Irrigation
2S/3W-24N	179	Irrigation
2S/3W-26H1	60	Irrigation
2S/3W-26H2	54	Irrigation
2S/3W-26H3	57	Irrigation
2S/3W-26H4	60	Irrigation
2S/3W-25D1	55	Irrigation
2S/3W-25E1	65	NA
5S/3W-25E2	60	Irrigation
2S/3W-23Ra*	NA	Abandoned
2S/3W-23Rb*	NA	NA
2S/3W-23Rc*	NA	NA
2S/3W-23Rd*	NA	NA

Data based on Alameda County Water District records.
Total Depth in feet.
* - indicates wells observed during field search.
NA - not available.

TABLE 5
LABORATORY RESULTS OF SOIL SAMPLES
500 Bancroft Avenue
Unocal Station 5367
San Leandro, California
(May 1989 and February 1990)

Soil Sample	TPHg	B	E	T	X
S-11-B5	<2	<0.05	<0.05	<0.05	<0.05
S-31-B5	<2	<0.05	<0.05	<0.05	<0.05
S-21-B6	<2	<0.05	<0.05	<0.05	<0.05
S-31-B6	<2	<0.05	<0.05	<0.05	<0.05
S-26-B7	<2	0.092	<0.05	<0.05	<0.05
S-36-B7	<2	<0.05	<0.05	<0.05	<0.05
S-26-B8	<2	0.098	<0.05	<0.05	<0.05
S-31-B8	90	<0.05	0.83	<0.05	3.9
S-38.5-B8	<2	<0.05	<0.05	<0.05	<0.05

Results in parts per million (ppm)
TPHg: Total petroleum hydrocarbons as gasoline
BETX: Benzene, Ethylbenzene, Toluene, and Xylenes
<: less than
Boring samples from B5 and B6 collected May 1989.
Boring samples from B7 and B8 collected February 1990.
Sample designation:

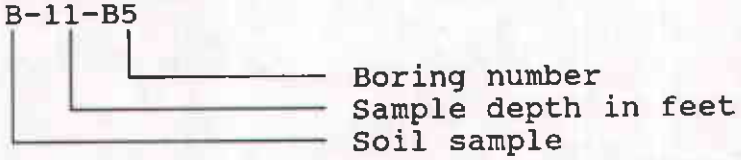


TABLE 6
LABORATORY RESULTS OF AUGER CUTTINGS
500 Bancroft Avenue
Unocal Station 5367
San Leandro, California
(March 1990)

Composite Sample	Constituent	Sample Results
S0308-SP(1,2,3,4) (From borings B-5 through B-8)	TPHg	38
	TPHd	<10
	Benzene	0.21
	Toluene	1.7
	Ethylbenzene	0.41
	Total Xylenes	2.7
	Arsenic	2.6
	Barium	120
	Cadmium	<0.5
	Chromium	31
	Lead	130
	Mercury	0.25
	Selenium	<0.25
	Silver	<0.5

Results are in mg/kg (ppm).
TPHg = Total petroleum hydrocarbons as gasoline.
TPHd = Total petroleum hydrocarbons as diesel.
< = Below detection limit for the method of analysis used.
* = Signifies element with detected levels above STLC.

Sample designation:
S-0308-SP(1,2,3,4)
- S = Sample matrix (S = soil)
- 0308 = Date sample collected
- SP(1,2,3,4) = Soil Pile

TABLE 7
SUBJECTIVE EVALUATIONS OF GROUND WATER
Unocal Station 5367
500 Bancroft Avenue
San Leandro, California

Well No.	Date	Depth to Water	Floating Product	Sheen	Emulsion
MW-1	02/90	Dry	NA	NA	NA
MW-2	02/90	34.50	NONE	NONE	NONE
MW-3	02/90	35.23	NONE	NONE	NONE
MW-4	02/90	35.60	NONE	NONE	NONE
MW-5	02/90	35.89	NONE	NONE	NONE
MW-6	02/90	34.50	NONE	NONE	NONE
MW-7	02/90	35.75	NONE	NONE	NONE
MW-8	02/90	35.10	NONE	NONE	NONE

Depth to water measured in feet below top of the casing.
NA = not applicable.

TABLE 8
LABORATORY RESULTS OF GROUND WATER
Unocal Station 5367
500 Bancroft Avenue
San Leandro, California
(February 1990)

Sample Number	TPHg	B	E	T	X
MW-2					
W-36-MW2	840	50	28	<0.5	44
MW-3					
W-36-MW3	22,000	710	690	410	33,000
MW-4					
W-36-MW4	<20	<0.5	<0.5	<0.5	<0.5
MW-5					
W-36-MW5	67	0.51	2.9	1.6	7.5
MW-6					
W-35-MW6	<20	<0.5	<0.5	<0.5	<0.5
MW-7					
W-36-MW7	<20	<0.5	<0.5	<0.5	<0.5
MW-7 BLANK					
W-BLANK-MW7	<20	<0.5	<0.5	<0.5	<0.5
MW-8					
W-35-MW8	1,900	11	52	<0.5	55

Results in parts per billion (ppb).
TPHg = total petroleum hydrocarbons as gasoline.
BTEX = Benzene, toluene, ethylbenzene, and total xylene isomers.
Sample designation:

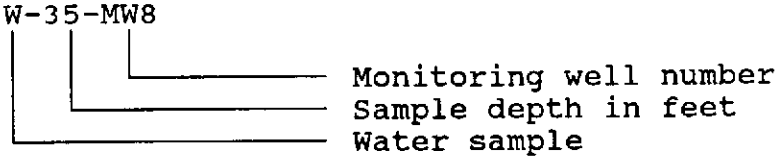


TABLE 9
RESULTS OF GENERAL MINERAL ANALYSIS
Unocal Station 5367
500 Bancroft Avenue
San Leandro, California
(March, 1990)

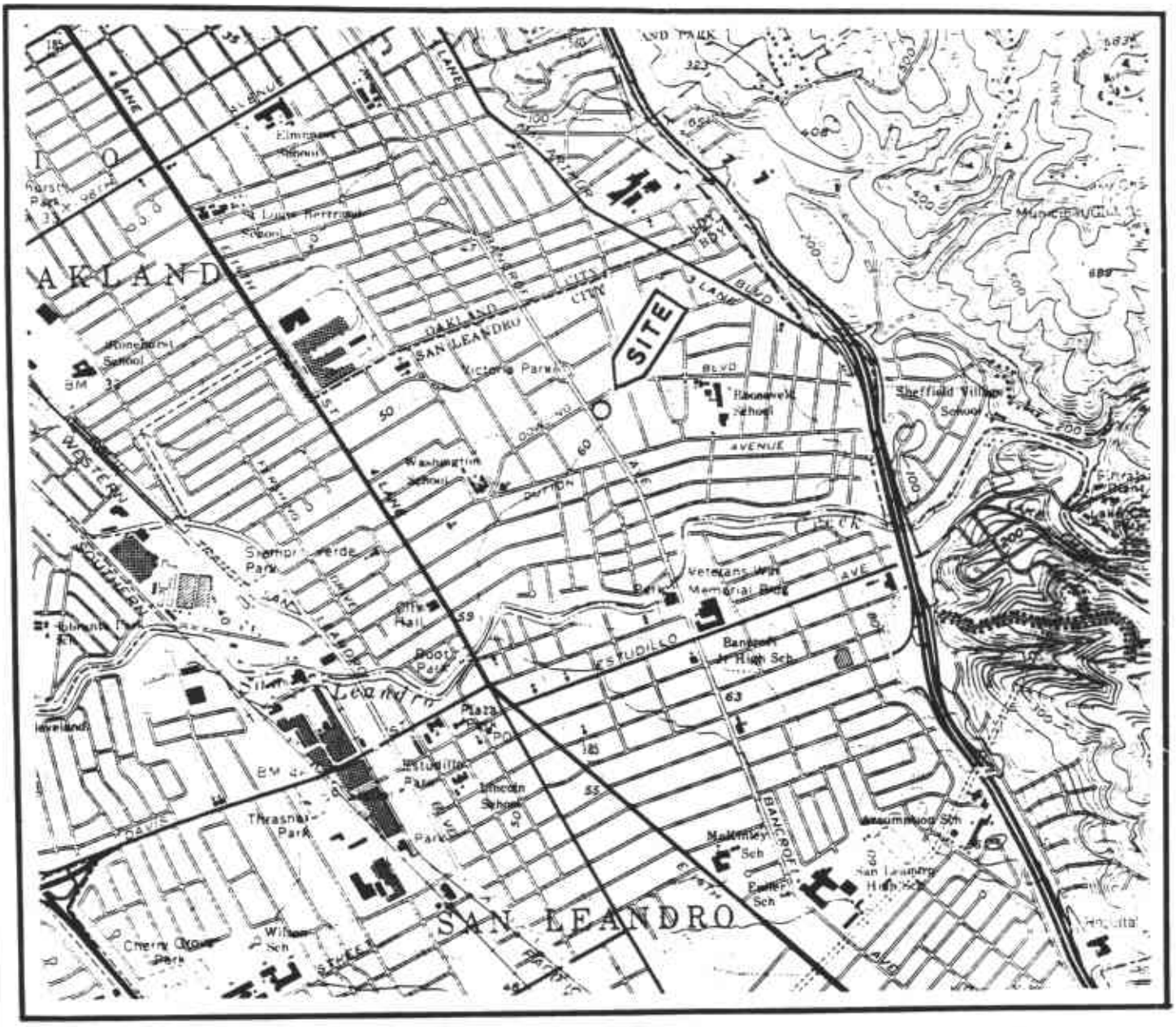
Constituent	MW-4	SMCL	COS
Bicarbonate Alkalinity	230	--	150-200
Calcium	56	--	25-50
Carbonate Alkalinity	<0.5	--	150-200
Chloride	32	250-500	--
Copper	0.013	1.0	--
Hardness	280		>180=v. hard
Hydroxide Alkalinity	<0.001	--	--
Iron	0.96	0.3	--
Magnesium	34	--	--
Manganese	0.026	0.05	--
pH (pH units)	7.8	6.5-8.5	--
Sodium	45	--	20-170
Specific Conductance ▲	480	900-1600	--
Sulfate	44	250-500	--
Surfactants	<0.02	0.5	--
Total Dissolved Solids	360	500-1000	--
Zinc	0.026	5.0	--

