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Applied GeoSystems
3315 Almaden Expressway, Suite 34
San Jose, California 95118
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Date	Project No.
3/12/90	69048-1

Subject: EXECUTIVE SUMMARY

TO MR. GIL WISTAR
ALAMEDA COUNTY HEALTH AGENCY
HAZARDOUS MATERIALS DIVISION
80 SWAN WAY, ROOM 200
OAKLAND, VA 94621

FROM STEVE BITTMAN

TITLE STAFF GEOLOGIST

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☐ Shop drawings ☐ Prints ☐ Plans ☒ Reports ☐ Specifications
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1	2/20/90		EXECUTIVE SUMMARY OF REPORT ON LIMITED ENVIRONMENTAL SITE ASSESSMENT
			AT ARCO STATION NO. 2112, 1260 PARK STREET, ALAMEDA, CA.

90 MAR 13 AM 10:24

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REPORT
LIMITED ENVIRONMENTAL SITE ASSESSMENT
at
ARCO Service Station 2112
1260 Park Street
Alameda, California

AGS Job 69048-1

Prepared for

ARCO Products Company
P.O. Box 5811
San Mateo, California

by
Applied GeoSystems

Steve Bittman
Staff Geologist

Greg Barclay
Branch Manager

Michael N. Clark
C.E.G. 1264

February 20, 1990

Applied GeoSystems 3315 Almaden Expressway, Suite 34, San Jose, CA 95118 (408) 264-7723

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February 20, 1990
AGS 69048-1

Mr. Kyle Christie
Environmental Engineer
ARCO Products Company
P.O. Box 5811
San Mateo, California 94402

Subject: Executive Summary of Report on Limited Environmental Site Assessment at ARCO Station 2112, 1260 Park Street, Alameda, California.

Mr. Christie:

The accompanying report presents the results of Applied GeoSystems limited environmental assessment at the site. The assessment included drilling six borings and analyzing selected soil samples from the borings. ARCO Products Company (ARCO) requested that Applied GeoSystems assess the areas near five underground gasoline-storage tanks on the southeastern portion of the site and the proposed location of the new tanks near the western corner at the site. The evaluation was for potential gasoline hydrocarbons in the soil before removal from and replacement of tanks from the site. As requested, soil samples were collected from two borings for soils testing and transported to Balbi and Chang (ARCO's geotechnical engineer) of Fairfield, California.

The following list summarizes the work performed.

- On January 22 and 29, 1990, an Applied GeoSystems geologist observed the drilling of six borings adjacent to five underground gasoline-storage tanks and in the area of the proposed new tanks. The borings were drilled to a depth of 11-1/2 to 13 feet with the exception of Boring B-1 which was drilled to a depth of 25 feet. The geologist collected soil samples from each boring. One soil sample from Boring B-5 and 5 samples from boring B-1 were collected for soils testing.

- Results of laboratory analyses of selected soil samples from Borings B-1 to B-5, drilled in the area of the gasoline-storage tanks, indicated concentrations of total petroleum hydrocarbons as gasoline (TPHg) up to 21,000 parts per million (ppm) and concentrations of benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) up to 210, 1,100, 320, and 2,600 ppm, respectively.

- Results of laboratory analyses of two soil samples from Boring B-6, in the area of the proposed new tanks, indicted no detectable concentrations of TPHg and BTEX.

- The earth material encountered during the investigation consisted primarily of sand and clayey sand.

- Free hydrocarbon product was not encountered in the six boreholes.

- Ground water was encountered initially in Borings B-1 and B-6 at a depth of approximately 12 feet and remained at that level during the drilling of the other borings. Borings B-2 to B-5 were drilled to a depth of approximately 11-1/2 feet, just above ground water.

- The inferred direction of ground-water flow beneath the site is generally southward based on local and regional topography and is variable because of tidal influence.

The following conclusions are based on the results of the work performed.

- The soil above first-encountered ground water in the area of the five underground gasoline-storage tanks has been affected by gasoline hydrocarbons, especially near Borings B-3, B-4, and B-5. Elevated concentrations of TPHg and BTEX and organic vapor meter (OVM) readings reported in soil samples collected from Borings B-1 to B-5 form the basis of this conclusion.

- Based on nondetectable concentrations of TPHg and BTEX reported in samples collected from Boring B-6, the soil above first-encountered ground water in the area of the proposed new tanks has not been affected by gasoline hydrocarbons.

We understand that ARCO intends to remove the existing tanks. We recommend the following from the results of this limited assessment. At ARCO's request, recommendations are not included in the enclosed report.

- Soil samples should be collected from below the underground product-storage tanks during tank removal to confirm concentrations (if any) of hydrocarbons in the soil beneath the gasoline-storage tanks. If ground water is encountered in the bottom of the tank excavation, soil samples should be collected from the walls of the excavation. The soil samples should be analyzed for TPHg by modified Environmental Protection Agency (EPA) Method 8015 and for BTEX by EPA Method 8020.

- If significant levels (over 100 ppm) of gasoline hydrocarbons are observed in the soil during removal of the tanks, as much of the affected soil as possible should be

excavated from the pit before backfilling the excavation. The excavated soil should be field tested with an OVM. Soil excavated from the new tank pit should be field tested to verify reported nondetectable levels of hydrocarbons in the soil in that area. The separation of soil with elevated levels of hydrocarbons (over 100 ppm) from soil with nondetectable to low levels (below 100 ppm) of hydrocarbons should be based on results of the vapor analysis. Soil with TPHg concentrations above 100 ppm should be aerated onsite to levels acceptable to a Class III disposal facility. If elevated levels of hydrocarbons appear to extend beyond the limits of the excavation, additional investigative work will be necessary to evaluate the extent of hydrocarbons and to select appropriate remediation alternatives, as necessary.

- Additional soil borings should be drilled and ground-water monitoring wells installed in the area of the existing tanks to enable evaluation of the extent of hydrocarbons in soil, potential hydrocarbons in first-encountered ground water beneath the site, and direction and magnitude of the ground-water gradient.

