

Applied GeoSystems

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

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LETTER REPORT
QUARTERLY GROUND-WATER MONITORING
First Quarter 1991

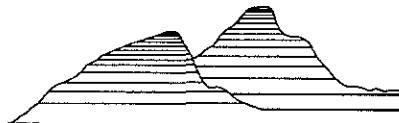
at

ARCO Station 2152
22141 Center Street
Castro Valley, California

3/91

AGS 69013-5





Applied GeoSystems

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

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March 24, 1991

0129ccar

AGS 69013-5

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

Subject: Letter Report of First Quarter 1991 Ground-Water Monitoring Report for ARCO Station 2152, 22141 Center Street, Castro Valley, California.

Mr. Carmel:

This letter report summarizes the methods and results of First Quarter 1991 ground-water monitoring performed by Applied GeoSystems (AGS) at the above-referenced site. The station is on the southwest corner of the intersection of Grove Way and Center Street in Castro Valley, California, as shown on the Site Vicinity Map (Plate 1). ARCO has requested that AGS perform quarterly ground-water sampling and analyses to monitor hydrocarbon concentrations associated with the former gasoline tanks at the site, and to evaluate trends related to fluctuations of these hydrocarbon concentrations. ARCO also requested that AGS perform monthly monitoring of water levels in the wells at the site to evaluate monthly fluctuations in ground-water gradient.

Prior to the present monitoring, AGS performed a subsurface environmental investigations related to the underground gasoline-storage tanks at the site. AGS performed observation and sampling during tank replacement activities at the site in August 1989. In June 1990, AGS performed a limited environmental investigation at the site, including drilling and sampling nine soil borings and installing four ground-water monitoring wells (MW-1, MW-2, MW-3, and MW-4) and two vadose monitoring wells (VW-1 and VW-2). 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 and vadose monitoring wells and pertinent site features are shown on the Generalized Site Plan (Plate 2).

Ground-Water Sampling and Gradient Evaluation

AGS personnel performed monthly monitoring of depth-to-water (DTW) levels and subjective analysis of water samples in the wells onsite on December 14, 1990 and January 8, 1991, and performed quarterly ground-water monitoring and sampling on January 8, 1991. Field work consisted of measuring depth-to-water (DTW) levels in wells MW-1, MW-2, MW-3, and MW-4; 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 (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. DTW levels and subjective analysis data were collected from the wells at the site on December 14, 1990 and January 8, 1991. The interpreted ground-water gradients of 0.004 to the southwest from the December 14, 1990 monitoring data and 0.004 to the southwest from the January 8, 1991 monitoring episodes are shown on the Ground-Water Gradient Maps (Plates 3 and 4, respectively). These interpreted gradients are generally consistent with the previously interpreted ground-water gradients for this site.

Water samples were collected from wells MW-1, MW-2, MW-3, and MW-4 for subjective analysis on December 14, 1990 and on January 8, 1991 before the monitoring wells were purged and sampled. No evidence of floating product or product odor was noted in the wells. Monitoring wells MW-1, MW-2, MW-3, MW-4 were then purged and sampled. Cumulative results of subjective analyses data are presented in Table 1.

Wells MW-1, MW-2, MW-3, and MW-4 were sampled on January 8, 1991, in accordance with the attached protocol. Well purge data sheets for the parameters monitored and stabilization graphs for each well are also attached.

Laboratory Analysis

Water samples collected from the wells were delivered to Applied Analytical Environmental Laboratories in Fremont, California (Hazardous Waste Testing Laboratory No. 1211). The water samples from wells MW-1, MW-2, MW-3, and MW-4 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 Chain of Custody Records and Laboratory Analysis Reports are attached. Results of these and previous water analyses are summarized in Table 2, Cumulative Results of Laboratory Analyses of Ground Water.

Results of this quarter's laboratory analyses of water samples from wells MW-1 through MW-4 indicate:

- o nondetectable concentrations of TPHg (<50 parts per billion [ppb]) and BTEX (<0.5 ppb) in the water samples collected from the wells at the site.

