REPORT
SUBSURFACE ENVIRONMENTAL INVESTIGATION
at
UNOCAL Service Station No. 5367
500 Bancroft Avenue
San Leandro, California

AGS Job No. 87091-3

Report prepared for

UNOCAL Corporation
2175 North California Boulevard
Walnut Creek, California 94596

by
Applied GeoSystems

John T. Lambert
Project Geologist

Gillian S. Holmes
G.E. 2023

November 18, 1988

November 18, 1988
AGS 87091-3

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

Subject: Executive Summary of Report No. 87091-3, Subsurface Environmental Investigation at UNOCAL Service Station No. 5367, 500 Bancroft Avenue, San Leandro, California.

Mr. Ross:

We are pleased to submit our report describing work related to a subsurface environmental investigation conducted at UNOCAL Station No. 5367 in San Leandro, California, during September and October 1988. The work was requested by UNOCAL after free product was detected in a monitoring well at the site. The investigation included drilling three boreholes and constructing a 4-inch-diameter ground-water monitoring well in each borehole. Laboratory analyses were performed on selected soil samples collected during drilling and ground-water samples collected from the wells. The elevation of the ground water was measured in each well at the site, and the ground-water flow direction in the vicinity of the site was estimated.

The soil encountered during drilling consisted predominantly of silty clay with occasional thin beds or lenses of sand and fine gravel. The depth to the static ground-water level was about 36 feet at the time of the investigation.

The results of the drilling investigation indicate that soil contamination appears to be limited to a zone between depths of 30 and 36 feet west and south of the tank pit. Laboratory analyses on soil samples collected from borings B-2 and B-4 showed nondetectable to low levels (52 parts per million [ppm]) and less) of total petroleum hydrocarbons. Analyses of a soil sample collected from a depth of 36 feet in boring B-3 showed a hydrocarbon concentration of 3,692 ppm.

Analyses of water samples showed elevated levels of dissolved hydrocarbons in wells MW-2 and MW-3. The concentration of benzene

in these wells and concentrations of ethylbenzene, toluene, and total xylene isomers in well MW-3 exceed the action levels recommended for drinking water by the California Department of Health Services. No dissolved hydrocarbons were detected in well MW-4, located upgradient from the tank pit.

We recommend that additional ground-water monitoring wells be installed in the vicinity of the site to delineate and monitor possible contamination migration. The wells should be purged and sampled at 3-month intervals to monitor changes in contamination levels. We also recommend that the ground-water use in the area of the site be studied and neighboring wells identified and located.

We recommend that copies of this report be sent to Mr. Greg Zentner 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 do not hesitate to call if you have any questions regarding this report.

Sincerely,
Applied GeoSystems

John T. Lambert
Project Geologist

REPORT
SUBSURFACE ENVIRONMENTAL INVESTIGATION
at
UNOCAL Service Station No. 5367
500 Bancroft Avenue
San Leandro, California

For UNOCAL Corporation

INTRODUCTION

At the request of UNOCAL Corporation, Applied GeoSystems conducted a subsurface environmental investigation at UNOCAL Service Station No. 5367 in San Leandro, California. The investigation involved drilling three boreholes and installing a 4-inch-diameter groundwater monitoring well in each boring. The purpose of the investigation was to delineate the extent of hydrocarbon contamination in the soil and ground water at the site. The investigation was requested by UNOCAL after floating product was reported in a monitoring well at the site.

This report describes the work performed during the investigation, summarizes and discusses the analytical results obtained, presents our interpretation of the data collected, and provides recommendations for future work.

SITE DESCRIPTION

UNOCAL Service Station No. 5367 is located at the intersection of Bancroft Avenue and Dowling Boulevard in San Leandro, California. The location of the site is shown on the Site Vicinity Map (Plate P-1). The service station property and the approximate locations of the station facilities are shown on the Generalized Site Plan (Plate P-2). The site is bounded to the southeast and northwest by residential properties. Residential properties are also present to the southwest across Bancroft Avenue and northwest across Dowling Avenue.

BACKGROUND

We understand that two underground storage tanks were removed from a common tank pit located in the northeast of the site in 1987 and that new tanks were placed in the tank pit. Applied GeoSystems performed a subsurface environmental investigation in September 1987 (Applied GeoSystems Report No 87091-1, dated December 16, 1987). The investigation involved drilling one soil boring and installing a ground-water monitoring well. The well was installed to a total depth of 36 feet. The location of the well is shown on

Plate P-2. The results of laboratory analyses performed on soil samples collected during drilling are presented in Table 1.

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

Sample Number	TVH	Benzene	Ethyl-benzene	Toluene	Total Xylenes
S-20-B1	20.04	<0.05	0.65	1.24	3.93
S-35-B1	587.3	22.1	29.7	20.5	167.1

Results in parts per million (ppm)
TVH: Total volatile hydrocarbons
<: less than the detetion limit indicated
Sample designation: S-35-B1
- S: Soil sample
- 35: Sample depth in feet
- B1: Boring number

Floating product was detected in the monitoring well. Cumulative results of measurements of floating product performed by Applied GeoSystems to date are summarized in Table 2.

At the request of UNOCAL, Applied GeoSystems performed a soil vapor survey at the site on June 17, 1988, to assist in delineating the subsurface distribution of contamination (Applied GeoSystems Report No. 87091-2V, dated August 12, 1988). Vapor

TABLE 2
CUMULATIVE MEASUREMENTS OF PRODUCT THICKNESS
FROM GROUND-WATER MONITORING WELL MW-1
UNOCAL Service Station No. 5367
500 Bancroft Avenue
San Leandro, California

Date	Product Thickness
09/23/87	0.02
09/25/87	0.01
10/06/87	0.01
11/05/87	0.31
11/13/87	0.38
11/19/87	0.06
04/27/88	0.01
09/07/88	well dry

Product thickness is reported in feet.

samples were collected from depths of 15 and 25 feet (the limit of the probe) at seven locations. The approximate locations of the vapor probe are shown on Plate P-2. The results of the survey showed an absence of detectable contaminant concentrations at the depths sampled.

HYDROGEOLOGY

Sediments in the vicinity of the site are alluvial gravel, sand, and clay of Pliocene-Pleistocene to Late Pleistocene age, laid down by San Leandro Creek during a period of rapid deposition. The sand

and gravel are now aquifers that are sources of ground water. Three confined aquifers are generally recognized in the area. The upper confined aquifer occurs between the ground surface and a depth of about 150 feet. A second aquifer occurs between about 150 and 200 feet, and a third aquifer occurs a depth of about 300 feet. In addition, there are several shallow aquifers (less than 50 feet deep) of limited areal extent that exist mainly under perched conditions.

The shallow aquifers and the upper confined aquifer do not yield large volumes of water; therefore, these aquifers are mainly only a source of water for domestic lawn and garden irrigation. The two deeper confined aquifers have much larger yields and are sources of water for garden nurseries, parks, and farms.

BOREHOLE DRILLING

Three boreholes were drilled during September 29 and 30, 1988, by Datum Exploration, Inc., of Pittsburg, California. The borings were drilled using a Mobile B-57 truck-mounted drill rig with steam-cleaned, 8- and 10-inch-diameter, continuous-flight, hollow-stem augers. A geologist from Applied GeoSystems was onsite to observe drilling, log the boreholes, collect soil samples for

laboratory analysis, and supervise construction of ground-water monitoring wells in the borings. Monitoring wells MW-2, MW-3, and MW-4 were installed in borings B-2, B-3, and B-4, respectively. The locations of the borings and monitoring wells are shown on Plate P-2.

Borings B-3 was located in the inferred downgradient direction from the underground storage tanks and well MW-1. Borings B-2 and B-4 were located south of the service island and east of the tank pit, respectively, to delineate the extent of hydrocarbon contamination onsite.

The soil samples and drill cuttings were analyzed onsite using an organic vapor meter (OVM). The OVM measures the relative organic vapor concentrations in the soil but cannot be used to measure directly the concentrations of hydrocarbon contaminants in the soil. Organic vapor in concentrations of 280 parts per million (ppm) was detected in soil collected from a depth of approximately 31 feet in boring B-2 and between 160 and 365 ppm in soil collected from below a depth of 31 feet in boring B-3. Soil collected from depths shallower than 31 feet in these borings had organic vapor concentrations of 55 ppm and less. Organic vapor was not detected in soil samples and cuttings from boring B-4.

The drill cuttings excavated from the boreholes were stockpiled at the site and remain the responsibility of UNOCAL. Applied GeoSystems will arrange to have this material hauled to an appropriate landfill at the request of UNOCAL.

