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

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

April 16, 1991
0211ccar
AGS 60026.02

Mr. Chuck Carmel
ARCO Products Company
P.O. Box 5811
San Mateo, California 94402

Subject: First Quarter 1991 Ground-Water Monitoring Report for ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California.

Mr. Carmel:

This letter report summarizes the methods and results of First Quarter 1991 ground-water monitoring performed by RESNA/Applied GeoSystems (AGS) at the above-referenced site. The station is on the southeastern side of the intersection of 106th Avenue and MacArthur Boulevard in Oakland, California, as shown on the Site Vicinity Map (Plate 1). ARCO Products Company (ARCO) has requested that AGS perform monthly ground-water monitoring and quarterly sampling and analyses to monitor hydrocarbon concentrations associated with the former waste-oil and gasoline tanks at the site, and to evaluate trends related to fluctuations of these hydrocarbon concentrations and ground-water gradient over time.

Prior to the present monitoring, Pacific Environmental Group (Pacific) and AGS performed limited subsurface environmental investigations related to the former underground gasoline and waste-oil storage tanks at the site. Pacific performed soil sampling and observation during removal of the waste-oil tank in December 1988. Our work included the installation of five ground-water monitoring wells (MW-1 through MW-5) in March 1989, and soil sampling and observation during removal of the gasoline tanks in February 1990. AGS also drilled three exploratory soil borings and collected soil samples from the new tank pit area. The results of these investigations are presented in the reports listed in the references attached to this letter report. The locations of the ground-water monitoring wells and pertinent site features are shown on the Generalized Site Plan (Plate 2).

Ground-Water Sampling and Gradient Evaluation

AGS personnel performed quarterly ground-water monitoring and sampling on January 30, 1991. Field work consisted of measuring depth-to-water (DTW) levels in wells MW-1, MW-2, MW-4, and 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 monitoring wells MW-1, MW-4, and MW-5 for laboratory analysis. Well MW-2 containing floating product and well MW-3 was dry on this date. The ground-water sampling protocol is attached (Appendix A).

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 gradient interpreted from the January 30, 1991 monitoring data is 0.005 to the northeast and is generally consistent with previously interpreted ground-water gradients for this site. This gradient interpretation is shown on the Ground-Water Gradient Map (Plate 3). 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; well MW-3 was dry.

Water samples were collected from wells MW-1, MW-2, MW-4, and MW-5 for subjective analysis (Table 1) before the monitoring wells were purged and sampled. Subjective analysis of water samples from well MW-2 indicated approximately 0.03 feet of floating product. No floating product was noted in the other wells on this date. The floating product was subsequently removed from well MW-2 and transported by Armour Petroleum to a disposal facility.

Monitoring wells MW-1, MW-4, and MW-5 were purged and sampled on January 30, 1991 in accordance with the attached protocol. Well purge data sheets for the parameters monitored for each well sampled 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, MW-4, and 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 (HVOs) 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). TPHg and Benzene concentrations are shown on Plate 4. 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, MW-4, and MW-5 indicated:

- nondetectable concentrations of TPHg and BTEX in wells MW-1, MW-4, and MW-5, except for 1.2 parts per billion (ppb) ethylbenzene in well MW-4;
- nondetectable concentrations of TOG and TPHd in well MW-4; and
- 12 ppb trichloroethene and 4,900 ppb tetrachloroethene detected as HVOs in well MW-4.

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 wells MW-1 and MW-5 are relatively constant and BTEX concentrations in these wells are nondetectable or low (within drinking water standards). Tetrachloroethene and trichloroethene are increasing in well MW-4. We recommend continued monthly ground-water monitoring and quarterly ground-water sampling for TPHg and BTEX in all wells and TPHd in well MW-4. Since TOG has been nondetectable since July 1990, we recommend annual sampling of well MW-4 for TOG. We also recommend analyzing water samples from all wells at the site for volatile organic compounds (VOCs) by EPA Method 601.

Schedule

Applied GeoSystems will continue the monthly water level measurements and 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 second quarter monitoring episode is scheduled for April 30, 1991. The

February and March monthly monitoring data will be included in the Second Quarter 1991 Ground-Water Monitoring report.

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, 7th Floor
Oakland, California 94612

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

Sincerely,
Applied GeoSystems

M. J. Barminski

Michael J. Barminski
Staff Geologist

Joan E. Tiernan

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, January 30, 1990
Plate 4, TPHg and Benzene Concentration Map

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
Chain of Custody Record (2 pages)
Laboratory Analysis Reports (3 pages)

cc: H.C. Winsor, ARCO

REFERENCES

Applied GeoSystems, February 11, 1991. " Report Underground Gasoline Storage Tank Removal and Replacement at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California". AGS job 19014-5.

Applied GeoSystems. January 29, 1991. "Fourth Quarter 1990 Ground-Water Monitoring at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California". AGS job 60026.01.

Applied GeoSystems. January 2, 1991. "Letter Report Quarterly Ground-Water Monitoring Third Quarter 1990 at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California". AGS job 60026.01.

Applied GeoSystems. October 4, 1990. "Draft 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.

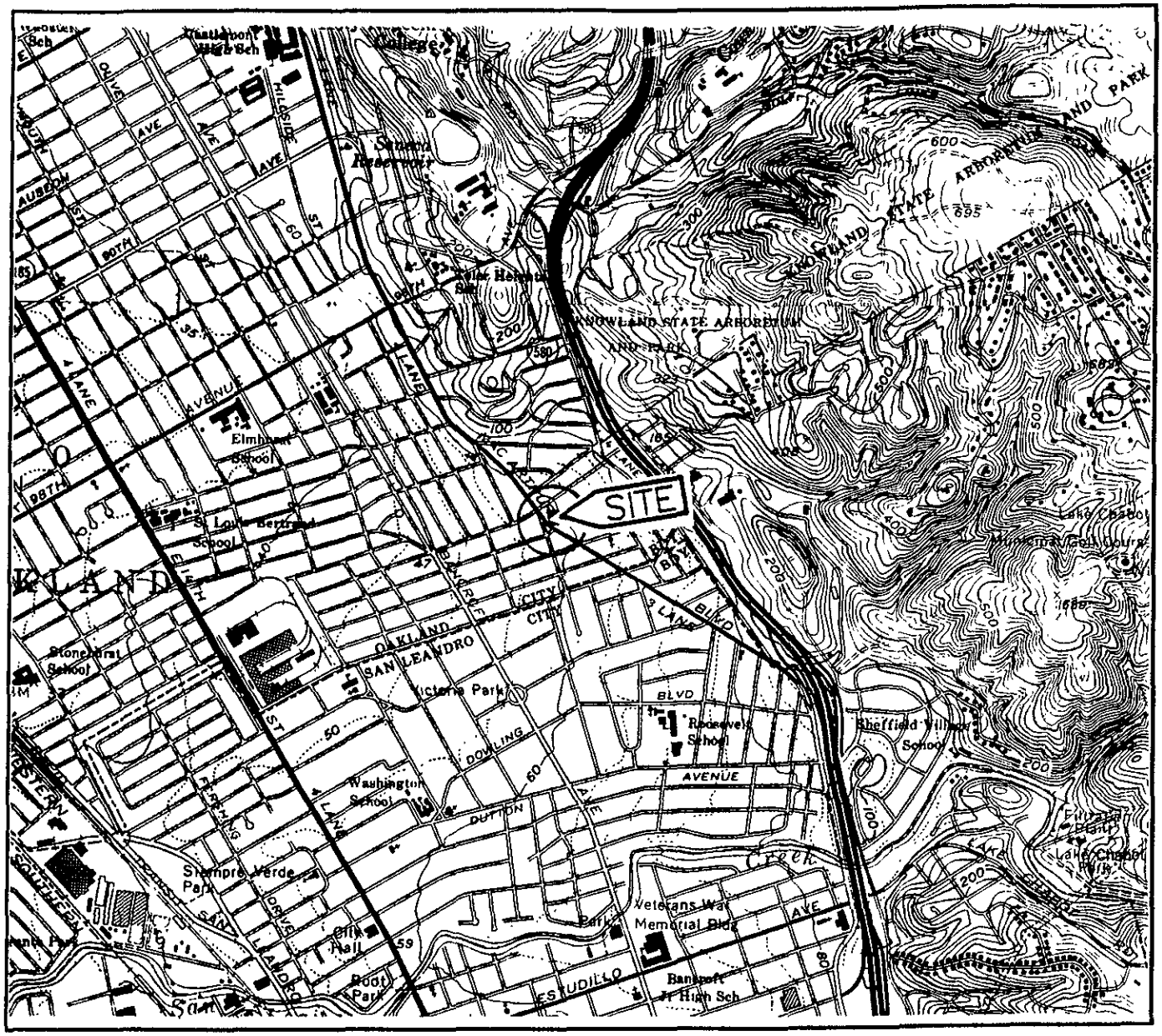
Applied GeoSystems. March 6, 1989. "Report Limited Subsurface Environmental Investigation". Job No. 19014-1.

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.



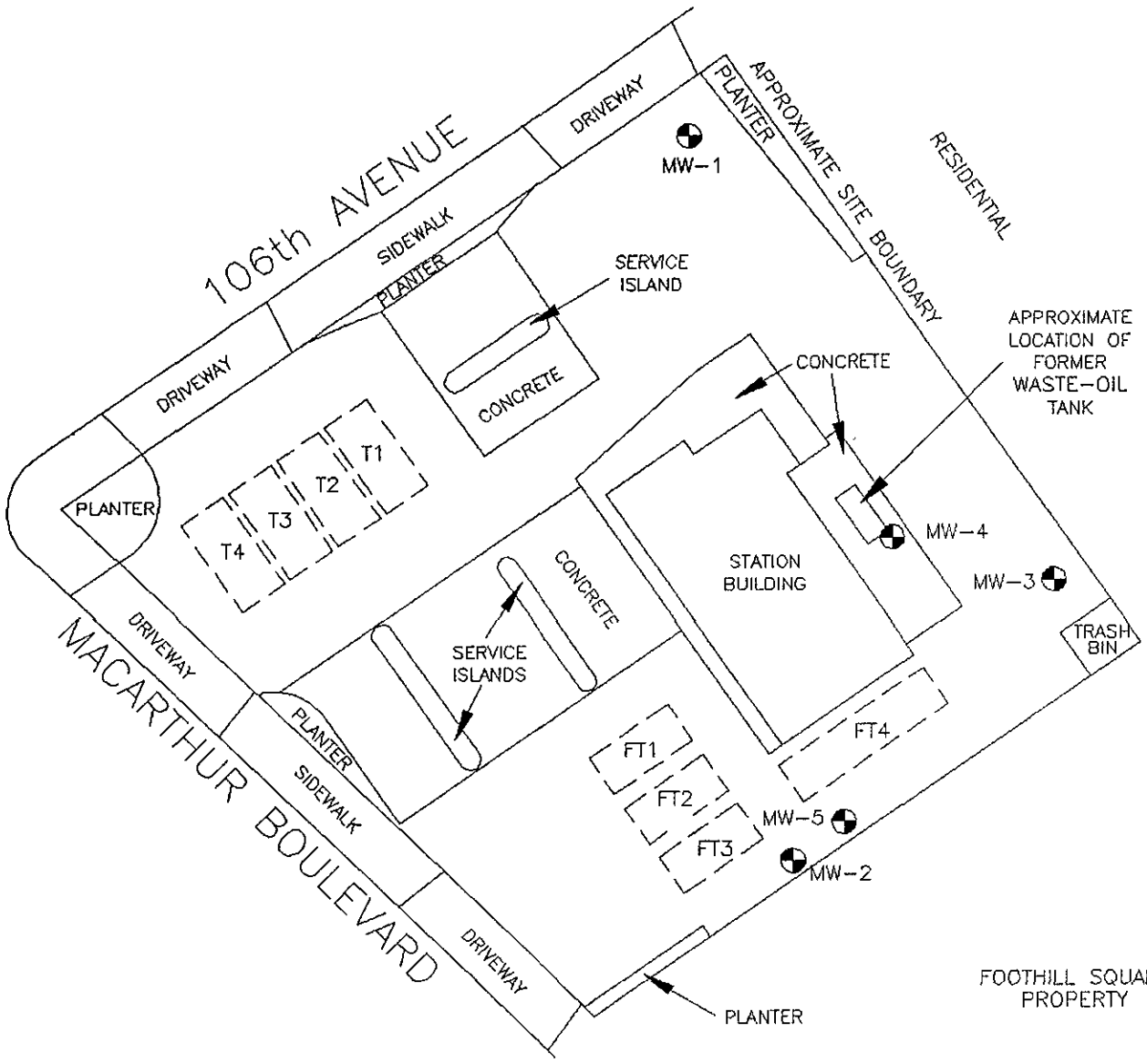
Source: U.S. Geological Survey
7.5-Minute Quadrangle
Oakland East/San Leandro
California
Photorevised 1980

Applied GeoSystems

PROJECT 60026-2

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

PLATE 1



EXPLANATION

MW-5 = Approximate location of monitoring well (Applied GeoSystems, 1989)

T4 = Existing underground Storage Tanks

FT4 = Former underground Storage Tanks

Approximate Scale

30 15 0 30 60

feet

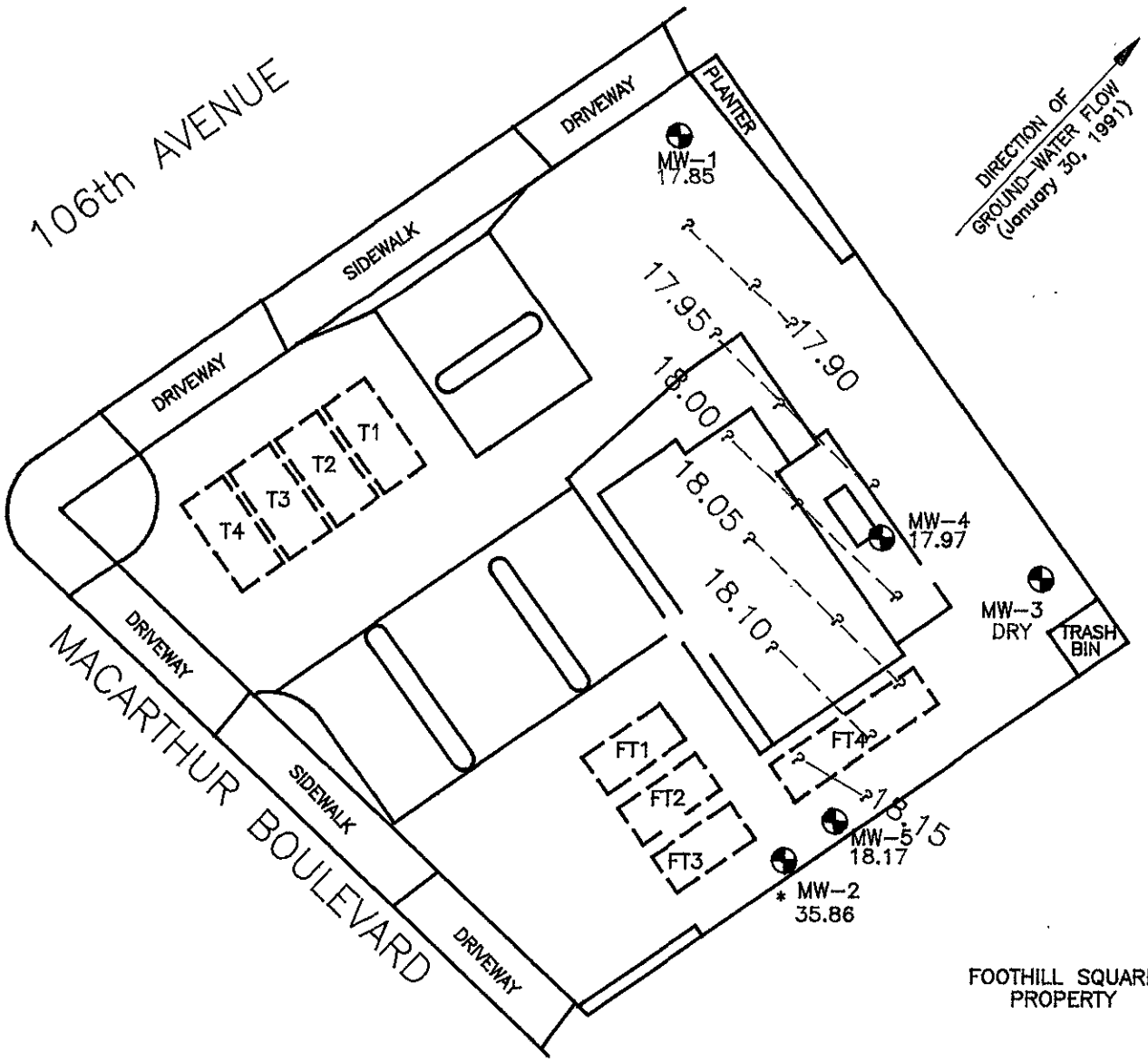
Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc.

Applied GeoSystems

PROJECT 60026-2

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

PLATE 2



EXPLANATION

18.17 = Elevation of ground water in feet, January 30, 1991

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

MW-5 = Approximate location of monitoring well (Applied GeoSystems, 1989)

*MW-2 = Constructed in a shallow perched zone and not used for ground-water gradient interpretation

Approximate Scale

30 15 0 30 60

feet

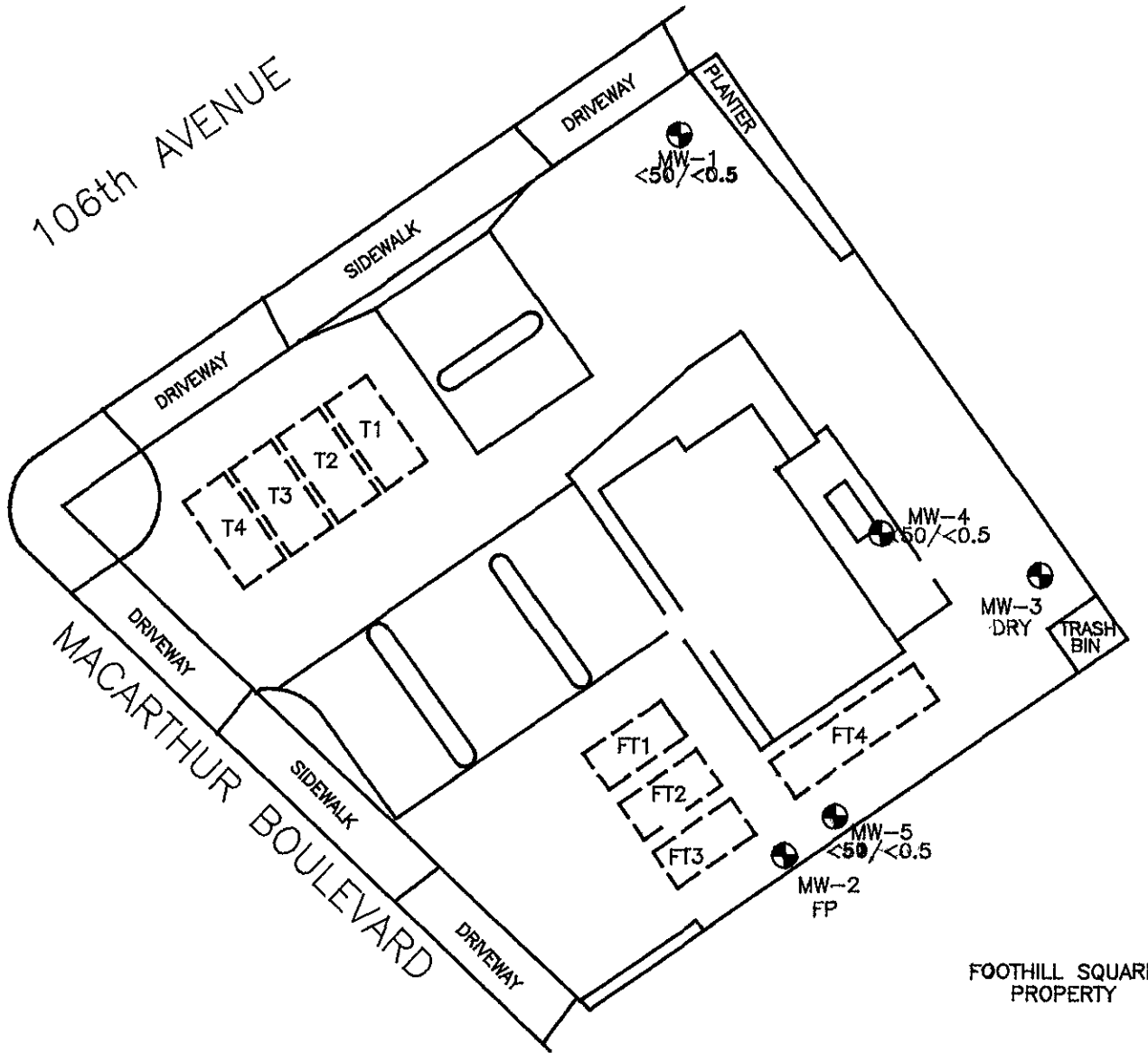
Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc.

Applied GeoSystems

PROJECT 60026-2

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

PLATE 3



EXPLANATION

<50/<0.5 = Concentration of TPHg/Benzene in ground water in ppb, January 1991

FP = Floating Product

Dry = Dry—Not Sampled

MW-5 = Approximate location of monitoring well (Applied GeoSystems, 1989)

Approximate Scale

30 15 0 30 60

feet

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

Applied GeoSystems

PROJECT 60026-2

TPHg/BENZENE CONCENTRATIONS IN GROUND WATER
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
10/30/90		37.73	18.18	None
11/20/90		37.92	18.37	None
12/19/90		37.90	18.01	None
1/30/91		38.06	17.85	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
10/30/90		25.04	30.31	1.04
11/20/90		25.56	29.79	0.60
12/19/90		18.23	37.12	Odor
1/30/91		19.49	35.86	0.03
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
10/30/90		38.15	18.40	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-3 continued				
11/20/90		38.33	18.58	None
12/19/90		38.30	18.25	None
1/30/91			Well Dry	
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		6.32	19.62	None
08/28/90		36.79	19.15	None
10/30/90		37.62	18.32	None
11/20/90		37.82	18.52	None
12/19/90		37.74	18.20	None
1/30/91		37.97	17.97	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
10/30/90		36.94	18.49	None
11/20/90		37.09	18.64	None
12/19/90		37.05	18.38	None
1/30/91		37.26	18.17	None

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 2)

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
10/30/90	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
1/30/91	<50	NA	<0.5	<0.5	<0.5	<0.5	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
10/30/90			FLOATING PRODUCT				
1/30/91			FLOATING PRODUCT				
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
10/30/90	340	NA	<0.5	<0.5	<0.5	<0.5	NA
1/30/91	NS	NS	NS	NS	NS	NS	NS
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
10/30/90	430	<100	<0.5	<0.5	<0.5	<0.5	<5,000
1/30/91	<50	<100	<0.5	<0.5	1.2	<0.5	<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
10/30/90	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
1/30/91	<50	NA	<0.5	<0.5	<0.5	<0.5	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: Ethylbenzene, 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. NS:Not sampled.

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

Date/Well		HVOs	MCLs
MW-4			
07/31/90	Trichloroethene	7.5	5.0
	Tetrachloroethene	1600	5.0
	1,2 Dichloroethene	0.7	6.0
10/30/90	Trichloroethene	8.1	5.0
	Tetrachloroethene	3600	5.0
	1,2 Dichloroethene	0.7	6.0
1/30/91	Trichlorethene	12	5.0
	Tetrachloroethene	4,900	5.0

what about MW 3 MW 5

Results in micrograms per liter (ug/L) = parts per billion (ppb).
HVO: Halogenated Volatile Organics (measured by EPA method 601/8010).
Compounds not shown not detected.
NA: Not analyzed
MCL: Maximum Contaminant Levels as reported by the California Department of Health Services 10/24/90.

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.

The static water level in each well that was suspected to contain floating product was measured with an ORS® interface probe; this instrument is accurate to the nearest 0.01 foot. The probe contains two different sensor units, one for detecting the liquid/air interface, and one for distinguishing between water and hydrocarbon. The thickness of the floating product and the ground-water depths were recorded. The recorded thickness of the floating product was then multiplied by 0.80 to obtain an approximate value for the displacement of water by the floating product. This approximate displacement value is then subtracted from the measured depth to water to obtain a calculated depth to water. These calculated ground-water depths were subtracted from wellhead elevations measured 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 evidence of free 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 1 well casing volume of water was purged before these wells were pumped dry or 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 volume 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. 60026.02

Date: 01/30/91 Page 1 of 1

Well No. MW-1 Time Started 10:15

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)
10:15	Begin pumping well MW-1			
10:20	.2	63.1	7.41	3.39
10:25	.3	64.4	7.18	3.24
10:30	.4	64.9	6.98	3.28
10:35	.45	64.9	6.92	3.30
10:40	.5	64.9	6.94	3.29
10:41	Well dry and stabilized, stop bailing.			

Notes:

Depth to Bottom (feet)	: 38.95
Depth to Water - initial (feet)	: 38.06
Depth to Water - final (feet)	: 38.11
% recovery	: 94.38%
Time Sampled	: 3:00
Gallons per Well Casing Volume	: 0.47
Gallons Purged	: .5
Well Casing Volumes Purged	: 1.06
Approximate Pumping Rate (gpm)	: 0.02

WELL PURGE DATA SHEET

Project Name: ARCO 276 Job No. 60026.02

Date: 01/30/91 Page 1 of 1

Well No. MW-4 Time Started 12:20

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)
12:20	Begin pumping well MW-4			
12:20	1	60.1	7.84	1.49
12:25	5	62.1	7.74	1.55
12:30	10	61.4	7.74	1.55
12:40	15	61.2	7.83	1.51
12:45	20	61.1	7.81	1.50
12:50	25	60.8	7.96	1.52
12:55	30	61.1	8.00	1.50
1:00	35	61.1	8.01	1.47
1:05	40	61.0	8.02	1.48
1:06	Well dry and stabilized, stop bailing.			

Notes:

Depth to Bottom (feet)	: 48.75
Depth to Water - initial (feet)	: 38.97
Depth to Water - final (feet)	: 38.95
% recovery	: 90.1
Time Sampled	: 3:30
Gallons per Well Casing Volume	: 27.63
Gallons Purged	: 40
Well Casing Volumes Purged	: 1.45
Approximate Pumping Rate (gpm)	: 0.88

WELL PURGE DATA SHEET

Project Name: ARCO 276 Job No. 60026.02

Date: 01/30/91 Page 1 of 1

Well No. MW-5 Time Started 10:20

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)
10:20	Begin pumping well MW-5			
10:20	1	62.2	7.72	5.22
10:25	5	65.0	7.60	4.71
10:40	10	63.0	7.88	4.41
10:45	15	59.8	7.97	4.36
10:50	20	61.8	7.80	4.42
10:55	25	59.8	7.65	4.43
11:00	30	60.8	7.74	4.68
11:05	35	60.4	7.55	5.01
11:10	40	62.4	7.65	4.89
11:15	45	61.9	7.93	4.94
11:20	50	62.5	7.96	4.71
11:25	55	62.0	7.58	4.72
11:30	60	60.9	7.82	4.71
11:31	Well dry and stabilized, stop bailing.			

Notes:

Depth to Bottom (feet) : 47.18
Depth to Water - initial (feet) : 37.26
Depth to Water - final (feet) : 37.45
% recovery : 98.01%
Time Sampled : 3:15
Gallons per Well Casing Volume : 25.79
Gallons Purged : 70
Well Casing Volumes Purged : 2.71
Approximate Pumping Rate (gpm) : 0.88

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

PROJ. NO.	PROJECT NAME
60026-2	ARCO 276
P.O. NO.	SAMPLERS (Signature)
	Mike Barminski

DATE MM/DD/YY	TIME		No. of Containers	TPHgasoline (8015)	BTEX (602/8020)	TPHdiesel (8015)	TOG	601/VOC's				Preserved?	REMARKS	LABORATORY I.D. NUMBER
				ANALYSIS										
1/30/91	3:00	W-38-MW-1	4	X	X							HCl		
1/30/91	3:15	W-38-MW-5	4	X	X							HCl		
1/30/91	3:30	W-39-MW-4	4	X	X							HCl		
1/30/91	3:35	W-39-MW-4	2					X				ice		
1/30/91	3:40	W-39-MW-4	3			X	X							

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
Mike Barminski	1/31/91 4:40	
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature): 2-1-91 8:00

Laboratory: Applied Analytical

Turn Around: 2week

SEND RESULTS TO:

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

Proj. Mgr.: MIKE BARMINSKI

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:	01-30-91
	Applied GeoSystems	Date Received:	02-01-91
	3315 Almaden Expressway	BTEX Analyzed:	02-05-91
	San Jose, CA 95118	TPHg Analyzed:	02-05-91
Project:	AGS 60026-2	TPHd Analyzed:	02-11-91
		Matrix:	Water

	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.5	0.5	0.5	0.5	50	100
SAMPLE Laboratory Identification						
W-38-MW1 W1102001	ND	ND	ND	ND	ND	NR
W-38-MW5 W1102002	ND	ND	ND	ND	ND	NR
W-39-MW4 W1102003	ND	ND	1.2	ND	ND	ND

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

February 11, 1991
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:	01-30-91
	Applied GeoSystems	Date Received:	02-01-91
	3315 Almaden Expressway	TOG Analyzed:	02-11-91
	San Jose, CA 95118	Matrix:	Water
Project:	AGS 60026-2	Detection Limit:	5000 µg/L

SAMPLE Laboratory Identification	TOG (µg/L)
W-39-MW4 W1102003	ND

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

ANALYTICAL PROCEDURES

TPH as Oil and Grease – Total Oil and Grease (TOG) of mineral or petroleum origin are measured by extraction and gravimetric analysis according to Standard Method 5520 B/F.

Laboratory Representative

February 12, 1991
Date Reported

CHAIN-OF-CUSTODY RECORD

CHROMALAB FILE # 291003

1527

PROJ. NO.	PROJECT NAME
60026-2	Arco
P.O. NO.	SAMPLERS (Signature)

DATE MM/DD/YY	TIME		No. of Containers	TPHgasoline (8015)	BTEX (602/8020)	TPHdiesel (8015)	VOC (601)					Preserved?	REMARKS	LABORATORY I.D. NUMBER
				ANALYSIS										
1-30-91		W-39-MW4	2				✓							

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
[signature]	2-1-91 11:45	T. Dawson
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):
	2-1 1:00	T. Dawson

Laboratory: chromalab

Turn Around: 1 week

SEND RESULTS TO:

Applied Analytical
42501 Albrae Street
Fremont, California

(415) 623-0775

Proj. Mgr.: Laura Kuelz

CHROMALAB, INC.

Analytical Laboratory
Specializing in GC-GC/MS

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

February 6, 1991 ChromaLab File # 0291003

Client: Applied Analytical Attn: Laura Kuck
Date Sampled: Jan. 30, 1990 Date Submitted: Feb. 01, 1990
Date of Analysis: Feb. 06, 1990

Project No.: 60026-2 Project Name: Arco
Sample I.D.: W-39-MW4
Method of Analysis: EPA 601 Detection Limit: 0.5 µg/L

COMPOUND NAME	µg/L	Spike Recovery
CHLOROMETHANE	N.D.	---
VINYL CHLORIDE	N.D.	---
BROMOMETHANE	N.D.	---
CHLOROETHANE	N.D.	---
TRICHLOROFLUOROMETHANE	N.D.	---
1,1-DICHLOROETHENE	N.D.	85.7% 92.4%
METHYLENE CHLORIDE	N.D.	---
1,2-DICHLOROETHENE (TOTAL)	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	12	92.8% 93.1%
1,2-DICHLOROPROPANE	N.D.	---
BROMODICHLOROMETHANE	N.D.	---
2-CHLOROETHYLVINYLETHER	N.D.	---
TRANS-1,3-DICHLOROPROPENE	N.D.	---
CIS-1,3-DICHLOROPROPENE	N.D.	---
1,1,2-TRICHLOROETHANE	N.D.	---
TETRACHLOROETHENE	4900	86.7% 88.4%
DIBROMOCHLOROMETHANE	N.D.	---
CHLOROBENZENE	N.D.	---
BROMOFORM	N.D.	---
1,1,2,2-TETRACHLOROETHANE	N.D.	85.2% 87.7%
1,3-DICHLOROBENZENE	N.D.	---
1,4-DICHLOROBENZENE	N.D.	---
1,2-DICHLOROBENZENE	N.D.	---

ChromaLab, Inc.

David Duong
Senior Chemist

Eric Tam
Lab Director

2239 Omega Road, #1 • San Ramon, California 94583
415/831-1788 • Facsimile 415/831-8798
Federal ID #68-0140157