Conclusions and Recommendations

Gasoline hydrocarbons have not impacted ground water beneath the site based on quarterly monitoring results since September 1990, which indicate nondetectable concentrations of BTEX and TPHg in ground water from wells MW-1 through MW-4 onsite. Concentrations of hydrocarbons were detected in wells MW-1, MW-2, and MW-3 during the initial sampling episode in June 1990.

We recommend continued quarterly ground-water monitoring and monthly monitoring of ground-water levels at this site to confirm nondetectable levels of gasoline hydrocarbons in ground water and to monitor changes in ground-water gradient with time. Recommendations for additional work at the site will be included under separate cover.

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 and quality control will be performed as necessary during these site visits. The next quarterly monitoring episode is scheduled for April 2, 1991.

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

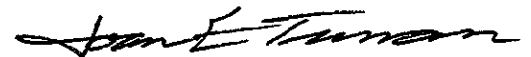
Mr. Lester Feldman
Regional Water Quality Control Board
San Francisco Bay Region
1800 Harrison Street
Oakland, California 94612

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

Sincerely,
Applied GeoSystems



Michael J. Barminski
Staff Geologist



Joan E. Tiernan
Registered Civil Engineer
No. 044600

Enclosures: References
 Plate 1, Site Vicinity Map
 Plate 2, Generalized Site Plan
 Plate 3, Ground-Water Gradient Map, December 14, 1990
 Plate 4, Ground-Water Gradient Map, January 8, 1991

 Table 1, Cumulative Ground-Water Monitoring Data
 Table 2, Cumulative Results of Laboratory Analyses of Ground Water

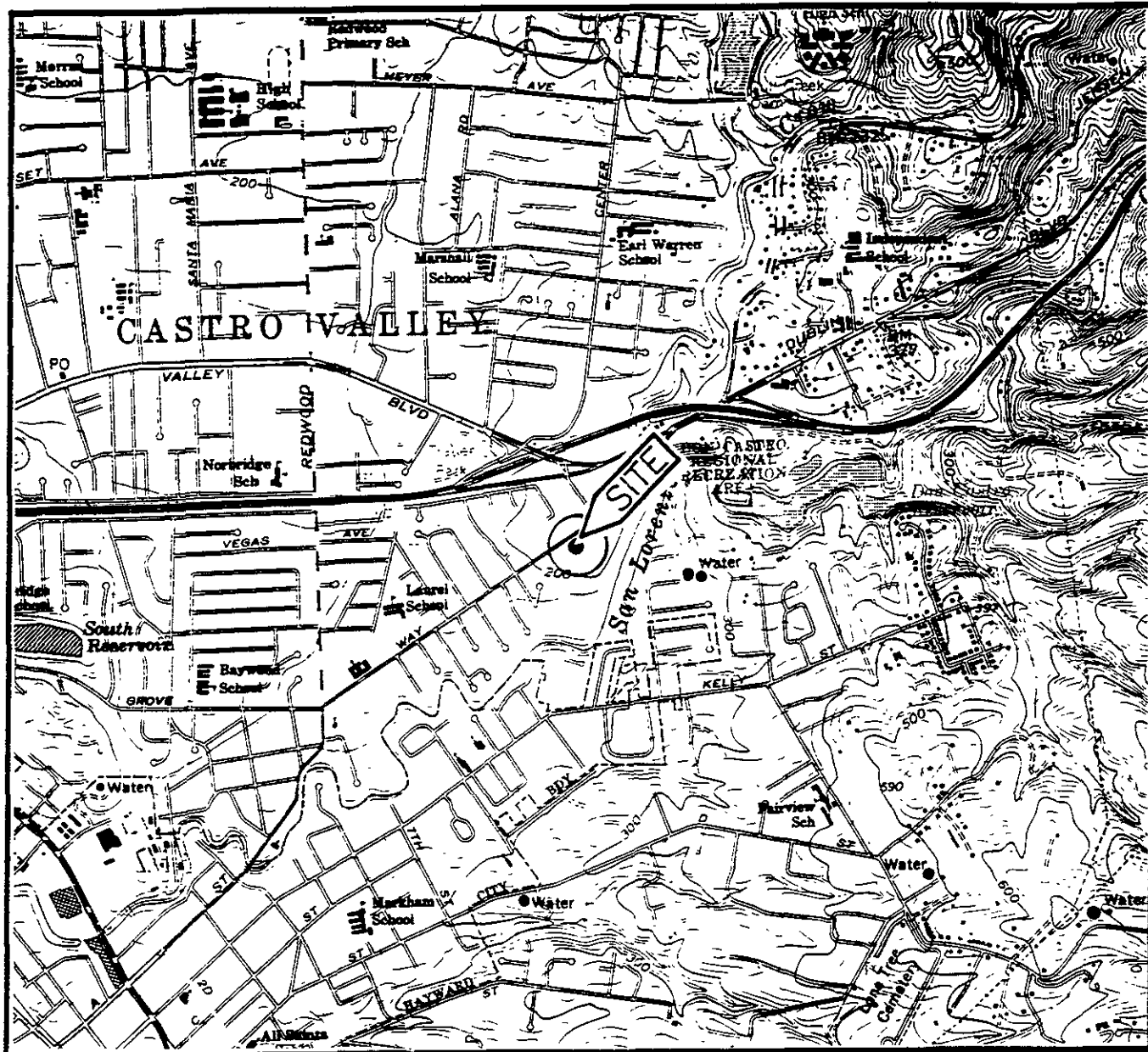
 Appendix A: Ground-Water Sampling Protocol
 Well Purge Data Sheets
 Chain of Custody Record (1 page)
 Laboratory Analysis Report (1 page)