SOIL SAMPLING

Soil samples were collected from each borehole and described onsite as drilling progressed. The soil samples were collected at 5-foot intervals to the total depth in each borehole. The samples were collected by advancing the boring to a point immediately above the sampling depth and then driving a California-modified, split-spoon sampler (2-1/2-inch-inside-diameter) into the soil through the hollow center of the auger. The sampler was driven into the soil 18 inches with a standard 140-pound hammer repeatedly dropped 30 inches. The number of blows to drive the sampler for each 6-inch increment was counted and recorded to evaluate the relative consistency of the soil materials.

The Unified Soil Classification System, which is summarized on Plate P-3, was used to describe the soil. Descriptions of the material encountered in each borehole are presented on the Logs of Boring (Plates P-4 through P-9). Ground water was initially

encountered at a depth of approximately 40 feet below the ground surface. The water table stabilized at a depth of approximately 36 feet. The native material encountered consisted predominantly of silty clay with occasional thin beds or lenses of medium-dense, poorly sorted sand and fine gravel.

The samples were removed from the sampler and immediately sealed in their brass sleeves with aluminum foil, plastic caps, and airtight tape. The samples were then labeled and placed in iced storage. Selected samples were delivered to a laboratory certified by the State of California to perform the tests requested. Chain-of-custody protocol was observed during handling and transporting of the soil samples. A copy of the completed Chain of Custody Record is included in Appendix A of this report.

CONSTRUCTION OF MONITORING WELLS

Each ground-water monitoring well was constructed with 4-inch-diameter, polyvinyl chloride (PVC) casing. The screened portions of the wells were constructed of factory-perforated casing with 0.020-inch-wide slots. Well screen was set from the bottom of each borehole to approximately 13 feet above the present water surface. Blank PVC casing was set from the top of the screened casing to the

ground surface. All casing joints are threaded; no glues, chemical cements, or solvents were used in well construction. The top of the casing is covered with a locking cap, and the bottom has a threaded cap.

The annular space of each well was backfilled with No. 3 Monterey sand from the bottom of the borehole to approximately 3 feet above the screened casing. A bentonite plug, approximately 1 foot thick, was placed above the sand as a seal against cement entering the sand pack, and the remaining annular space was backfilled with neat cement to the ground surface. Graphic representations of the well constructions are shown on the right margins of the boring logs.

An aluminum utility box with a PVC apron was placed over each well head and secured in place with cement set flush with the surrounding ground surface. The utility box has a watertight seal to protect the ground-water monitoring well against surface-water infiltration and requires a specially designed spanner wrench to open. This design discourages vandalism and reduces the possibility of accidental disturbance of the well.

GROUND-WATER SAMPLING

On October 3, 1988, ground-water samples were collected from monitoring wells MW-2 through MW-4 for subjective analysis. The samples were collected by gently lowering about half the length of a Teflon bailer past the air/water interface and collecting a sample from the surface of the water in the well. The water samples showed no floating product, sheen, or emulsion.

After the subjective analyses, the wells were purged of approximately three well volumes of water and allowed to recover to static water levels. Samples for laboratory analysis were then collected with a clean Teflon bailer. The samples were transferred to laboratory-cleaned, 40-milliliter glass vials. Hydrochloric acid was added to the containers to minimize bacterial degradation of the samples. Each sample container was immediately sealed with a Teflon-lined cap, labeled, and placed in iced storage. The samples were delivered to Applied GeoSystems' laboratory in Fremont, California, for analytical testing. Chain-of-custody protocol was observed throughout the process of handling the samples. A copy of the Chain of Custody Record is included in the Appendix A of this report.

LABORATORY ANALYSES

Six soil samples were selected for laboratory analysis. One soil sample was collected from just above the approximate top of the saturated zone from each borehole. Soil samples were also selected from an area of suspected contamination at a depth of approximately 26 feet in boring B-3 and a depth of approximately 11 feet in borings B-2 and B-4.

The six soil samples were analyzed for total petroleum hydrocarbons as gasoline by modified Environmental Protection Agency (EPA) Method 8015 and the hydrocarbon constituents benzene, toluene, ethylbenzene, and total xylene isomers by EPA Method 8020. These analyses were performed at Applied GeoSystems' laboratory, which is certified by the State of California to perform the analyses requested.

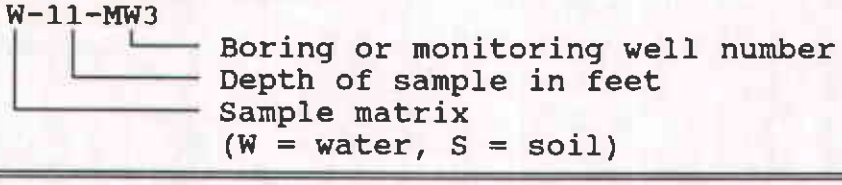
The three ground-water samples were analyzed for total petroleum hydrocarbons as gasoline by modified EPA Method 8015 and the hydrocarbon constituents benzene, toluene, ethylbenzene, and total xylene isomers by EPA Method 602 at Applied GeoSystems' laboratory in Fremont. The analytical results of both the soil and ground-

water samples are presented on Table 3.

TABLE 3
RESULTS OF SOIL AND WATER ANALYSES
UNOCAL Service Station No. 5367
500 Bancroft Avenue
San Leandro, California

Sample Number	TPH	Benzene	Ethyl-benzene	Toluene	Total Xylenes
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-26.0-B3	7	0.10	0.30	0.45	1.67
S-36.0-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
W-37-MW2	1.76	0.0478	0.0209	0.0074	0.0816
W-37-MW3	61	1.06	1.52	3.38	8.72
W-37-MW4	<0.0005	<0.0005	<0.0005	<0.0005	<0.02

Results in parts per million (ppm).
TPH = Total petroleum hydrocarbons
< = Less than the detection limit for analysis used
NA = Not analyzed
Sample designation:



EVALUATION OF GROUND-WATER POTENTIOMETRIC SURFACE

The elevation of the top of each well casing was surveyed by Cross Land Surveying, Inc., on October 7, 1988. The elevations were surveyed to the National Vertical Geodetic Datum of 1929. The results were presented in a letter from Cross Land Surveying (dated October 11, 1988); a copy of this letter is included in Appendix B of this report. A representative from Applied GeoSystems was onsite to observe the survey and returned to the site on October 27, 1988, to measure the static water level in each well with an electric Solinst water-level sounder. The differences in well-head elevations and ground-water depths were used to calculate the differences in the water-level elevations. The results of the survey using ground-water elevation measurements taken on October 27, 1988, are summarized on Table 4.

A graphical interpretation of the ground-water table at the time of measurement is shown on the Ground-Water Potentiometric Surface Map (Plate P-10). The ground water is inferred to flow at right angles to and in a direction downgradient from the equipotential lines. The ground-water gradient calculated from the above measurements is 0.0015 (approximately 1 foot vertical

distance per 670 feet horizontal distance). The measured differences in ground-water elevations indicate a ground-water flow direction approximately downgradient toward the east.

TABLE 4
GROUND-WATER ELEVATION DIFFERENCES
UNOCAL Service Station No. 5367
500 Bancroft Avenue
San Leandro, California
(measured on October 27, 1988)

Monitoring Well Number	Top of Casing (C)	Static Water Depth (W)	Water Level Elevation (C - W)
MW-1	57.84	Dry	--
MW-2	58.14	36.04	22.10
MW-3	57.92	35.86	22.06
MW-4	58.30	36.12	22.18

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

CONCLUSIONS AND RECOMMENDATIONS

The results of the investigation indicate that soil contamination appears to be limited to the west and south of the tank pit. The contamination also appears to be limited to a zone between 30 and 36 feet deep, which is located just above the water table. Laboratory analyses of soil samples collected from the three

boreholes show nondetectable levels of hydrocarbon contamination in boring B-4 and low levels of contamination (52 ppm and less) in boring B-2. Total petroleum hydrocarbons were detected at 3,692 ppm in a sample from a depth of 36 feet in boring B-3.

Analyses of ground-water samples showed elevated levels of dissolved hydrocarbons in wells MW-2 and MW-3. The concentrations of benzene in these wells and concentrations of ethylbenzene, toluene, and total xylene isomers in well MW-3 exceed the action levels for drinking water recommended by the California Department of Health Services. No dissolved hydrocarbons were detected in well MW-4 located upgradient from the tank pit.

Because elevated levels of hydrocarbon contamination are present in the ground water, we recommend that additional monitoring wells be installed in the vicinity of the site to delineate and monitor for possible contamination migration. We recommend that a well be installed near the south boundary of the property and that three wells be installed offsite, possibly along the west side of Bancroft Avenue. The locations of the wells will be limited by underground and overhead utilities.

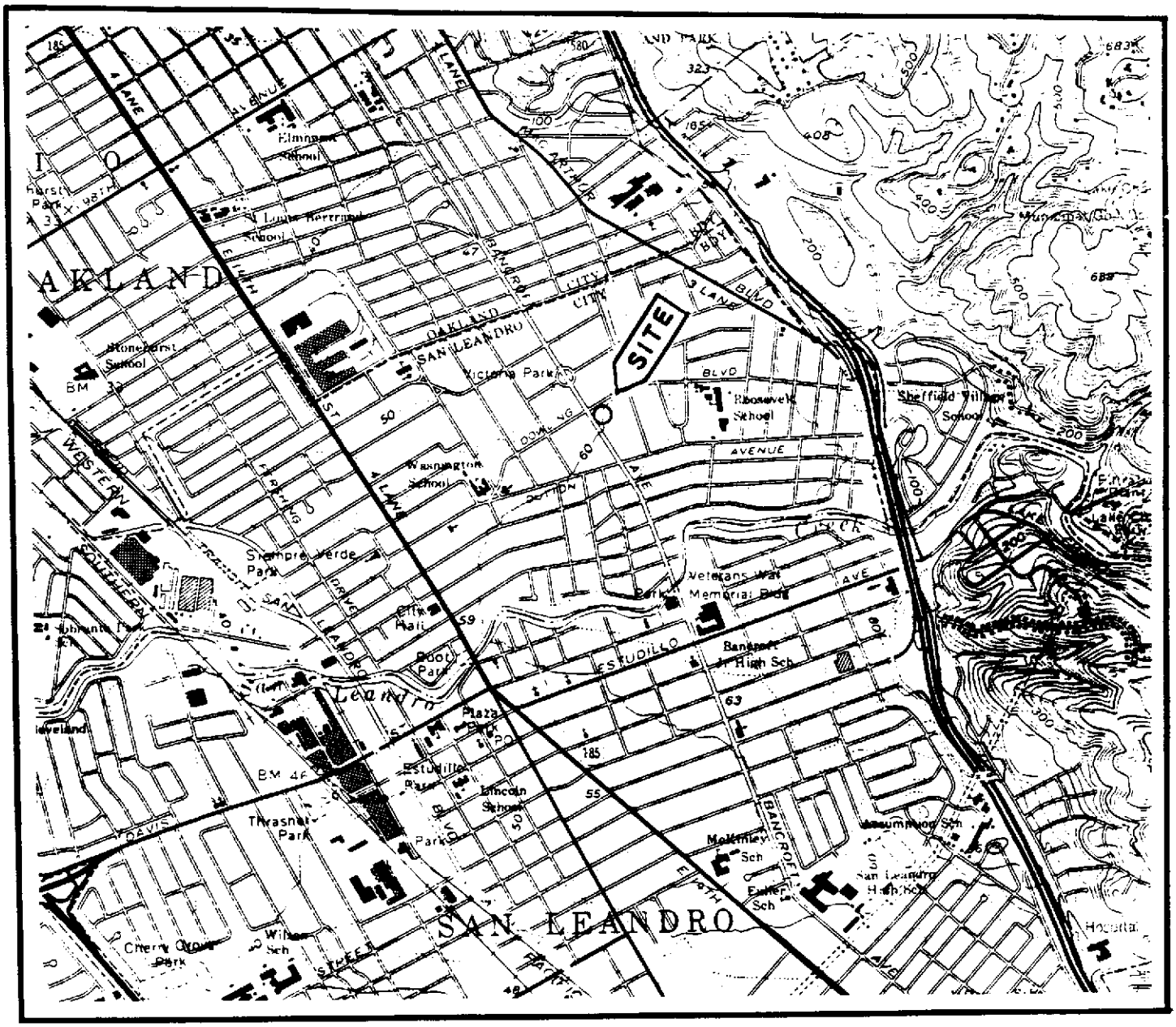
We recommend that the ground-water use in the area be studied and neighboring wells identified and located. We also recommend that the wells be purged and sampled at 3-month intervals to monitor changes in contamination levels. The water samples collected should be analyzed for total petroleum hydrocarbons as gasoline using modified EPA Method 8015 and the hydrocarbon constituents benzene, ethylbenzene, toluene, and total xylene isomers using EPA Method 602.

Copies of this report should be sent to Mr. Greg Zentner of the Regional Water Quality Control Board, San Francisco Bay Region, 1111 Jackson Street, Room 6040, Oakland, California 94607, and Mr. Joe Ferreira at the San Leandro Fire Department, 835 East 14th Street, San Leandro, California 94577.

LIMITATIONS

This study has been conducted in accordance with generally accepted standards of environmental geological practice in California at the time this report was prepared. This investigation was conducted solely for the purpose of evaluating environmental conditions of the soil and ground water with respect to hydrocarbon-product contamination in the vicinity of the subject property. No soil

engineering or geotechnical recommendations are implied or should be inferred. Evaluation of 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.



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
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PROJECT NO. 87091-3

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

PLATE
P - 1

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		LTR	DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel sand mixtures, little or no fines.
		GP	Poorly-graded gravels or gravel sand mixture, little or no fines
		GM	Silty gravels, gravel-sand-clay mixtures.
		GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS	SW	Well-graded sands or gravelly sands, little or no fines.
		SP	Poorly-graded sands or gravelly sands, little or no fines.
		SM	Silty sands, sand-silt mixtures.
		SC	Clayey sands, sand-clay mixtures.

MAJOR DIVISIONS		LTR	DESCRIPTION
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.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		OL	Organic silts and organic silt-clays of low plasticity.
	SILTS AND CLAYS LL<50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
		OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.

I — Depth through which sampler is driven

I — Relatively undisturbed sample

I — Missed sample

▼ — Ground water level observed in boring

S-10 — Sample number

OVM — Organic vapor meter (parts per million)

Sand pack

Bentonite annular seal

Neat cement annular seal

Blank PVC

Machine-slotted PVC

BLOW/FT. REPRESENTS THE NUMBER OF BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES TO DRIVE THE SAMPLER THROUGH THE LAST 12 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.

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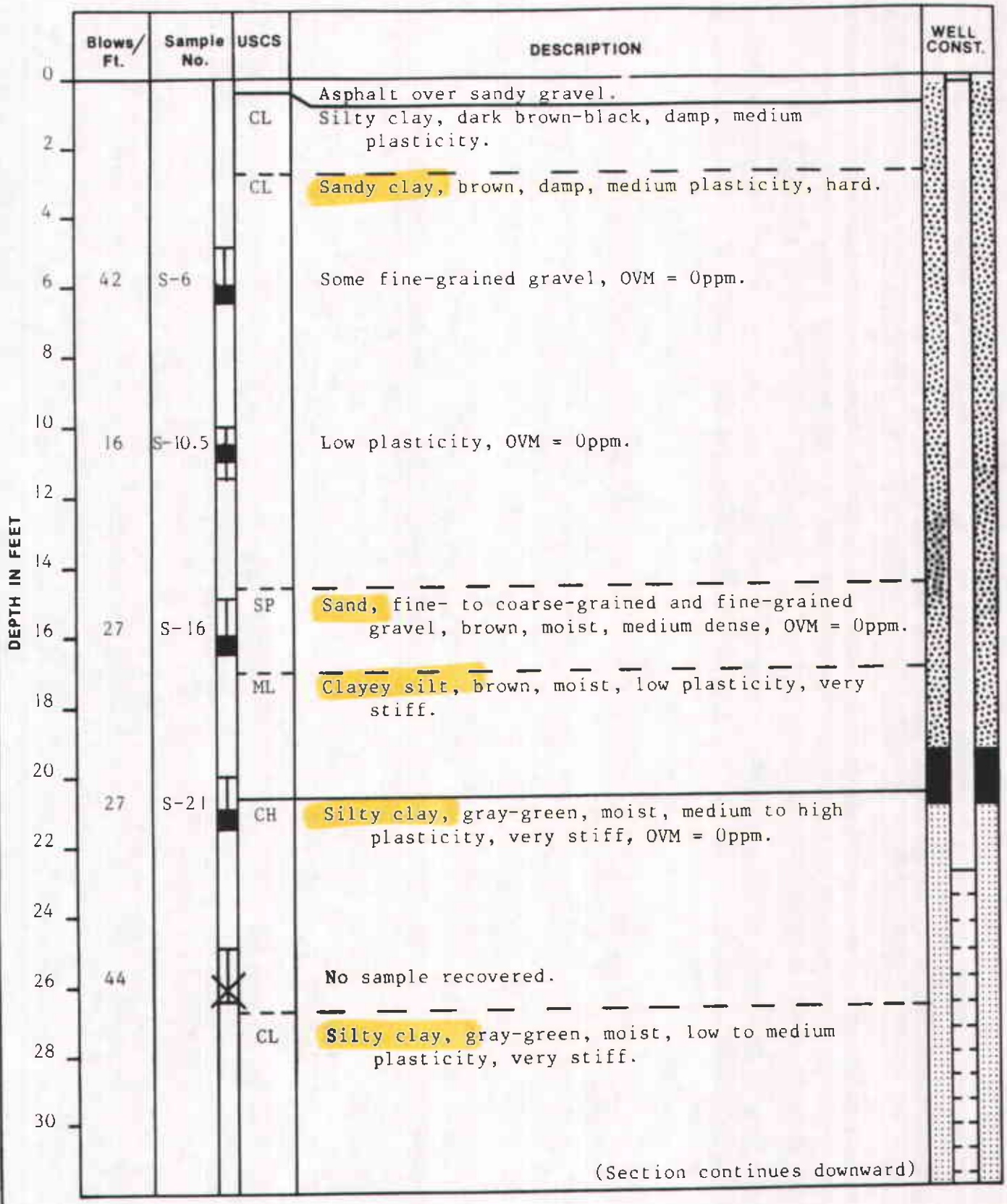
PROJECT NO. 87091-3

