

**Applied GeoSystems, Inc.**

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

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LETTER REPORT  
QUARTERLY GROUND-WATER MONITORING  
Second Quarter 1991

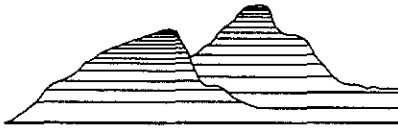
at

ARCO Station 2152  
22141 Center Street  
Castro Valley, California

5/20/91

AGS 69013-5





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May 20, 1991

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AGS 69013-5

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

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

Mr. Carmel:

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

Previously, AGS performed a subsurface environmental investigation of the site related to the former USTs. In August 1989, AGS supervised the replacement of USTs onsite and collected soil samples for laboratory analysis in and around the former tank pit area. In June 1990, AGS performed a limited environmental investigation at the site which included drilling nine soil borings, collecting soil samples from the borings, and installing four ground-water monitoring wells (MW-1 through MW-4) and two vadose monitoring wells (VW-1 and VW-2). The results of these investigations are described 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). Additional onsite investigation of gasoline hydrocarbons in soil is ongoing and the results of this investigation will be included under separate cover.

### Ground-Water Sampling and Gradient Evaluation

AGS personnel performed monthly monitoring for depth-to-water (DTW) levels and subjective analysis for the presence of floating product in the ground water in the wells onsite on February 21, March 8, and April 2, 1991, and performed quarterly ground-water sampling of monitoring wells MW-1 through MW-4 on April 2, 1991. Field work consisted of measuring DTW levels in wells MW-1 through MW-4; subjectively analyzing the ground water from these wells for the presence of gasoline hydrocarbon sheen and floating product; and purging and subsequently sampling the ground water from all four wells for laboratory analysis. The methods utilized during this ground-water sampling episode are described in Appendix A, Ground-Water Sampling Protocol.

Ground-water elevations were calculated for each well by subtracting DTW levels from the surveyed wellhead elevations. 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 February 21, March 19, and April 2, 1991 monitoring data indicate an interpreted ground-water gradient of 0.004 to the south-southwest. Graphic interpretations for the February 21, March 8, and April 2, 1991 monitoring data are shown on the Ground-Water Gradient Maps (Plates 3, 4, and 5, respectively). These interpreted gradients are generally consistent with the previously interpreted ground-water gradients for this site.

Ground-water samples were collected from wells MW-1 through MW-4 for subjective analysis on February 21, March 8, and April 2, 1991. No evidence of measurable floating product or hydrocarbon sheen was noted in the ground-water samples collected for subjective analysis from monitoring wells MW-1 through MW-4.

Monitoring wells MW-1 through MW-4 were purged and sampled for laboratory analysis on April 2, 1991, in accordance with the attached protocol (Appendix A). Well purge data sheets for the parameters monitored and stabilization graphs for each well are also included in Appendix A.

### Laboratory Analysis

Ground-water samples collected from each of the monitoring wells (MW-1 through 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. All ground-water samples were delivered to Columbia Analytical Services, Inc., in San Jose, California (Hazardous Waste Testing Laboratory No. 132) under Chain of Custody protocol. The Chain of Custody Records and

Laboratory Analysis Reports are attached to this letter report. Results of these and previous ground-water analyses are summarized in Table 2, Cumulative Results of Laboratory Analyses of Ground Water.

Results of this quarter's laboratory analyses of ground-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 ground-water samples collected from the wells at the site.

### Conclusions and Recommendations

Gasoline hydrocarbons have not impacted the ground water beneath the site based on quarterly monitoring and sampling results from the September 1990, January 1991, and April 1991 sampling episodes, which indicated nondetectable concentrations of BTEX and TPHg in the ground water from wells MW-1 through MW-4. However, the initial sampling episode in June 1990 reported low concentrations of gasoline hydrocarbons in the ground water from monitoring wells MW-1, MW-2, and MW-3.

We recommend continued quarterly ground-water monitoring and sampling to confirm nondetectable concentrations of gasoline hydrocarbons. Monthly ground-water monitoring for DTW levels will be continued at the site to evaluate 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 gasoline 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 July 2, 1991.