REFERENCES

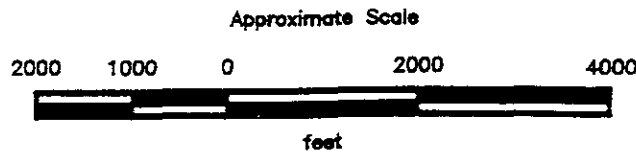
Applied GeoSystems. November 13, 1990. Environmental Subsurface Investigation at ARCO Station 2152, 22141 Center Street, Castro Valley, California: AGS Report 69013-4.

Applied GeoSystems. January 18, 1990. Limited Subsurface Environmental Investigation Related to Underground Tank Removal, 22141 Center Street, Castro Valley, California: AGS Report 69013-2.

Applied GeoSystems. May 26, 1989. Limited Environmental Site Assessment, 22141 Center Street, Castro Valley, California, AGS Report 69013-1.



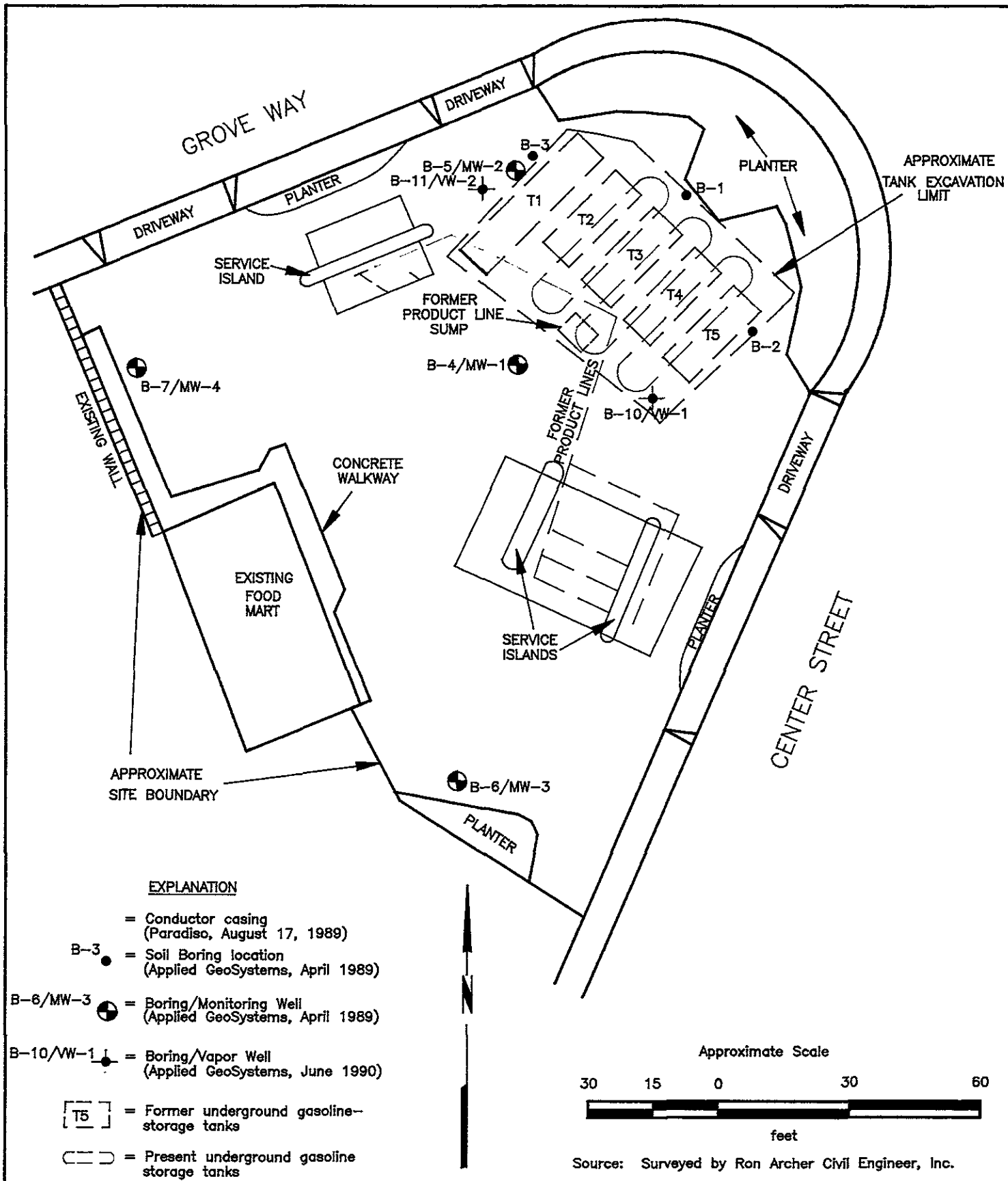
Source: U.S. Geological Survey
 7.5-Minute Quadrangle
 Hayward, California
 Photorevised 1980