▲ = Results and values in parts per million with exception of Specific Conductance (micro-mhos/cm or micro-siemens/cm).
SMCL = Maximum Contamination Level for Secondary Drinking Water Standards, established by Title 22, Section 64445.1 of the California Code of Regulations.
COS = Concentration of Significance as defined in USGS Water-Supply Paper 2220, page 65, 1983.
-- = No SMCL or COS values established for this constituent.

TABLE 10
GROUND-WATER ELEVATION DIFFERENCES
Unocal Station 5367
500 Bancroft Avenue
San Leandro, California
(February 16, 1990)

Monitoring Well	Top of Casing Above MSL (C)	Static Water Level (W)	Water Level Above MSL (C-W)
MW-2	58.13	35.50	22.63
MW-3	57.92	35.25	22.67
MW-4	58.29	35.60	22.69
MW-5	58.50	35.83	22.67
MW-6	56.96	34.50	22.46
MW-7	57.25	35.25	22.00
MW-8	57.71	35.10	22.61

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.



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

N

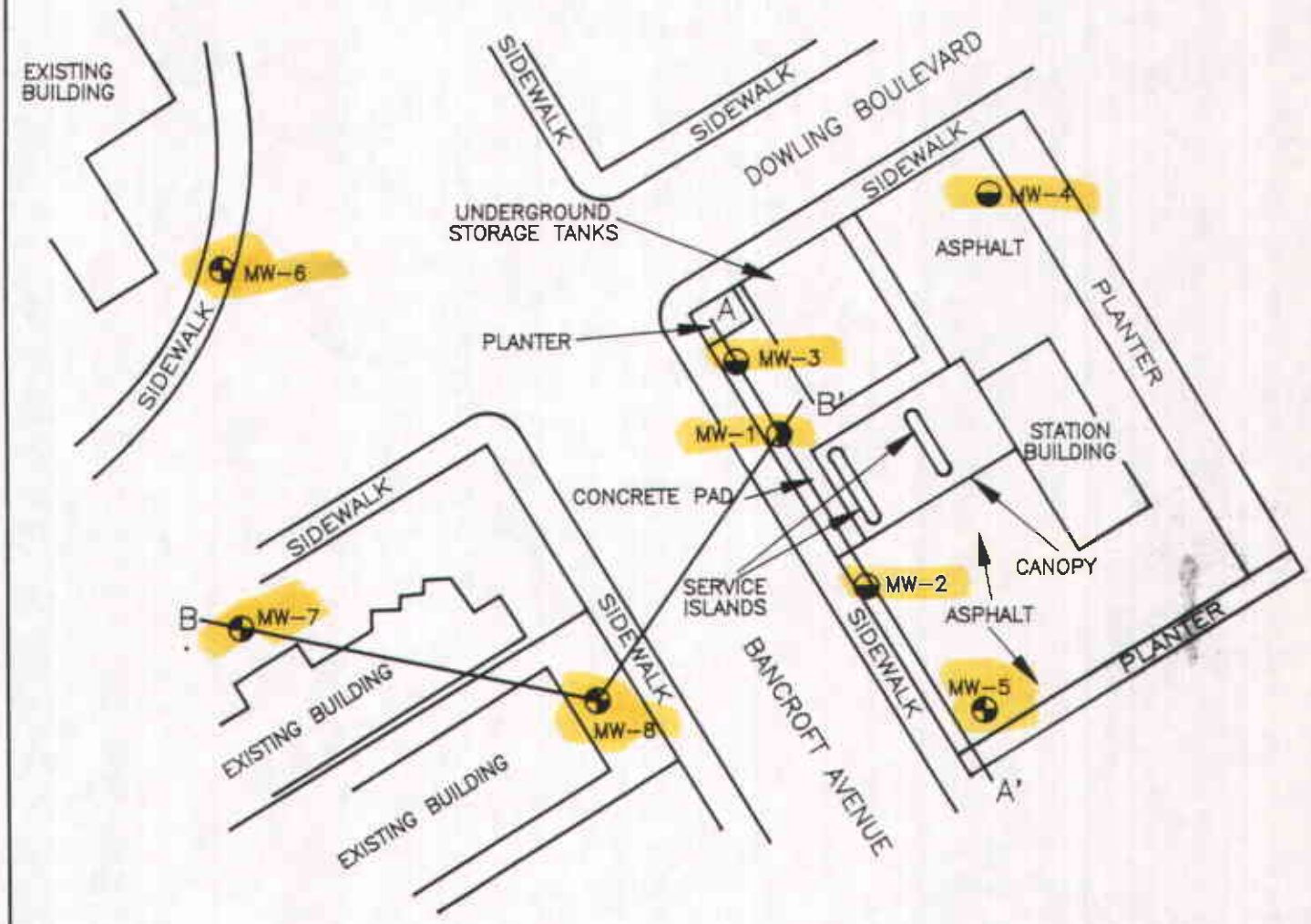
Approximate Scale
2000 1000 0 2000 4000
feet

Applied GeoSystems

PROJECT NO. 87091-4

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

PLATE
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)

B — B' = Cross section line

N

Approximate Scale

50 25 0 50 100

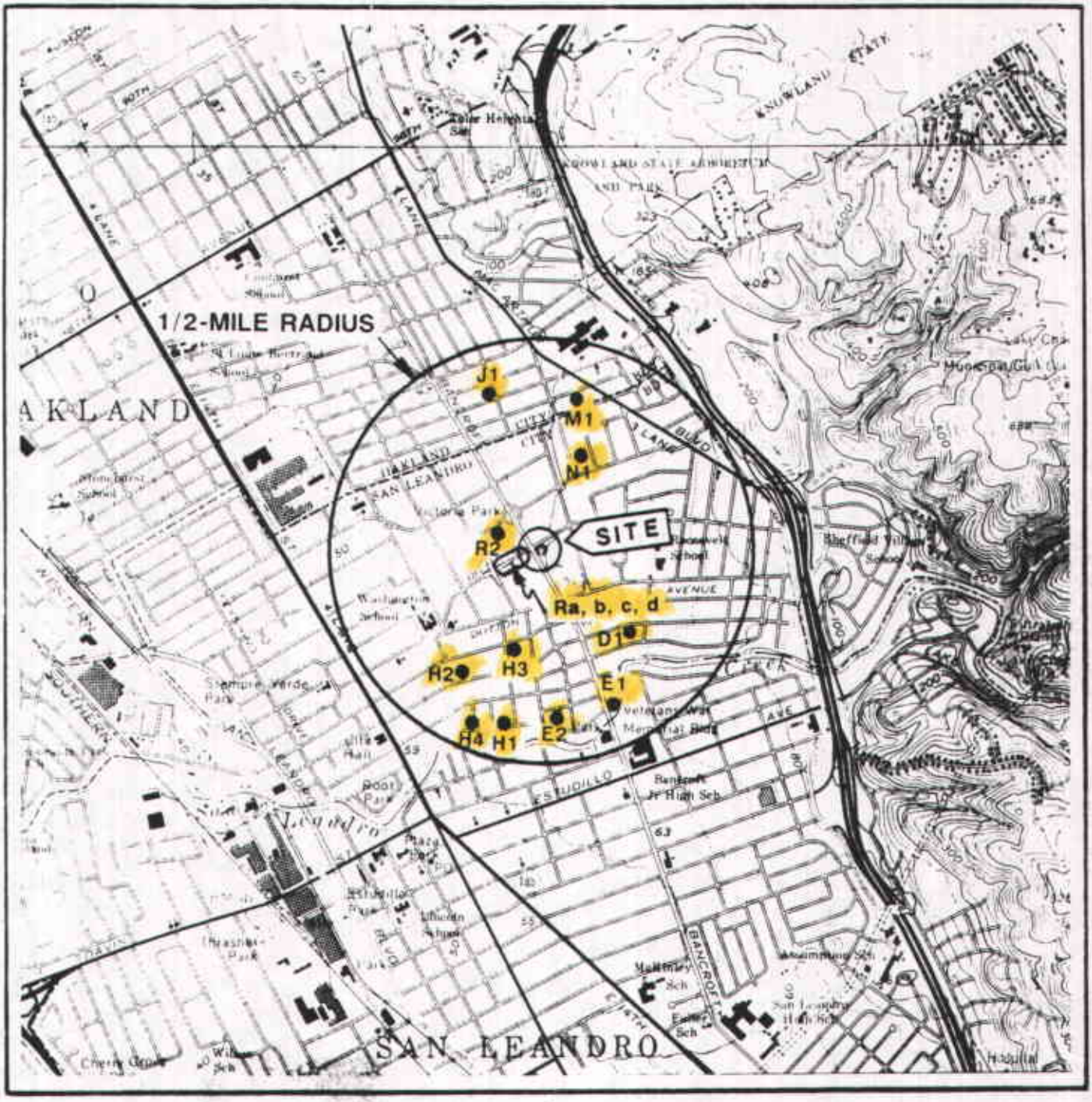
feet

Applied GeoSystems

PROJECT NO. 87091-4

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

PLATE 2



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

R2● = Well location

N

Approximate Scale
2000 1000 0 2000 4000
feet

Applied GeoSystems

PROJECT NO. 87091-4

LOCATION MAP OF NEAR BY WELLS
UNOCAL Station No. 5367
500 Bancroft Avenue
San Leandro, California

