Applied GeoSystems

TRANSMITTAL

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TO: Mr. Gil Wistar CC
Alameda County Department of
Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

DATE: 1/9/91
PROJECT NUMBER: 60026-1
SUBJECT: Letter Report, Quarterly Ground-Water Monitoring

FROM: Michael J. Barminski
TITLE: Staff Geologist

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1	1/2/91	60026-1	Letter Report, Quarterly Ground-Water Monitoring for Third Quarter 1990 at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, CA.

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REMARKS: Per ARCO's authorization, this report has been forwarded for your review.

Copies: 1 to AGS project file no. 60026-1 San Jose's Reader's File

*Revision Date: 10/15/90
*File Name: TRANSMT.PRJ

Ground-Water Sampling and Gradient Evaluation

AGS personnel performed quarterly ground-water monitoring and sampling on July 31 and August 1, 1990. Field work consisted of measuring depth-to-water (DTW) levels in wells MW-1 through MW-5; subjectively analyzing water from these wells for the presence of petroleum hydrocarbon sheen and floating product; and purging and sampling ground water from these monitoring wells for laboratory analysis. The ground-water sampling protocol is attached. Ground-water elevations and subjective analysis data were also collected from the wells at the site on August 28, 1990.

The DTW levels, wellhead elevations, and ground-water elevations for this and previous monitoring episodes at the site are summarized in Table 1, Cumulative Ground-Water Monitoring Data. The ground-water gradients interpreted from the August 1, and August 28, 1990 monitoring data are about 0.002 (approximately 0.2 feet vertical per 100 feet horizontal) toward the north-northwest, as shown on the Ground-Water Gradient Maps (Plates 3 and 4). These interpreted gradients are generally consistent with the previously interpreted ground-water gradients for this site. The elevation data for well MW-2 was not used in evaluating the gradient because the well is screened in a shallow perched water-bearing zone.

Water samples were collected from wells MW-1 through MW-5 for subjective analysis (Table 1) before the monitoring wells were purged and sampled. On July 31, 1990 no evidence of floating product was noted in the wells, but product odor was detected and organic vapor meter (OVM) readings of 877 parts per million (ppm) were recorded in the water samples from well MW-2. Subsequent subjective analysis of water samples from well MW-2 on August 1 and August 28, 1990 indicated approximately ten inches and 1 foot of floating product in MW-2, respectively. No floating product was noted in the other wells on those dates. The floating product was subsequently removed from well MW-2. One water sample from well MW-2 was analyzed inadvertently by the laboratory.

Monitoring wells MW-1 through MW-5 were purged and sampled on July 31, and August 1, 1990 in accordance with the attached protocol. Well purge data sheets for the parameters monitored and stabilization graphs for each well are also attached (Appendix A).

Laboratory Analysis

Water samples collected from the wells were delivered under Chain of Custody protocol to Applied Analytical Environmental Laboratories in Fremont, California (Hazardous Waste Testing Laboratory No. 1211). The water samples from wells MW-1 through MW-5 were analyzed for total petroleum hydrocarbons as gasoline (TPHg), and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using modified Environmental Protection Agency (EPA) Methods 5030/8015/8020/602. The water samples from well MW-4, located near the former waste-oil tank, were also analyzed for total oil and grease (TOG) using standard method 503A/E, halogenated volatile organics (HVO's) by EPA method 601/8010, and total petroleum hydrocarbons as diesel (TPHd) by EPA methods 3510/8015. The Chain of Custody Records and Laboratory Analysis Reports are attached (Appendix A). Results of these and previous water analyses are summarized in Table 2, Cumulative Results of Laboratory Analyses of Water Samples.

Results of this quarter's laboratory analyses of water samples from wells MW-1 through MW-5 indicated:

- nondetectable concentrations of BTEX in wells MW-1, MW-3, MW-4, and MW-5; nondetectable levels of TPHg in well MW-1 and levels of TPHg in wells MW-3 through MW-5 ranging from 110 to 410 parts per billion (ppb);

- elevated concentrations of BTEX (up to 24,000 ppb) and TPHg (240,000 ppb) in well MW-2; and the presence of approximately 10 inches to 1 foot of floating product measured during subsequent visits to the site in August 1990 in MW-2;

- nondetectable concentrations of TOG and HVO's in well MW-4, with the exception of TCE (7.5 ppb) and PCE (1600 ppb), and TPHd reported at 240 ppb. TCE and PCE in water samples from well MW-4 exceed state MCL's (maximum contaminant levels) for drinking water.

Conclusions

Monitoring well MW-2, which is screened in the shallow perched water-bearing zone, continues to collect floating product and maintain high levels of petroleum hydrocarbons since it was initially sampled in April 1989. Hydrocarbon concentrations in MW-4 have decreased since April 1989. Hydrocarbon concentrations in MW-1, MW-3, and MW-5 are relatively constant and BTEX concentrations in these wells are within drinking water standards.

Schedule

Applied GeoSystems will continue the quarterly ground-water monitoring at this site to evaluate trends in petroleum hydrocarbons and changes in ground-water gradient with time. Routine well maintenance, removal of free product from well MW-2, and quality control will be performed as necessary during these site visits. The fourth quarter monitoring episode was conducted on October 30, 1990.

We recommend that copies of this report be forwarded to:

Mr. Gil Wistar
Alameda County Department of
Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

Mr. Lester Feldman
Regional Water Quality Control Board
San Francisco Bay Region
1800 Harrison Street
Oakland, California 94612

If you have any questions or comments, please call Greg Barclay at (408) 264-7723.

Sincerely,
Applied GeoSystems

Michael J. Barminski
Staff Geologist

Joan E. Tiernan
Registered Civil
Engineer 044600

Enclosures: References
Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Ground-Water Gradient Map, August 1, 1990
Plate 4, Ground-Water Gradient Map, August 28, 1990
Table 1, Cumulative Ground-Water Monitoring Data
Table 2, Cumulative Results of Laboratory Analyses of Water Samples

Appendix A: Ground-Water Sampling Protocol
Well Purge Data Sheets and Stabilization Graphs
Chain of Custody Records (3 pages)
Laboratory Analysis Reports (5 pages)

cc: H.C. Winsor, ARCO

REFERENCES

Applied GeoSystems. October 4, 1990. "Report Limited Offsite Subsurface Environmental Investigation". AGS job 19014-3.

Applied GeoSystems. August 6, 1990. "Letter Report Quarterly Ground-Water Monitoring Fourth Quarter 1989 and First and Second Quarters 1990".

Applied GeoSystems. March 6, 1989. "Site Safety Plan for ARCO Station No. 276, Oakland, California". Job No. 19014-1.

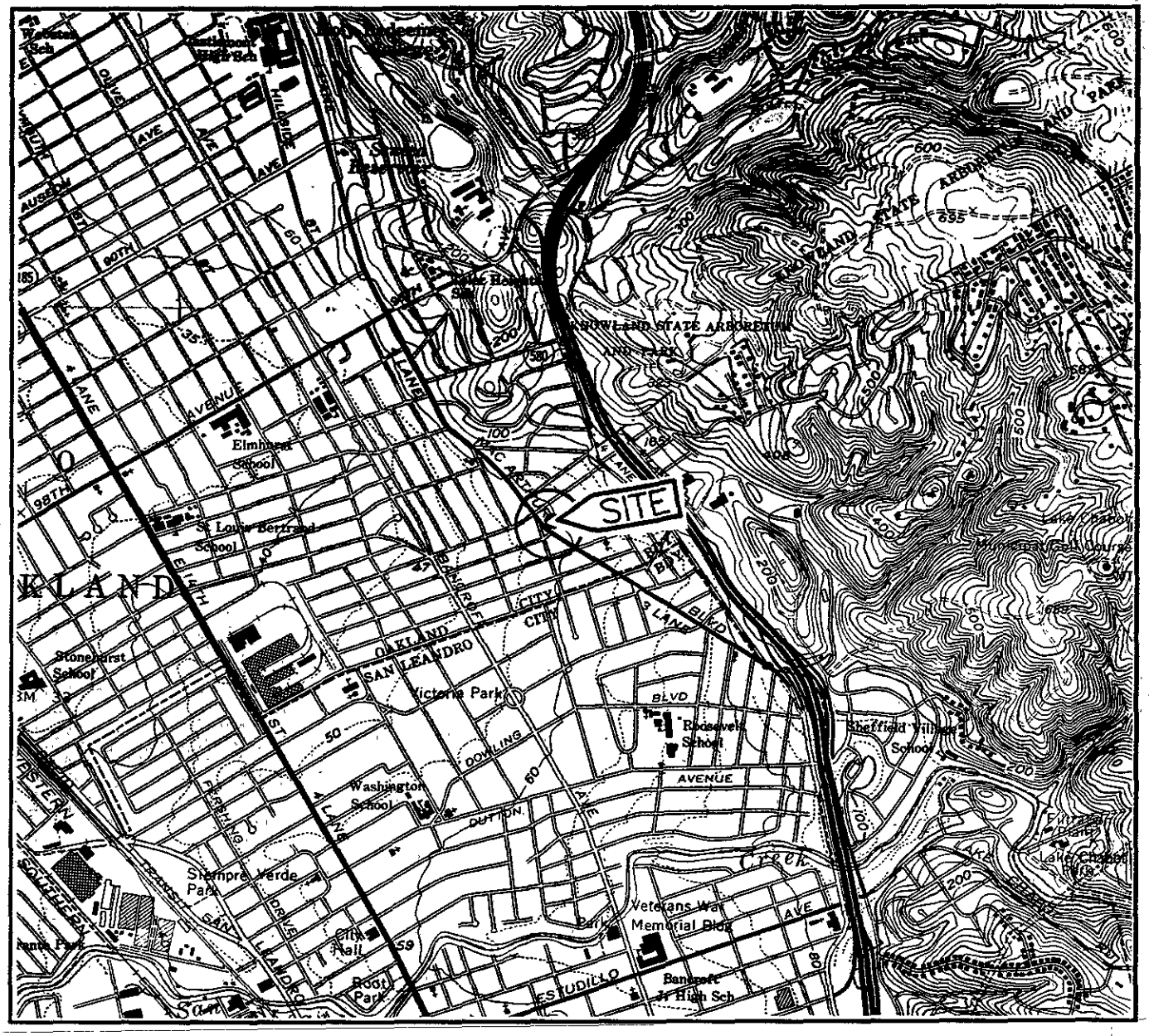
Applied GeoSystems. March 6, 1989. "Report Limited Subsurface Environmental Investigation". Job No. 19014-1.