PROJECT 69013-5

**SITE VICINITY MAP
 ARCO Station 2152
 22141 Center Street
 Castro Valley, California**

**PLATE
 1**



EXPLANATION

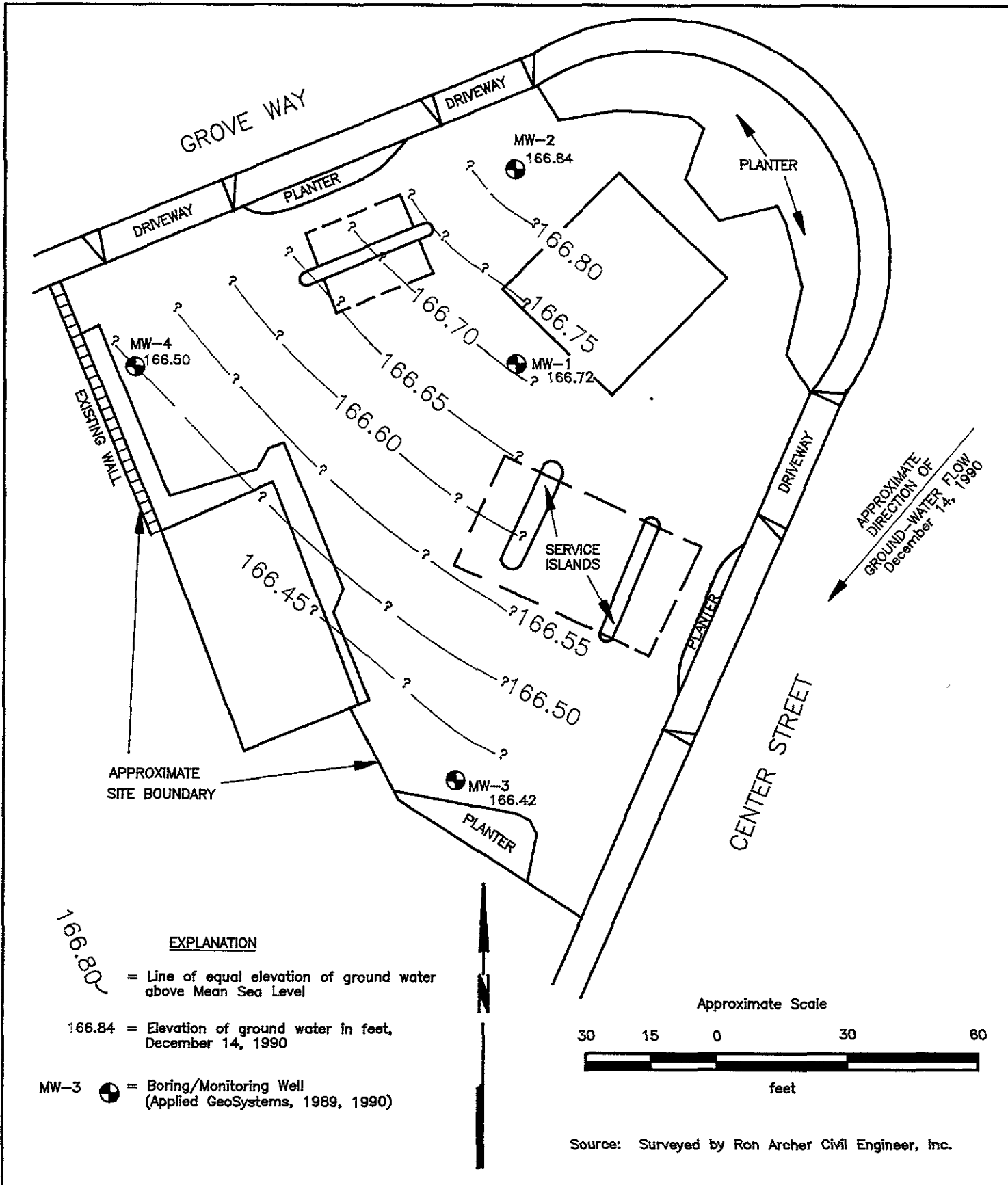
- = Conductor casing (Paradiso, August 17, 1989)
- B-3 ● = Soil Boring location (Applied GeoSystems, April 1989)
- B-6/MW-3 ● = Boring/Monitoring Well (Applied GeoSystems, April 1989)
- B-10/VW-1 ● = Boring/Vapor Well (Applied GeoSystems, June 1990)
- [T5] = Former underground gasoline-storage tanks
- = Present underground gasoline storage tanks

GENERALIZED SITE PLAN
ARCO Station 2152
22141 Center Street
Castro Valley, California