PLATE
3

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		LTR	DESCRIPTION	MAJOR DIVISIONS		LTR	DESCRIPTION
Coarse-grained soils	Gravel and gravelly soils	GW	Well-graded gravels or gravel-sand mixtures, little or no fines	Fine-grained soils	Silts and clays LL<50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		GM	Silty gravels, gravel-sand-silt mixtures			OL	Organic silts and organic silt-clays of low plasticity
		GC	Clayey gravels, gravel-sand-clay mixtures		Silts and clays LL>50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils. Elastic silts
	Sand and sandy soils	SW	Well-graded sand or gravelly sands, little or no fines			CH	Inorganic clays of high plasticity, fat clays
		SP	Poorly-graded sands or gravelly sands, little or no fines			OH	Organic clays of medium to high plasticity, organic silts
		SM	Silty sands, sand-silt mixtures				
		SC	Clayey sands, sand-clay mixtures	Highly organic soils		PT	Peat and other highly organic soils


Depth through which sampler is driven


Relatively undisturbed sample


No sample recovered


Static water level observed in well


Initial water level observed in boring

S-10 Sample number


Sand pack


Bentonite annular seal


Neat cement annular seal


Caved native soil


Blank PVC


Machine-slotted PVC

P.I.D. Photoionization detector

BLOWS REPRESENT THE NUMBER OF BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES TO DRIVE THE SAMPLER THROUGH EACH 6 INCHES OF AN 18-INCH PENETRATION.

DASHED LINES SEPARATING UNITS ON THE LOG REPRESENT APPROXIMATE BOUNDARIES ONLY. ACTUAL BOUNDARIES MAY BE GRADUAL. LOGS REPRESENT SUBSURFACE CONDITIONS AT THE BORING LOCATION AT THE TIME OF DRILLING ONLY.

Applied GeoSystems

PROJECT NO. 87091-4

UNIFIED SOIL CLASSIFICATION SYSTEM AND SYMBOL KEY
Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California

PLATE
4

Total depth of boring: 46-1/2 feet **Diameter of boring:** 8 inches **Date drilled:** 5-15-89

Casing diameter: 2 inches **Length:** 45 feet **Slot size:** 0.020-inch

Screen diameter: 2 inches **Length:** 20 feet **Material type:** Sch 40 PVC

Drilling Company: HEW Drilling, Inc. **Driller:**

Method Used: Hollow-Stem Auger **Field Geologist:** James Orr

Depth	Sample No.	Blows	OVM	USCS Code	Description	Well Const.
0					Asphalt (6 inches).	
2				CL	Silty clay, dark brown, damp, medium plasticity, loose.	
4				CL	Sandy clay, brown, damp, low plasticity, very stiff, remnant root holes.	
6	S-6	6 14 16	1.0			
8						
10						
12	S-11	4 7 5	1.0		Layers of sand and fine-grained gravel.	
14				SP	Fine-grained sand, light brown, moist, loose, remnant root holes.	
16	S-16	2 3 6	1.0			
18						
20				ML	Clayey silt, brown, moist, medium plasticity, stiff.	
	S-16	2 4 5	1.2		(Section continues downward)	

Applied GeoSystems

PROJECT NO. 87091-4

LOG OF BORING B-5/MW-5

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

PLATE 5

Depth	Sample No.	Blows	OVM	USCS Code	Description	Well Const.
22				ML	Clayey silt, brown, moist, medium plasticity, stiff.	
24				ML	Sandy silt, brown, moist, low plasticity, stiff.	
26	S-26	2 6 7	1.0			
28						
30				CL	Silty clay, light brown, damp, medium plasticity, very stiff.	
	S-31	5 10 14	1.0			
32						
34						
36	S-36	5 10 17	0.8	▼	Layers of saturated fine-grained sand and damp silty clay.	
38						
40				SC	Clayey sand, trace gravel, brown, damp, medium plasticity, hard.	
	S-41	9 14 19	0.8			
42						
44						
46	S-46	7 7 12	0.9		Layers of saturated sand and damp sandy clay.	
					Total Depth = 46-1/2 feet.	
48						
50						

Applied GeoSystems

PROJECT NO. 87091-4

LOG OF BORING B-5/MW-5

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

PLATE 6

Total depth of boring: 46-1/2 feet **Diameter of boring:** 8 inches **Date drilled:** 5-15-89

Casing diameter: 2 inches **Length:** 45 feet **Slot size:** 0.020-inch

Screen diameter: 2 inches **Length:** 20 feet **Material type:** Sch 40 PVC

Drilling Company: HEW Drilling, Inc. **Driller:** Anibal

Method Used: Hollow-Stem Auger **Field Geologist:** James Orr

Depth	Sample No.	Blows	OVM	USCS Code	Description	Well Const.
0				CL	Silty clay, brown, damp, medium plasticity, very stiff, some organic material.	
2						
4						
6	S-6	5 9 12	1.2			
8						
10				SC	Clayey sand, brown-black, damp, loose.	
		6		SP	Gravelly sand, brown, damp, loose.	
	S-11	2 3	0.0	CL	Silty clay, medium brown, moist, medium plasticity, medium stiff.	
12				SP	Sand, brown, moist, medium plasticity, medium dense.	
14						
		4 5				
16	S-16	6	0.0			
18						
20		2 3		CL	Silty clay, brown, damp, medium plasticity, medium stiff, remnant root holes.	
	S-21	4	0.5			

Applied GeoSystems

PROJECT NO. 87091-4

LOG OF BORING B-6/MW-6

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

PLATE 7

Depth	Sample No.	Blows	OVM	USCS Code	Description	Well Const.
22				CL	Silty clay, brown, damp, medium plasticity, medium stiff, remnant root holes.	
24						
26	S-26	5 20 20	0.5			
28				ML	Clayey silt, brown, damp, low plasticity, stiff, remnant root holes.	
30		4 5				
32	S-31	5	0.3			
34						
36	S-35.5	6 11	0.3	SM	Silty sand, brown, wet, medium dense.	
38						
40		4 6				
42	S-41	6	0.3	SC	Clayey sand, brown, damp, low plasticity, medium dense.	
44						
46	S-46	4 8 13	0.1			
48					Total Depth = 46-1/2 feet.	
50						

Applied GeoSystems

PROJECT NO. 87091-4

LOG OF BORING B-6/MW-6

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

PLATE 8

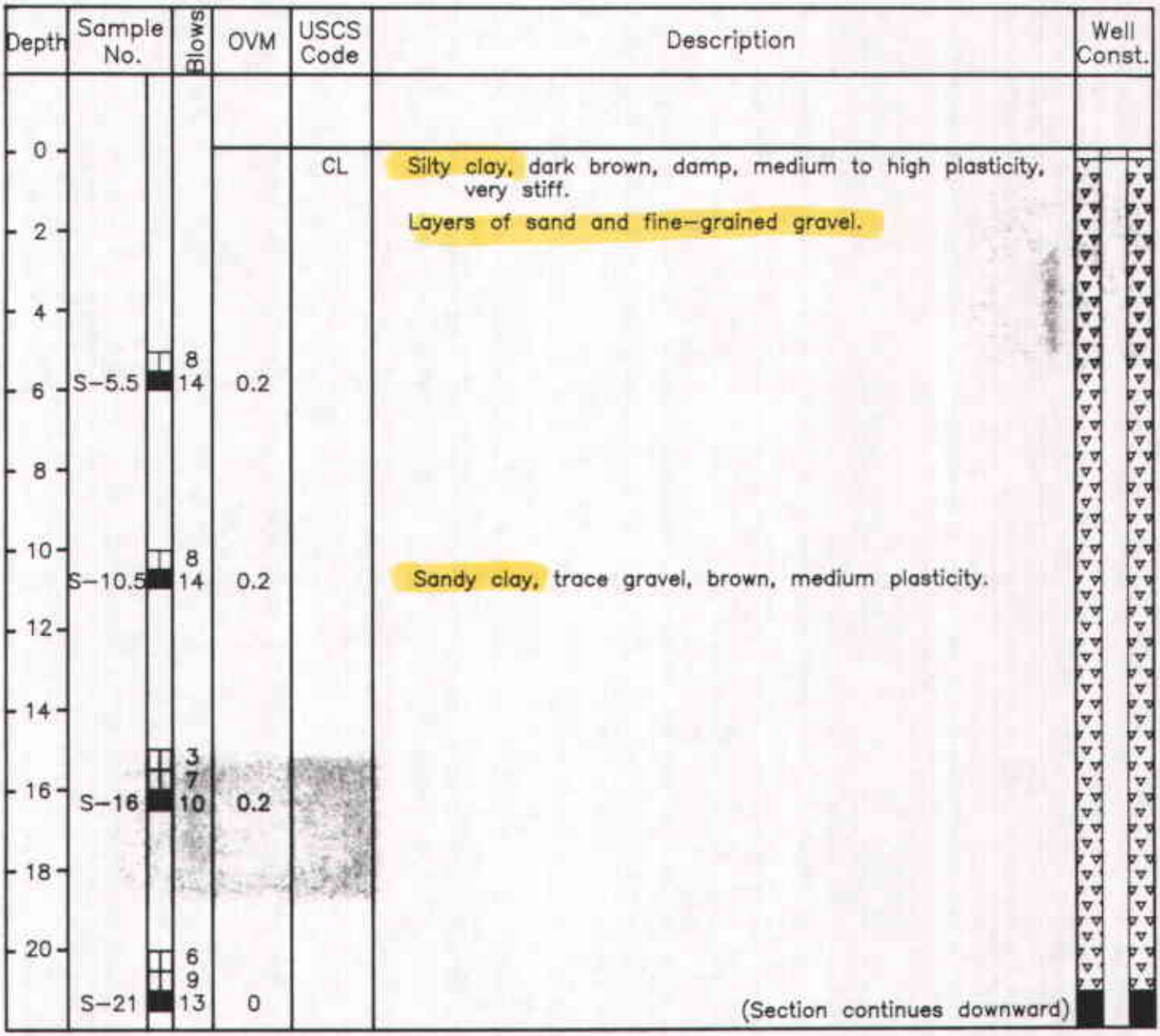
Total depth of boring: 44 feet **Diameter of boring:** 8 inches **Date drilled:** 2-7-90