- Selected soil and water samples collected from the borings and wells should be analyzed for TPHg and BTEX by modified EPA Methods 5030/8015 and 3550/8020, respectively.

We also recommend that ARCO forward copies of the enclosed report to:

Mr. Lester Feldman
Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street
Room 6040
Oakland, California 94607

Mr. Gil Wistar
Alameda County Health Agency
Hazardous Materials Division
80 Swan Way
Room 200
Oakland, California 94621

If you have any questions regarding the contents of this report please call myself or Greg Barclay at (408) 264-7723. Thank you.

Sincerely,
Applied GeoSystems

Steve Bittman
Staff Geologist

Enclosure: Limited Environmental Site Assessment

cc: Mr. Chris Winsor, ARCO Products Company

Applied GeoSystems 3315 Almaden Expressway, Suite 34, San Jose, CA 95118 (408) 264-7723

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REPORT
LIMITED ENVIRONMENTAL SITE ASSESSMENT
ARCO Service Station 2112
1260 Park Street
Alameda, California

For ARCO Products Company

INTRODUCTION

At the request of ARCO Products Company (ARCO), Applied GeoSystems did a limited subsurface environmental assessment to evaluate the presence of possible gasoline hydrocarbons in the soil in the immediate area of the underground gasoline-storage tanks and in the area of the proposed new tanks at ARCO Station 2112. Work was done at the above-referenced location before tank removal and replacement. We understand, from information supplied by ARCO, that the site does not contain a waste-oil tank. The assessment involved drilling six soil borings and laboratory analyses of selected soil samples obtained from the borings. This report presents our findings and conclusions.

SITE DESCRIPTION AND BACKGROUND

ARCO Service Station 2112 is an operating service station southeast of the intersection of Park Street and Encinal Avenue in Alameda, California. The location of the site is shown on the Site Vicinity Map (Plate 1).

The site is a relatively flat, asphalt- and concrete-covered lot. It is our understanding, from information supplied by ARCO, that one 10,000-gallon (T1), two 4,000-gallon (T2 and T3), and two 6,000-gallon underground gasoline-storage tanks (T4 and T5) are at the site. We understand that a waste-oil tank was removed from the site by Crosby and Overton Environmental, Inc. in May 1987. We also understand that ARCO intends to install four new tanks near the northeastern portion of the site. The approximate locations of the underground storage tanks, future tanks, and other features at the site are shown on the Generalized Site Plan (Plate 2).

REGIONAL AND LOCAL HYDROGEOLOGY

ARCO Station 2112 is within the East Bay Plain in the north-central portion of the Berkeley Alluvial Plain (Hickenbottom and Muir, 1988). The active Hayward Fault is approximately 4 miles east of the site. Helley et al. (1979) mapped the earth material underlying the site as beach and dune sand deposits (Merrit Sand) composed of a loose,

well-sorted, fine- to medium-grained sand with subordinate silt. The site is on the central portion of the southeast end of Alameda Island, approximately 1/2 mile from San Francisco Bay to the southwest and 1/2 mile from the Oakland Estuary Channel to the northeast.

Ground-water flow in the vicinity is inferred to be generally southward, but variably influenced by tidal movement because of its close proximity to San Francisco Bay. Ground water was encountered during our recent drilling at a depth of approximately 12 feet.

FIELD WORK

A permit was obtained from Alameda County Flood Control and Water Conservation District (Zone 7) before drilling the borings at the site. A copy of the permit is included in Appendix A. Field work at the site for ARCO was conducted in accordance with Applied GeoSystems Site Safety Plan 69048-1S, dated January 19, 1990. A description of the site safety plan is in Appendix B.

On January 22 and 29, 1990, six soil borings were drilled near underground gasoline-storage tanks T1 to T5 and in the area of the future tanks, to evaluate potential gasoline hydrocarbons in the soil in those areas. The locations of the six borings are shown on Plate 2. Field procedures followed during the drilling of the borings are described in Appendix B.

Soil Description

The earth material encountered during the investigation consisted primarily of sand and clayey sand. A summary of the Unified Soil Classification System used to describe the soil excavated during drilling is presented on Plate 3. Descriptions of earth material encountered in Borings B-1 to B-6 are presented on the Logs of Boring (Plates 4 to 10). A graphic representation of the earth material encountered in the borings is shown on Geologic Cross Section A-A' (Plate 11).

Ground water was encountered in Borings B-1 and B-6 at a depth of approximately 12 feet. Borings B-2 to B-5 were drilled to a depth of approximately 11-1/2 feet, just above ground water. Free hydrocarbon product was not encountered in the six borings.

LABORATORY ANALYSES

Twelve soil samples collected at an approximate depth of 6 feet and just above first-encountered ground water (at a depth of 12 feet) from Borings B-1 to B-6 were selected for chemical analysis. The selected samples were analyzed for total petroleum hydrocarbons as gasoline (TPHg) by modified Environmental Protection Agency (EPA) Method 5030/8015 and for purgeable gasoline constituents benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) by EPA Method 8020.

RESULTS OF LABORATORY ANALYSES

Results of laboratory analyses of selected soil samples from Borings B-1 to B-6 indicated:

- concentrations of TPHg from nondetectable to 12 parts per million (ppm) and concentrations of BTEX up to 0.16, 0.34, 0.14, and 1.3 ppm, respectively, at an approximate depth of 6 feet;
- concentrations of TPHg from 570 to 21,000 ppm and concentrations of BTEX up to 210, 1,100, 320, and 2,600 ppm, respectively, at an approximate depth of 10 to 11 feet (near first-encountered ground water); and
- no detectable concentrations of TPHg and BTEX in soil samples collected from Boring B-6 in the area of the future tanks.

Results of samples analyzed for TPHg and BTEX are summarized in Table 1 and are presented in Appendix C.

