

**Applied GeoSystems**

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

• FREMONT • IRVINE • HOUSTON • BOSTON • SACRAMENTO • CULVER CITY • SAN JOSE

February 13, 1990  
0213alev  
AGS 19014-5

Mr. Ariu Levi  
Division of Hazardous Materials  
Alameda County Health Care Services Agency  
80 Swan Way, Room 200,  
Oakland, California 94621

Subject: Results of soil sampling in proposed tank-pit location at ARCO Station No. 276, 10600 MacArthur Boulevard in Oakland, California.

Mr. Levi:

At the request of ARCO Products Company (ARCO), we have prepared this letter describing the results of our limited investigation related to the proposed location of new underground gasoline-storage tanks at ARCO Station 276 in Oakland, California. The location of the station is shown on Plate P-1. Our investigation involved drilling three exploratory soil borings within the proposed tank pit area, collecting samples for laboratory analyses, and constructing a geologic cross section from the soil boring information.

On January 31, and February 6, 1990 Applied GeoSystems observed the drilling and sampling of three boreholes in the northwest corner of the site. The locations of the boreholes and other pertinent site features are shown on Plate P-2.

In general, a silty clay soil was encountered from immediately beneath the asphalt surface to a depth of about 15 feet below the surface. A 3- to 5-foot thick layer of clayey and sandy gravel was encountered between 10 and 20 feet below the ground surface. Discontinuous lenses of silty and clayey sand were observed above and below the gravel layer. The sand and gravel lenses are underlain by silty clay extending to at least 21-1/2 feet below the ground surface, the depth of the deepest boring. Our interpretation of the subsurface geology within the proposed tank pit is presented as preliminary cross section A-A' on Plate P-3. The soil boring logs, from which the cross-section was constructed, will be presented in a future Applied GeoSystems report describing the planned removal of four existing underground gasoline-storage tanks at the site.

Relatively wet soil samples were observed below 19 feet beneath the surface, and a saturated zone was observed in boring TPB-1 at a depth of about 18 feet below the surface. The saturated zone appears to be associated with variably-saturated discontinuous gravel lenses beneath the site. We encountered conditions similar to these while drilling monitoring well MW-2 during a previous investigation at the site (Applied GeoSystems Report No. 19014-1, dated August 8, 1989). Well MW-2 is a shallow well with a total depth of about 28 feet, and has occasionally gone dry. The other monitoring wells installed at the site (MW-1, MW-3, MW-4, and MW-5 on Plate P-2) have total depths ranging from approximately 38- to 48-feet, and contain water throughout the year. The depth to water in the deeper wells is consistently between 34 and 37 feet below the surface. From our previous work at this site, it appears that silty clays separate the variably-saturated gravels from the first encountered continuously-saturated water-bearing zone.

Soil samples were collected at 5-foot intervals below the ground surface. Eleven samples were submitted to Applied GeoSystems' Laboratory in Fremont, California (Hazardous Waste Testing Laboratory Certificate No. 153) for analysis of total petroleum hydrocarbons as gasoline (TPHg) by modified Environmental Protection Agency (EPA) Method 8015, and for the purgeable hydrocarbon constituents benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) by EPA Method 8020. The laboratory results are summarized on Table 1. Copies of the laboratory's Analysis Reports and Chain of Custody records, which accompanied the samples, are attached to this letter.

As shown on Table 1, hydrocarbon compounds were detected in samples collected from TPB-1 at a depth of 15 and 18-1/2 feet below the surface. Analyses of samples from TPB-2 did not detect the presence of TPHg. In the sample collected from boring TPB-3, at a depth of 20 feet, TPHg was detected at a concentration slightly above the detection limit of the analytical method used.

The samples from boring TPB-1 were collected in the clayey gravels immediately above and below the water observed in boring TPB-1, and may represent dissolved-phase hydrocarbons in the variably-saturated gravels.

It is our understanding that ARCO will be installing a soil venting system on the site to remediate hydrocarbon vapors in the vadose zone. We have recommended that they also install two 4-inch diameter slotted well casings within the proposed tank pit to allow monitoring and, if necessary, purging of contaminated water from the perched zone.

Proposed Tank Pit Investigation  
ARCO No. 276, MacArthur Blvd, Oakland, CA

AGS 19014-5  
February 13, 1990

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Please call if you have any questions regarding this letter.

Sincerely,  
Applied GeoSystems



K. William Howell  
Project Geologist



James A. Perkins  
Project Manager  
R.G. 4472

Attachments: Table 1: Results of Analysis of Soil Samples  
Plate P-1: Site Vicinity Map  
Plate P-2: Generalized Site Plan  
Plate P-3 Geologic Cross Section  
Chain of Custody Record (2)  
Analysis Reports (3)

**TABLE 1**  
**RESULTS OF ANALYSIS OF SOIL SAMPLES**  
 ARCO Station No. 276  
 10600 MaCarthur Boulevard  
 Oakland, California

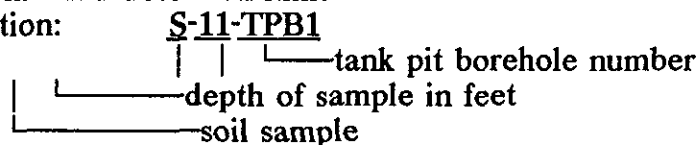
Sample Number	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes
<b>Boring 1</b>					
S-9.5-TPB1	<2.0	<0.050	<0.050	<0.050	<0.050
S-15-TPB1	290	0.19	0.47	3.3	6.6
S-18.5-TPB1	58	<0.050	0.069	0.14	0.22
S-21-TPB1	<2.0	<0.050	<0.050	<0.050	<0.050
<b>Boring 2</b>					
S-11-TPB2	<2.0	<0.050	<0.050	<0.050	<0.050
S-16-TPB2	<2.0	<0.050	<0.050	<0.050	<0.050
S-18.5-TPB2	<2.0	<0.050	<0.050	<0.050	<0.050
<b>Boring 3</b>					
S- 5-TPB3	<2.0	<0.050	<0.050	<0.050	<0.050
S-10-TPB3	<2.0	0.075	<0.050	<0.050	<0.050
S-15-TPB3	<2.0	<0.050	<0.050	<0.050	<0.050
S-20-TPB3	2.1	0.46	<0.050	0.086	<0.050

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

TPHg = Total petroleum hydrocarbons

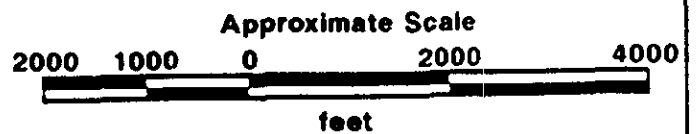
< = Less than method detection limit

Sample designation:





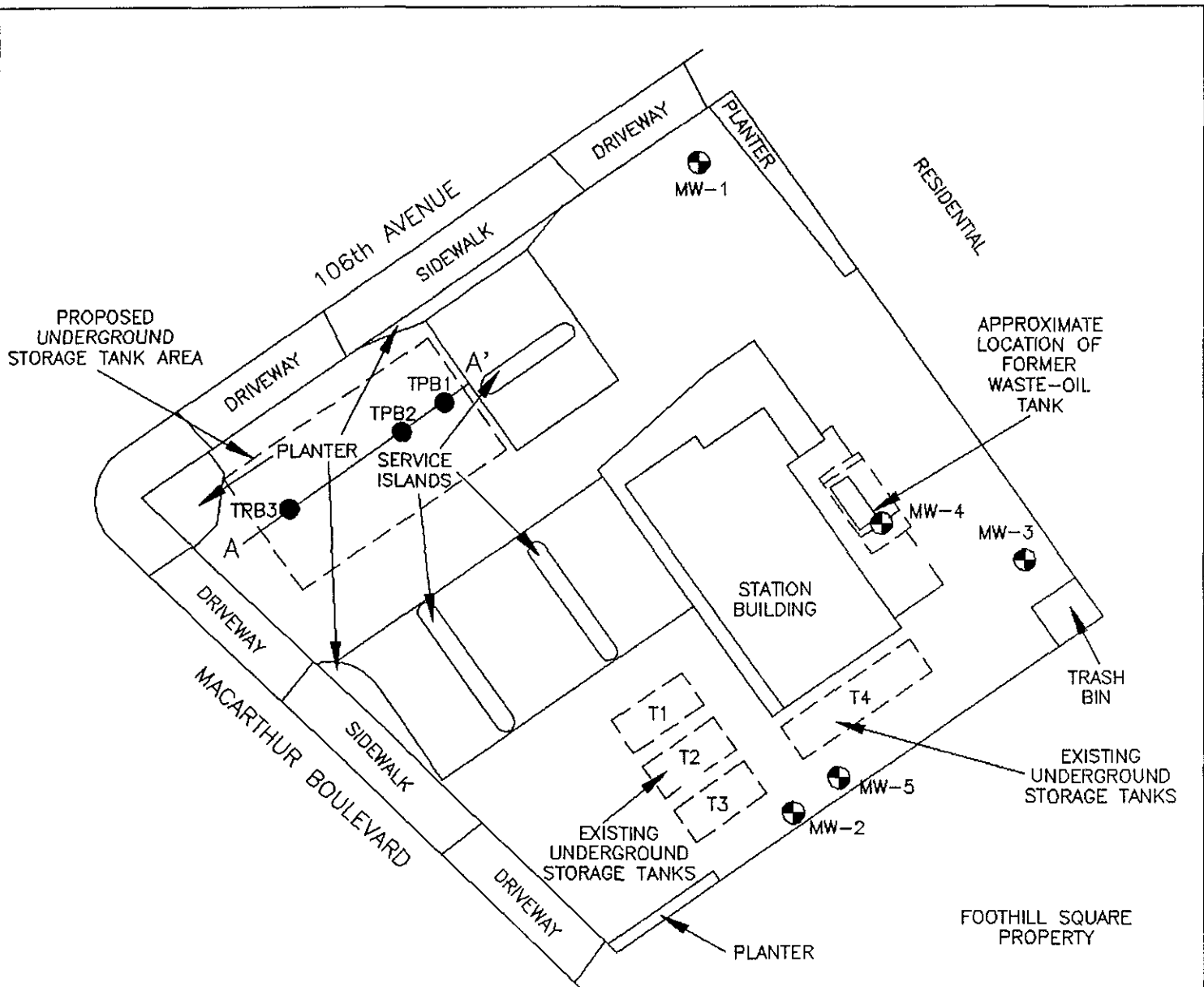
Source: U.S. Geological Survey  
 7.5-Minute Quadrangle  
 Oakland East/San Leandro  
 California  
 Photorevised 1980