Casing diameter: 2 inches **Length:** 44 feet **Slot size:** 0.020-inch

Screen diameter: 2 inches **Length:** 20 feet **Material type:** Sch 40 PVC

Drilling Company: HEW Drilling, Inc. **Driller:** Tomas and Perfecto

Method Used: Hollow-Stem Auger **Field Geologist:** Russell Bak



Applied GeoSystems

PROJECT NO. 87091-4

LOG OF BORING B-7/MW-7

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

PLATE 9

Depth	Sample No.	Blows	OVM	USCS Code	Description	Well Const.
22				CL	Sandy clay, trace gravel, brown, damp, medium plasticity, stiff to hard.	
24						
26	S-26	16 33 36	0		Increase in sand.	
28						
30	S-31	9 15 16	0		Trace sand.	
32						
34	S-33.5	5 7 18	0			
36	S-36	14 21 30	0	▽ ▼	Some gray-green mottling.	
38	S-38.5	5 9 14	0			
40	S-41	18 34 55	0			
42	S-43.5	20 44 45	0		Silty clay, trace sand and gravel.	
44					Total Depth = 44 feet.	
46						
48						
50						

Applied GeoSystems

PROJECT NO. 87091-4

LOG OF BORING B-7/MW-7

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

PLATE 10

Total depth of boring: 44 feet **Diameter of boring:** 8 inches **Date drilled:** 2-6-90

Casing diameter: 2 inches **Length:** 44 feet **Slot size:** 0.020-inch

Screen diameter: 2 inches **Length:** 20 feet **Material type:** Sch 40 PVC

Drilling Company: HEW Drilling, Inc. **Driller:** Tomas and Perfecto

Method Used: Hollow-Stem Auger **Field Geologist:** Russell Bak

Depth	Sample No.	Blows	OVM	USCS Code	Description	Well Const.
0					Concrete (3 inches).	
2				CL	Silty clay, medium brown to tan, damp, medium plasticity, very stiff to hard.	
4						
6	S-6	12 20 27	1.7		Layers of fine-grained sand and silt.	
8						
10	S-11	10 13 20	0.8		Tan to brown, moist.	
12						
14						
16	S-16	5 10 13	1.1		Low plasticity.	
18						
20	S-21	8 13 15	0.4		(Section continues downward)	

Applied GeoSystems

PROJECT NO. 87091-4

LOG OF BORING B-8/MW-8

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

PLATE 11

Depth	Sample No.	Blows	OVM	USCS Code	Description	Well Const.
22				CL	Silty clay, tan to brown, moist, low plasticity, very stiff to hard.	
24						
26	S-26	8 28 32	1.1			
28						
30		8 13				
	S-31	18	6.3			
32				ML	Silt, tan to brown, damp, low to medium plasticity, very dense, noticeable odor.	
34						
		12 28				
36	S-36	50	10.1	CL	Silty clay, trace rock fragments, brown, damp, medium plasticity, hard, trace mottling.	
38		15 25				
	S-38.5	35	3.1	ML	Sandy silt, trace sand and gravel, brown, moist, low plasticity, hard, trace mottling.	
40		20 25				
	S-41	38	1.3			
42		9		GC	Clayey gravel, some sand, gray-brown, wet, dense.	
		11		CL	Sandy clay, trace gravel, brown, damp, low to medium plasticity, very stiff.	
44	S-43.5	20	3			
					Total Depth = 44 feet.	
46						
48						
50						

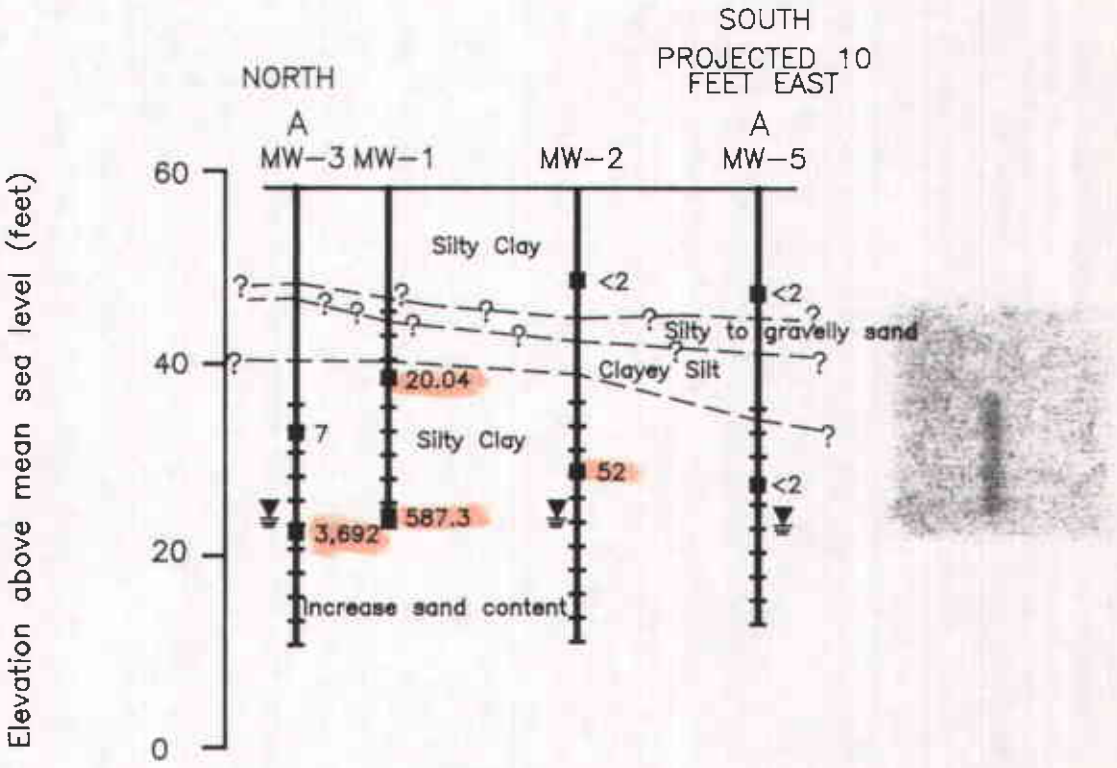
Applied GeoSystems

PROJECT NO. 87091-4

LOG OF BORING B-8/MW-8

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

PLATE 12



--- = Approximate geologic contact

= Analytical result of soil sample in ppm (TPH)

= Well casing

= Well screen

= Static water level (February 16, 1990)