TABLE 1
RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
ARCO Station 2112
1260 Park Street
Alameda, California

Sample Number	TPHg	B	T	E	X
S-6-B1	12	0.16	0.34	0.14	1.3
S-10-B1	1,700	15	72	22	180
S-6-B2	<2.0	<0.050	<0.050	<0.050	<0.050
S-11-B2	570	3.9	13	11	82
S-6-B3	<2.0	0.097	<0.050	<0.050	0.20
S-11-B3	10,000	47	350	120	940
S-6-B4	<2.0	0.063	0.096	<0.050	0.20
S-11-B4	21,000	210	1,100	320	2,600
S-6-B5	3.7	<0.050	0.081	<0.050	0.18
S-11-B5	5,400	8.8	27	66	160
S-5.5-B6	<2.0	<0.050	<0.050	<0.050	<0.050
S-10-B6	<2.0	<0.050	<0.050	<0.050	<0.050

Results in milligrams per kilogram or parts per million

TPHg = Total petroleum hydrocarbons as gasoline
B = benzene E = ethylbenzene T = toluene X = total xylene isomers
< = indicates less than the reported limit

Sample identification:

S-10-B6
- S-10-B6 — Soil sample
- S-10-B6 — Approximate sample depth in feet
- S-10-B6 — Boring number

CONCLUSIONS

The following conclusions are based on the results of this limited assessment.

- The soil above first-encountered ground water near the five underground gasoline-storage tanks has been affected by gasoline hydrocarbons, especially in the areas of Borings B-3, B-4, and B-5 in the inferred downgradient direction of the tanks. The elevated concentrations of TPHg and BTEX and organic vapor meter (OVM) readings reported in soil samples collected from Borings B-1 to B-5 form the basis of this conclusion.

- The soil above first-encountered ground water in the area of the future underground gasoline-storage tanks has not been affected by gasoline hydrocarbons. This conclusion is based on nondetectable concentrations of TPHg and BTEX and OVM readings reported in soil samples collected from Boring B-6.

LIMITATIONS

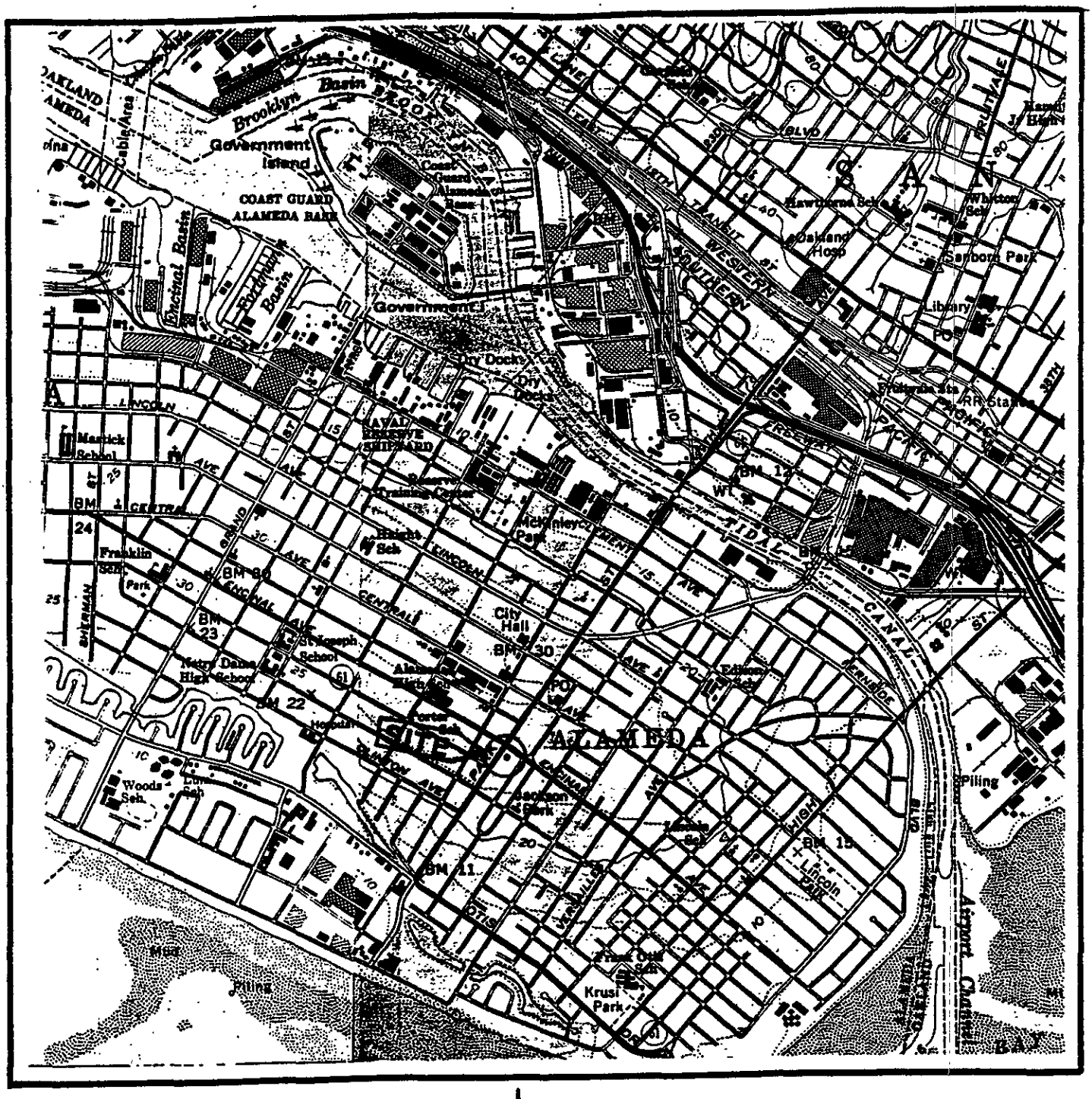
This report was prepared in accordance with generally accepted standards of environmental geological practice in California at the time of assessment. The assessment was conducted solely to evaluate environmental conditions of the soil for gasoline hydrocarbons at the site in the areas of the existing product-storage tanks and future tanks. 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 assessment is made from a limited number of observation points. Subsurface conditions may vary away from the data points available.