We recommend that copies of this report be forwarded to:

Mr. Scott O. Seery  
Alameda County Health Care Services Agency  
80 Swan Way, Room 200  
Oakland, California 94621

Mr. Lester Feldman  
Regional Water Quality Control Board  
San Francisco Bay Region  
2101 Webster Street, Suite 500  
Oakland, California 94612

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

Sincerely,  
Applied GeoSystems

Lou Leet  
Geologic Technician

Joan E. Tiernan  
Engineering Manager

Enclosures:   References  
Plate 1, Site Vicinity Map  
Plate 2, Generalized Site Plan  
Plate 3, Ground-Water Gradient Map, February 21, 1991  
Plate 4, Ground-Water Gradient Map, March 8, 1991  
Plate 5, Ground-Water Gradient Map, April 2, 1991  
  
Table 1, Cumulative Ground-Water Monitoring Data  
Table 2, Cumulative Results of Laboratory Analyses of Ground Water  
  
Appendix A:   Ground-Water Sampling Protocol  
                  Chain of Custody Record (1 page)  
                  Laboratory Analysis Reports (5 pages)

cc: H.C. Winsor, ARCO Products Company

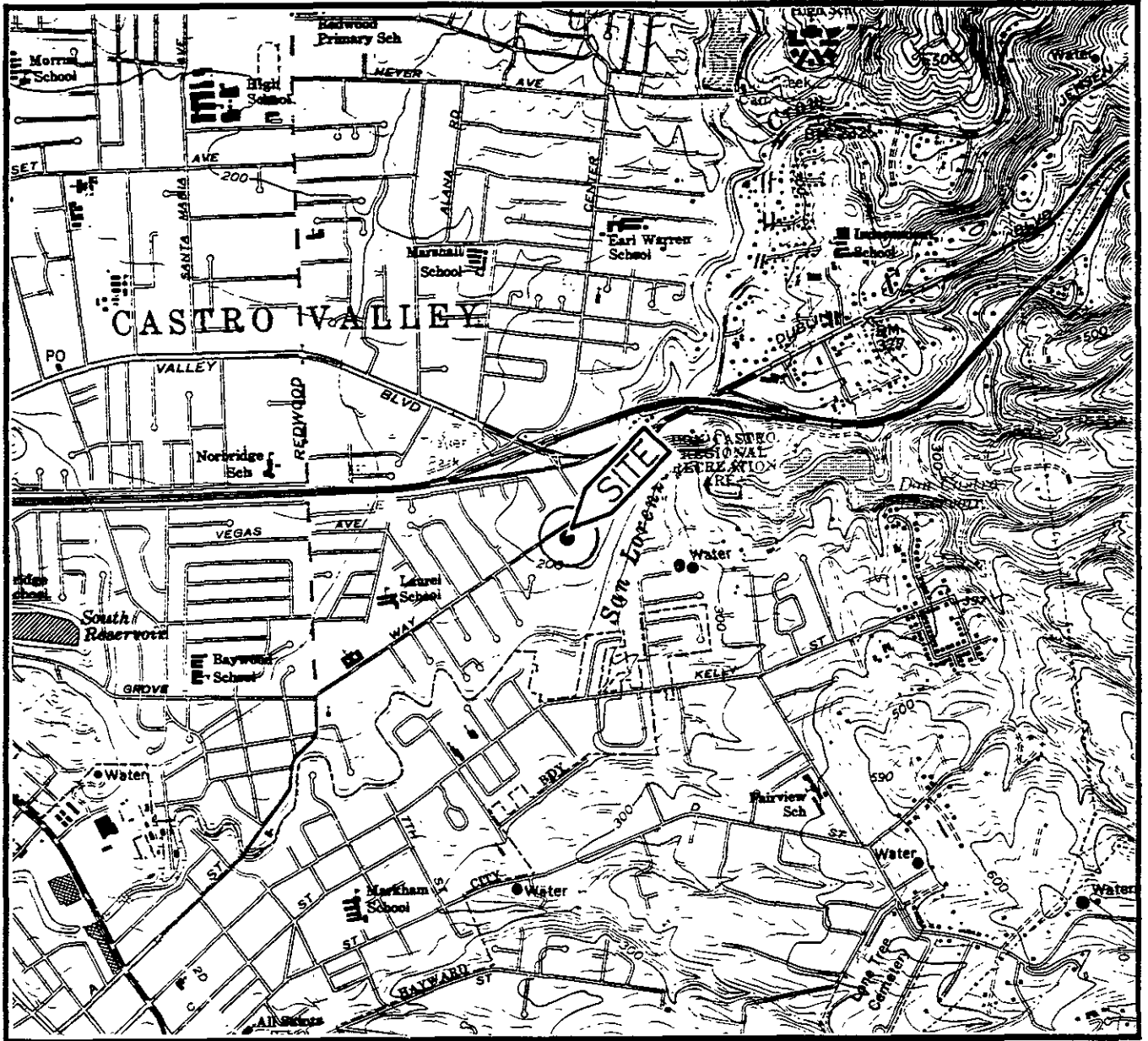
### REFERENCES

Applied GeoSystems. March 24, 1991. Letter Report, Quarterly Ground-Water Monitoring, First Quarter 1991, 22141 Center Street, Castro Valley, California, AGS Report 69013-5.