**SITE VICINITY MAP**  
**ARCO Station No. 276**  
**10600 MacArthur Boulevard**  
**Oakland, California**

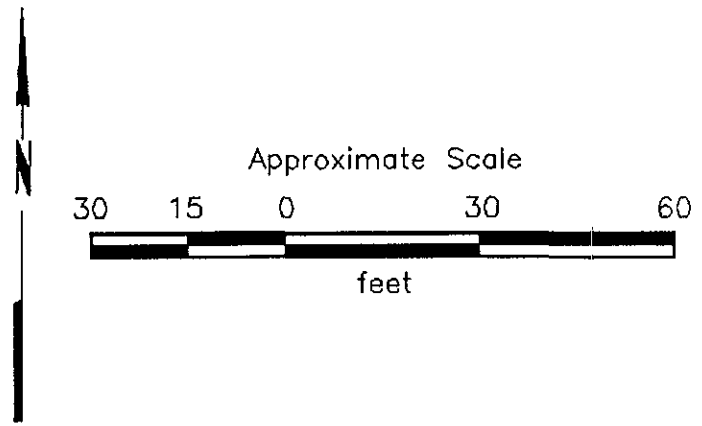
**PLATE**  
**P - 1**

PROJECT NO. 19014-5



- A — A' = Cross section line
- MW-5 = Monitoring well
- TPB3 = Tank pit boring

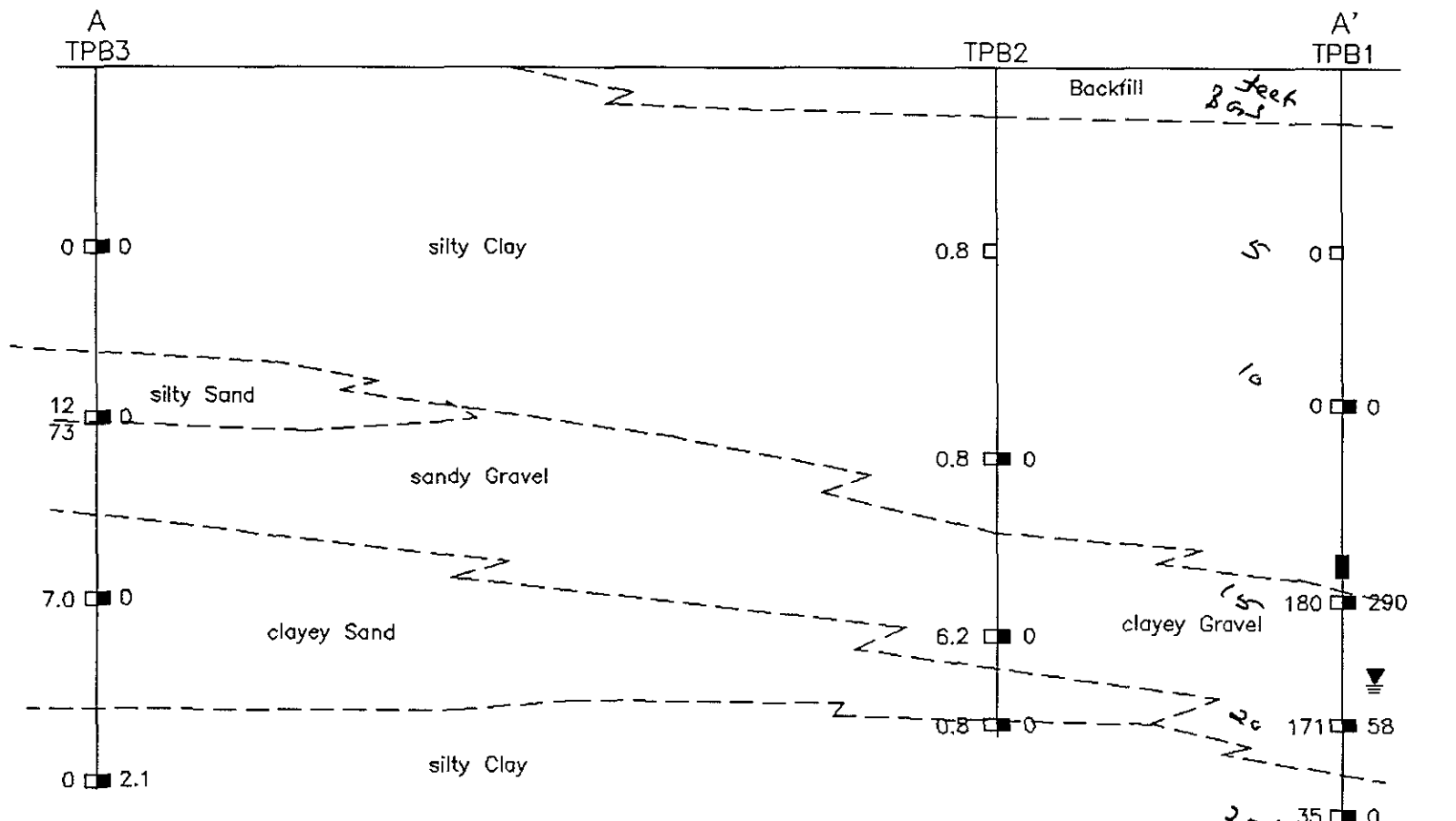
Source: Modified from plan supplied by ARCO and surveyed by Ron Archer Civil Engineer, Inc.



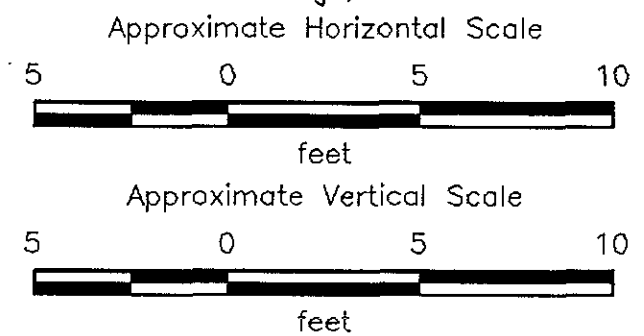
**PROJECT NO. 19014-5**

**GENERALIZED SITE PLAN  
ARCO Station No. 276  
10600 MacArthur Boulevard  
Oakland, California**

**PLATE  
P - 2**



- 180 □ = Organic vapor meter reading field (ppm)
- 290 ■ = Analytical result of (TPH) as gasoline (ppm)
- = Bentonite seal
- = Boring
- ▽ = Static water level



**PLATE**  
**P - 3**

**PRELIMINARY GEOLOGIC CROSS SECTION**  
**Arco Station No. 276**  
**10600 MacArthur Boulevard**  
**Oakland, California**



**PROJECT NO. 19014-5**

# CHAIN OF CUSTODY RECORD



**Applied GeoSystems**

SAMPLER (signature): \_\_\_\_\_

Phone: 415-651-1906

LABORATORY: \_\_\_\_\_

AGS

TURNAROUND TIME: 24 hr.

Project Leader: Bill Howell

Phone No. 415-651-1906

41255 Mission Blvd Suite B Fremont CA 94539 415/651-1906

**SHIPPING INFORMATION:**

Shipper \_\_\_\_\_

Address \_\_\_\_\_

Date Shipped \_\_\_\_\_

Service Used \_\_\_\_\_

Airbill No. \_\_\_\_\_ Cooler No. \_\_\_\_\_

Relinquished by: (signatures)  
Stephen J. Johnson  
Bill Howell

Received by: (signatures)  
Bill Howell  
  
 Received for laboratory by:  
[Signature]

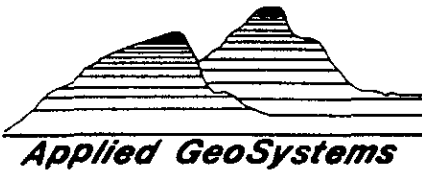
Date	Time
1/31/90	14:00
1-31-90	1430

**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-9.5-TPB1	19014-5	1/31/90		iced
S-15-TPB1	19014-5	1/31/90		iced
S-18.5-TPB1	19014-5	1/31/90		
S-21-TPB1	19014-5	1/31/90		
S-11-TPB2	19014-5	1/31/90		iced
S-16-TPB2	19014-5	1/31/90		
S-18.5-TPB2	19014-5	1/31/90		

TPH<sub>9</sub> as x PTE x  
 TPH<sub>9</sub> as x PTE x





**Applied GeoSystems**

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

**ANALYSIS REPORT**

*BB16*  
*200 gpd*  
*< 3000 TDS* 1020lab.frm

Attention: Mr. Bill Howell  
 Applied GeoSystems  
 43255 Mission Boulevard  
 Fremont, CA 94539  
 Project: AGS 19014-5

Date Sampled: 01-31-90  
 Date Received: 01-31-90  
 BETX Analyzed: 01-31-90  
 TPHg Analyzed: 01-31-90  
 TPHd Analyzed: NR  
 Matrix: Soil

*Bill's 4 detectors*

	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-9.5-TPB1 S1001201	ND	ND	ND	ND	ND	NR
S-15-TPB1 S1001202	0.19	0.47	3.3	6.6	290	NR
S-18.5-TPB1 S1001203	ND	0.069	0.14	0.22	58	NR
S-21-TPB1 S1001204	ND	ND	ND	ND	ND	NR
S-11-TPB2 S1001205	ND	ND	ND	ND	ND	NR
S-16-TPB2 S1001206	ND	ND	ND	ND	ND	NR

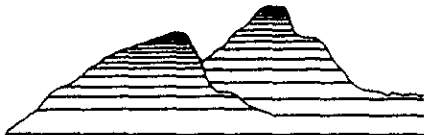
ppm = parts per million = mg/kg = milligrams per kilogram.  
 ND = Not detected. Compound(s) may be present at concentrations below the detection limit.  
 NR = Analysis not requested.

**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.

*[Signature]*  
 Laboratory Representative

02-01-90  
 Date Reported



**Applied GeoSystems**

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

**ANALYSIS REPORT**

1020lab.frm

Attention: Mr. Bill Howell  
Applied GeoSystems  
43255 Mission Boulevard  
Fremont, CA 94539  
Project: AGS 19014-5

Date Sampled: 01-31-90  
Date Received: 01-31-90  
BETX Analyzed: 01-31-90  
TPHg Analyzed: 01-31-90  
TPHd Analyzed: NR  
Matrix: Soil

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>	<u>ppm</u>
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10

**SAMPLE**  
Laboratory Identification

S-18.5-TPB2 S1001207	ND	ND	ND	ND	ND	NR
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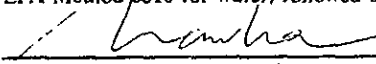
ppm = parts per million = mg/kg = milligrams per kilogram.  
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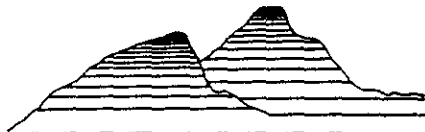
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\_\_\_\_\_  
Laboratory Representative

02-01-90  
\_\_\_\_\_  
Date Reported





**Applied GeoSystems**

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

### ANALYSIS REPORT

1020lab.frm

Attention: Mr. Bill Howell  
 Applied GeoSystems  
 43255 Mission Boulevard  
 Fremont, CA 94539  
 Project: AGS 19014-5

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

	Benzene <u>ppm</u>	Toluene <u>ppm</u>	Ethyl- benzene <u>ppm</u>	Total Xylenes <u>ppm</u>	TPHg <u>ppm</u>	TPHd <u>ppm</u>
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10

**SAMPLE**  
 Laboratory Identification

S-5-TPB3 S1002032	ND	ND	ND	ND	ND	NR
S-10-TPB3 S1002033	0.075	ND	ND	ND	ND	NR
S-15-TPB3 S1002034	ND	ND	ND	ND	ND	NR
S-20-TPB3 S1002035	0.46	ND	0.086	ND	2.1	NR

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

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 Laboratory Representative

02-07-90  
 Date Reported

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