REFERENCES CITED

Applied GeoSystems. January 19, 1990. Site Safety Plan - Subsurface Environmental Assessment at ARCO Station No. 2112, 1260 Park Street, Alameda, California. AGS Report No. 69048-1S.

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

Hickenbottom, K. and K. Muir. 1988. Geohydrology and Ground-Water-Quality Overview of the East Bay Plain Area, Alameda County, California. Alameda County 205 (j) Report.



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

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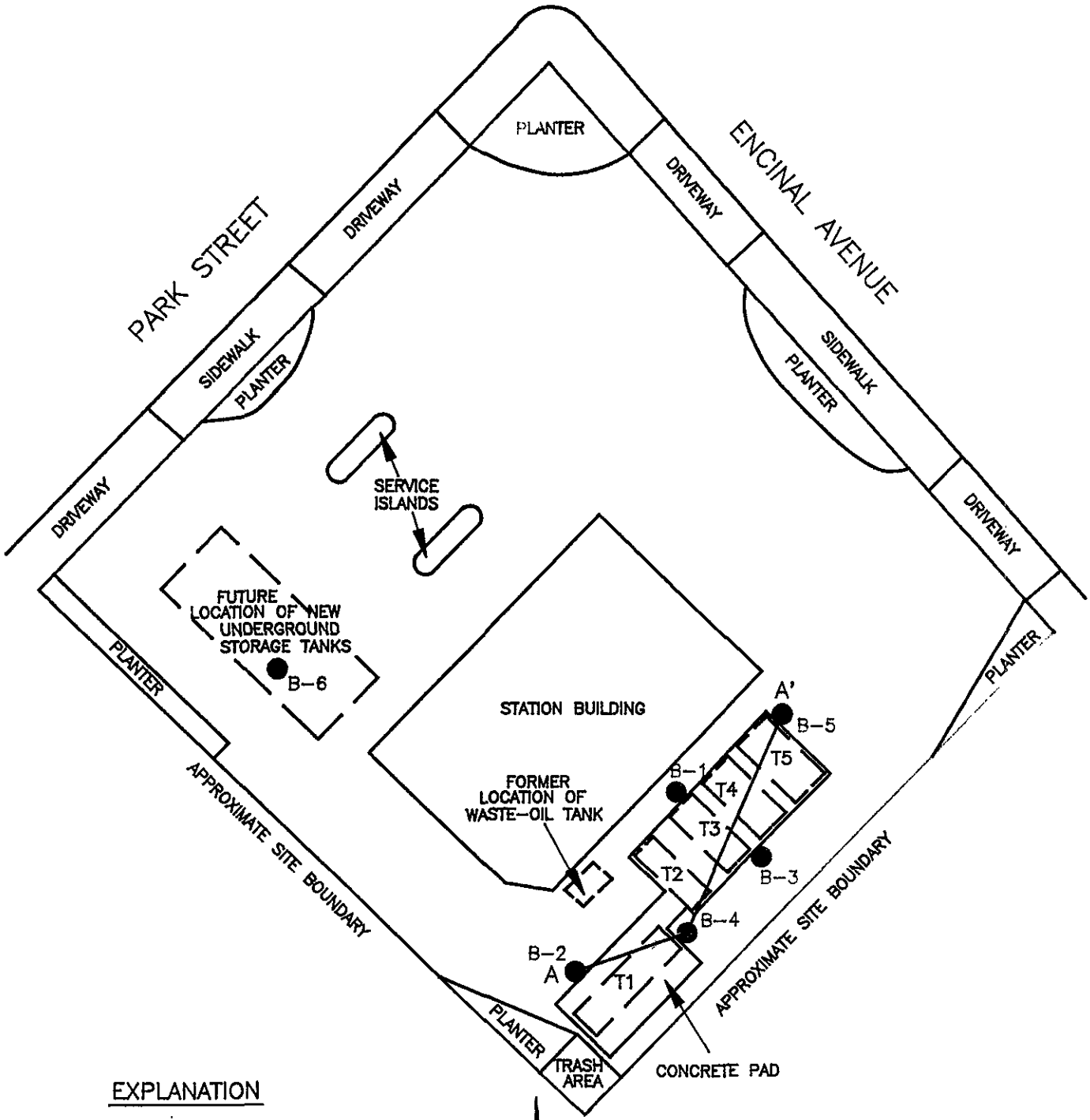
SITE VICINITY MAP
ARCO Station 2112
1260 Park Street
Alameda, California

PLATE
1



EXPLANATION

B-6 ● = Soil boring (Applied GeoSystems, January 23, 1990)

T5 = Existing underground storage tanks

A' = Cross Section

A

N

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by ARCO.

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GENERALIZED SITE PLAN
ARCO Station 2112
1260 Park Street
Alameda, California

PLATE

2

UNIFIED SOIL CLASSIFICATION SYSTEM

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


Depth through which sampler is driven


Relatively undisturbed sample


No sample recovered


Static water level observed in well


Initial water level observed in boring

S-10 Sample number


Sand pack


Bentonite annular seal


Neat cement annular seal


Caved native soil


Blank PVC


Machine-slotted PVC

P.I.D. Photoionization detector

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

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

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UNIFIED SOIL CLASSIFICATION SYSTEM AND SYMBOL KEY
ARCO Station 2112
1260 Park Street
Alameda, California

PLATE 3

Total depth of boring: 25-1/2 feet **Diameter of boring:** 6 inches **Date drilled:** 1-22-90

Casing diameter: N/A **Length:** N/A **Slot size:** N/A

Screen diameter: N/A **Length:** N/A **Material type:** N/A

Drilling Company: H.E.W. Drilling Inc. **Driller:** Tomas & Defecto

Method Used: Continuos-Flight Auger **Field Geologist:** Steve Bittman

Signature of Registered Professional:

Registration No.: CEG 1264 **State:** CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt (6 inches) over baserock (6 inches).	
2	S-1.5	8		SP	Sand with some clay, fine-grained, gray-green, damp to moist, medium dense, noticeable odor.	
	S-2	6 10	80			
4	S-3.5	5				
	S-4	8 9	425			
6	S-5.5	8			Gray-brown.	
	S-6	10 17	450			
8	S-7.5	21		SC	Clayey sand, fine-grained, brown-gray, moist, very dense, obvious odor.	
	S-8	39 52	660			
10	S-9.5	10				
	S-10	35 50	600			
12	S-12.5	15		▽	Wet, noticeable odor.	
	S-13	35 57	50			
14	S-15.5	14				
16	S-16	32 59	35		Brown.	
18						
20	S-20	35				
	S-20.5	60	2		(Section continues downward)	

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LOG OF BORING B - 1

ARCO Station 2112
1260 Park Street
Alameda, California

PLATE 4

Depth	Sample No.	BLOWS	P.I.D.	USCS Code	Description	Well Const.
22				SC	Clayey sand, fine–grained, brown, moist, very dense.	
24	S–25	0				
26					Total Depth = 25–1/2 feet.	
28						
30						
32						
34						
36						
38						
40						
42						
44						
46						
48						
50						

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LOG OF BORING B - 1

ARCO Station 2112
1260 Park Street
Alameda, California

PLATE 5

Total depth of boring: 11-1/2 feet **Diameter of boring:** 6 inches **Date drilled:** 1-22-90

Casing diameter: N/A **Length:** N/A **Slot size:** N/A

Screen diameter: N/A **Length:** N/A **Material type:** N/A

Drilling Company: H.E.W. Drilling Inc. **Driller:** Tomas & Pefecto

Method Used: Continuos-Flight Auger **Field Geologist:** Steve Bittman

Signature of Registered Professional:

Registration No.: CEG 1264 **State:** CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt (6 inches) over baserock (6 inches).	
2		11		SP	Sand with some clay, fine-grained, dark brown, damp, medium dense, noticeable odor.	
	S-3	12 13	110			
4						
		10		SC	Clayey sand, fine-grained, dark brown, damp to moist, dense, noticeable odor.	
6		15				
	S-6	26	115			
8						
10		15				
		26				
	S-11	39	650			
12					Total Depth = 11-1/2 feet.	
14						
16						
18						
20						

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LOG OF BORING B - 2

ARCO Station 2112
1260 Park Street
Alameda, California

PLATE 6

Total depth of boring: 11-1/2 feet **Diameter of boring:** 6 inches **Date drilled:** 1-22-90

Casing diameter: N/A **Length:** N/A **Slot size:** N/A

Screen diameter: N/A **Length:** N/A **Material type:** N/A

Drilling Company: H.E.W. Drilling Inc. **Driller:** Tomas & Pefecto

Method Used: Continuos-Flight Auger **Field Geologist:** Steve Bittman

Signature of Registered Professional:

Registration No.: CEG1264 **State:** CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt (6 inches) over baserock (6 inches).	
2		11		SP	Sand with some clay, fine-grained, brown, moist, dense.	
	S-3	12				
4		13	110			
		10				
6		15		SC	Clayey sand, fine-grained, gray, moist, noticeable odor.	
	S-6	26	115			
8						
10		15				
		26				
	S-11	39	650			
12					Total Depth = 11-1/2 feet.	
14						
16						
18						
20						

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LOG OF BORING B - 3

ARCO Station 2112
1260 Park Street
Alameda, California

PLATE 7

Total depth of boring: 11–1/2 feet **Diameter of boring:** 6 inches **Date drilled:** 1–22–90

Casing diameter: N/A **Length:** N/A **Slot size:** N/A

Screen diameter: N/A **Length:** N/A **Material type:** N/A

Drilling Company: H.E.W. Drilling Inc. **Driller:** Tomas & Pefecto

Method Used: Continuos–Flight Auger **Field Geologist:** Steve Bittman

Signature of Registered Professional:

Registration No.: CEG 1264 **State:** CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt (6 inches) over baserock (6 inches).	
2	S–3	20 22 35	60	SP	Sand with some clay, fine–grained, dark brown, damp, very dense, noticeable odor.	
4						
6	S–6	3 6 10	25	SC	Clayey sand, fine–grained, blue–gray, medium dense, noticeable odor.	
8						
10	S–11	16 21 32	800			
12					Total Depth = 11–1/2 feet.	
14						
16						
18						
20						

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LOG OF BORING B - 4

ARCO Station 2112
1260 Park Street
Alameda, California

PLATE 8

Total depth of boring: 11-1/2 feet **Diameter of boring:** 6 inches **Date drilled:** 1-22-90

Casing diameter: N/A **Length:** N/A **Slot size:** N/A

Screen diameter: N/A **Length:** N/A **Material type:** N/A

Drilling Company: H.E.W. Drilling Inc. **Driller:** Tomas & Pefecto

Method Used: Continuos-Flight Auger **Field Geologist:** Steve Bittman

Signature of Registered Professional:

Registration No.: CEG 1264 **State:** CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt (6 inches) over baserock (6 inches).	
2		5		SP	Sand with some clay, fine-grained, brown, damp, medium dense.	
	S-3	8	0			
4		9				
		7		SC	Clayey sand, fine-grained, brown, mottled gray, medium dense, noticeable odor.	
6		7				
	S-6	7	2			
8						
10		12				
		22				
	S-11	35	800			
12					Total Depth = 11-1/2 feet.	
14						
16						
18						
20						

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LOG OF BORING B - 5

ARCO Station 2112
1260 Park Street
Alameda, California

PLATE 9

Total depth of boring: 13 feet **Diameter of boring:** 6 inches **Date drilled:** 1-29-90

Casing diameter: N/A **Length:** N/A **Slot size:** N/A

Screen diameter: N/A **Length:** N/A **Material type:** N/A

Drilling Company: Garret Enterprises **Driller:** Red & Dave

Method Used: Continuos-Flight Auger **Field Geologist:** Steve Strausz

Signature of Registered Professional:

Registration No.: CEG 1264 **State:** CA

Depth	Sample No.	Blows	P.I.D.	USCS Code	Description	Well Const.
0					Asphalt (6 inches) over baserock (6 inches).	
2						
4				SM	Silty sand, fine-to medium-grained, gray to light brown, damp, medium dense.	
6	S-5.5	5 6				
	S-6	8	1.7			
8						
				SC	Clayey sand, gray-brown, moist, dense.	
10		12 18				
	S-10	18 14				
12		21		▽		
	S-12	30	3.1			
14					Total Depth = 13 feet.	
16						
18						
20						

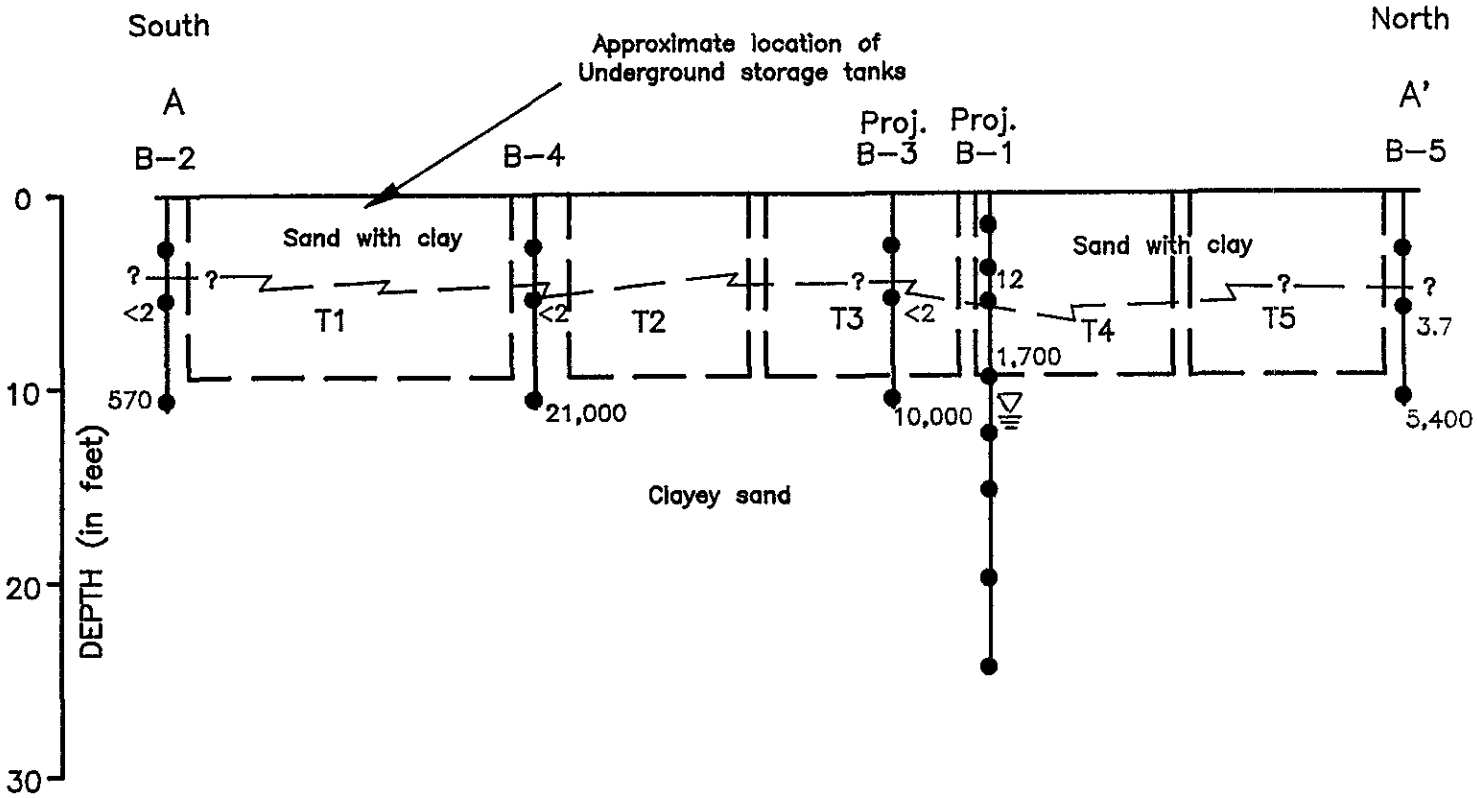
Applied GeoSystems

PROJECT 69048-1

LOG OF BORING B - 6

ARCO Station 2112
1260 Park Street
Alameda, California

PLATE 10



EXPLANATION

= Laboratory analyzed soil sample showing concentration of TPH in part per million

= Boring

= Initial water level in boring

Approximate Horizontal and Vertical Scale

10 5 0 10 20

feet

Applied GeoSystems

PROJECT 69048-1

GEOLOGIC CROSS SECTION A - A'
ARCO Station 2112
1260 Park Street
Alameda, California

PLATE 11

APPENDIX A

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

24 January 1990

Applied GeoSystems
3315 Almaden Expressway, Ste 34
San Jose, CA 95118

Gentlemen:

Enclosed is Groundwater Protection Ordinance permit 90039 for a contamination investigation at 1260 Park Street in Alameda for Arco Products Company.

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

Very truly yours,

Mun J. Mar
General Manager

By
J. Killingstad, Chief
Water Resources Engineering

WH:bkm
Enc.

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

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

(1) LOCATION OF PROJECT 1260 Park St. Alameda, CA

(2) CLIENT
Name Arco Products Co
Address PO Box 5811 Phone 415 571-2434
City San Mateo CA Zip 94403

(3) APPLICANT
Name Applied GeoSystems #34
Address 3315 Almaden Exp Phone 408-264-7723
City San Jose, CA Zip 95118

(4) DESCRIPTION OF PROJECT
Water Well Construction ___ Geotechnical Investigation
Cathodic Protection ___ General ___
Well Destruction ___ Contamination ___

(5) PROPOSED WATER WELL USE N/A
Domestic ___ Industrial ___ Irrigation ___
Municipal ___ Monitoring ___ Other ___

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

DRILLER'S LICENSE NO. C-57 384167

WELL PROJECTS
Drill Hole Diameter ___ in. Maximum
Casing Diameter ___ in. Depth ___ ft.
Surface Seal Depth ___ ft. Number ___

GEOTECHNICAL PROJECTS
Number of Borings 4 Maximum
Hole Diameter 6 in. Depth 15 ft.