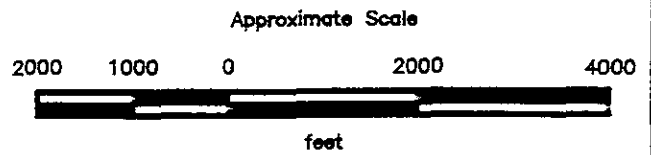
Applied GeoSystems. November 13, 1990. Environmental Subsurface Investigation at ARCO Station 2152, 22141 Center Street, Castro Valley, California: AGS Report 69013-4.

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.



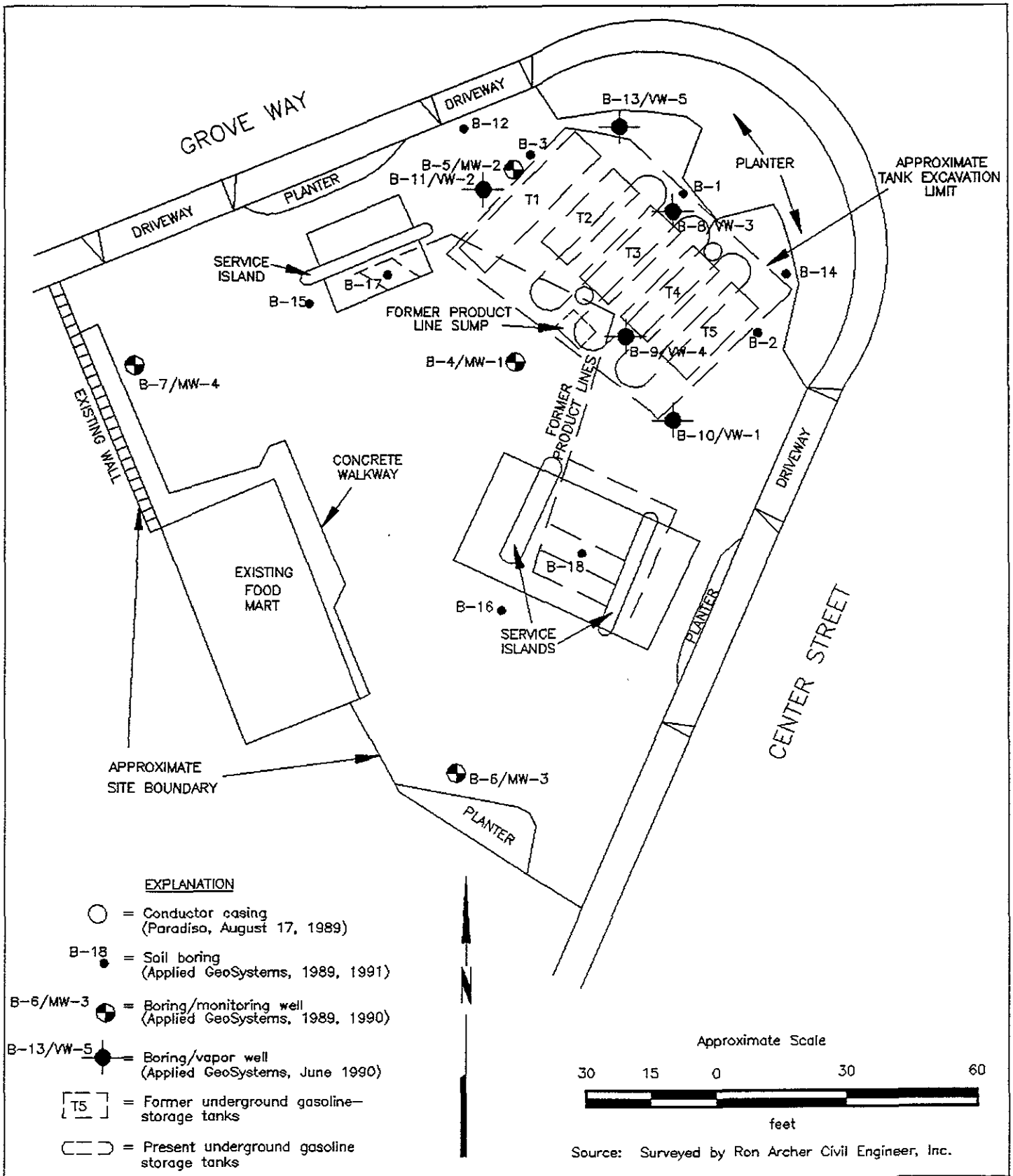
Source: U.S. Geological Survey  
 7.5-Minute Quadrangle  
 Hayward, California  
 Photorevised 1980