Approximate Horizontal Scale

50 25 0 50 100

feet

Approximate Vertical Scale

20 10 0 20 40

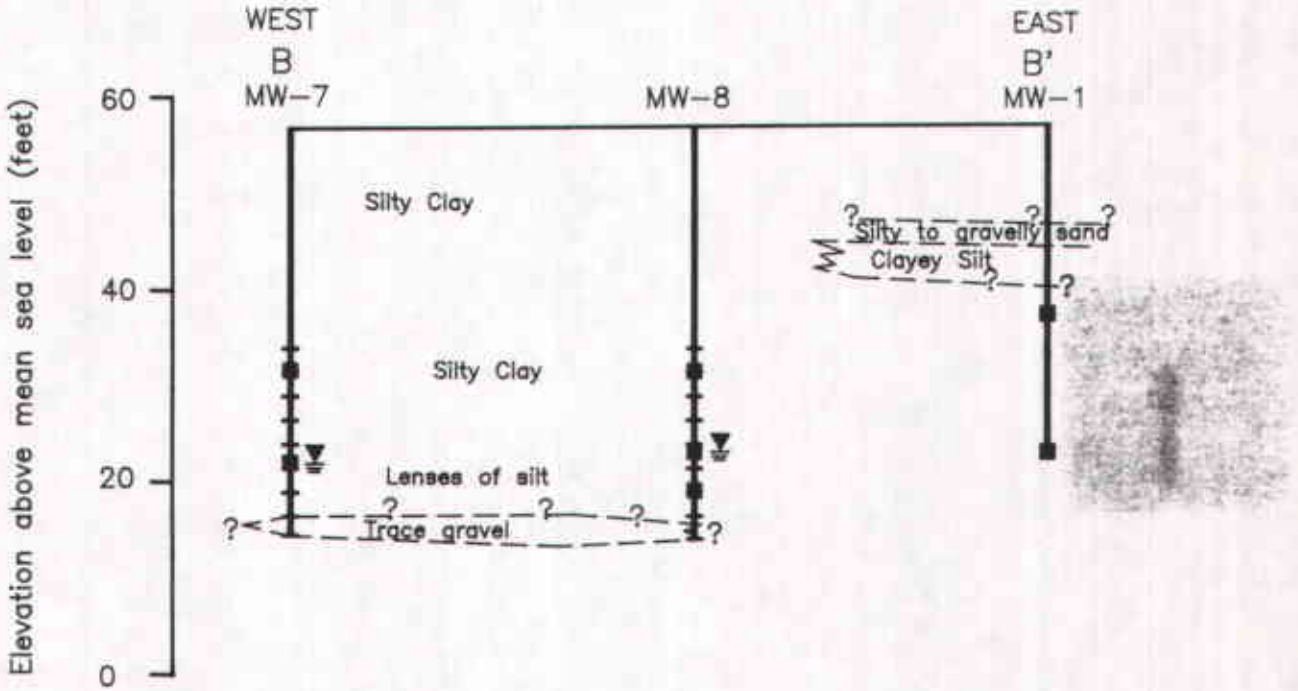
feet

Applied GeoSystems

PROJECT NO. 87091-4

GEOLOGIC CROSS SECTION A-A'
Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California

PLATE
13



= Approximate geologic contact

= Analytical result of soil sample in ppm (TPH)

= Well casing

= Well screen

= Static water level (February 16, 1990)

Approximate Horizontal Scale

50 25 0 50 100

feet

Approximate Vertical Scale

20 10 0 20 40

feet

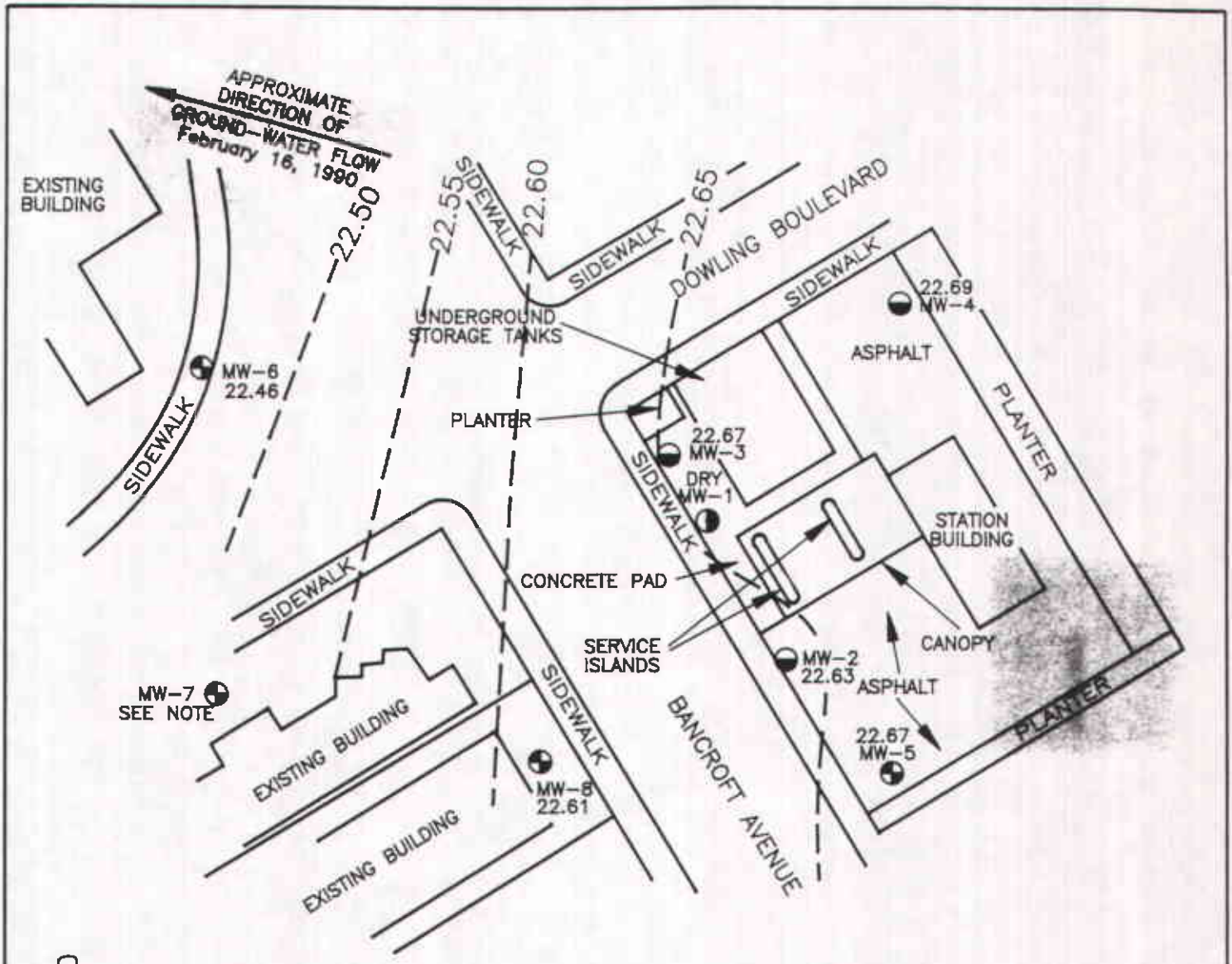
Applied GeoSystems

PROJECT NO. 87091-4

GEOLOGIC CROSS SECTION B - B'
Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California

PLATE

14



Applied GeoSystems

PROJECT NO. 87091-4

GROUND-WATER GRADIENT MAP
Unocal Station No. 5367
500 Bancroft Avenue
San Leandro, California

PLATE 15

APPENDIX A

OPERATING PROCEDURES

Site Safety Plan

The Site Safety Plan describes the safety requirements for the subsurface environmental investigation and for drilling of soil borings at the site. The Site Safety Plan is applicable to personnel and subcontractors of AGS scheduled to perform work at the site, and who were briefed on the contents of the plan before work began. A copy of the Site Safety Plan was kept at the site, and was available for reference by appropriate parties during work at the site.

Borehole Drilling

Augers were steam cleaned prior to use to reduce the possibility of contamination. Cuttings generated from the borings were placed temporarily on a plastic liner and remain Unocal's responsibility.

Monitoring Well Construction

The well was constructed of thread-jointed, 2-inch-diameter, Schedule 40, PVC casing. No chemical cements, glues, or solvents were used in the well construction. The perforated portion of the well casing consists of machine-slotted PVC with 0.020-inch-wide slots. Blank casing extends from the top of the screened casing to a few inches below the ground surface. A threaded end-cap was added to the bottom of the well casing. The top of the well casing was covered with a locking watertight cap. An aluminum utility box with a PVC apron was placed over the wellhead and grouted in place approximately flush with the ground surface.

Soil Sampling

A 2-1/2-inch inside-diameter, California-modified split-spoon sampler lined with clean brass sleeves was used to retrieve soil from the borings. To retrieve soil from the boring, the augers were advanced to a point immediately above the sampling depth and the sampler was driven into the soil through the hollow center of the auger. A standard 140-pound hammer, repeatedly dropped 30 inches, was used to drive the sampler into the soil. The number of blows to push the sampler each 6-inch increment were counted, and recorded to evaluate the relative consistency of the soil.

Soil samples were collected at 5-foot intervals from the ground surface to total depth of the boring. The samples were removed from the sampler and analyzed with a organic vapor meter (OVM) for the presence of hydrocarbons. Readings were obtained by placing the rubber cup skirting the intake probe flush against the soil sample promptly after it was removed from the sampler. Field instruments such as the OVM can indicate relative organic vapor concentrations in soil, but cannot measure concentrations of

hydrocarbons in soil with the precision of laboratory analyses. The soil samples were then sealed in their brass sleeves with aluminum foil, plastic caps, and tape; labeled and placed in iced storage for transport to the laboratory.

Subjective evaluations and Ground Water Sampling

The depth to water in each well is measured to the nearest 0.01 foot using a Solinst water-level indicator. An initial ground-water sample is collected from each well and evaluated for floating product, sheen, and emulsion. The wells were then purged of approximately 4 well volumes of water, after the ground water has recovered to at least 80 percent of its static level, a clean Teflon bailer was lowered approximately half its length past the air-water interface to collect a representative sample of the formation water. The ground-water samples were recovered and gently decanted into laboratory-cleaned, 40-milliliter, volatile organic glass sample vials. Hydrochloric acid is added to the samples as a preservative. The vials were sealed with Teflon-lined caps, labeled, and placed in iced storage for transport to the analytical laboratory.

APPENDIX B

MONITORING WELL PERMIT

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

24 April 1989

Mr. Ron Duncan
Applied Geosystems
43255 Mission Boulevard, Suite B
Fremont, CA 94539

Dear Mr. Duncan:

Enclosed is Groundwater Protection Ordinance permit 89236 for a monitoring well construction project at 500 Bancroft Avenue in San Leandro for Unocal Corporation.

Please note that permit condition A-2 requires that a well construction report be submitted after completion of the work. The report should include drilling and completion logs, location sketch, and permit number.

If you have any questions, please contact Wyman Hong or Craig Mayfield at 484-2600.

Very truly yours,

Mun J. Mar
General Manager

By J. Killingstad
J. Killingstad, Chief
Water Resources Engineering

WH:bkm
Enc.

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

(1) LOCATION OF PROJECT West side of Bancroft Ave near Dowling Blvd. Across from UNOCAL station 5367 on 506 Bancroft Ave., San Leandro, CA. (also 1 well will be on the UNOCAL station property)

(2) CLIENT
Name Mr. Tim Ross / UNOCAL Corp.
Address 2175 N. California Blvd, Suite 650 Phone 415 945 7676
City Walnut Creek, CA Zip 94539

(3) APPLICANT
Name Applied GeoSystems
Address 43255 Mission Blvd Phone 415 651 1906
City Fremont, CA Zip 94539

(4) DESCRIPTION OF PROJECT

Water Well Construction	___	Geotechnical Investigation	
Cathodic Protection	___	General	___
Well Destruction	___	Contamination	✓

(5) PROPOSED WATER WELL USE

Domestic	___	Industrial	___	Irrigation	___
Municipal	___	Monitoring	✓	Other	___

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary ___ Air Rotary ___ Auger ✓
Cable ___ Other ___

DRILLER'S LICENSE NO. 384167

WELL PROJECTS
Drill Hole Diameter 8 in. Maximum
Casing Diameter 4 in. Depth 50 ft.
Surface Seal Depth 19 ft. Number 4

GEOTECHNICAL PROJECTS
Number of Borings ___ Maximum
Hole Diameter ___ in. Depth ___ ft.

(7) ESTIMATED STARTING DATE May 15, 1989
ESTIMATED COMPLETION DATE May 17, 1989

(8) I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE Ron Duncan Date 4/19/89

FOR OFFICE USE

PERMIT NUMBER 89236
LOCATION NUMBER ___

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling logs and location sketch for geotechnical projects.
3. Permit is void if project not begun within 90 days of approval date.

(B.) WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic, irrigation, and monitoring wells unless a lesser depth is specially approved.

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 21 Apr 89
Wyman Hong

21989

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

30 January 1990

Applied Geosystems
43255 Mission Boulevard, Suite B
Fremont, CA 94539

Gentlemen:

Enclosed is Groundwater Protection Ordinance permit 90043 for a monitoring well construction project at 501 Bancroft Avenue in San Leandro for Unocal Corporation.

Please note that permit condition A-2 requires that a well construction report be submitted after completion of the work. The report should include drilling and completion logs, location sketch, and permit number.

If you have any questions, please contact Wyman Hong or Craig Mayfield at 484-2600.

Very truly yours,

Mun J. Mar
General Manager

By
J. Killingstad, Chief
Water Resources Engineering

WH:mm
Enc.

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE • PLEASANTON, CALIFORNIA 94566 • (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

(1) LOCATION OF PROJECT 501 and 511 Bancroft Ave San Leandro, CA

(2) CLIENT
Name Mr Ron Bort / Unocal Corp
Address 2175 N California Blvd Phone 415 945 7676
City Walnut Creek, CA Zip 94539

(3) APPLICANT
Name Applied GeoSystems (Ron Duncan)
Address 43255 Mission Blvd Phone
City Zip

(4) DESCRIPTION OF PROJECT
Water Well Construction ___ Geotechnical ___
Cathodic Protection ___ Well Destruction ___
Environmental ✓

(5) PROPOSED WATER WELL USE
Domestic ___ Industrial ___ Irrigation ___
Municipal ___ Monitoring ✓ Other

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary ___ Air Rotary ___ Auger ✓
Cable ___ Other

WELL PROJECTS
Drill Hole Diameter 8 in. Depth(s) * ft.
Casing Diameter 2 in. Number
Surface Seal Depth 19 ft. of Wells *
Driller's License No. 384167

GEOTECHNICAL PROJECTS
Number ___
Diameter ___ in. Maximum Depth ___ ft.

(7) ESTIMATED STARTING DATE Feb. 6, '90
ESTIMATED COMPLETION DATE Feb. 7, '90

(8) I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE (Ron Duncan) Date 1/22/90

FOR OFFICE USE

PERMIT NUMBER 90043
LOCATION NUMBER

Approved Wyman Hong Date 23 Jan 90
Wyman Hong

PERMIT CONDITIONS

Circled Permit Requirements Apply

(A.) GENERAL
1. A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Notify this office (484-2600) at least one day prior to starting work on permitted work and before placing well seals.
3. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or bore hole logs and location sketch for geotechnical projects. Permitted work is completed when the last surface seal is placed or the last boring is completed.
4. Permit is void if project not begun within 90 days of approval date.

(B.) WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie, or equivalent.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic, irrigation, and monitoring wells unless a lesser depth is specially approved.

C. GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie, or equivalent.

E. WELL DESTRUCTION. See attached.

* Depth: 50 ft. Number of Wells: 2
As discussed with Applied GeoSystems representative Ron Duncan.

91987

APPENDIX C

LABORATORY REPORTS AND CHAIN OF CUSTODY

CHAIN OF CUSTODY RECORD

Applied GeoSystems

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

SAMPLER (signature): James Orr

Phone: (415) 651-1906

LABORATORY: A-G-S

TURNAROUND TIME: 2 weeks

Project Leader: Ron Duncan

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
James Orr	Ron Duncan	5/15/89	5:15pm
Ron Duncan			
	Received for laboratory by: [illegible]	5/18/89	16 15 pm

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
S-11-B5	87091-4	5/15/89	TPHg + BTEX	Iced
S-31-B5	87091-4	5/15/89	TPHg + BTEX	Iced
S-21-B6	87091-4	5/15/89	TPHg + BTEX	Iced
S-31-B6	87091-4	5/15/89	TPHg + BTEX	Iced

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

• FREMONT • COSTA MESA • SACRAMENTO • HOUSTON

ANALYSIS REPORT

0212lab.frm

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

Date Received: 05-18-89
Laboratory Number: 90534S01
Project #: 87091-4
Sample #: S-11-B5
Matrix: Soil

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		2.0		05-25-89	
TEH as Diesel						NR
Benzene	ND		0.050		05-25-89	
Toluene	ND		0.050		05-25-89	
Ethylbenzene	ND		0.050		05-25-89	
Total Xylenes	ND		0.050		05-25-89	

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

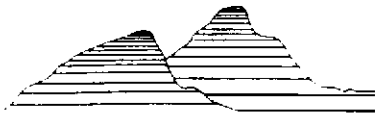
TVH/BTEX--Total volatile hydrocarbons (TVH) and benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction according to EPA Method 5030 followed by analysis by a EPA Method 8020/602 (modified for TVH) which uses a gas chromatograph (GC) equipped with a photo-ionization 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

05-30-89
Date Reported



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

• FREMONT • COSTA MESA • SACRAMENTO • HOUSTON

ANALYSIS REPORT

0212lab.frm

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

Date Received: 05-18-89
Laboratory Number: 90534S02
Project #: 87091-4
Sample #: S-31-B5
Matrix: Soil

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		2.0		05-25-89	
TEH as Diesel						NR
Benzene	ND		0.050		05-25-89	
Toluene	ND		0.050		05-25-89	
Ethylbenzene	ND		0.050		05-25-89	
Total Xylenes	ND		0.050		05-25-89	

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

05-30-89
Date Reported

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

• FREMONT • COSTA MESA • SACRAMENTO • HOUSTON

ANALYSIS REPORT

02121ab.frm

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

Date Received: 05-18-89
Laboratory Number: 90534S03
Project #: 87091-4
Sample #: S-21-B6
Matrix: Soil

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		2.0		05-25-89	
TEH as Diesel						NR
Benzene	ND		0.050		05-25-89	
Toluene	ND		0.050		05-25-89	
Ethylbenzene	ND		0.050		05-25-89	
Total Xylenes	ND		0.050		05-25-89	

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

05-30-89
Date Reported

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

• FREMONT • COSTA MESA • SACRAMENTO • HOUSTON

ANALYSIS REPORT

0212lab.frm

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

Date Received: 05-18-89
Laboratory Number: 90534S04
Project #: 87091-4
Sample #: S-31-B6
Matrix: Soil

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		2.0		05-25-89	
TEH as Diesel						NR
Benzene	ND		0.050		05-25-89	
Toluene	ND		0.050		05-25-89	
Ethylbenzene	ND		0.050		05-25-89	
Total Xylenes	ND		0.050		05-25-89	

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

05-30-89
Date Reported

CHAIN OF CUSTODY RECORD

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

SAMPLER (signature): Russell Bak
Phone: (415) 691-1906

LABORATORY:

TURNAROUND TIME: 2 weeks
Project Leader: Bill Short, Ron Duncan
Phone No.

SHIPPING INFORMATION:
Shipper
Address
Date Shipped
Service Used
Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date	Tim
Russell Bak			
	Received for laboratory by:	2-9-90	11a

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
S-31-B8	87091-4	2-6-90	TPHg + BTEX.	
S-38½-B8	"	"	"	
* S-26 B8	"	"	(Do this sample only if S-31 is above 5 ppm TPH-g	
S-36-B7	87091-4	2-7-90	"	
S-26-B7	"	"	"	

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Bill Short
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Project: AGS 87091-4

Date Sampled: 02-07-90
Date Received: 02-15-90
BETX Analyzed: 02-16-90
TPHg Analyzed: 02-16-90
TPHd Analyzed: NR
Matrix Soil

	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHg ppm	TPHd ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-26-B7 S1002074	0.092	ND	ND	ND	ND	NR
S-36-B7 S1002075	ND	ND	ND	0.13	2.3	NR

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

02-23-90
Date Reported

APPLIED GEOSYSTEMS IS CERTIFIED BY THE STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES AS A HAZARDOUS WASTE TESTING LABORATORY
(Certification No. 153)

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Bill Short
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Project: AGS 87091-4

Date Sampled: 02-06-90
Date Received: 02-15-90
BETX Analyzed: 02-16-90
TPHg Analyzed: 02-16-90
TPHd Analyzed: NR
Matrix Soil

	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	T tal Xylenes ppm	TPHg ppm	TPHd ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-26-B8 S1002071	0.098	ND	ND	ND	ND	NR
S-31-B8 S1002072	ND	ND	0.83	3.9	90	NR
S-38.5-B8 S1002073	ND	ND	ND	ND	ND	NR

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

02-23-90
Date Reported

APPLIED GEOSYSTEMS IS CERTIFIED BY THE STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES AS A HAZARDOUS WASTE TESTING LABORATORY
(Certification No. 153)

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO.	PROJECT NAME
87091-4	UNOCAL SAN LEANDRO
P.O. NO.	SAMPLERS (Signature)

DATE MM/DD/YY	TIME		No. of Containers	TPHgasoline (8015)	BTEX (602/8020)	TPHdiesel (8015)	Preserved?	REMARKS	LABORATORY I.D. NUMBER
3/9	3:00	S-0308-SP1	1	X	X	X	ICE	Make into 1 composite sample	
3/9	3:00	S-0308-SP2	1	X	X	X	ICE		
3/9	3:00	S-0308-SP3 ⇒ Make into one composite sample and then analyze	1	X	X	X	ICE		
3/9	3:00	S-0308-SP4	1	X	X	X	ICE		

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
	3/9/90 4:00	
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
	3/12/90 2:00	
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):

Laboratory: A.G.S.

Turn Around: 2 weeks

SEND RESULTS TO:

Applied GeoSystems
43255 Mission Boulevard
Fremont, California 95826

(415) 651-1906

Proj. Mgr.: RON DUNCAN

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Ron Duncan
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Project: AGS 87091-4

Date Sampled: 03-09-90
Date Received: 03-12-90
BTEX Analyzed: 03-14-90
TPHg Analyzed: 03-14-90
TPHd Analyzed: 03-19-90
Matrix: Soil

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-0308-SP(1,2,3,4) S1003117	0.21	1.7	0.41	2.7	38	ND

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

03-20-90
Date Reported

APPLIED GEOSYSTEMS IS CERTIFIED BY THE STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES AS A HAZARDOUS WASTE TESTING LABORATORY
(Certification No. 153)

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Applied GeoSystems	Client Project ID:	#87091-4, Unocal, San Leandro	Sampled:	Mar 9, 1990
43255 Mission Blvd., Suite B	Sample Descript:	Soil, S-308-SP1-4	Received:	Mar 14, 1990
Fremont, CA 94539				
Attention: Ron Duncan	Lab Number:	003-1951 A-D		
			Reported:	Mar 29, 1990

LABORATORY ANALYSIS

Analyte	Detection Limit mg/kg	Sample Results mg/kg
Arsenic	**0.25**	**2.6**
Barium	**5.0**	**120**
Cadmium	0.50	N.D.
Chromium	**0.25**	**31**
Lead	**0.25**	**130**
Mercury	**0.10**	**0.25**
Selenium	0.25	N.D.
Silver	0.50	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

CHAIN OF CUSTODY RECORD

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

SAMPLER (signature): Russell Bak

Phone: 651-1906

LABORATORY: Applied Geosystems.

TURNAROUND TIME: 2 weeks

Project Leader: Rod Duncan

Phone No. ~~2~~ 415 651-1906

SHIPPING INFORMATION:

Shipper

Address

Date Shipped

Service Used

Airbill No. Cooler No.

Relinquished by: (signatures)	Received by: (signatures)	Date
Russell Bak		
	Received for laboratory by:	2-15-90

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 Conditio Upon Receipt
W-36-MW2	8709/1-4	2-14-90	TPH + BTEX	HCl +ICE
W-36-MW3				
W-36-MW7				
W-36-MW6				
W-36-MW5				
Field Blank MW7				
Field Blank MW6				

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Ron Duncan
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Project: AGS 87091-4

Date Sampled: 02-14-90
Date Received: 02-15-90
BTEX Analyzed: 02-21-90
TPHg Analyzed: 02-21-90
TPHd Analyzed: NR
Matrix: Water

	Benzene ppb	Toluene ppb	Ethyl-benzene ppb	Total Xylenes ppb	TPHg ppb	TPHd ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100
SAMPLE Laboratory Identification						
W-36-MW2 W1002097	50	ND	28	44	840	NR
W-36-MW5 W1002099	0.51	1.6	2.9	7.5	67	NR
W-35-MW6 W1002100	ND	ND	ND	ND	ND	NR
W-36-MW7 W1002101	ND	ND	ND	0.69	ND	NR
W-BLANK-MW7 W1002102	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

02-23-90
Date Reported

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Ron Duncan
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Project: AGS 87091-4

Date Sampled: 02-14-90
Date Received: 02-15-90
BTEX Analyzed: 02-21-90
TPHg Analyzed: 02-21-90
TPHd Analyzed: NR
Matrix: Water

	Benzene ppb	Toluene ppb	Ethyl-benzene ppb	Total Xylenes ppb	TPHg ppb	TPHd ppb
Detection Limit:	10	10	10	10	500	100
SAMPLE Laboratory Identification						
W-36-MW3 W1002098	710	410	690	3300	22000	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

02-23-90
Date Reported

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO.	PROJECT NAME
87091-2	87091-2
P.O. NO.	SAMPLERS (Signature)

DATE MM/DD/YY	TIME		No. of Containers	TPHgasoline (8015)	BTEX (602/8020)	TPHdiesel (8015)						Preserved?	REMARKS	LABORATORY I.D. NUMBER
2/16/90	3:45	W-35 - MW8	4	X	X							HCl/ICE		
2/16/90	3:45	PRE-BLANK - MW8	1	X	X							HCl/ICE		
2/16/90	3:45	POST-BLANK - MW8	1	X	X							HCl/ICE		

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
	02/16/90 1:00	
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):
	02/23/90 1:00	

Laboratory:

Turn Around: 2 wks

SEND RESULTS TO:

Applied GeoSystems
43255 Mission Boulevard
Fremont, California 95826

(415) 651-1906

Proj. Mgr.: RON DUNCAN

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Ron Duncan
Applied GeoSystems
43255 Mission Boulevard
Fremont, CA 94539
Project: AGS 87091-2

Date Sampled: 02-16-90
Date Received: 02-27-90
BTEX Analyzed: 03-01-90
TPHg Analyzed: 03-01-90
TPHd Analyzed: NR
Matrix: Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100
SAMPLE Laboratory Identification						
W-35-MW8 W1002187	11	ND	52	55	1900	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

03-06-90
Date Reported

CHAIN OF CUSTODY RECORD

Applied GeoSystems

43255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-1

SAMPLER (signature): Russell Bak

Phone: _____

LABORATORY: Applied Geo Systems

TURNAROUND TIME: 2 weeks

Project Leader: Ron Duncan

Phone No. 651-1906

SHIPPING INFORMATION:

Shipper _____

Address _____

Date Shipped _____

Service Used _____

Airbill No. _____ Cooler No. _____

Relinquished by: (signatures)	Received by: (signatures)	Date	T
Russell Bak			
	Received for laboratory by:	2/8/90	

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-36-MW4	8709-4	2-1-90	TPHg + BTEX	HCL + ICED

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

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Ron Duncan	Date Sampled:	02-12-90
	Applied GeoSystems	Date Received:	02-15-90
	43255 Mission Boulevard	BTEX Analyzed:	02-20-90
	Fremont, CA 94539	TPHg Analyzed:	02-20-90
Project:	AGS 87091-4	TPHd Analyzed:	NR
		Matrix:	Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100
SAMPLE Laboratory Identification						
W-36-MW4 W1002096	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

02-23-90
Date Reported

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO.	PROJECT NAME
87091-4	Unocal San Leandro
P.O. NO.	SAMPLERS (Signature)
	Twitty

DATE MM/DD/YY	TIME		No. of Containers	TPHgasoline (8015)	BTEX (602/8020)	TPHdiesel (8015)	General Mineral Metals	ANALYSIS				Preserved?	REMARKS	LABORATORY I.D. NUMBER
03/08/90	2:00	W-35 - MW4	2-1L glass				X	=	16MA			ice	None of the samples have been filtered	
03/08/90	2:00	W-35 - MW4	5-500mL plastic				X					ice		
03/08/90	2:00	W-35 - MW4	1-500mL plastic				X					H_2NO_3/ice		

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
Twitty	03/09/90 12:00	Ron C. Duncan
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
Ron C. Duncan	03/09/90 1:15	
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):

Laboratory:

Turn Around: 2 weeks

SEND RESULTS TO:

Applied GeoSystems
43255 Mission Boulevard
Fremont, California 95826

(415) 651-1906

Proj. Mgr.: Bill Stuart/Ron Duncan

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Applied GeoSystems	Client Project ID:	#87091-4, Unocal, San Leandro	Sampled:	Mar 8, 1990
43255 Mission Blvd., Suite B	Sample Descript:	Water, W-35-MW4	Received:	Mar 9, 1990
Fremont, CA 94539				
Attention: Ron Duncan	Lab Number:	003-1281 A-C	Reported:	Mar 19, 1990

GENERAL MINERAL ANALYSIS

Analyte	Detection Limit mg/L (ppm)	Sample Results mg/L (ppm)
Bicarbonate Alkalinity	2.0	230
Calcium	2.0	56
Carbonate Alkalinity	0.50	N.D.
Chloride	0.50	32
Copper	0.010	0.013
Hardness	2.0	280
Hydroxide Alkalinity	0.0010	N.D.
Iron	0.010	0.96
Magnesium	2.0	34
Manganese	0.010	0.026
pH (pH units)	N.A.	7.8
Sodium	0.50	45
Specific Conductance (µmhos/cm)	1.0	480
Sulfate	0.50	44
Surfactants	0.020	N.D.
Total Dissolved Solids	5.0	360
Zinc	0.010	0.026

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

VM Tague

Vickie Tague
Project Manager

31281.APF <1>

RON ARCHER
CIVIL ENGINEER, INC.

CONSULTING • PLANNING • DESIGN • SURVEYING

4133 Mohr Ave., Suite E • Pleasanton, CA 94566
(415) 462-9372

REGISTERED PROFESSIONAL ENGINEER
RONALD R. ARCHER
No. 23721
EXP. 12/31/92
STATE OF CALIFORNIA

MARCH 27, 1990 JOB NO.1663

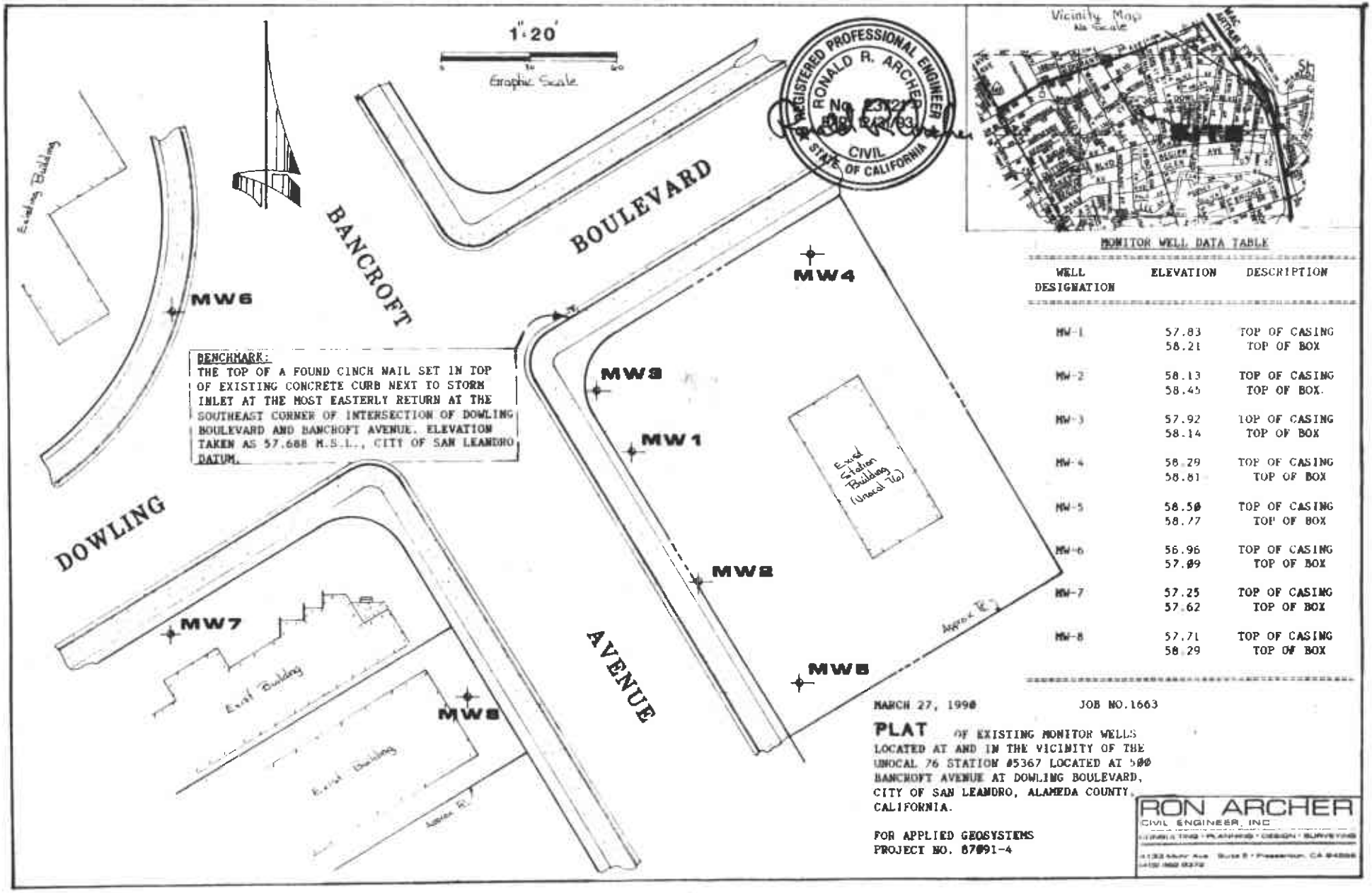
ELEVATIONS OF EXISTING MONITOR WELLS LOCATED AT AND IN THE VICINITY OF THE UNOCAL 76 STATION #5367 LOCATED AT 500 BANCROFT AVENUE AT DOWLING BOULEVARD, CITY OF SAN LEANDRO, ALAMEDA COUNTY, CALIFORNIA.

FOR APPLIED GEOSYSTEMS
PROJECT NO. 87091-4

BENCHMARK: THE TOP OF A FOUND CINCH NAIL SET IN TOP OF EXISTING CONCRETE CURB NEXT TO STORM INLET AT THE MOST EASTERLY RETURN AT THE SOUTHEAST CORNER OF INTERSECTION OF DOWLING BOULEVARD AND BANCROFT AVENUE. ELEVATION TAKEN AS 57.688 M.S.L., CITY OF SAN LEANDRO DATUM.

MONITOR WELL DATA TABLE

WELL DESIGNATION	ELEVATION	DESCRIPTION
MW-1	57.83	TOP OF CASING
	58.21	TOP OF BOX
MW-2	58.13	TOP OF CASING
	58.45	TOP OF BOX
MW-3	57.92	TOP OF CASING
	58.14	TOP OF BOX
MW-4	58.29	TOP OF CASING
	58.81	TOP OF BOX
MW-5	58.50	TOP OF CASING
	58.77	TOP OF BOX
MW-6	56.96	TOP OF CASING
	57.09	TOP OF BOX
MW-7	57.25	TOP OF CASING
	57.62	TOP OF BOX
MW-8	57.71	TOP OF CASING
	58.29	TOP OF BOX



MONITOR WELL DATA TABLE

WELL DESIGNATION	ELEVATION	DESCRIPTION
MW-1	57.83	TOP OF CASING
	58.21	TOP OF BOX
MW-2	58.13	TOP OF CASING
	58.45	TOP OF BOX
MW-3	57.92	TOP OF CASING
	58.14	TOP OF BOX
MW-4	58.29	TOP OF CASING
	58.81	TOP OF BOX
MW-5	58.50	TOP OF CASING
	58.77	TOP OF BOX
MW-6	56.96	TOP OF CASING
	57.09	TOP OF BOX
MW-7	57.25	TOP OF CASING
	57.62	TOP OF BOX
MW-8	57.71	TOP OF CASING
	58.29	TOP OF BOX

MARCH 27, 1990 JOB NO.1663

PLAT OF EXISTING MONITOR WELLS LOCATED AT AND IN THE VICINITY OF THE UNOCAL 76 STATION #5367 LOCATED AT 500 BANCROFT AVENUE AT DOWLING BOULEVARD, CITY OF SAN LEANDRO, ALAMEDA COUNTY, CALIFORNIA.

FOR APPLIED GEOSYSTEMS
PROJECT NO. 87091-4

RON ARCHER
CIVIL ENGINEER, INC