(7) ESTIMATED STARTING DATE 1-22-90
ESTIMATED COMPLETION DATE 1-22-90

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

APPLICANT'S SIGNATURE Steve Bottrell Date 1-19-90

FOR OFFICE USE

PERMIT NUMBER 90039
LOCATION NUMBER ___

PERMIT CONDITIONS

Circled Permit Requirements Apply

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

B. WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inc cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municip industrial wells or 20 feet for domestic, i tion, and monitoring wells unless a lesser is specially approved.

(C.) GEOTECHNICAL. Backfill bore hole with compacte tings or heavy bentonite and upper two feet wit pacted material. In areas of known or sus contamination, tremied cement grout shall be u place of compacted cuttings.

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

E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 19 Jan
Wyman Hong

APPENDIX B

FIELD METHODS

Site Safety Plan

This plan describes the safety requirements for the evaluation of potential gasoline hydrocarbons in soil. The site safety plan is applicable to personnel of Applied GeoSystems and its subcontractors. Applied GeoSystems personnel and subcontractors of Applied GeoSystems scheduled to work at the site were briefed on the site safety plan before work began. A copy of the site safety plan was available for reference by appropriate parties during the work. The Staff Geologist of Applied GeoSystems acted as the Site Safety Officer.

Soil Borings

Before borings were drilled, a permit was acquired from the Alameda County Flood Control and Water Conservation District (Zone 7), and Underground Service Alert was notified of our intent to drill. A copy of the permit is included in Appendix A. Approximate locations of known utility lines and structures were marked.

HEW Drilling Company, Inc. of Palo Alto, California, drilled Borings B-1 to B-5 with a CME 55 truck-mounted drill rig. Garret Enterprises of Alameda, California, drilled Boring B-6 with a Mobile B-31 drill rig. The drill rigs were equipped with 6-inch-diameter, continuous-flight augers. The augers were steam-cleaned before drilling each boring to minimize the possibility of cross-contamination. After the borings were drilled, neat-cement grout with bentonite was used to backfill the borings to the ground surface.

Drill Cuttings

Drill cuttings subjectively evaluated as having gasoline hydrocarbons at levels greater than 100 parts per million (ppm) were separated from those subjectively evaluated as having gasoline hydrocarbon levels less than 100 ppm. Evaluation was based either on subjective evidence of soil discoloration or on measurements taken with an organic vapor meter (OVM). Readings were collected by placing the intake probe of the OVM against the soil in the brass sleeve promptly after opening the sampler. The drill cuttings from the borings were placed on plastic at the site and covered with plastic.

Soil Sampling in Borings

Soil samples were collected at 5-foot intervals from the ground surface to the total depth of the borings. The soil samples were collected by advancing the boring to a point just above the sampling depth and driving a California-modified, split-spoon sampler containing brass sleeves through the hollow center of the auger into the soil. The sampler and brass sleeves were laboratory-cleaned, steam-cleaned, or washed thoroughly with Alconox and

water before each use. 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 successive 6 inches was counted and recorded to evaluate the relative consistency of the soil.

The samples selected for laboratory analysis were removed from the sampler and promptly sealed in their brass sleeves with aluminum foil, plastic caps, and aluminized duct tape. The samples were labeled, promptly placed in iced storage, and delivered for analyses to a laboratory certified by the State of California.In addition, as requested by ARCO, samples for soil testing were collected from Boring B-1 at depths of 2, 4, 6, 13, and 20-1/2 feet and from Boring B-5 at a depth of 3 feet. These samples were sent to Balbi and Chang Engineering of Fairfield, California, for testing. The results of the soil testing will be reported by Balbi and Chang Engineering directly to ARCO, and are not a part of this assessment.

One of the samples in brass sleeves not selected for laboratory analysis at each sampling interval was tested in the field with an OVM. This testing was performed by placing the intake probe of the OVM against the soil in the brass sleeve promptly after opening the sampler. The OVM readings are presented in Logs of Boring.

Logging of Borings

A geologist was present to log the soil cuttings and samples by the Unified Soil Classification System. Samples not selected for chemical analysis and the soil in the sampler shoe were extruded in the field for inspection. Logs include texture, color, moisture, plasticity, consistency, blow counts, and any other characteristics noted. Logs also include subjective evidence for the presence of hydrocarbons, such as soil staining, obvious product odor, and OVM readings.

Sample Labeling and Handling

Sample containers were labeled in the field with the job number, sample location and depth, and date and promptly placed in iced storage for transport to the laboratory. A Chain of Custody Record was initiated by the geologist and updated throughout handling of the samples and accompanied the samples to a laboratory certified by the State of California for the analyses requested and to Balbi and Chang Engineering. Samples were transported to the laboratory promptly to help ensure that recommended sample holding times would not be exceeded. Samples will be properly disposed of after their useful life has expired.

APPENDIX C

Applied GeoSystems 3315 Almaden Expressway, Suite 34, San Jose, CA 95118 (408) 264-7723

CHAIN OF CUSTODY RECORD

Sampler (signature): Steve Bittman Site ID: 69048-1
Phone Number: (408) 264-7723

Laboratory: Applied GeoSystems
43255 Mission Blvd
Fremont, CA

Shipping Information:
Shipper:
Address:
Date Shipped:
Service Used: Airbill No.

Turnaround Time: 2 weeks
Project Leader: Greg Barclay
Phone Number: (408) 264-7723

RELINQUISHED BY:

Signature	Date	Time
Steve Bittman	1-23-90	

RECEIVED BY:

Signature	Date	Time
Karen Kuck	1-23-90	14:05

Laboratory: AGS

Laboratory should sign upon receipt and return a copy with the laboratory results.