PLATE
2



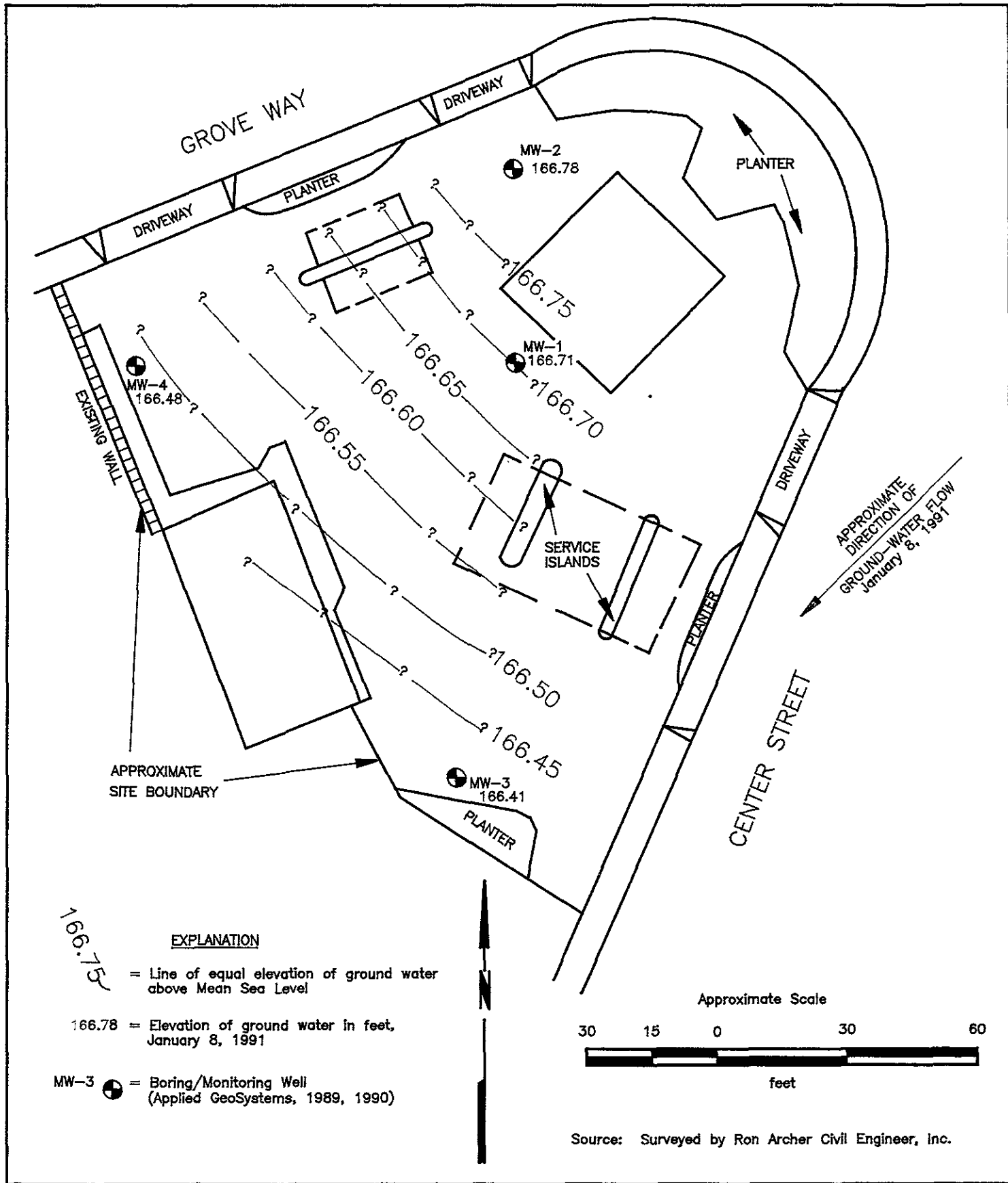
PROJECT 69013-5



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**GROUND WATER GRADIENT MAP
ARCO Station 2152
22141 Center Street
Castro Valley, California**

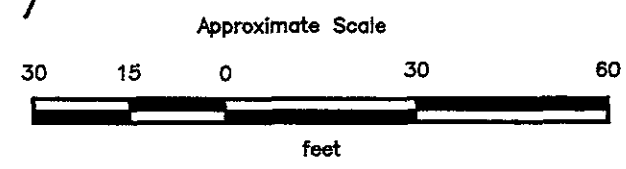
**PLATE
3**



166.75

EXPLANATION

- - - = Line of equal elevation of ground water above Mean Sea Level
- 166.78 = Elevation of ground water in feet, January 8, 1991
- MW-3  = Boring/Monitoring Well (Applied GeoSystems, 1989, 1990)



Source: Surveyed by Ron Archer Civil Engineer, Inc.



PROJECT 69013-5

**GROUND WATER GRADIENT MAP
ARCO Station 2152
22141 Center Street
Castro Valley, California**

**PLATE
4**

TABLE 1
CUMULATIVE GROUND-WATER MONITORING DATA
ARCO Station 2152
Castro Valley, California

Date Well Measured	Depth of Well	Well Elevation	Static Water Depth	Water Elevation
<u>MW-1</u>				
06/25/90	58.10	217.16	49.80	167.36
09/07/90			50.00	167.16
09/26/90			50.09	167.07
12/14/90			50.44	166.72
01/08/91			50.45	166.71
<u>MW-2</u>				
06/25/90	59.20	216.50	49.04	167.46
09/07/90			49.22	167.28
09/26/90			49.32	167.18
12/14/90			49.66	166.84
01/08/91			49.72	166.78
<u>MW-3</u>				
06/25/90	59.70	217.57	50.55	167.02
09/07/90			50.73	166.84
09/26/90			50.81	166.76
12/14/90			51.15	166.42
01/08/91			51.16	166.41
<u>MW-4</u>				
06/25/90	60.30	215.18	48.06	167.12
09/07/90			48.25	166.93
09/26/90			48.35	166.83
12/14/90			48.68	166.50
01/08/91			48.70	166.48

Measurements in feet. Datum is mean sea level.
Static water level measured in feet below top of casing.

TABLE 2
 CUMULATIVE RESULTS OF LABORATORY ANALYSES
 OF GROUND WATER
 ARCO Station 2152
 Castro Valley, California

Well	Date	TPHg	B	T	E	X
MW-1	06/26/90	64	0.63	<0.50	<0.50	<0.50
	09/26/90	<50	<0.50	<0.50	<0.50	<0.50
	01/08/91	<50	<0.50	<0.50	<0.50	<0.50
MW-2	06/26/90	27	<0.50	<0.50	<0.50	<0.50
	09/26/90	<50	<0.50	<0.50	<0.50	<0.50
	01/08/91	<50	<0.50	<0.50	<0.50	<0.50
MW-3	06/25/90	52	0.65	1.5	<0.50	2.0
	09/26/90	<50	<0.50	<0.50	<0.50	<0.50
	01/08/91	<50	<0.50	<0.50	<0.50	<0.50
MW-4	06/25/90	<20	<0.50	<0.50	<0.50	<0.50
	09/26/90	<50	<0.50	<0.50	<0.50	<0.50
	01/08/91	<50	<0.50	<0.50	<0.50	<0.50

Results in parts per billion (ppb).

TPHg: Total petroleum hydrocarbons as gasoline

B:benzene T:toluene E:ethylbenzene X:total xylene isomers

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 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 and sheen.

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. Approximately 5 well casing volumes of water were purged before these characteristics stabilized. The quantity of water purged from the wells was calculated as follows:

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

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 within 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 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 2152

Job No. 69013-5

Date: 09/26/90

Page 1 of 1

Well No. MW-1

Time Started 1:40

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)
1:40	Begin pumping well MW-1			
1:44	4	74.8	7.42	2.09
2:06	10	76.0	7.71	2.13
2:34	15	76.8	7.58	2.15
2:49	20	72.4	7.47	2.05
3:18	25	74.5	7.76	2.12
3:26	30	74.3	7.58	2.04
3:44	35	74.4	7.42	2.05
3:57	40	73.2	7.38	2.03
3:58	Stop purging MW-1			

Notes:

Depth to Bottom (feet) : 58.10
 Depth to Water - initial (feet) : 50.09
 Depth to Water - final (feet) : 50.10
 % recovery : 100.125
 Time Sampled : 8:45
 Gallons per Well Casing Volume : 12.25
 Gallons Purged : 40
 Well Casing Volumes Purged : 3.26
 Approximate Pumping Rate (gpm) : 0.3

WELL PURGE DATA SHEET

Project Name: ARCO 2152

Job No. 69013-5

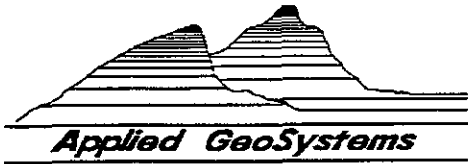
Date: 09/26/90

Page 1 of 2

Well No. MW-2

Time Started 11:15

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)
11:15	Begin pumping well MW-2			
11:33	1	72.5	8.40	2.64
2:07	5	74.3	7.26	2.38
2:27	7.5	73.1	7.34	2.59
3:11	10	76.5	7.40	2.44
3:19	15	74.8	7.30	2.42
3:23	20	73.7	7.22	2.40
3:28	25	75.3	7.26	2.41
3:43	30	75.8	7.30	2.44
Continued on page 2				



91 MAR 82 11:10:53
TRANSMITTAL

3315 Almaden Expressway, Suite 34
San Jose, California 95118
(408) 264-7723 FAX (408) 264-2435

TO: MR. GIL WISTAR
ALAMEDA COUNTY DEPARTMENT OF
ENVIRONMENTAL HEALTH
80 SWAN WAY, ROOM 200
OAKLAND, CA 94621

DATE: 3/28/91
PROJECT NUMBER: 69013.05
SUBJECT: REPORT

FROM: MIKE BARMINSKI
TITLE: STAFF GEOLOGIST

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1	3/24/91	69013.05	LETTER REPORT QUARTERLY GROUND-WATER MONITORING FIRST QUARTER 1991, AT ARCO STATION 2152, 22141 CENTER STREET, CASTRO VALLEY, CA.

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

WELL PURGE DATA SHEET

Project Name: ARCO 2152

Job No. 69013-5

Date: 09/26/90

Page 2 of 2

Well No. MW-2

Time Started 11:15

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)
3:43	Continued from page 1			
3:52	35	72.8	7.38	2.40
4:08	40	75.1	7.29	2.40
4:19	45	74.7	7.52	2.42
4:35	50	74.6	7.12	2.40
4:44	55	73.6	7.31	2.38
4:45	Stop purging MW-2			

Notes:

Depth to Bottom (feet) : 59.68
 Depth to Water - initial (feet) : 49.32
 Depth to Water - final (feet) : 49.35
 % recovery : 99.7
 Time Sampled : 8:00
 Gallons per Well Casing Volume : 15.11
 Gallons Purged : 55
 Well Casing Volumes Purged : 3.64
 Approximate Pumping Rate (gpm) : 0.17

WELL PURGE DATA SHEET

Project Name: ARCO 2152

Job No. 69013-5

Date: 09/26/90

Page 1 of 1

Well No. MW-3

Time Started 10:20

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)
10:20	Begin pumping well MW-1			
10:23	2	71.5	7.63	2.84
10:55	5	70.6	7.58	2.96
11:28	10	70.2	7.62	2.79
11:46	15	69.8	8.13	2.88
11:53	20	68.3	7.64	2.77
12:07	25	69.4	7.63	2.72
12:24	30	69.1	7.74	2.66
12:39	35	70.0	7.63	2.63
1:15	40	75.5	7.62	2.74
1:16	Stop purging MW-3			
Notes:				
	Depth to Bottom (feet)	:	59.68	
	Depth to Water - initial (feet)	:	50.81	
	Depth to Water - final (feet)	:	50.98	
	% recovery	:	98.1	
	Time Sampled	:	7:45	
	Gallons per Well Casing Volume	:	13.57	
	Gallons Purged	:	40	
	Well Casing Volumes Purged	:	2.95	
	Approximate Pumping Rate (gpm)	:	0.23	

WELL PURGE DATA SHEET

Project Name: ARCO 2152

Job No. 69013-5

Date: 09/26/90

Page 1 of 1

Well No. MW-4

Time Started 5:00

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)
5:00	Begin pumping well MW-4			
5:04	2	69.4	7.15	1.97
5:15	5	67.4	7.14	1.86
5:33	10	67.2	7.08	1.93
5:54	16	66.0	7.47	1.89
6:13	20	63.8	6.90	2.21
6:33	27	56.7	5.98	2.32
6:53	32	55.0	6.06	2.03
7:13	37	54.8	5.83	2.02
7:14	Stop purging MW-4			

Notes:

Depth to Bottom (feet) : 60.29
 Depth to Water - initial (feet) : 48.35
 Depth to Water - final (feet) : 48.38
 % recovery : 99.7
 Time Sampled : 8:30
 Gallons per Well Casing Volume : 18.26
 Gallons Purged : 37
 Well Casing Volumes Purged : 2.03
 Approximate Pumping Rate (gpm) : 0.28

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
Applied GeoSystems
3315 Almaden Expressway
San Jose, CA 95118
Project: AGS 69013-5

Date Sampled: 01-08-91
Date Received: 01-09-91
BTEX Analyzed: 01-10-91
TPHg Analyzed: 01-10-91
TPHd Analyzed: NR
Matrix: Water

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>
Detection Limit:	0.50	0.50	0.50	0.50	50	100

SAMPLE

Laboratory Identification

W-50-MW1 W1101109	ND	ND	ND	ND	ND	NR
W-49-MW2 W1101110	ND	ND	ND	ND	ND	NR
W-51-MW3 W1101111	ND	ND	ND	ND	ND	NR
W-48-MW4 W1101112	ND	ND	ND	ND	ND	NR

ppb = parts per billion = $\mu\text{g/L}$ = 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

January 17, 1991

Date Reported