Kaldveer Associates. October 3, 1988. "Preliminary Environmental Assessment Proposed Foothill Square Oakland, California". Job No. KE812-3, 12056.

Kaldveer Associates. October 7, 1988. "Preliminary Soil And Groundwater Quality Testing Program Foothill Square Oakland, California". Job No. KE812-3A, 12302.

Western Geologic Resources, Inc. "Soil Sampling and Monitoring Well Installation Foothill Square Shopping Center Oakland, California". Job No. 8-088.01.

Pacific Environmental Group, Inc. February 6, 1989. Former Waste-Oil Tank Pit Analytical Results and Site Plan of ARCO Station No. 276. Copy of letter sent to Ms. Mary Meirs, Alameda County Environmental Health Department Hazardous Material Division.



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

N

Approximate Scale

2000 1000 0 2000 4000

feet

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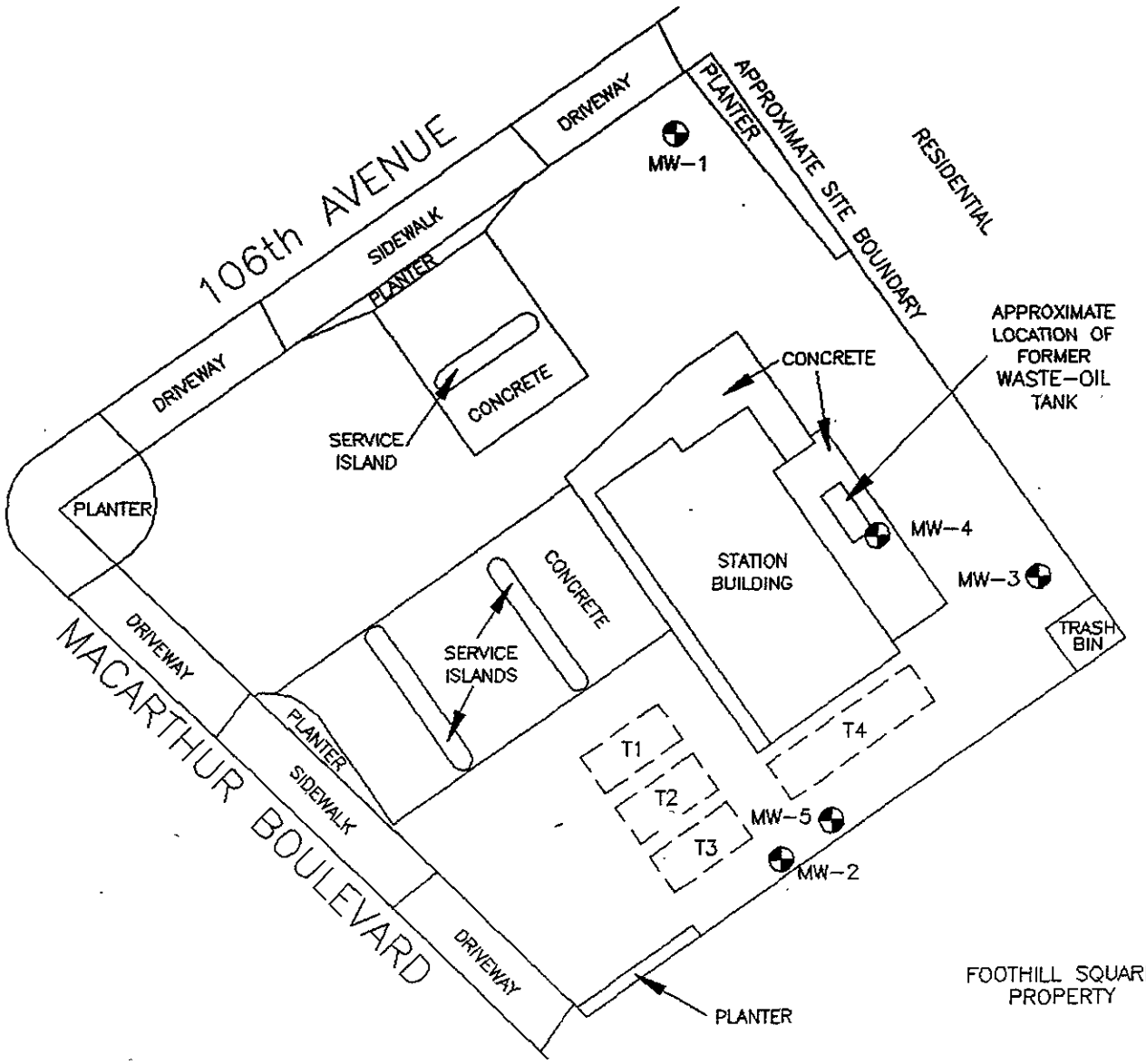
SITE VICINITY MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE

1



EXPLANATION

MW-5 = Approximate location of monitoring well

T4 = Former Underground Storage Tanks

N

Approximate Scale

30 15 0 30 60

feet

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

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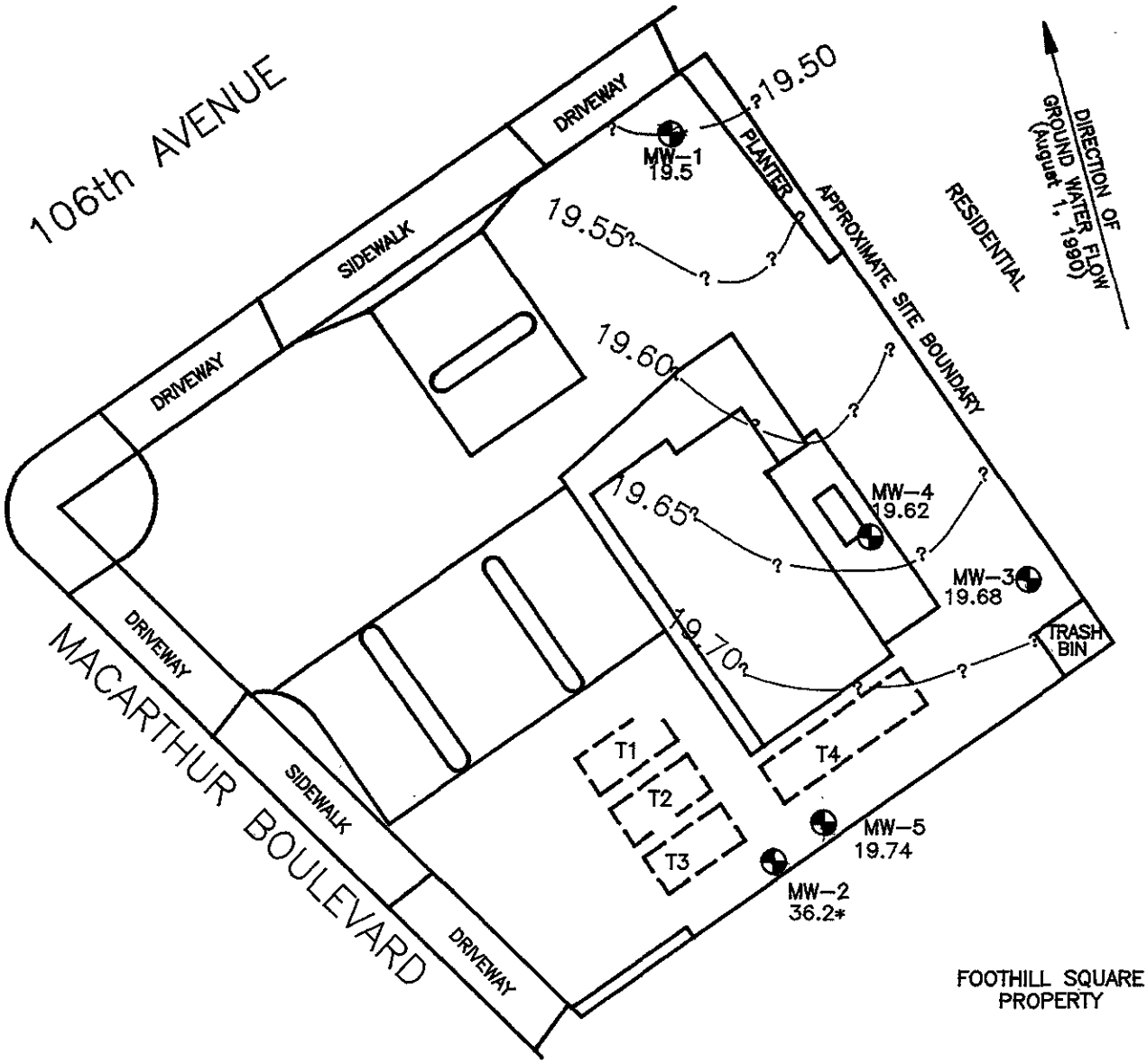
GENERALIZED SITE PLAN
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 2



EXPLANATION

* = Well MW-2 screened in shallow perched zone

19.74 = Elevation of ground water in feet, August 1, 1990

19.70 = Line of equal elevation of ground water above mean sea level

MW-5 = Approximate location of monitoring well

Approximate Scale

30 15 0 30 60

feet

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

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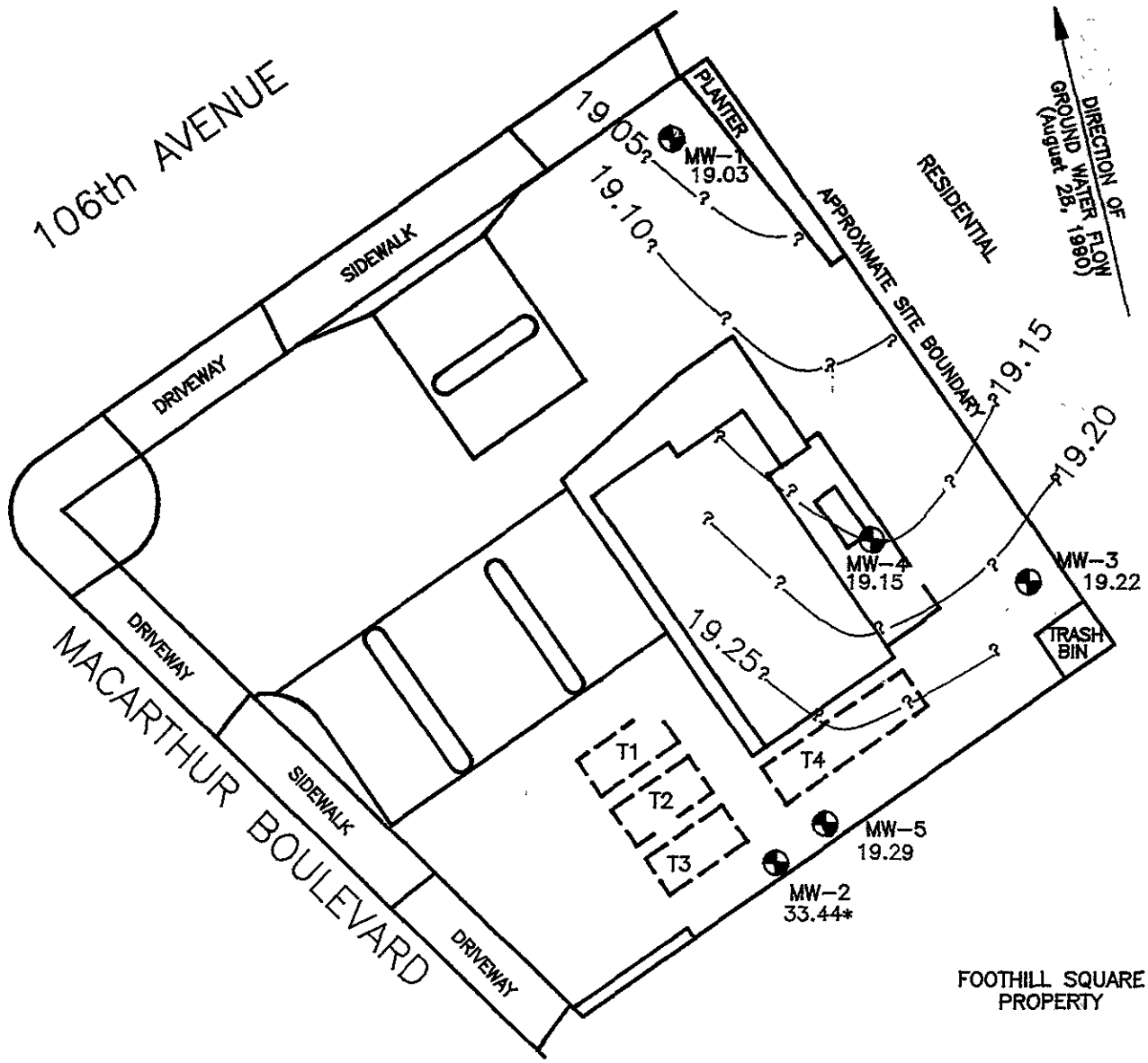
GROUND-WATER GRADIENT MAP
August 1, 1990
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 3



EXPLANATION

* = Well MW-2 screened in shallow perched zone

19.29 = Elevation of ground water in feet, August 28, 1990

19.25 —— = Line of equal elevation of ground water above mean sea level

MW-5 = Approximate location of monitoring well

Approximate Scale

30 15 0 30 60

feet

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

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PROJECT 60026-1

GROUND-WATER GRADIENT MAP
August 28, 1990
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
4

TABLE 1
CUMULATIVE GROUND-WATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 1 of 2)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-1				
04/17/89		33.04	22.87	None
04/24/89		33.84	22.07	None
10/13/89	55.91	37.19	18.72	None
02/01/90		36.73	19.18	None
07/31/90		36.42	19.49	None
08/01/90		36.41	19.50	None
08/28/90		36.88	19.03	None
MW-2				
04/17/89		17.20	38.15	None
04/24/89		17.83	37.52	None
10/13/89	55.35	20.17	35.18	0.03
02/01/90		NM	NM	None
07/31/90		18.90	36.45	None
08/01/90		19.15	36.20	1.04
08/28/90		21.91	33.44	0.83
MW-3				
04/24/89		34.47	22.08	None
10/13/89	56.55	37.60	18.95	None
02/01/90		37.20	19.35	None
07/31/90		36.90	19.65	None
08/01/90		36.87	19.68	None
08/28/90		37.33	19.22	None

See notes on page 2 of 2.

TABLE 1
CUMULATIVE GROUND-WATER ELEVATION DATA
ARCO Station 276
Oakland, California
(Page 2 of 2)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-4				
04/17/89		33.87	22.07	None
04/24/89		33.76	22.18	None
10/13/89	55.94	37.03	18.91	None
02/01/90		36.57	19.37	None
07/31/90		36.39	19.55	None
08/01/90		36.32	19.62	None
08/28/90		36.79	19.15	None
MW-5				
04/17/89		33.17	22.26	None
04/24/89		33.06	22.37	None
10/13/89	55.43	36.33	19.10	None
02/01/90		35.96	19.47	None
07/31/90		35.70	19.73	None
08/01/90		35.69	19.74	None
08/28/90		36.14	19.29	None

NM = Not Measured
Depths are in feet below top of each well casing.
Elevations are referenced in feet above mean sea level.
Floating product reported in feet.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSIS OF WATER SAMPLES
ARCO Station 276
Oakland, California
(Page 1 of 3)

Date/Well	TPHg	TPHd	B	T	E	X	TOG
MW-1							
04/24/89	<50	NA	<0.50	<0.50	<0.50	<0.50	NA
10/13/89	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
02/01/90	91	NA	<0.30	<0.30	<0.30	0.36	NA
07/31/90	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
MW-2							
04/24/89	165,000	NA	13,000	21,000	2,100	12,700	NA
10/13/89		FLOATING PRODUCT					
02/01/90		SHEEN PRESENT					
07/31/90	240,000	NA	14,000	24,000	3,000	17,000	NA
MW-3							
04/24/89	560	NA	0.54	0.75	<0.50	<0.50	NA
10/13/89	450	NA	<0.50	<0.50	<0.50	<0.50	NA
02/01/90	360	NA	<0.30	<0.30	<0.30	0.85	NA
08/01/90	440	NA	<0.50	<0.50	<0.50	<0.50	NA

See notes on page 2 of 3

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSIS OF WATER SAMPLES
ARCO Station 276
Oakland, California
(Page 2 of 3)

Date/Well	TPHg	TPHd	B	T	E	X	TOG
MW-4							
04/24/89	2,500	NA	270	1.4	<0.50	85	NA
10/13/89	760	NA	0.86	<0.50	1.2	<0.50	NA
02/01/90	680	NA	<0.30	<0.30	<0.30	1.6	NA
07/31/90	470	240	<0.50	<0.50	<0.50	<0.50	<5,000
MW-5							
04/24/89	130	NA	0.67	<0.50	<0.50	<0.50	NA
10/13/89	75	NA	<0.50	<0.50	<0.50	<0.50	NA
02/01/90	81	NA	0.94	0.88	<0.30	1.8	NA
07/31/90	110	NA	<0.50	<0.50	<0.50	<0.50	NA

Results in micrograms per liter (ug/L) = parts per billion (ppb).
TPHg: Total petroleum hydrocarbons as gasoline by EPA method 8015.
TPHd: Total petroleum hydrocarbons as diesel by EPA method 3550/3510.
B: Benzene, T: Toluene, E: Ethlybenzene, T: Total Xylene isomers
BTEX: Measured by EPA method 8020/602.
TOG: Measured by Standard Method 503A/E.
<: Results reported as less than the detection limit.

NA: Not analyzed

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSIS OF WATER SAMPLES
ARCO Station 276
Oakland, California
(Page 3 of 3)

Date/Well		HVO's	MCL's
MW-4			
07/31/90	Trichloroethene	7.5	5.0
	Tetrachloroethene	1600	5.0

Results in micrograms per liter (ug/L) = parts per billion (ppb).
Halogenated Volatile Organics: Measured by EPA method 601/8010.
Compounds not shown not detected.
NA: Not analyzed
MCL's as reported by the California Department of Health Services 10/24/90.
Trichloroethene: TCE. Tetrachloroethene: PCE.

APPENDIX A

GROUND-WATER SAMPLING PROTOCOL

The static water level in each well that contained water was measured with a Solinst® water-level indicator; this instrument is accurate to the nearest 0.01 foot. These ground-water depths were subtracted from wellhead elevations measured in 1989 by Ron Archer, Civil Engineer, Inc., of Pleasanton, California, a licensed land surveyor, to calculate the differences in ground-water elevations.

Water samples collected for subjective evaluation were collected by gently lowering approximately half the length of a clean Teflon® bailer past the air-water interface (if possible) and collecting a sample from near the surface of the water in the well. The samples were checked for measurable floating hydrocarbon product.

Before water samples were collected from the ground-water monitoring wells, the wells were purged until stabilization of the temperature, Ph, and conductivity was obtained. A minimum of approximately 7 well casing volumes of water were purged before these characteristics stabilized. The quantity of water purged from the wells was calculated as follows:

1 well casing volume = $\pi r^2 h(7.48)$

where:

r = radius of the well casing in feet.
h = column of water in the well in feet (well depth - depth to water).
7.48 = conversion constant from cubic feet to gallons

gallons of water purged/gallons in 1 well casing volume = well casing volumes removed.

After purging, each well was allowed to recharge to at least approximately 80% of the initial water level. Water samples were then collected with an Environmental Protection Agency (EPA) approved Teflon® bailer which had been cleaned with Alconox® and deionized water. The water samples were carefully poured into 40-milliliter glass vials, which were filled so as to produce a positive meniscus. Each sample container was preserved with hydrochloric acid, sealed with a cap containing a Teflon® septum, and subsequently examined for air bubbles to avoid headspace which would allow volatilization to occur. The samples were promptly transported in iced storage in a thermally-insulated ice chest, accompanied by a Chain of Custody Record, to a California-certified laboratory.

WELL PURGE DATA SHEET

Project Name: Arco 276 **Job No.** 60026-1

Date: July 31, 1990 **Page** 1 **of** 1

Well No. MW-1 **Time Started** 10:30

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)	Turbidity (NTU)
10:30	Start bailing MW-1				
10:50	2	71.0	8.29	2.80	54.6
11:30	4	72.3	8.14	2.93	60.2
12:20	6	71.8	8.00	2.86	67.3
13:45	8	71.6	7.94	2.85	50.2
15:10	10	72.0	7.96	2.86	47.9
15:50	12	73.4	7.99	2.87	70.3
15:51	Stop bailing MW-1				

Notes:

Depth to Bottom (feet)	:	38.92
Depth to Water - initial (feet)	:	36.42
Depth to Water - final (feet)	:	36.84
% recovery	:	83.2%
Time Sampled	:	16:30
Dissolved Oxygen - initial (ppm)	:	
Dissolved Oxygen - final (ppm)	:	
Gallons per Well Casing Volume	:	0.425
Gallons Bailed	:	12.0
Well Casing Volumes Bailed	:	28.24
Approximate Bailing Rate (gpm)	:	0.038

WELL PURGE DATA SHEET

Project Name: Arco 276 **Job No.** 60026-1

Date: July 31, 1990 **Page** 1 **of** 1

Well No. MW-2 **Time Started** 14:05

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)	Turbidity (NTU)
14:05	Start purging MW-2				
14:21	5	71.2	7.16	8.93	63.7
14:28	10	69.4	7.81	8.61	48.5
14:36	15	69.6	7.89	8.54	27.8
14:45	20	70.8	8.07	8.54	103.8
14:51	25	72.5	7.62	8.52	105.9
15:06	30	71.0	7.63	8.54	26.9
15:23	35	71.7	7.65	8.55	18.3
15:24	Stop purging MW-2				

Notes:

Depth to Bottom (feet)	:	25.75
Depth to Water - initial (feet)	:	18.90
Depth to Water - final (feet)	:	19.76
% recovery	:	87.4%
Time Sampled	:	17:00
Dissolved Oxygen - initial (ppm)	:	
Dissolved Oxygen - final (ppm)	:	
Gallons per Well Casing Volume	:	4.45
Gallons Purged	:	35.0
Well Casing Volumes Purged	:	7.86
Approximate Pumping Rate (gpm)	:	0.44

WELL PURGE DATA SHEET

Project Name: Arco 276 Job No. 60026-1

Date: August 1, 1990 Page 1 of 2

Well No. MW-3 Time Started 16:00

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)	Turbidity (NTU)
16:00	Start bailing MW-3				
16:01	0.1	79.0	7.15	11.03	>200
16:07	0.3	74.8	7.75	10.58	>200
16:17	0.6	71.4	7.26	9.74	>200
16:24	0.9	70.0	7.28	10.54	>200
16:31	1.2	69.7	7.28	10.72	>200
16:39	1.5	69.5	7.30	10.94	>200
16:49	1.8	68.9	7.32	11.21	>200
16:58	2.1	68.4	7.33	11.10	>200
17:06	2.4	68.6	7.34	11.54	>200
17:15	2.7	68.4	7.35	11.68	>200
17:25	3.0	68.5	7.35	11.49	>200
17:33	3.3	68.3	7.36	11.97	>200
17:47	3.6	68.4	7.36	11.80	>200
17:55	3.9	68.2	7.34	11.87	>200

See notes on page 2 of 2

WELL PURGE DATA SHEET

Project Name: Arco 276 **Job No.** 60026-1

Date: August 1, 1990 **Page** 2 **of** 2

Well No. MW3 **Time Started** 16:00

Notes:

Depth to Bottom (feet):	38.80
Depth to Water - initial (feet):	36.90
Depth to Water - final (feet):	36.86
% recovery:	102.0%
Time sampled:	19:00
Dissolved Oxygen - initial (ppm):	
Dissolved Oxygen - final (ppm):	
Gallons per Well Casing Volume:	0.31
Gallons Purged:	3.9
Well Casing Volumes Purged:	12.6
Approximate Pumping Rate (gpm):	0.034

WELL PURGE DATA SHEET

Project Name: Arco 276 **Job No.** 60026-1

Date: July 31, 1990 **Page** 1 **of** 1

Well No. MW-4 **Time Started** 12:00

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)	Turbidity (NTU)
12:00	Begin purging MW-4				
12:12	5	71.7	8.95	1.50	>200
12:30	10	71.8	8.53	1.48	>200
12:48	15	72.9	9.21	1.41	>200
12:57	20	71.9	8.96	1.34	174.2
13:08	25	73.7	8.72	1.34	136.4
13:16	30	70.4	8.40	1.31	96.7
13:24	35	71.6	8.43	1.36	91.3
13:32	40	71.4	8.44	1.36	60.1
13:39	45	70.9	8.43	1.39	56.3
13:40	Stop purging MW-4				

Notes:

Depth to Bottom (feet) :	49.30
Depth to Water - initial (feet) :	36.39
Depth to Water - final (feet) :	37.46
% recovery :	91.7%
Time Sampled :	16:00
Dissolved Oxygen - initial (ppm) :	
Dissolved Oxygen - final (ppm) :	
Gallons per Well Casing Volume :	2.10
Gallons Purged :	45.0
Well Casing Volumes Purged :	21.4
Approximate Pumping Rate (gpm) :	0.45

WELL PURGE DATA SHEET

Project Name: Arco 276 **Job No.** 60026-1

Date: July 31, 1990 **Page** 1 **of** 1

Well No. MW-5 **Time Started** 10:15

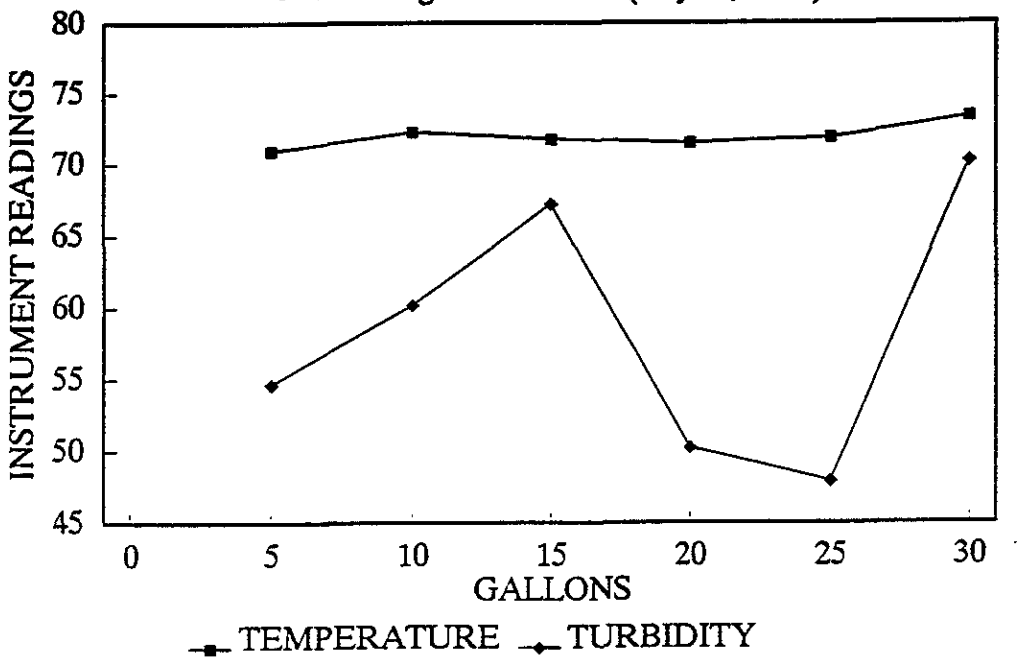
Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)	Turbidity (NTU)
10:15	Start purging MW-5				
10:22	5	68.2	8.64	4.23	>200
10:30	10	66.8	8.22	4.26	>200
10:38	15	66.5	8.45	4.37	85.9
10:45	20	66.8	8.03	4.48	27.4
10:52	25	66.6	8.74	4.56	29.1
11:57	30	66.5	8.78	4.64	21.8
11:03	35	66.8	8.81	4.74	17.0
11:09	40	67.0	8.79	4.78	20.5
11:16	45	67.7	8.77	4.77	16.0
11:23	50	67.2	8.77	4.78	15.9
11:24	Stop purging MW-5				

Notes:

Depth to Bottom (feet)	:	47.10
Depth to Water - initial (feet)	:	35.70
Depth to Water - final (feet)	:	35.73
% recovery	:	100%
Time Sampled	:	14:18
Dissolved Oxygen - initial (ppm)	:	
Dissolved Oxygen - final (ppm)	:	
Gallons per Well Casing Volume	:	7.41
Gallons Purged	:	50.0
Well Casing Volumes Purged	:	6.75
Approximate Pumping Rate (gpm)	:	0.74

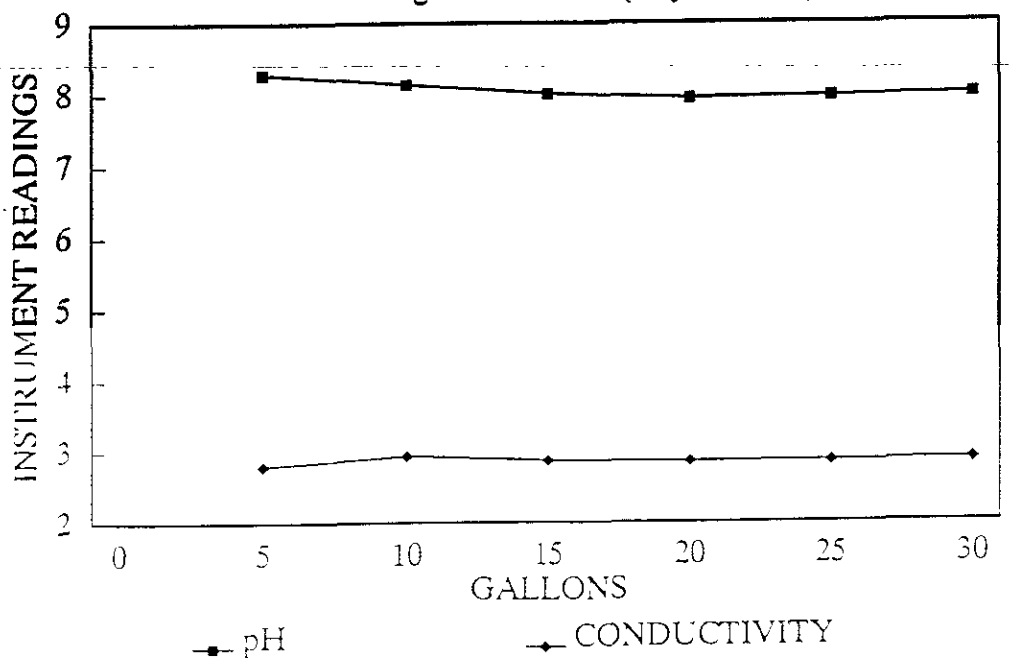
ARCO 276 STABILIZATION GRAPH

Monitoring Well MW–1 (July 31, 1990)



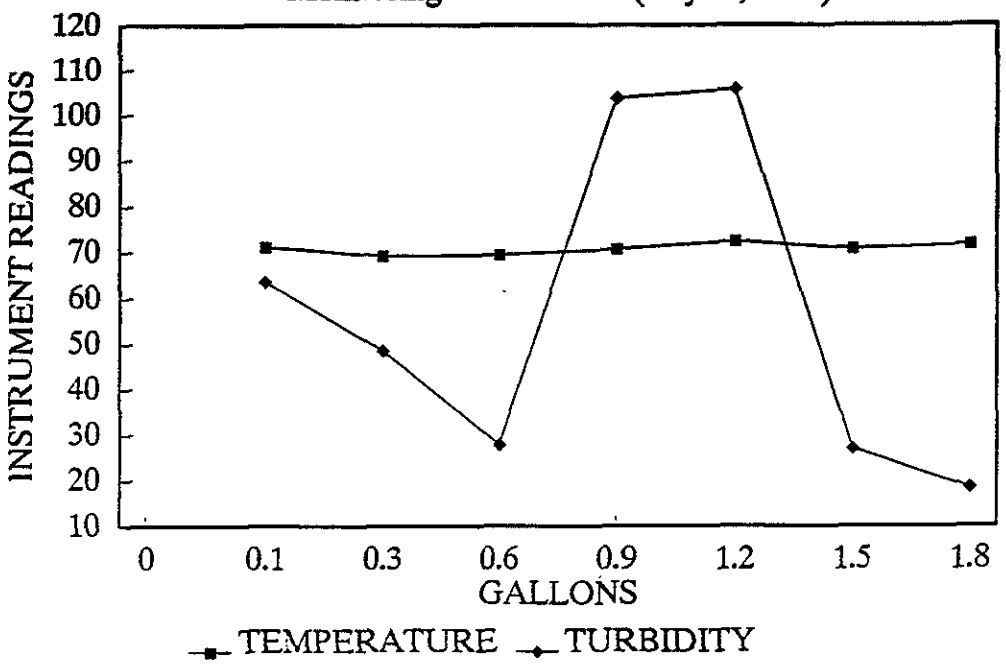
ARCO 276 STABILIZATION GRAPH

Monitoring Well MW–1 (July 31, 1990)



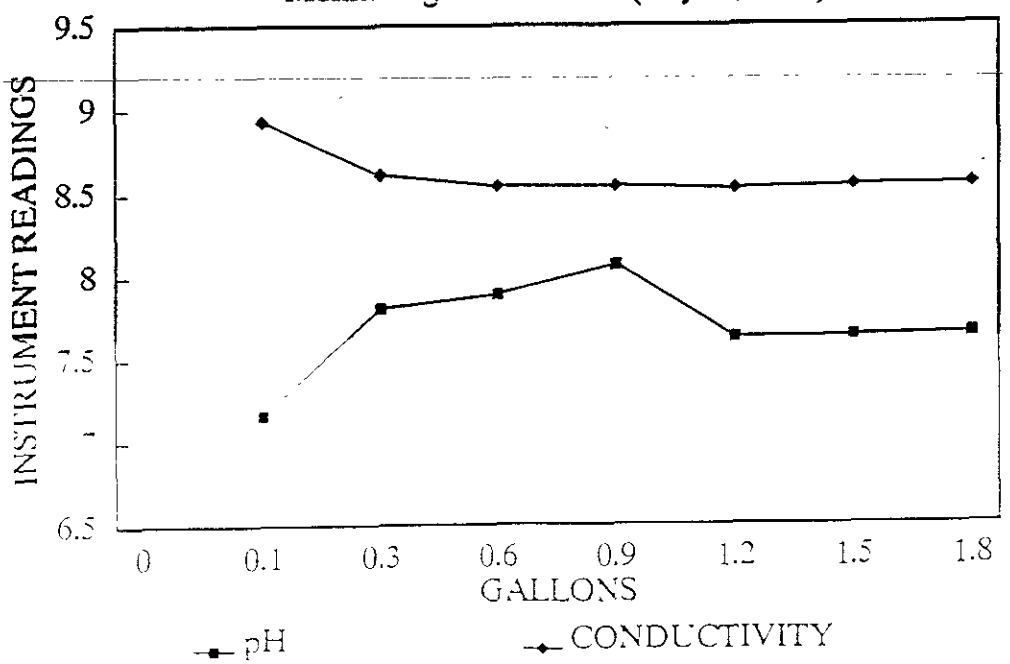
ARCO 276 STABILIZATION GRAPH

Monitoring Well MW–2 (July 31, 1990)



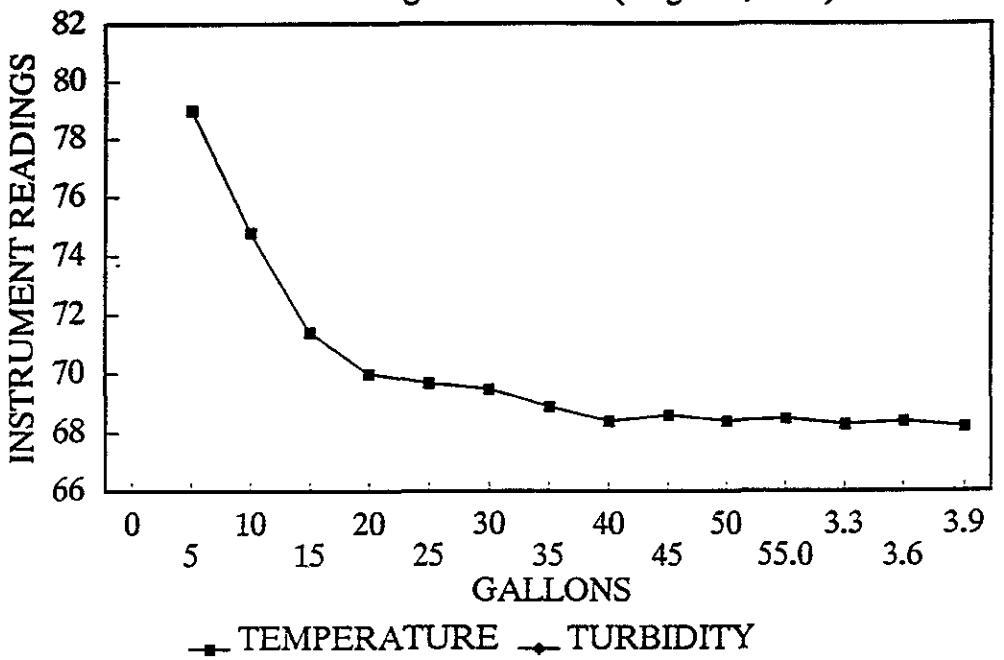
ARCO 276 STABILIZATION GRAPH

Monitoring Well MW–2 (July 31, 1990)



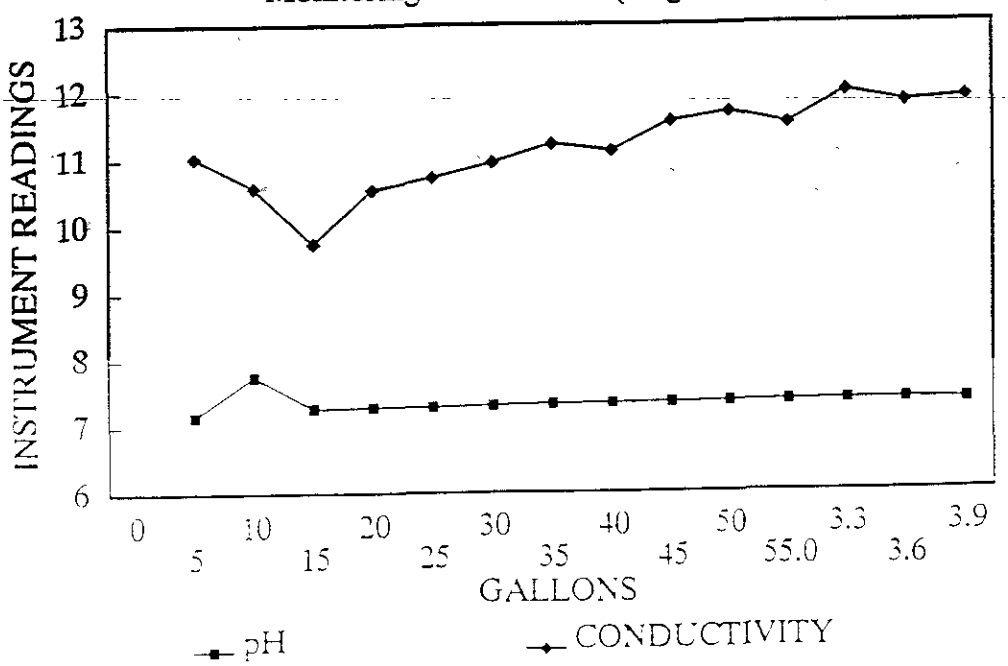
ARCO 276 STABILIZATION GRAPH

Monitoring Well MW–3 (August 1, 1990)



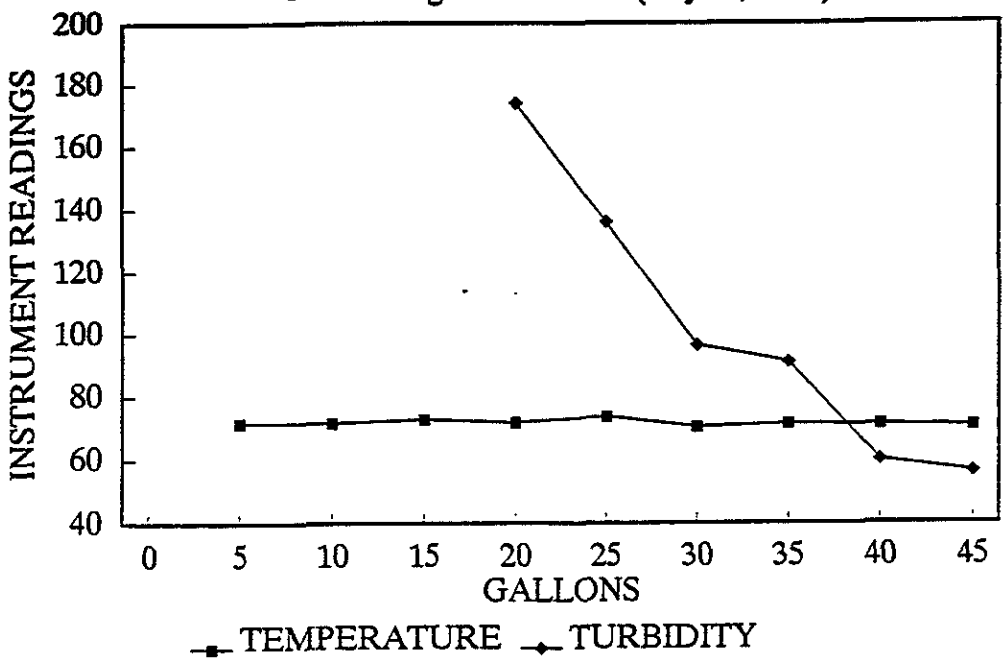
ARCO 276 STABILIZATION GRAPH

Monitoring Well MW–3 (August 1, 1990)



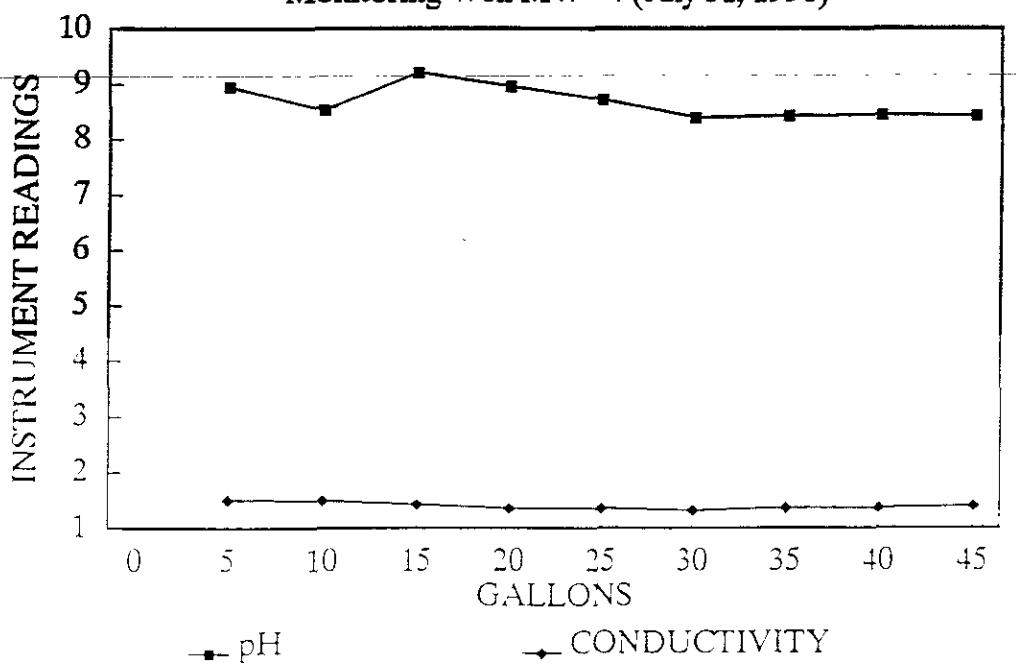
ARCO 276 STABILIZATION GRAPH

Monitoring Well MW–4 (July 31, 1990)



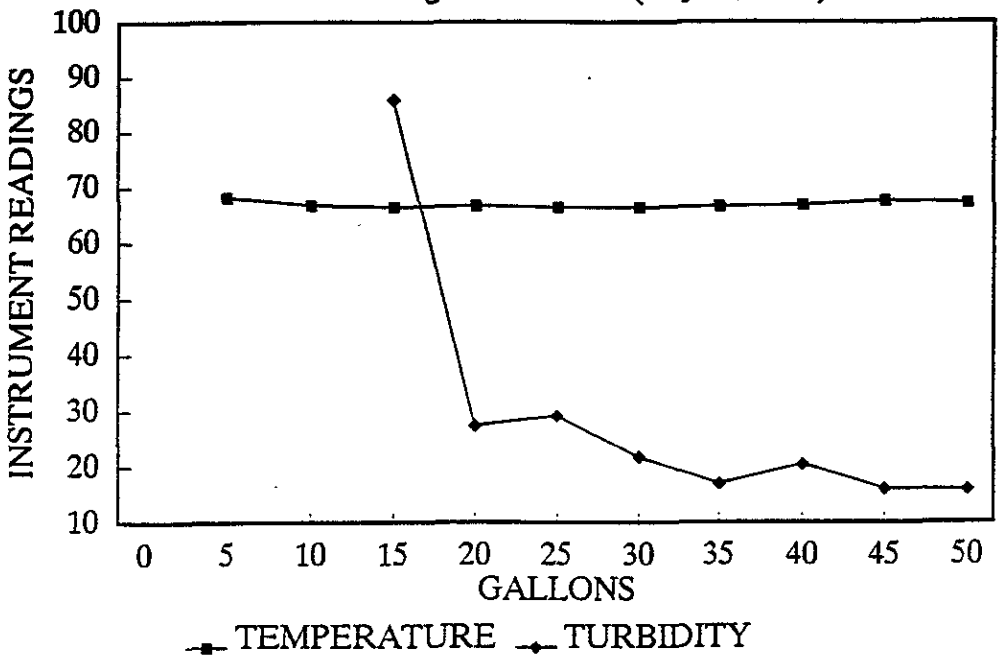
ARCO 276 STABILIZATION GRAPH

Monitoring Well MW–4 (July 31, 1990)



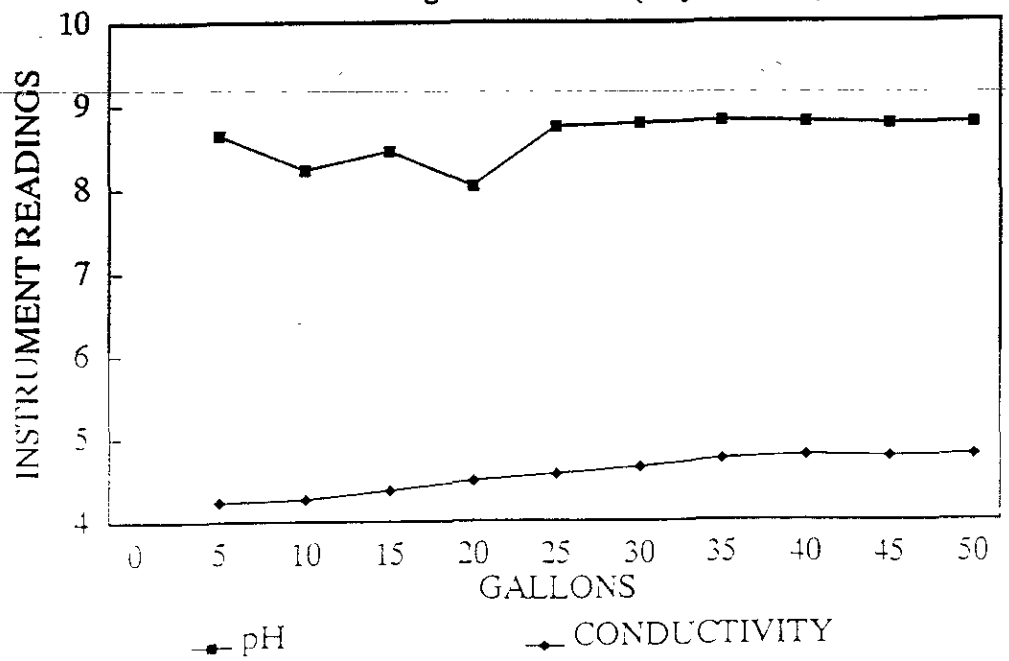
ARCO 276 STABILIZATION GRAPH

Monitoring Well MW–5 (July 31, 1990)



ARCO 276 STABILIZATION GRAPH

Monitoring Well MW–5 (July 31, 1990)



Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO	PROJECT NAME
60026-1	ARCO 276
P.O NO.	SAMPLERS (Signature) Marc A Buggs

DATE MM/DD/YY	TIME		No. of Containers	TPHgasoline (8015)	BTEX (602/8020)	TPHdiesel (8015)	TOG 503E	Chlorinate - 9010				Preserved? Yes	REMARKS	LABORATORY I.D. NUMBER
				ANALYSIS										
7/31/90	14:18	W-Rinsate-MW5 (Hold)	1									HCl		
	14:18	W-35-MW5	4	X	X							HCl		
	16:00	W-Rinsate-MW4 (Hold)	1									HCl		
	16:00	W-Rinsate-MW4 (Liter) (Hold)	1									x		
	16:00	W-37-MW4 mjb	4	X	X							HCl		
	16:00	W-37-MW4 mjb	3					X				x		
	16:00	W-37-MW4 (Liters) mjb	3			X	X					x		
	16:30	W-Rinsate-MW1 (Hold)	1									HCl		
	16:30	W-36-MW1	4	X	X							HCl		
	17:15	W-19-MW2	4	X	X							HCl		
7/31/90	17:15	W-Rinsate-MW2 (Hold)	1									HCl		

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
Marc A Buggs	8/1/90 8:00	
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature): 8-1-90 14:30

Laboratory:
Applied Analytical
1205T Aldrae
Fremont CA 94538
4156230775

Turn Around: 2 Week

SEND RESULTS TO:
Applied GeoSystems
3315 Almaden Expressway
Suite 34
San Jose, California 95118
(408) 264-7723

Proj. Mgr.: Mike Barminski

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ NO	PROJECT NAME
60026-1	ARCO 276
P.O. NO.	SAMPLERS (Signature)
	Mike Hainrich

DATE MM/DD/YY	TIME	SAMPLE I.D.	No. of Containers	TPHg	BTEX	TPHd	Preserved? (Y/N)	LABORATORY I.D. NUMBER
2/1/90	555	MW-2 RINSATE (hold)	1					
2/1/90	7:00	W-37-MW-3	4	X	X		X	

ANALYSIS

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
Mike Hainrich	8/1/90 900	
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):
		Raghavan

REMARKS:

SEND RESULTS TO:

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

Proj. Mgr.: DAVE Hicking

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Mike Barminski	Date Sampled:	07-31-90
	Applied GeoSystems	Date Received:	08-01-90
	3315 Almaden Expressway	BTEX Analyzed:	08-03-90
	San Jose, CA 95118	TPHg Analyzed:	08-03-90
Project:	AGS 60026-1	TPHd Analyzed:	08-03-90
		Matrix:	Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100
SAMPLE Laboratory Identification						
W-36-MW1 W1008001	ND	ND	ND	ND	ND	NR
W-37-MW4 W1008003	ND	ND	ND	ND	470	240
W-35-MW5 W1008004	ND	ND	ND	ND	110	NR

ppb = parts per billion = µg/L = micrograms per liter.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

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

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

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

Laura Kuck
Laboratory Representative

August 7, 1990
Date Reported

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Mike Barminski	Date Sampled:	07-31-90
	Applied GeoSystems	Date Received:	08-01-90
	3315 Almaden Expressway	BTEX Analyzed:	08-03-90
	San Jose, CA 95118	TPHg Analyzed:	08-03-90
Project:	AGS 60026-1	TPHd Analyzed:	NR
		Matrix:	Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	200	200	200	200	8000	100
SAMPLE Laboratory Identification						
W-19-MW2 W1008002	14000	24000	3000	17000	240000	NR

ppb = parts per billion = µg/L = micrograms per liter.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

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

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

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

Laura Kuck
Laboratory Representative

August 7, 1990
Date Reported

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention:	Mr. Mike Barminski	Date Sampled:	08-01-90
	Applied GeoSystems	Date Received:	08-01-90
	3315 Almaden Expressway	BTEX Analyzed:	08-03-90
	San Jose, CA 95118	TPHg Analyzed:	08-03-90
Project:	AGS 60026-1	TPHd Analyzed:	NR
		Matrix:	Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100
SAMPLE Laboratory Identification						
W-37-MW3 W1008009	ND	ND	ND	ND	440	NR

ppb = parts per billion = µg/L = micrograms per liter.
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.
NR = Analysis not requested.

ANALYTICAL PROCEDURES

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

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

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

Laboratory Representative

August 7, 1990
Date Reported

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

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

togwater.rpt

Report Prepared for:
Applied GeoSystems
3315 Almaden Expressway
San Jose, CA 95118
Attention: Mark Barminski

Date Received: 08-01-90
Laboratory #: W1008003
Project #: 60026-1
Sample #: W-37-MW4
Matrix: Water

Parameter	Result (µg/L)	Detection Limit (µg/L)	Date Analyzed
TPH as Oil and Grease	ND	5000	08-06-90

µg/L = micrograms per liter = ppb
ND = Not detected. Compound(s) may be present at concentrations below the detection limit.

PROCEDURES

TPH as Oil and Grease: Total Oil and Grease of mineral or petroleum origin are measured by extraction and gravimetric analysis according to Standard Method 503A/E.

Laura Kuck, Laboratory Manager

August 7, 1990
Date Reported

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

CHROMALAB FILE # 890023

PROJ. NO.	PROJECT NAME
60026-1	Arco 276
P.O. NO.	SAMPLERS (Signature)

DATE MM/DD/YY	TIME	SAMPLE I.D.	No. of Containers	TPHg	BTEX	TPHd	8010	Preserved?	LABORATORY I.D. NUMBER
7/31/90	1600	W-37-MW4	3			X		iced	130
									307
									180

RELINQUISHED BY (Signature)	DATE / TIME	RECEIVED BY (Signature):
Tawa Kuck	8/3/90 9AM	
RELINQUISHED BY (Signature)	DATE / TIME	RECEIVED BY (Signature):
	8/3/90 1:30pm	Madeleine Monet
RELINQUISHED BY (Signature)	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):
Madeleine Monet	8/3/90 3:30pm	

REMARKS:

Chromalab

Normal TAT

SEND RESULTS TO:

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

Proj. Mgr.: Mike Barminski

CHROMALAB, INC.

Analytical Laboratory
Specializing in GC-GC/MS

- Environmental Analysis
- Hazardous Waste (#E694)
- Drinking Water (#955)
- Waste Water
- Consultation

August 16, 1990
APPLIED GEOSYSTEMS, INC.
Project Name: Arco 276
Sample No.: W-37-MW4
Date Sampled: July 31, 1990
Date of Analysis: August 13, 1990

ChromaLab File No.: 0890023
Attn: Mike Barminski
Project No.: 60026-1
Detection Limit: 1 µg/L
Date Submitted: Aug. 3, 1990

601/8010	µg/L
Dichlorodifluoromethane	N.D.
Chloromethane	N.D.
Vinyl Chloride	N.D.
Bromomethane	N.D.
Chlorethane	N.D.
Trichlorofluoromethane	N.D.
1,1-Dichloroethene	N.D.
Methylene Chloride	N.D.
t-1,2-Dichloroethene	N.D.
c-1,2-Dichloroethene	N.D.
1,1-Dichloroethane	N.D.
Chloroform	N.D.
1,1,1-Trichloroethane	N.D.
Carbon Tetrachloride	N.D.
1,2-Dichloroethane	N.D.
Trichloroethene	7.5
1,2-Dichloropropane	N.D.
Bromodichloromethane	N.D.
2-Chloroethylvinyl ether	N.D.
t-1,3-Dichloropropene	N.D.
Cis-1,3-Dichloropropene	N.D.
1,1,2-Trichloroethane	N.D.
1,1,2-Trichlorotrifluorethane	N.D.
Tetracnloroethene	1600
Dibromochloromethene	N.D.
Chlorobenzene	N.D.
Bromoform	N.D.
1,1,2,2-Tetrachloroethane	N.D.
1,3-Dichlorobenzene	N.D.
1,4-Dichlorobenzene	N.D.
1,2-Dichlorobenzene	N.D.

QA/QC:

*Sample blank concentration is none detected.

*Spiked recovery for Methylene Chloride is 97.5%, Trichloroethene is 101.2%, 1,1,2-Trichloroethane is 89.9%, and Bromoform is 105.2%

CHROMALAB, INC.

David Duong, Sr. Chemist

Eric Tam, Lab Director

2239 Omega Road, #1 • San Ramon, California 94583
415/831-1788 • Facsimile 415/831-8798