Sample Number	Site ID	Date/Time Sampled	Analysis Requested	Method Preserved	Containers
S-6-B1	69048-1	1-22-90	TPHg, BTEX with EPA 8015 extracted by EPA 5030. PID+FID in Series	ICED	Brass Sleeves Plastic Caps
S-10-B1					
S-6-B2					
S-11-B2					
S-6-B3					
S-11-B3					
S-6-B4					
S-11-B4					
S-6-B5					
S-11-B5					

69048-1 1-22-90 TPHg BTEX as above ICED Brass Sleeves Plastic Caps

Notes to Lab:

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

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Greg Barclay	Date Sampled:	01-22-90
	Applied GeoSystems	Date Received:	01-23-90
	3315 Almaden Expressway	BETX Analyzed:	01-24-90
	San Jose, CA 95118	TPHg Analyzed:	01-24-90
Project:	AGS 69048-1	TPHd Analyzed:	NR
		Matrix	Soil

	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHg ppm	TPHd ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-6-B1 S1001150	0.16	0.34	0.14	1.3	12	NR
S-6-B2 S1001152	ND	ND	ND	ND	ND	NR
S-6-B3 S1001154	0.097	ND	ND	0.20	ND	NR
S-6-B4 S1001156	0.063	0.096	ND	0.20	ND	NR
S-6-B5 S1001158	ND	0.081	ND	0.18	3.7	NR

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

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

01-26-90
Date Reported

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

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Greg Barclay
Applied GeoSystems
3315 Almaden Expressway
San Jose, CA 95118
Project: AGS 69048-1

Date Sampled: 01-22-90
Date Received: 01-23-90
BETX Analyzed: 01-24-90
TPHg Analyzed: 01-24-90
TPHd Analyzed: NR
Matrix Soil

	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHg ppm	TPHd ppm
Detection Limit:	0.50	0.50	0.50	0.50	100	10
SAMPLE Laboratory Identification						
S-10-B1 S1001151	15	72	22	180	1700	NR

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

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.
TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.
TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

01-26-90
Date Reported

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Greg Barclay
Applied GeoSystems
3315 Almaden Expressway
San Jose, CA 95118
Project: AGS 69048-1

Date Sampled: 01-22-90
Date Received: 01-23-90
BETX Analyzed: 01-24-90
TPHg Analyzed: 01-24-90
TPHd Analyzed: NR
Matrix Soil

	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHg ppm	TPHd ppm
Detection Limit:	0.50	0.50	0.50	0.50	20	10
SAMPLE Laboratory Identification						
S-11-B2 S1001153	3.9	13	11	82	570	NR

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

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.
TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.
TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

01-26-90
Date Reported

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

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Greg Barclay
Applied GeoSystems
3315 Almaden Expressway
San Jose, CA 95118
Project: AGS 69048-1

Date Sampled: 01-22-90
Date Received: 01-23-90
BETX Analyzed: 01-24-90
TPHg Analyzed: 01-24-90
TPHd Analyzed: NR
Matrix Soil

	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHg ppm	TPHd ppm
Detection Limit:	5.0	5.0	5.0	5.0	200	10
SAMPLE Laboratory Identification						
S-11-B3 S1001155	47	350	120	940	10000	NR
S-11-B4 S1001157	210	1100	320	2600	21000	NR

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

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.
TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.
TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

01-26-90
Date Reported

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

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Greg Barclay
Applied GeoSystems
3315 Almaden Expressway
San Jose, CA 95118
Project: AGS 69048-1

Date Sampled: 01-22-90
Date Received: 01-23-90
BETX Analyzed: 01-24-90
TPHg Analyzed: 01-24-90
TPHd Analyzed: NR
Matrix Soil

	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHg ppm	TPHd ppm
Detection Limit:	1.0	1.0	1.0	1.0	100	10
SAMPLE Laboratory Identification						
S-11-B5 S1001159	8.8	27	66	160	5400	NR

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

ANALYTICAL PROCEDURES

BTEX– Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.
TPHg–Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.
TPHd–Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

01-26-90
Date Reported

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

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Bill Dugan
Applied GeoSystems
3315 Almaden Expressway
San Jose, CA 95118
Project: AGS 69048-1

Date Sampled: 01-29-90
Date Received: 01-29-90
BETX Analyzed: 01-31-90
TPHg Analyzed: 01-31-90
TPHd Analyzed: NR
Matrix Soil

	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Total Xylenes ppm	TPHg ppm	TPHd ppm
Detection Limit:	0.050	0.050	0.050	0.050	2.0	10
SAMPLE Laboratory Identification						
S-5.5-B6 S1001189	ND	ND	ND	ND	ND	NR
S-10-B6 S1001190	ND	ND	ND	ND	ND	NR

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

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.
TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.
TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.

Laboratory Representative

02-01-90
Date Reported

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

Applied GeoSystems 3315 Almaden Expressway, Suite 34, San Jose, CA 95118 (408) 264-7723

CHAIN OF CUSTODY RECORD

Sampler (signature): Steve Bittman *Site ID:* 69048-1
Phone Number: (408) 264-7723

Laboratory: Balbi & Chang
151 Link Rd
Cordelia, CA 94585

Shipping Information:
Shipper:
Address:
Date Shipped:
Service Used: *Airbill No.*

Turnaround Time:
Project Leader: Steve Bittman
Phone Number: (408) 264-7723

RELINQUISHED BY:
Signature Steve Bittman *Date Time* 1-24-90

RECEIVED BY:
Signature Ken Lamarck *Date Time* 1-24-90 12:45

Laboratory:

Laboratory should sign upon receipt and return a copy with the laboratory results.

Sample Number	Site ID	Date/Time Sampled	Analysis Requested	Method Preserved	Containers
S-2-B1	69048-1	1-22-90	To be specified by Balbi & Chang	None	Brass Sleeves
S-4-B1					
S-6-B1					
S-13-B1					
S-20.5-B1					
S-3-B5					

Notes to Lab: