NC

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

• FREMONT • COSTA MESA • SACRAMENTO • HOUSTON

REPORT
LIMITED ENVIRONMENTAL SITE ASSESSMENT
at
ARCO Service Station No. 0374
Telegraph Avenue and Alcatraz Avenue
Oakland, California

AGS Job No. 018039-1

Report prepared for

ARCO Products Company
515 South Flower Street
Los Angeles, California

by
Applied GeoSystems

William R. Short
Project Geologist

Gillian S. Holmes
G.E. 2023

June 15, 1988

Applied GeoSystems 43255 Mission Boulevard, Fremont, CA 94539 (415) 651-1906
• FREMONT • COSTA MESA • SACRAMENTO • HOUSTON

REPORT
LIMITED ENVIRONMENTAL SITE ASSESSMENT
at
ARCO Service Station No. 0374
Telegraph Avenue and Alcatraz Avenue
Oakland, California

For: ARCO Products Company

INTRODUCTION

This report describes the work conducted to drill four soil borings at ARCO Service Station No. 0374, located at the northwest corner of Telegraph Avenue and Alcatraz Avenue in Oakland, California. ARCO Products Company contracted with Applied GeoSystems to evaluate the immediate area around the underground hydrocarbon-product storage tanks for potential hydrocarbon contamination in the subsurface soil in conjunction with future replacement of the tanks. This report describes the work elements conducted during our investigation, includes our interpretations of the data collected, and presents our conclusions.

SITE DESCRIPTION AND BACKGROUND

ARCO Service Station No. 0374 is an operating service station located on the northwest corner of the intersection of Telegraph Avenue and Alcatraz Avenue in Oakland, California. The site location is shown on the Site Vicinity Map, Plate P-1. The Generalized Site Plan, Plate P-2, shows the property and approximate locations of selected features at the site. The site is situated on a relatively flat, asphalt- and concrete-covered lot. We understand that two 6,000-gallon and two 4,000-gallon underground petroleum product storage tanks are located along the west side of the site as shown on Plate P-2. We understand that the tanks are used to store regular, unleaded, and supreme unleaded gasoline for retail sale.

Apartments are located adjacent to the west and north sides of the service station. Small shops and apartments are located across Telegraph and Alcatraz Avenues to the south and east of the site, and a vacant lot is located on the southeast corner of the intersection.

REGIONAL AND LOCAL HYDROGEOLOGY

Regionally, the site is located on the East Bay Alluvial Plain, near the base of the East Bay Hills at an elevation of approximately 160 feet above Mean Sea Level. The site vicinity is underlain by late Pleistocene alluvial deposits which consist of poorly sorted silt, sand, and gravel deposits (Helley and others, 1979). The site area is underlain by a complex distribution of continuous and discontinuous perched layers and aquifers which vary from a few to tens of feet in thickness. The shallow soils at the western portion of the site consist of silty clay and a lens or layer of clayey gravel and clayey sand. The local ground-water table was encountered at a depth of approximately 10 feet below the ground surface.

SOIL BORINGS

Based on the local and regional topography the direction of ground-water flow was inferred and the boring locations were selected. Three borings were placed in the inferred downgradient direction of ground-water flow from the underground hydrocarbon product tank locations. Borings B-1, B-3, and B-4 were drilled within approximately 5 feet of the underground storage tanks.

The exact location and orientation of the western product tank was uncertain, therefore, boring B-2 was drilled approximately 5 feet downgradient of its inferred location. The locations of the four borings are shown on the Generalized Site Plan, Plate P-2.

Field Work

A geologist from Applied GeoSystems observed the drilling of soil borings B-1 through B-4 on April 8, 1988. The upper few feet of each boring were augered by hand to confirm that each location was clear of any underground lines or structures. The borings were drilled with a Mobile B-53 truck-mounted drill rig operated by Kvilhaug Well Drilling and Pump Company, Inc., of Concord, California. Continuous flight, 8-inch-diameter, hollow-stem augers were used to drill boring B-1 to a depth of approximately 21-1/2 feet, boring B-2 to approximately 14-1/2 feet, and borings B-3 and B-4 to approximately 11 feet below the ground surface. Each boring was terminated because ground water was encountered. After the ground water was sampled, the borings were backfilled to a few inches below grade with a slurry of sand and cement and 5 percent bentonite and then capped with asphalt to grade.

Samples were collected at 5-foot intervals and subjectively analyzed in the field for hydrocarbon contamination using an

organic vapor analyzer (OVA). Each soil sample collected and portions of the drill cuttings were checked with the OVA for the presence of hydrocarbons. The results of the measurements are included on the Logs of Borings.

Plate P-3 gives a summary of the Unified Soil Classification System used to identify the soils excavated during drilling. Descriptions of earth materials encountered in borings B-1 through B-4 are presented on the Logs of Borings, Plates P-4 through P-7. The earth materials encountered at the site consist primarily of silty clay with a lens or layer of clayey gravel to clayey sand.

Soil Sampling Procedure

Ten soil samples were collected and described from borings B-1 through B-4 during drilling. These samples, described as indicated on the Logs of Borings, were collected at approximately 5-foot intervals from the ground surface to the total depth of the borings. Soil samples were collected by advancing the boring to a point immediately above the sampling depth and then driving a California-modified split-spoon sampler (2.5-inch inside-diameter) into the soil through the hollow center of the auger. The sampler was driven 18 inches with a standard 140-pound hammer

repeatedly dropped 30 inches. The number of blows to drive the sampler each 6 inches was counted and recorded to evaluate the relative consistency of soil materials.

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. The geologist initiated a Chain of Custody Record and selected samples were delivered to a Applied GeoSystems' certified analytical laboratory in Fremont, California for analytical testing. The completed Chain of Custody Record is included in the Appendix of this report.

Subjective Analysis

The drill cuttings and soil samples were subjectively analyzed as they were excavated for any discoloration or product odor using an organic vapor analyzer (OVA). Readings were collected by placing the rubber cup that skirts the intake probe against the soil in the brass sleeve immediately after breaking the sampler. The measurements indicate the relative organic vapor concentrations in soil but cannot be used to assess directly the absolute concentrations of hydrocarbon contaminants in the soil.

The values of the OVA readings are presented on the Logs of Borings, Plates P-4 through P-7.

Noticeable product odor was noted in all the soil excavated with the exception of the lowest approximately 5 feet of boring B-1. OVA readings above ambient levels were encountered in all but the 20-foot sample in boring B-1. OVA readings less than 100 ppm were measured in the samples collected from the upgradient boring (B-3). OVA readings over 100 ppm were encountered in borings B-2 and B-4 and in all but the 15- and 20-foot samples from boring B-1.

Approximately 1-inch of dark-colored hydrocarbon product was encountered floating on the ground water in boring B-1. A sheen was observed on water samples collected from borings B-2 and B-4. No ground-water sample was collected from boring B-3 prior to backfilling.

Analytical Results

Eight soil samples were selected for analyses including four samples from a depth of approximately 5 feet and four samples from approximately 10 feet below the ground surface. Some of the

samples analyzed may have been saturated because ground water was present at approximately 10 feet below the ground surface. The samples collected from borings B-1, B-2, B-3, and B-4 were analyzed for total petroleum hydrocarbons (TPH) using modified Environmental Protection Agency (EPA) Method 8015. The results of the chemical analyses are presented in Table 1 and in the laboratory Analysis Reports included in the Appendix of this report.

DISCUSSION OF RESULTS

Analytical results of the soil samples collected from the four borings adjacent to the product tanks show relatively low to relatively high levels of hydrocarbon contamination (from 48 ppm to 930 ppm). The hydrocarbon contamination detected subjectively and using analytical testing appears to extend from the ground surface to total depth in borings B-2, B-3, and B-4 (approximately 10 feet) and to approximately 15 feet in boring B-1. Approximately 1 inch of dark-colored hydrocarbon product was measured floating on the groundwater in boring B-1. A sheen was detected on water samples collected from borings B-2 and B-4. Soil slough at the base of boring B-3 prevented ground-water sampling prior to backfilling the boring.

TABLE 1
RESULTS OF CHEMICAL ANALYSES OF SOIL SAMPLES
ARCO Service Station No. 0374
Telegraph Avenue and Alcatraz Avenue
Oakland, California

Sample Number	Total Petroleum Hydrocarbons	Detection Limits
S-05-B1	165	2
S-10-B1	48	2
S-05-B2	260	2
S-8.5-B2	60	2
S-05-B3	64	2
S-09-B3	62	2
S-05-B4	389	5
S-8.5-B4	930	10

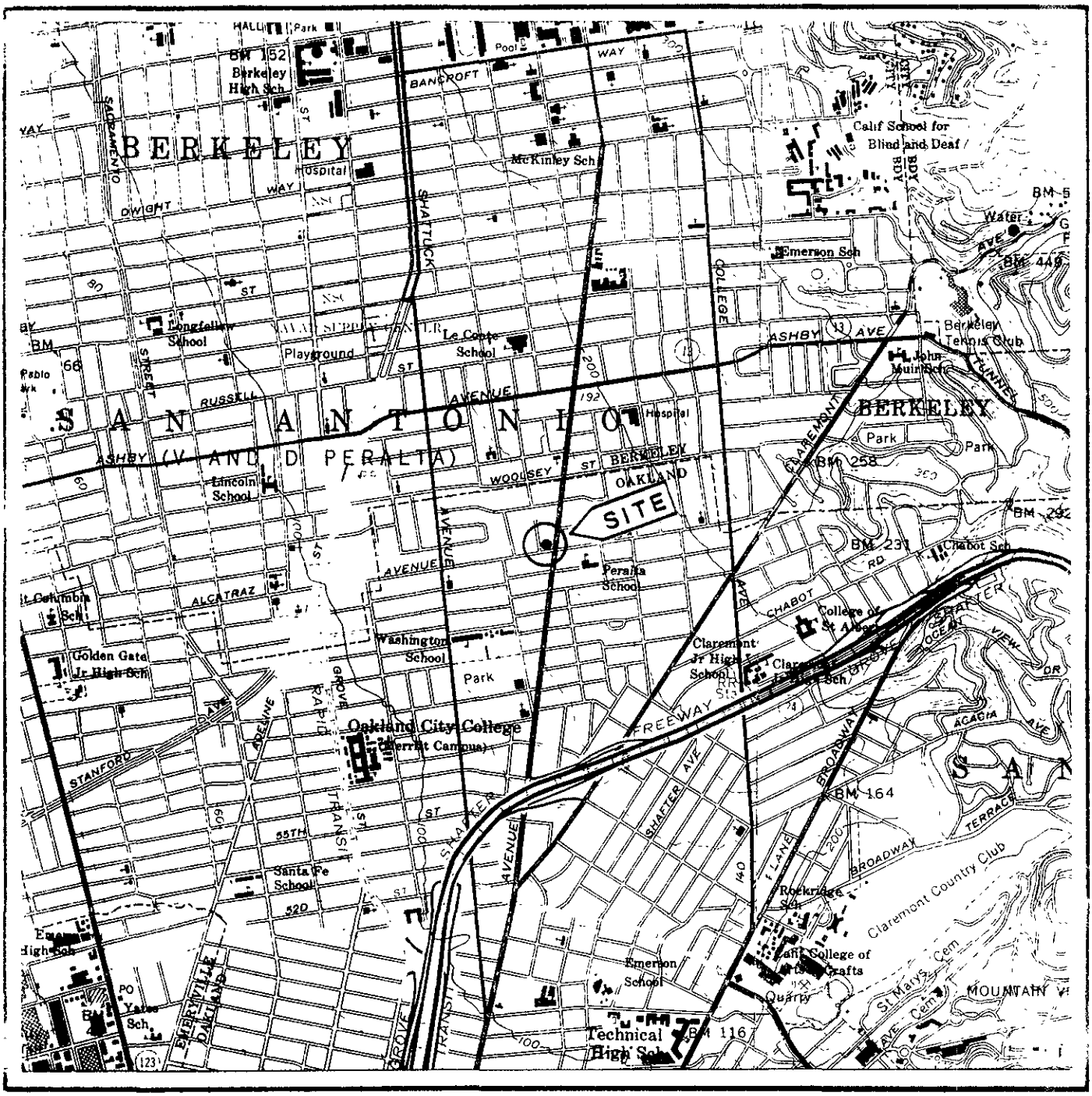
Results in milligrams per kilogram (mg/kg) = parts per million (ppm)
Total petroleum hydrocarbons analyzed by modified EPA Method 8015
Sample identification:
S-05-B1
- Boring number
- Approximate sample interval in feet below existing grade
- Sample matrix (S = Soil)

LIMITATIONS

This report was prepared in accordance with generally accepted standards of environmental geological practice in California at the time this investigation was performed. This investigation was conducted solely for the purpose of evaluating environmental conditions of the soil with respect to hydrocarbon product contamination at the subject site. No soil engineering or geotechnical implications are stated 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.

REFERENCE CITED

Helley, E.S., Lajoie, K.R., Spangle, W.E., and Blair, M.L., 1979, Flatland deposits of the San Francisco Bay region, California, U.S. Geological Survey Professional Paper 943, 87p.



Source: U.S. Geological Survey
7.5-Minute Quadrangle
Oakland West/Oakland East
California
Photorevised 1980

N

Approximate Scale

2000 1000 0 2000 4000

feet

Applied GeoSystems

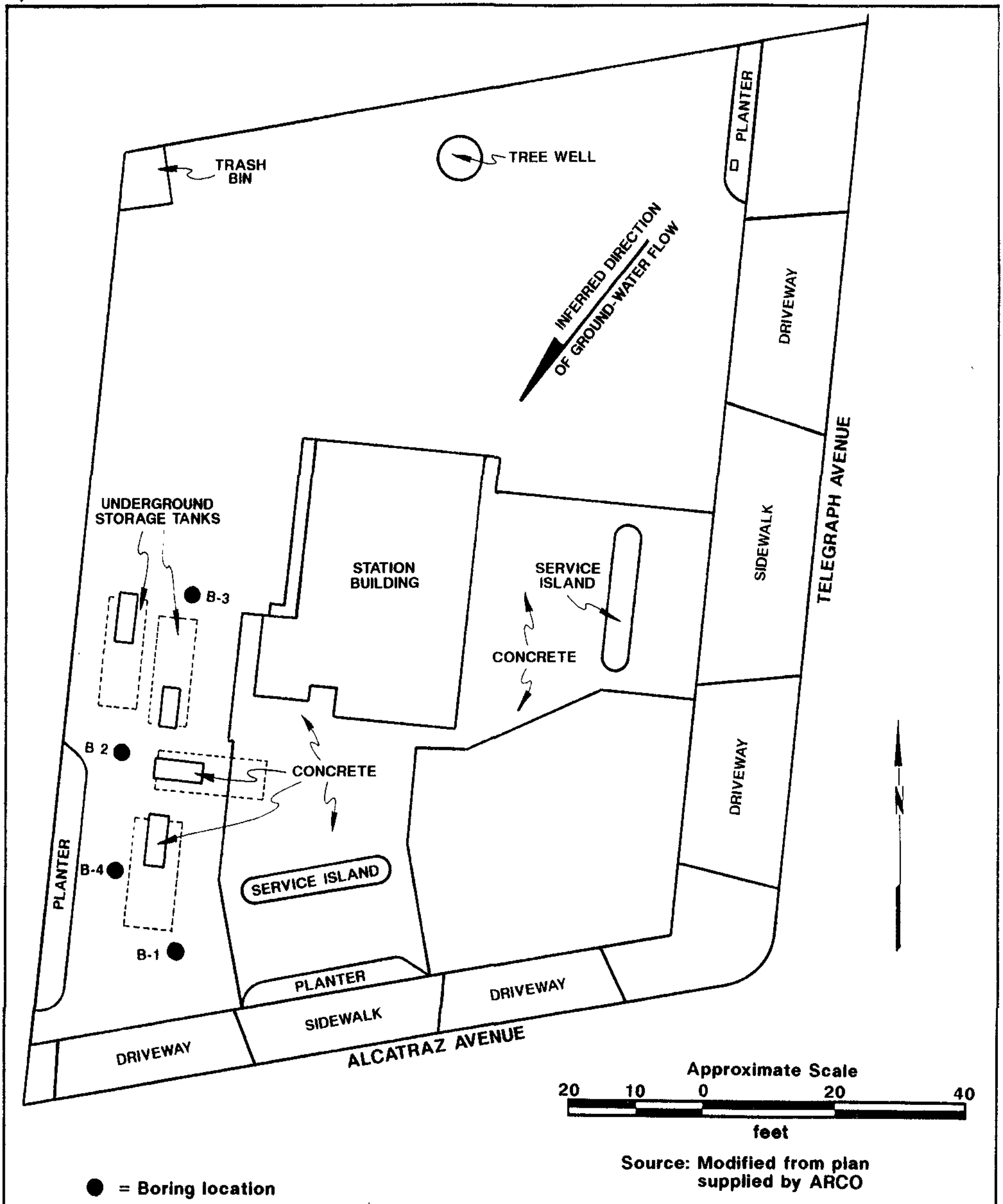
41355 Mission Blvd Suite B Fremont CA 94539 (415) 651-1906

PROJECT NO. 18039-1

SITE VICINITY MAP
ARCO Station No. 374
Telegraph and Alcatraz Avenues
Oakland, California

PLATE

P - 1



Applied GeoSystems	GENERALIZED SITE PLAN ARCO Station No. 374 Telegraph and Alcatraz Avenues Oakland, California	PLATE **P - 2**
PROJECT NO. 18039-1		

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.

Depth through which sampler is driven

Relatively undisturbed sample

Missed sample

Ground water level observed in boring

S-10 Sample number

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.

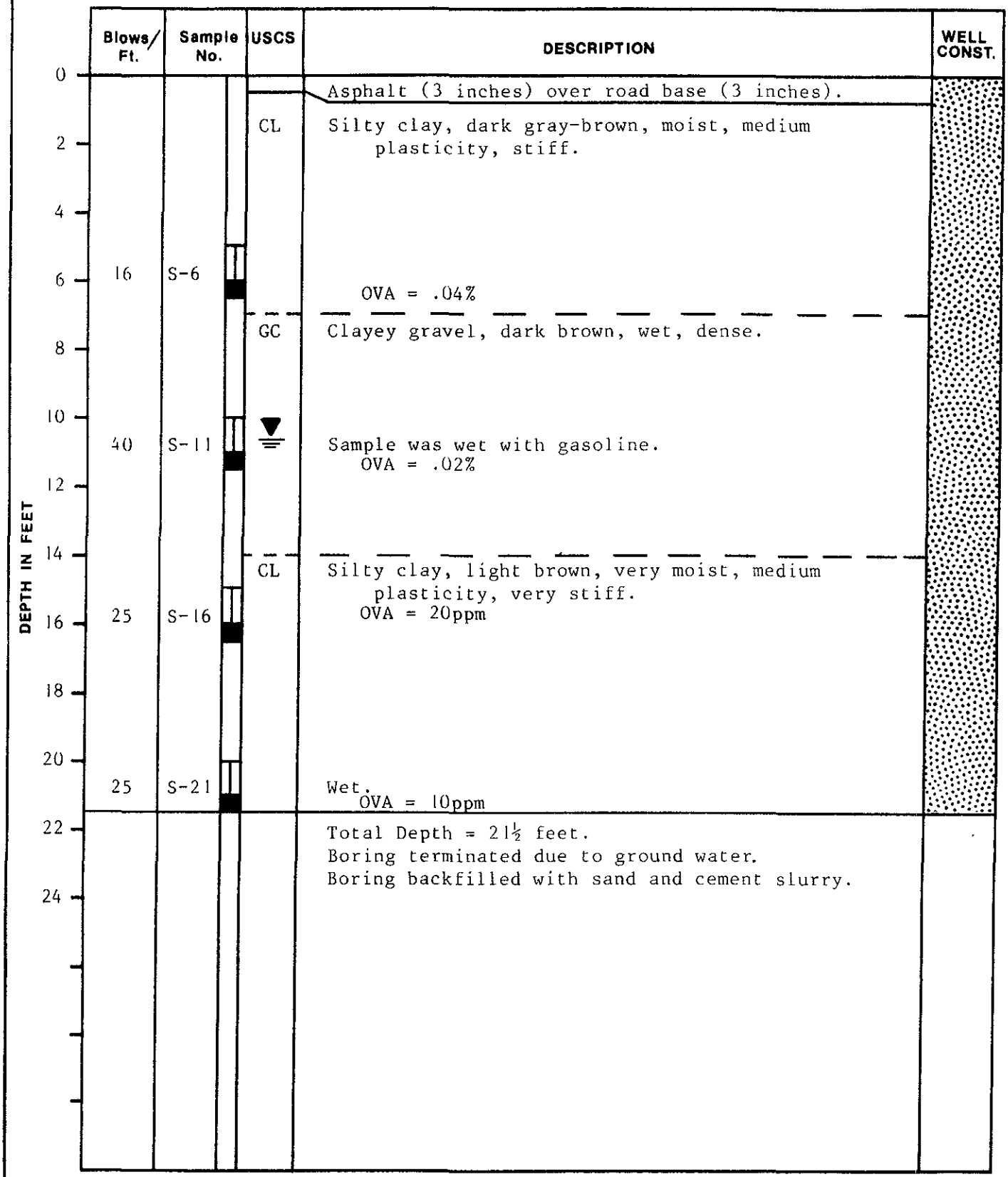
DASHED LINES SEPARATING UNITS ON THE LOG REPRESENT APPROXIMATE BOUNDARIES ONLY. ACTUAL BOUNDARIES MAY BE GRADUAL. LOGS REPRESENT SUBSURFACE CONDITIONS AT THE BORING LOCATION AT THE TIME OF DRILLING ONLY.

Applied GeoSystems

PROJECT NO. 18039-1

UNIFIED SOIL CLASSIFICATION SYSTEM AND SYMBOL KEY
ARCO Station No. 374
Telegraph and Alcatraz Avenues
Oakland, California

PLATE
P - 3



Applied GeoSystems
41255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

PROJECT NO. 18039-1

LOG OF BORING B - 1

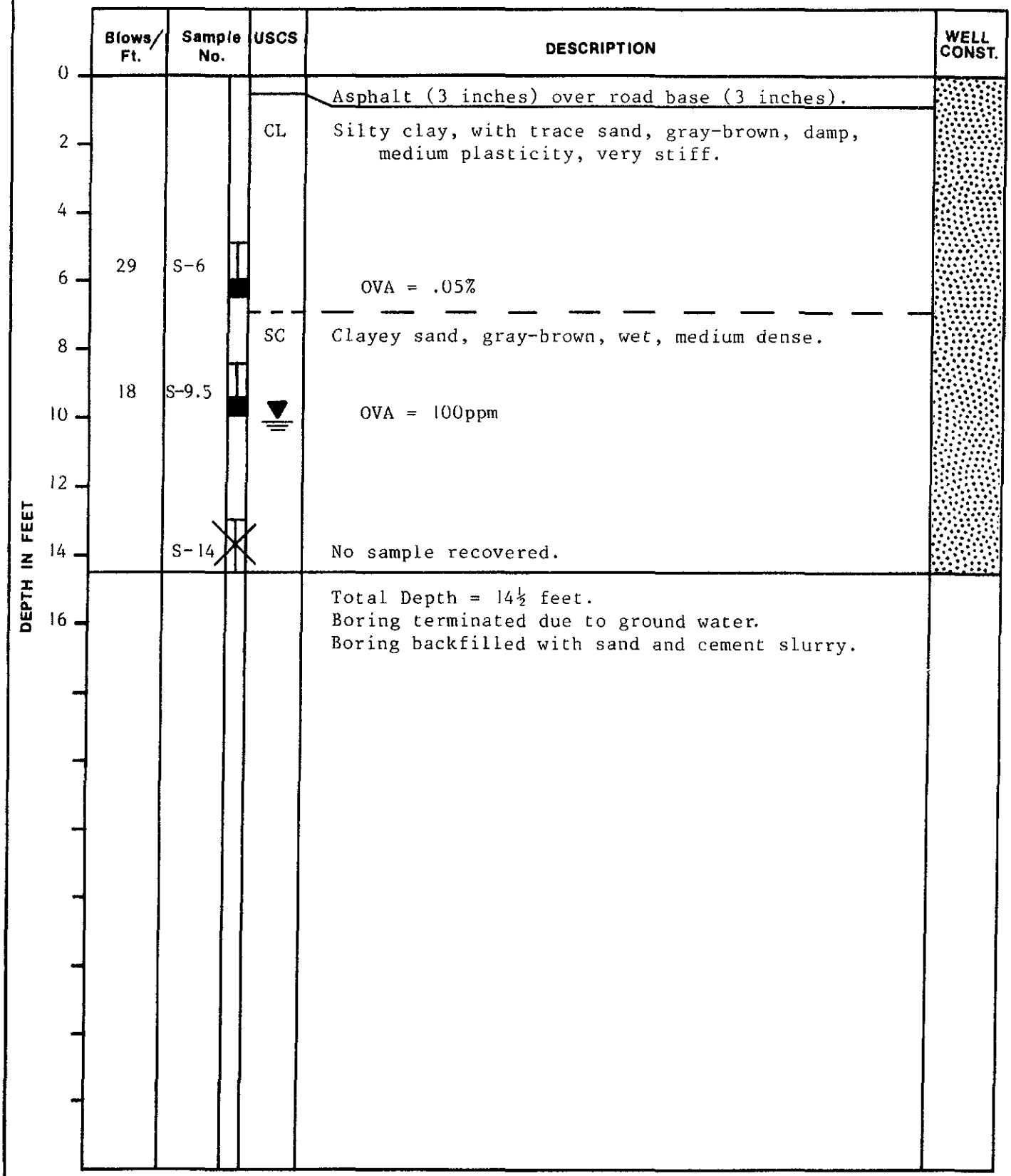
ARCO Station No. 374

Telegraph and Alcatraz Avenues

Oakland, California

PLATE

P-4



Applied GeoSystems
41255 Mission Blvd Suite B Fremont, CA 94539 (415) 651-1906

PROJECT NO. 18039-1

LOG OF BORING B - 2

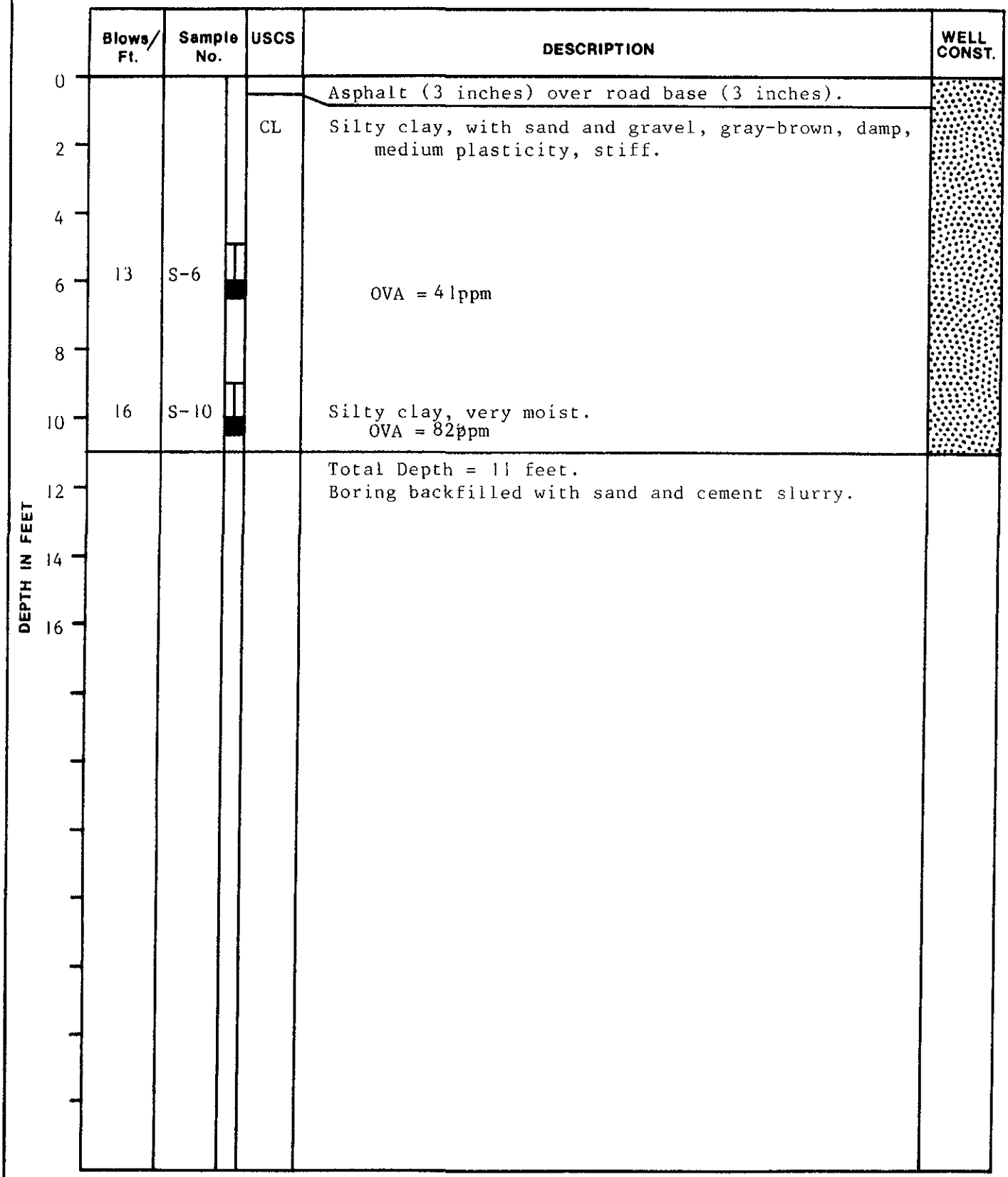
ARCO Station No. 374

Telegraph and Alcatraz Avenues

Oakland, California

PLATE

P-5



Applied GeoSystems

PROJECT NO. 18039-1

LOG OF BORING B - 3

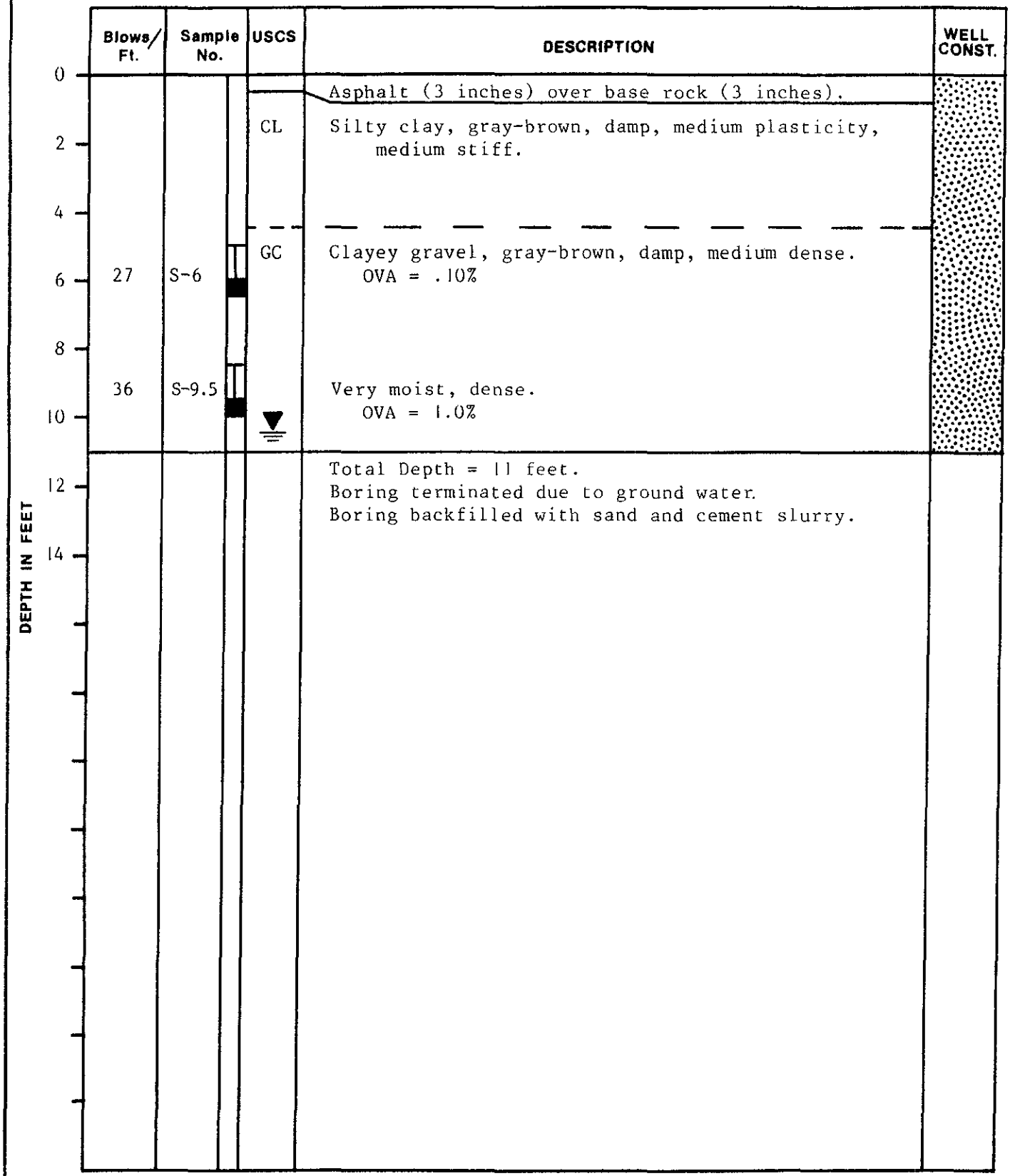
ARCO Station No. 374

Telegraph and Alcatraz Avenues

Oakland, California

PLATE

P-6



Applied GeoSystems
31255 Mission Blvd. Suite B Fremont, CA 94539 (415) 651-1906

PROJECT NO. 18039-1

LOG OF BORING B - 4

ARCO Station No. 374

Telegraph and Alcatraz Avenues

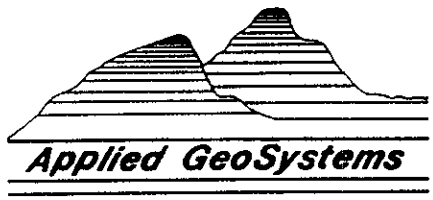
Oakland, California

PLATE

P-7

APPENDIX

CHAIN OF CUSTODY RECORD



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

SAMPLER (signature): Dan Kickman

Phone: 651-1906

LABORATORY:
Applied GeoSystems
43255 Mission Blvd
Fremont, CA 94539

TURNAROUND TIME: 1 week

Project Leader: Bill Short

Phone No. 651-1906

SHIPPING INFORMATION:

Shipper _____

Address _____

Date Shipped _____

Service Used _____

Airbill No. _____ Cooler No. _____

Relinquished by: (signatures)	Received by: (signatures)	Date	Time
	Received for laboratory by:	4-11-88	9:00

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-5-B1	018039-1	4-8-88	TPH	ICED
S-10-B1	018039-1	4-8-88	TPH	ICED
S-5-B2	018039-1	4-8-88	TPH	ICED
S-85-B2	018039-1	4-8-88	TPH	ICED
S-5-B3	018039-1	4-8-88	TPH	ICED
S-9-B3	018039-1	4-8-88	TPH	ICED
S-5-B4	018039-1	4-8-88	TPH	ICED
S-85-B4	018039-1	4-8-88	TPH	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: William R. Short

Date Received: 4-11-88
Laboratory Number: 04025S01
Project: 018039-1
Sample: S-5-B1
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	165		2		04-14-88	
TEH as Diesel						NR
Benzene						NR
Toluene						NR
Ethylbenzene						NR
Total Xylenes						NR

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

4-15-88
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: William R. Short

Date Received: 4-11-88
Laboratory Number: 04025S02
Project: 018039-1
Sample: S-10-B1
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	48		2		04-14-88	
TEH as Diesel						NR
Benzene						NR
Toluene						NR
Ethylbenzene						NR
Total Xylenes						NR

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

4-15-88
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: William R. Short

Date Received: 4-11-88
Laboratory Number: 04025S03
Project: 018039-1
Sample: S-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	260		2		04-14-88	
TEH as Diesel						NR
Benzene						NR
Toluene						NR
Ethylbenzene						NR
Total Xylenes						NR

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

4-15-88
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: William R. Short

Date Received: 4-11-88
Laboratory Number: 04025S04
Project: 018039-1
Sample: S-8.5-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	60		2		04-14-88	
TEH as Diesel						NR
Benzene						NR
Toluene						NR
Ethylbenzene						NR
Total Xylenes						NR

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

4-15-88
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: William R. Short

Date Received: 4-11-88
Laboratory Number: 04025S05
Project: 018039-1
Sample: S-5-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	64		2		04-14-88	
TEH as Diesel						NR
Benzene						NR
Toluene						NR
Ethylbenzene						NR
Total Xylenes						NR

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

4-15-88
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: William R. Short

Date Received: 4-11-88
Laboratory Number: 04025S06
Project: 018039-1
Sample: S-9-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	62		2		04-14-88	
TEH as Diesel						NR
Benzene						NR
Toluene						NR
Ethylbenzene						NR
Total Xylenes						NR

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

4-15-88
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: William R. Short

Date Received: 4-11-88
Laboratory Number: 04025S07
Project: 018039-1
Sample: S-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	389		5		04-14-88	
TEH as Diesel						NR
Benzene						NR
Toluene						NR
Ethylbenzene						NR
Total Xylenes						NR

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

4-15-88
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: William R. Short

Date Received: 4-11-88
Laboratory Number: 04025S08
Project: 018039-1
Sample: S-8.5-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	930		10		04-14-88	
TEH as Diesel						NR
Benzene						NR
Toluene						NR
Ethylbenzene						NR
Total Xylenes						NR

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

4-15-88
Date Reported