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

PLATE
P - 3



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LOG OF BORING B-2/MW-2

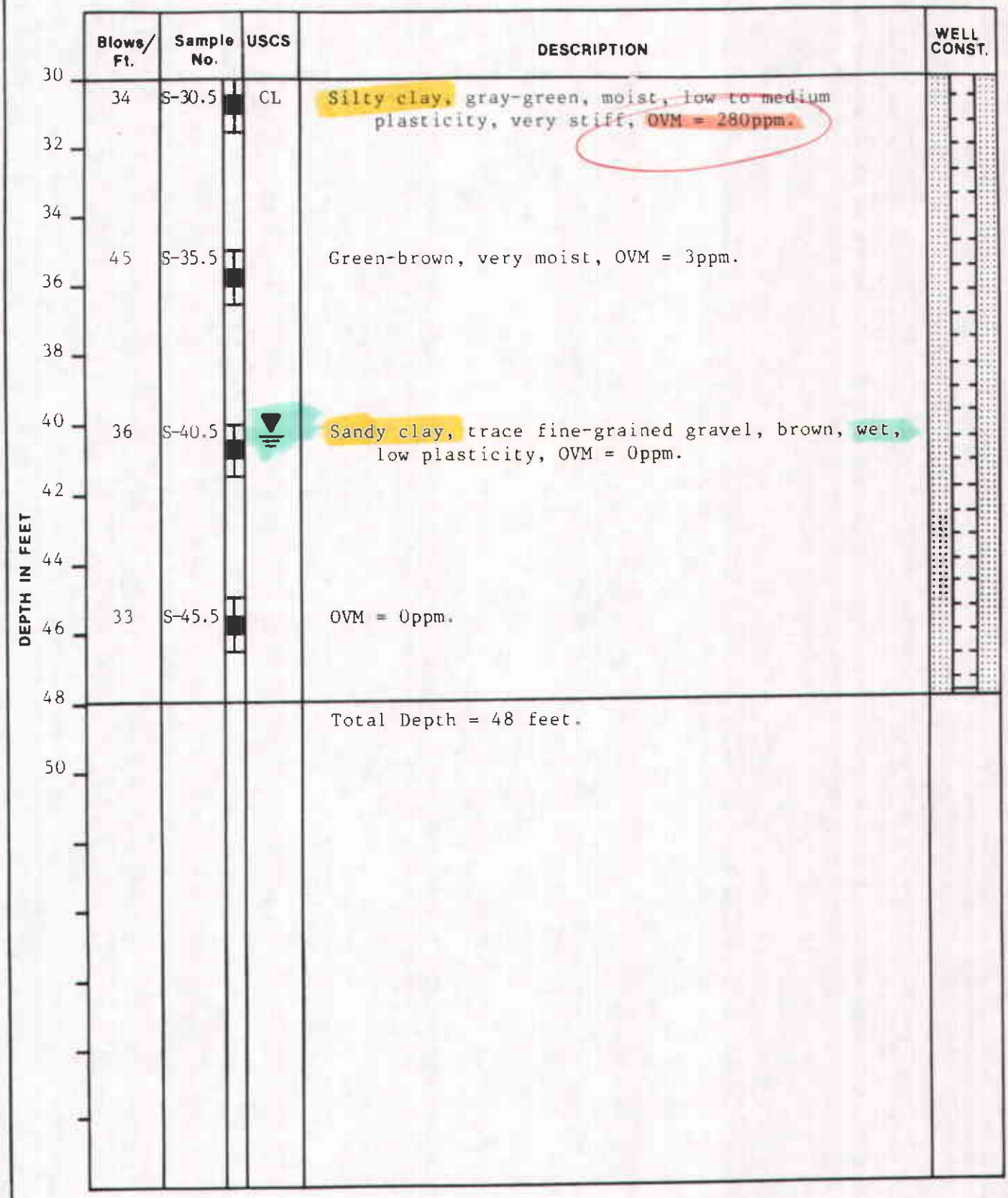
UNOCAL Station No. 5367

500 Bancroft Avenue

San Leandro, California

PLATE P - 4

PROJECT NO. 87091-3



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LOG OF BORING B-2/MW-2

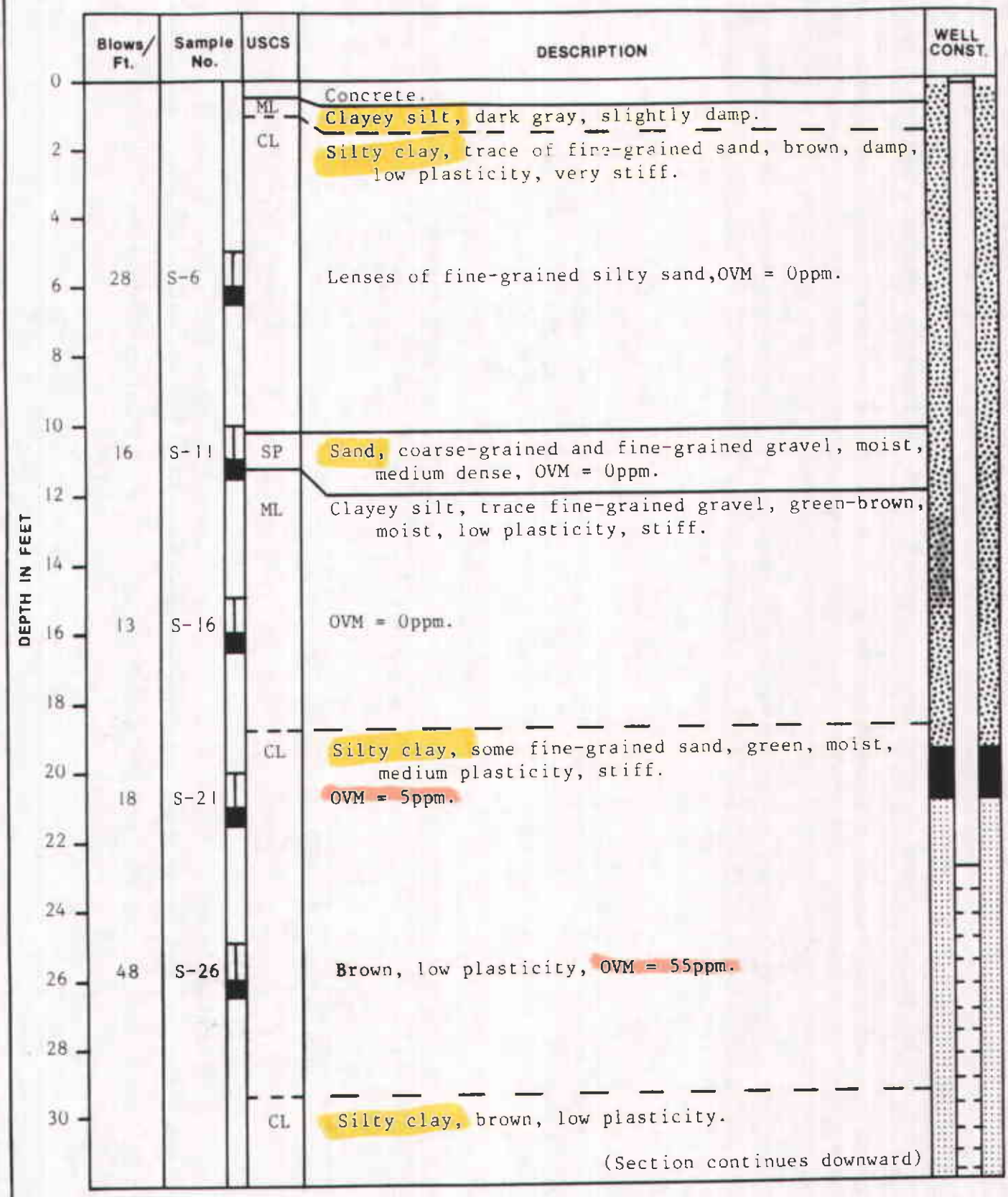
UNOCAL Station No. 5367

500 Bancroft Avenue

San Leandro, California

PLATE P-5

PROJECT NO. 87091-3



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LOG OF BORING B-3/MW-3

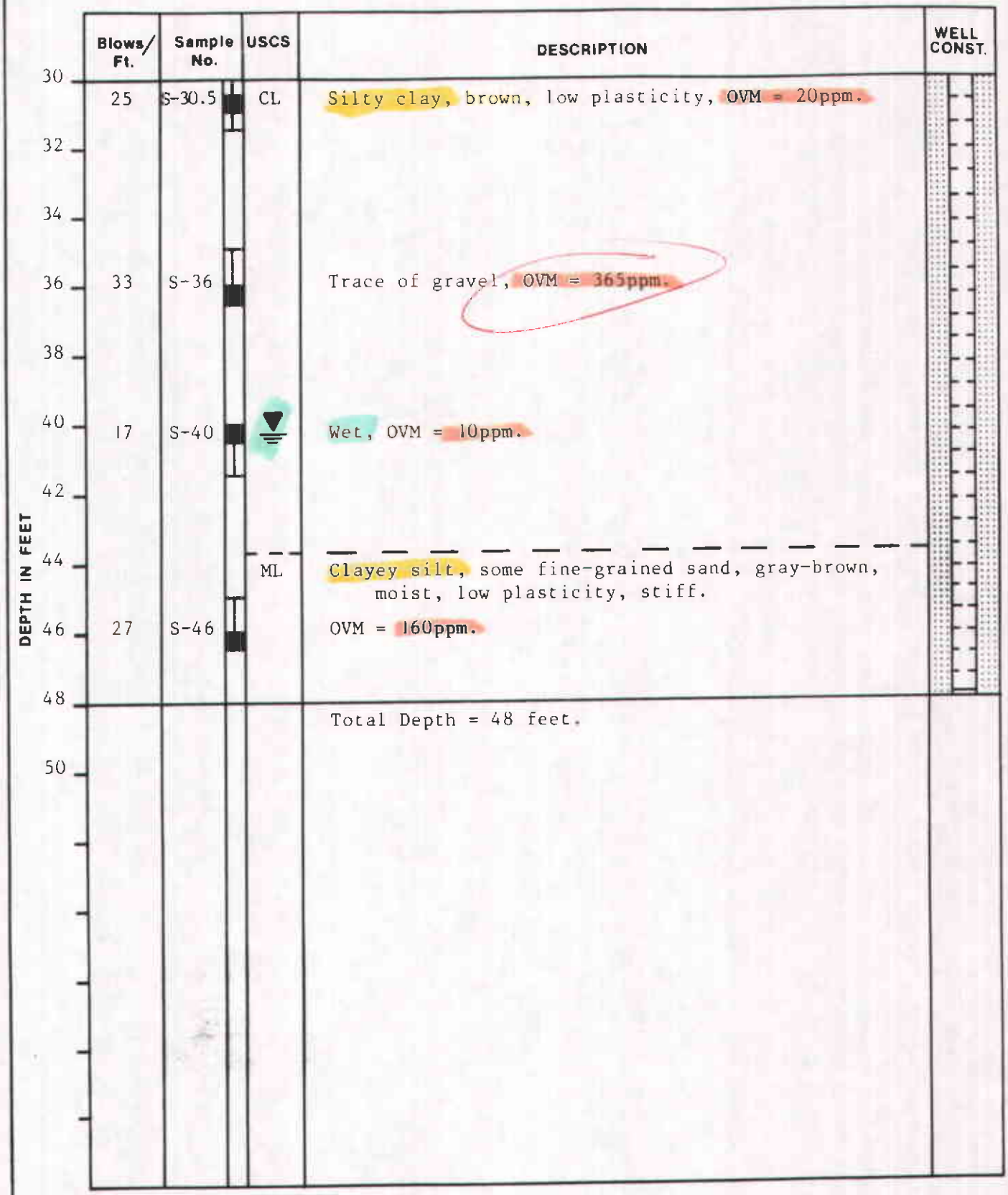
UNOCAL Station No. 5367

500 Bancroft Avenue

San Leandro, California

PLATE P - 6

PROJECT NO. 87091-3



Applied GeoSystems

41255 Albrae Blvd. Suite B Fremont CA 94538 (415) 651-1906

LOG OF BORING B-3/MW-3

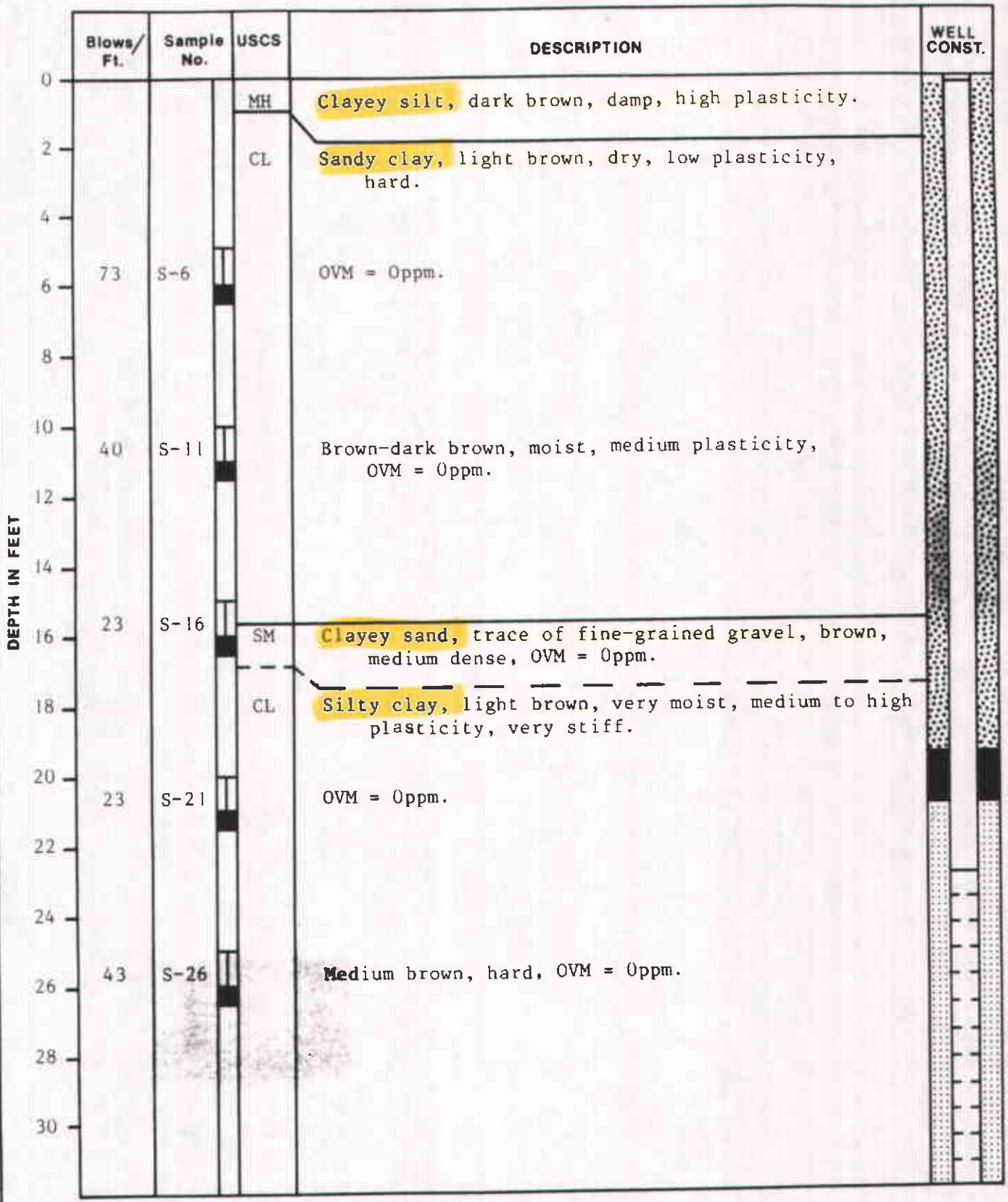
UNOCAL Station No. 5367

500 Bancroft Avenue

San Leandro, California

PLATE P-7

PROJECT NO. 87091-3



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43253 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-7906

PROJECT NO. 87091-3

LOG OF BORING B-4/MW-4

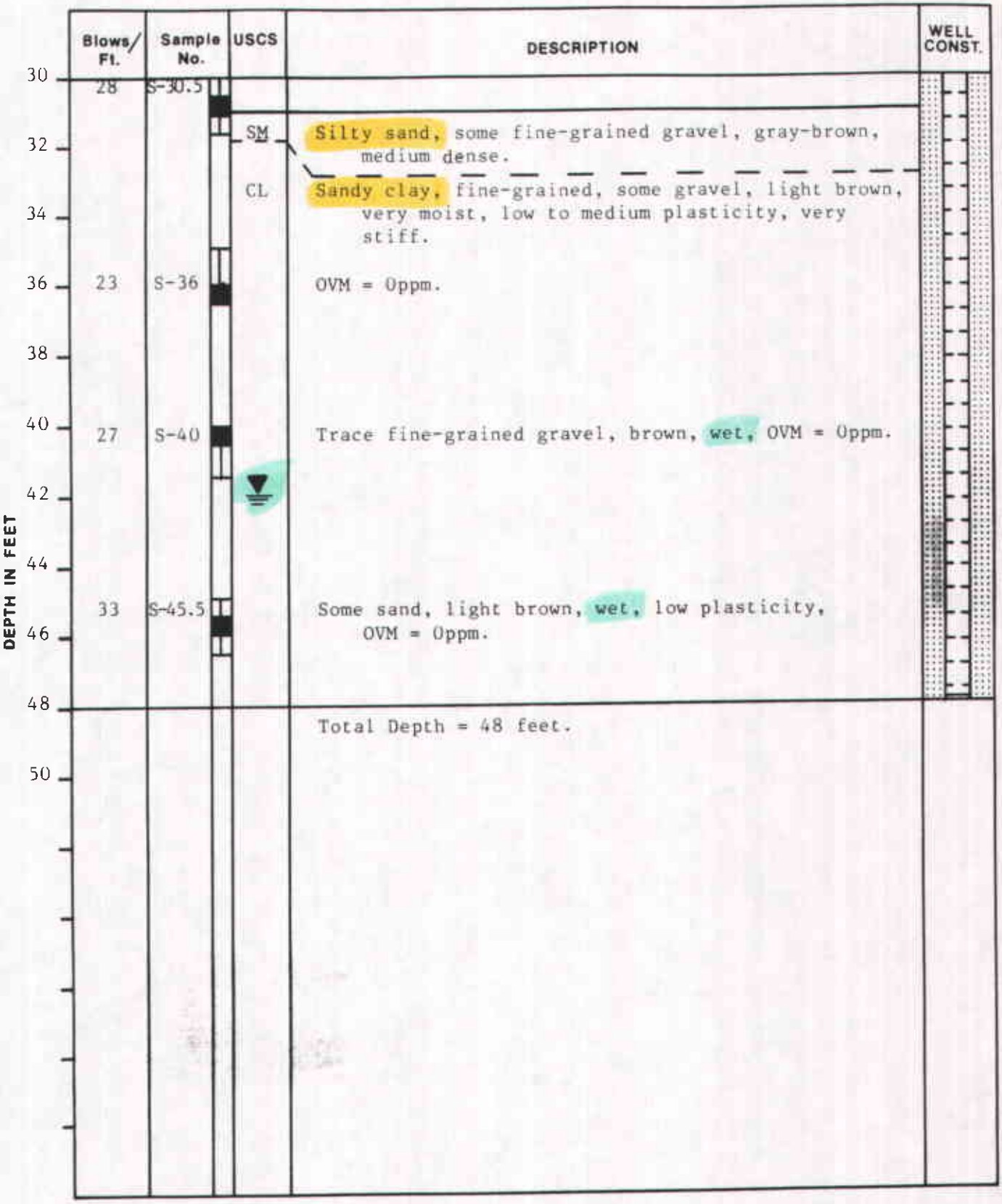
UNOCAL Station No. 5367

500 Bancroft Avenue

San Leandro, California

PLATE

P - 8



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LOG OF BORING B-4/MW-4

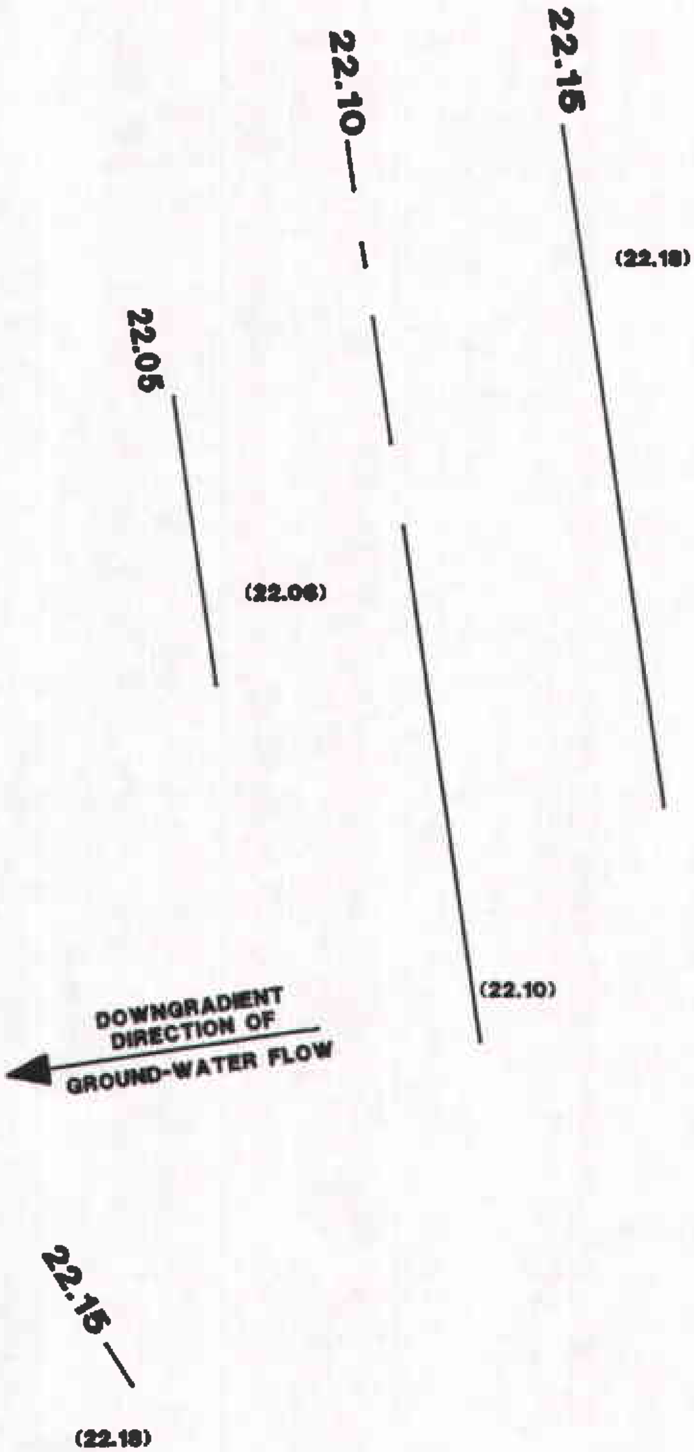
UNOCAL Station No. 5367

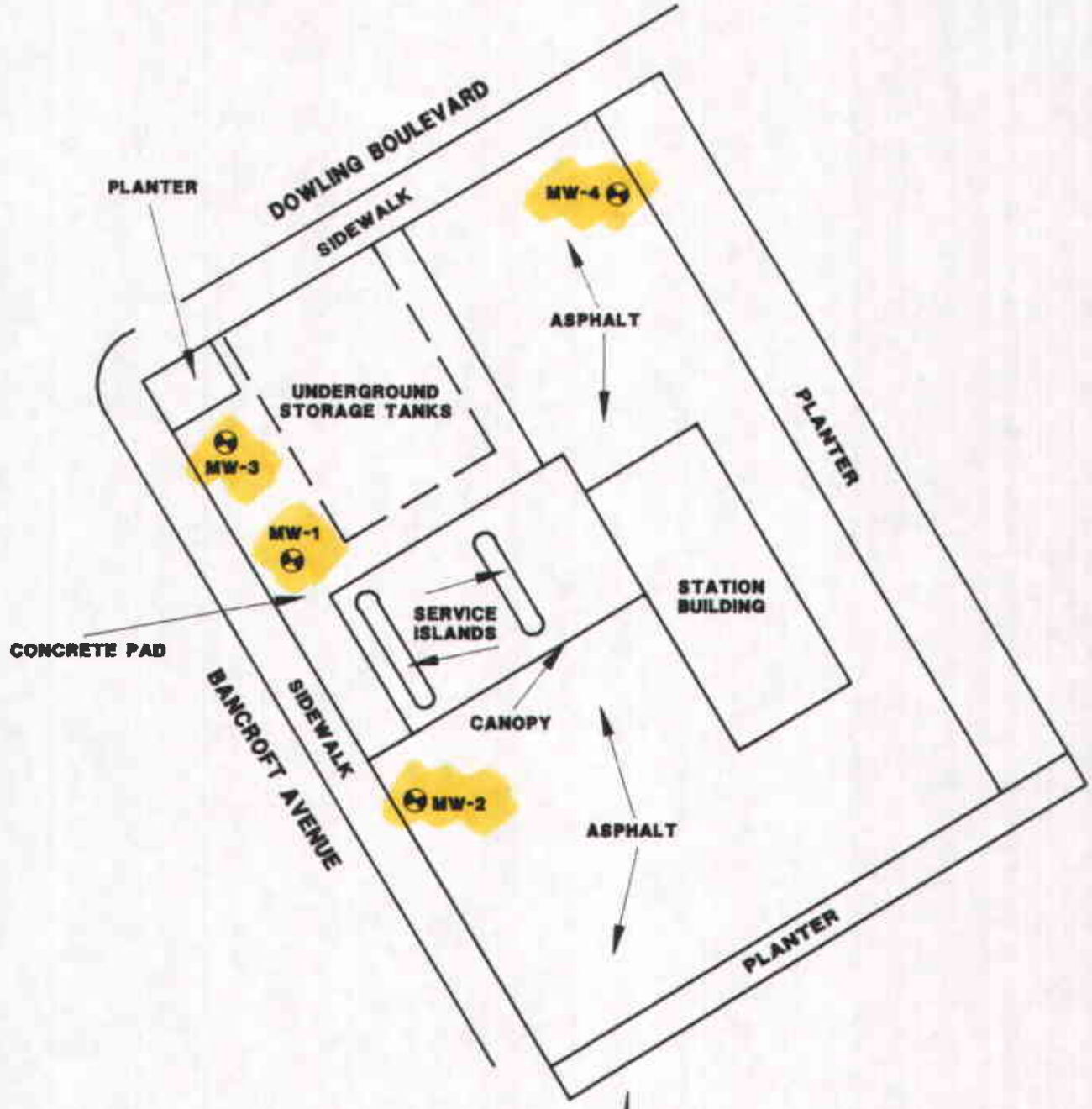
500 Bancroft Avenue

San Leandro, California

PLATE P-9

PROJECT NO. 87091-3


22.15
22.10
(22.18)
22.05
(22.06)
(22.10)
DOWNGRADIENT
DIRECTION OF
GROUND-WATER FLOW
22.15
(22.18)



- Line of equal elevation to ground water (October 26, 1988)
- Elevation of ground water (October 26, 1988)

MW-4 - Monitoring well location

Source: Measured by tape and compass

N

Approximate Scale

30 15 0 30 60

feet

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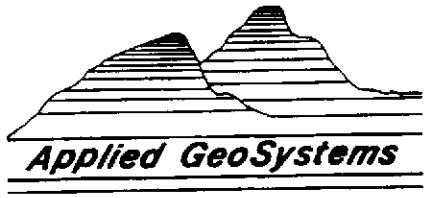
PROJECT NO. 87091-3

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

PLATE
P - 10

APPENDIX A

CHAIN OF CUSTODY RECORD



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

SAMPLER (signature): Barbara E Nifong

Phone: 415 651 1906

LABORATORY: Applied GeoSystems

TURNAROUND TIME: 2 weeks

Project Leader: J. Lambert

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
Barbara E Nifong		Oct 3 88	0930
	Received for laboratory by:	10-3-88	1000

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-30.5-B2	87091-3	29 Sept 88	BETX + TPH (Gas)	a iced
S-10.5-B2		29 Sept 88	a	
S-26.0-B3		29 Sept 88		
S-36.0-B3		29 Sept 88		
S-11-B4		30 Sept 88		
S-30.5-B4	87091-3 a	30 Sept 88	a	a

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

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ANALYSIS REPORT

0212lab.frm

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

Date Received: 10-03-88
Laboratory Number: 10003S01
Project: 87091-3
Sample: S-10.5-B2
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		10-04-88	
TEH as Diesel						NR
Benzene	ND		0.05		10-04-88	
Toluene	ND		0.05		10-04-88	
Ethylbenzene	ND		0.05		10-04-88	
Total Xylenes	ND		0.05		10-04-88	

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

PROCEDURES

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

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

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

Tia Tran, Laboratory Supervisor

10-11-88
Date Reported

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ANALYSIS REPORT

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

Date Received: 10-03-88
Laboratory Number: 10003S02
Project: 87091-3
Sample: S-30.5-B2
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	52		2		10-04-88	
TEH as Diesel						NR
Benzene	0.17		0.05		10-04-88	
Toluene	ND		0.05		10-04-88	
Ethylbenzene	1.52		0.05		10-04-88	
Total Xylenes	5.11		0.05		10-04-88	

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

PROCEDURES

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

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

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

Tia Tran, Laboratory Supervisor

10-11-88
Date Reported

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ANALYSIS REPORT

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

Date Received: 10-03-88
Laboratory Number: 10003S03
Project: 87091-3
Sample: S-26.0-B3
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	7		2		10-04-88	
TEH as Diesel						NR
Benzene	0.10		0.05		10-04-88	
Toluene	0.45		0.05		10-04-88	
Ethylbenzene	0.30		0.05		10-04-88	
Total Xylenes	1.67		0.05		10-04-88	

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

PROCEDURES

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

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

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

Tia Tran, Laboratory Supervisor

10-11-88
Date Reported

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

Date Received: 10-03-88
Laboratory Number: 10003S04
Project: 87091-3
Sample: S-36.0-B3
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	3692		20		10-04-88	
TEH as Diesel						NR
Benzene	8		1		10-04-88	
Toluene	129		1		10-04-88	
Ethylbenzene	65		1		10-04-88	
Total Xylenes	394		1		10-04-88	

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

PROCEDURES

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

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

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

Tia Tran, Laboratory Supervisor

10-11-88
Date Reported

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

Date Received: 10-03-88
Laboratory Number: 10003S05
Project: 87091-3
Sample: S-11-B4
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		10-04-88	
TEH as Diesel						NR
Benzene	ND		0.05		10-04-88	
Toluene	ND		0.05		10-04-88	
Ethylbenzene	ND		0.05		10-04-88	
Total Xylenes	ND		0.05		10-04-88	

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

PROCEDURES

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

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

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

Tia Tran, Laboratory Supervisor

10-11-88
Date Reported

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

Date Received: 10-03-88
Laboratory Number: 10003S06
Project: 87091-3
Sample: S-30.5-B4
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		10-04-88	
TEH as Diesel						NR
Benzene	ND		0.05		10-04-88	
Toluene	ND		0.05		10-04-88	
Ethylbenzene	ND		0.05		10-04-88	
Total Xylenes	ND		0.05		10-04-88	

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

PROCEDURES

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

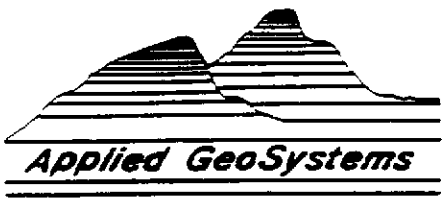
TPH--Total petroleum hydrocarbons (low-to-medium boiling points) are measured by extraction according to EPA Method 5030 followed by analysis by a modified EPA Method 8015 which uses a GC equipped with an FID. Soil extracts and water samples are subjected to purge-and-trap introduction into the GC.

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

Tia Tran, Laboratory Supervisor

10-11-88
Date Reported

CHAIN OF CUSTODY RECORD



43255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-191

SAMPLER (signature): Bute E Nelson

Phone: _____

LABORATORY: Applied GeoSystems

TURNAROUND TIME: 2 weeks

Attention: John Lambert

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
Bute E Nelson		5 Oct 88	8:43
	Received for laboratory by:	10-5-88	9:05AM

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-37-MW2	87091-3	10-4-88	BTEX TPH	iced
W-37-MW3	87091-3	10-4-88		iced
W-37-MW4	87091-3	10-3-88		iced

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ANALYSIS REPORT

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

Date Received: 10-05-88
Laboratory Number: 10008W01
Project: 87091-3
Sample: W-37-MW2
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		1.76		0.02	10-06-88	
TEH as Diesel						NR
Benzene		0.0478		0.0005	10-06-88	
Toluene		0.0074		0.0005	10-06-88	
Ethylbenzene		0.0209		0.0005	10-06-88	
Total Xylenes		0.0816		0.0005	10-06-88	

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

PROCEDURES

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

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

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

Tia Tran, Laboratory Supervisor

10-13-88
Date Reported

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ANALYSIS REPORT

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

Date Received: 10-05-88
Laboratory Number: 10008W02
Project: 87091-3
Sample: W-37-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		61		1	10-06-88	
TEH as Diesel						NR
Benzene		1.06		0.05	10-06-88	
Toluene		3.38		0.05	10-06-88	
Ethylbenzene		1.52		0.05	10-06-88	
Total Xylenes		8.72		0.05	10-06-88	

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

PROCEDURES

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

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

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

Tia Tran, Laboratory Supervisor

10-13-88
Date Reported

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ANALYSIS REPORT

02121ab.frm

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

Date Received: 10-05-88
Laboratory Number: 10008W03
Project: 87091-3
Sample: W-37-MW4
Matrix: Water

Parameter	Result (mg/kg)	Result (mg/L)	Detection Limit (mg/kg)	Detection Limit (mg/L)	Date Analyzed	Notes
TVH as Gasoline						NR
TPH as Gasoline		ND		0.02	10-06-88	
TEH as Diesel						NR
Benzene		ND		0.0005	10-06-88	
Toluene		ND		0.0005	10-06-88	
Ethylbenzene		ND		0.0005	10-06-88	
Total Xylenes		ND		0.0005	10-06-88	

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

PROCEDURES

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

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

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

Tia Tran, Laboratory Supervisor

10-13-88
Date Reported

APPENDIX B

CROSS LAND SURVEYING, INC.
Consulting Land Surveyors
EARL R. CROSS, L.S. 3242
2210 Mt. Pleasant Road
San Jose, CA 95148
(408) 274-7994

11 October 1988
Job No. 88-91

ELEVATIONS OF WELLS AT THE UNION 76 STATION AT THE NORTHEAST CORNER OF BANCROFT AVENUE AND DOWLING BOULEVARD SAN LEANDRO, CALIFORNIA.

DATE OF SURVEY: 7 OCTOBER 1988
YOUR JOB NUMBER: 87091-3

WELL NUMBER	ELEVATION AT TOP OF CASING AT BLACK MARK
MW-1	57.84
MW-2	58.14
MW-~~3~~4	58.30
MW-~~4~~3	57.92

ELEVATION DATUM

Elevations shown hereon are in feet and decimals thereof and are based upon N.G.V.D. Mean Sea Level Datum of 1929, adjusted 1973, (City Datum). The benchmark used is a cinch nail in a yellow paint mark at the top of curb at the most Easterly storm water inlet at the Southeast corner of Bancroft Avenue and Dowling Boulevard having an elevation of 57.69 feet.

Ed Patz, L.S. 4236

LICENSED LAND SURVEYOR
EDWARD R. PATZ
NO. 4236
STATE OF CALIFORNIA

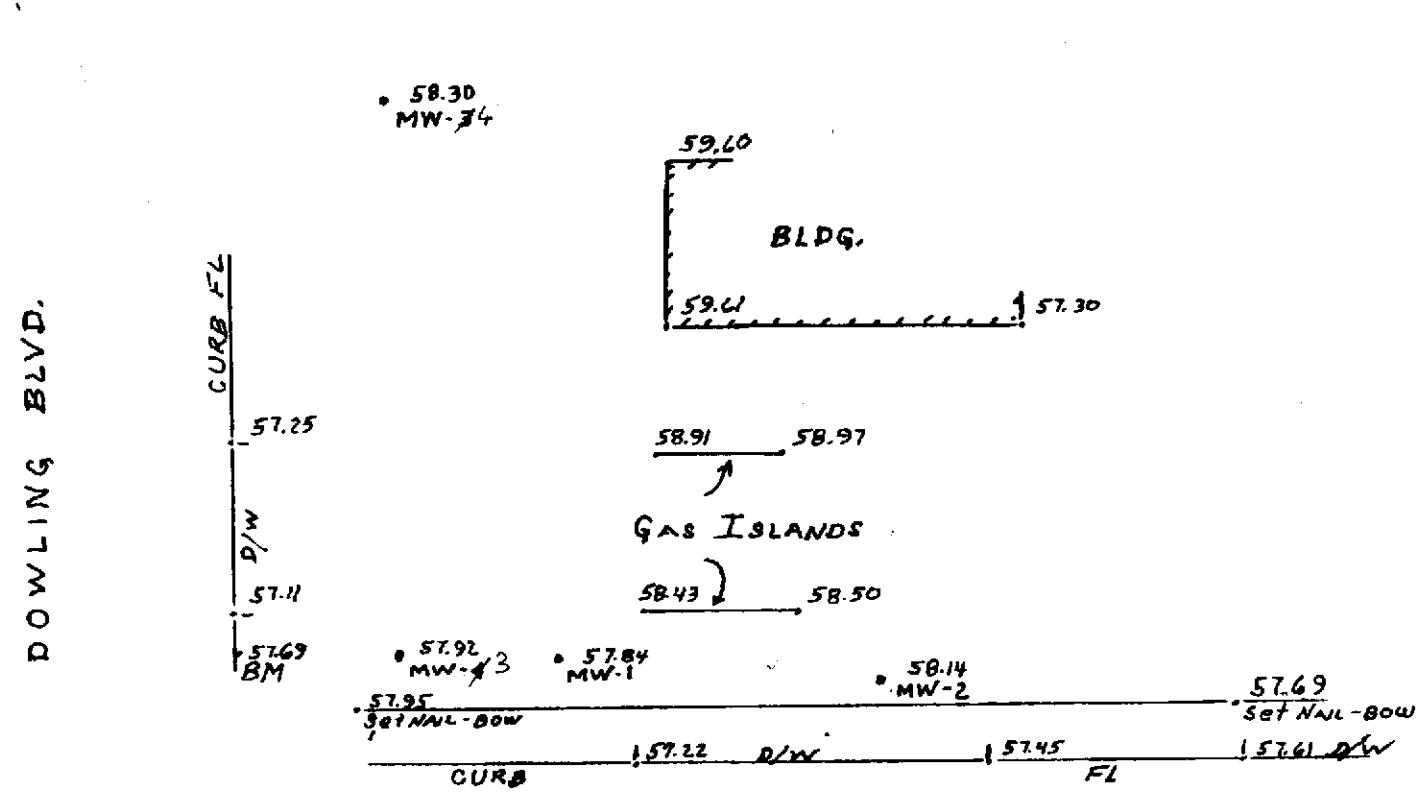
CROSS LAND SURVEYING, INC.
2210 MT. PLEASANT RD
SAN JOSE, CALIF. 95148
(408) 274-7994

Date: 10-11-88
Time: 16:51:09
Page: 1

Coordinate File: SANLEAN.CRD
List of Coordinate Points
* Denotes Contouring Masspoint

Prj. No. 87091-3

Point ID	NORTH	EAST	ELEV	Descriptor
50	1000.0000	1000.0000	57.9500	set nail
51	1000.0000	1137.0300	58.5500	set nail bw
52	1008.0400	981.0000	57.6900	BM nail toc
53	1007.8800	1006.9700	57.9200	mw-4
54	1007.5400	1031.2400	57.8400	mw-1
55	1004.0500	1081.4500	58.4400	mw-2
56	1094.8900	1004.8600	58.3000	mw-3
57	1084.7100	1049.1900	59.6000	bldg c
58	1059.2000	1048.8300	59.6100	bldg c
59	1039.6600	1046.9900	58.9100	W end gas island
60	1039.5700	1066.4600	58.9700	E end gas island
61	1020.9400	1067.3000	58.5000	E end gas island
62	1015.2100	1044.6900	58.4300	W end gas island
63	991.3600	1043.1500	57.2200	fc/fl
64	991.4000	1098.3700	57.4500	fc/fl
65	991.3600	1137.0000	57.6100	fc/fl
66	1059.2700	1104.2600	57.3000	bldg c
67	1041.4800	980.7100	57.2500	fc/fl
68	1014.6200	980.6000	57.1100	fc/fl



APPLIED GEO. SYSTEMS		
SCALE: 1" = 30'	APPROVED BY:	DRAWN BY E.P.
DATE: 10/10/88		REVISED
PROJECT NO. 87091-3		
		DRAWING NUMBER

88-91

8½ X 11 PRINTED ON NO. 1000H CLEARPRINT