PROJECT 69013-5

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

**PLATE**  
**1**

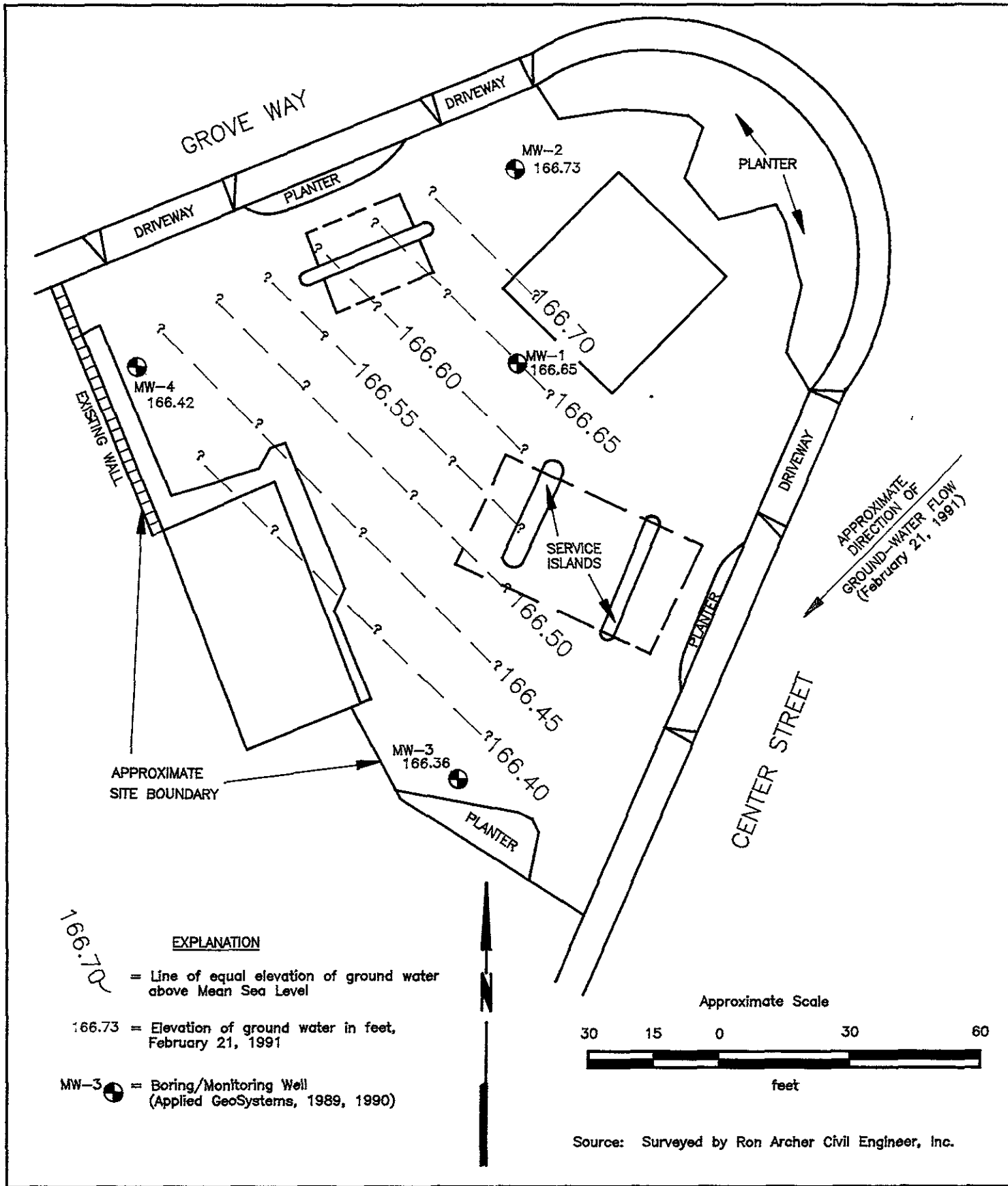


**PROJECT 69013-5**

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

**PLATE  
2**





**EXPLANATION**

166.70 = Line of equal elevation of ground water above Mean Sea Level

166.73 = Elevation of ground water in feet, February 21, 1991

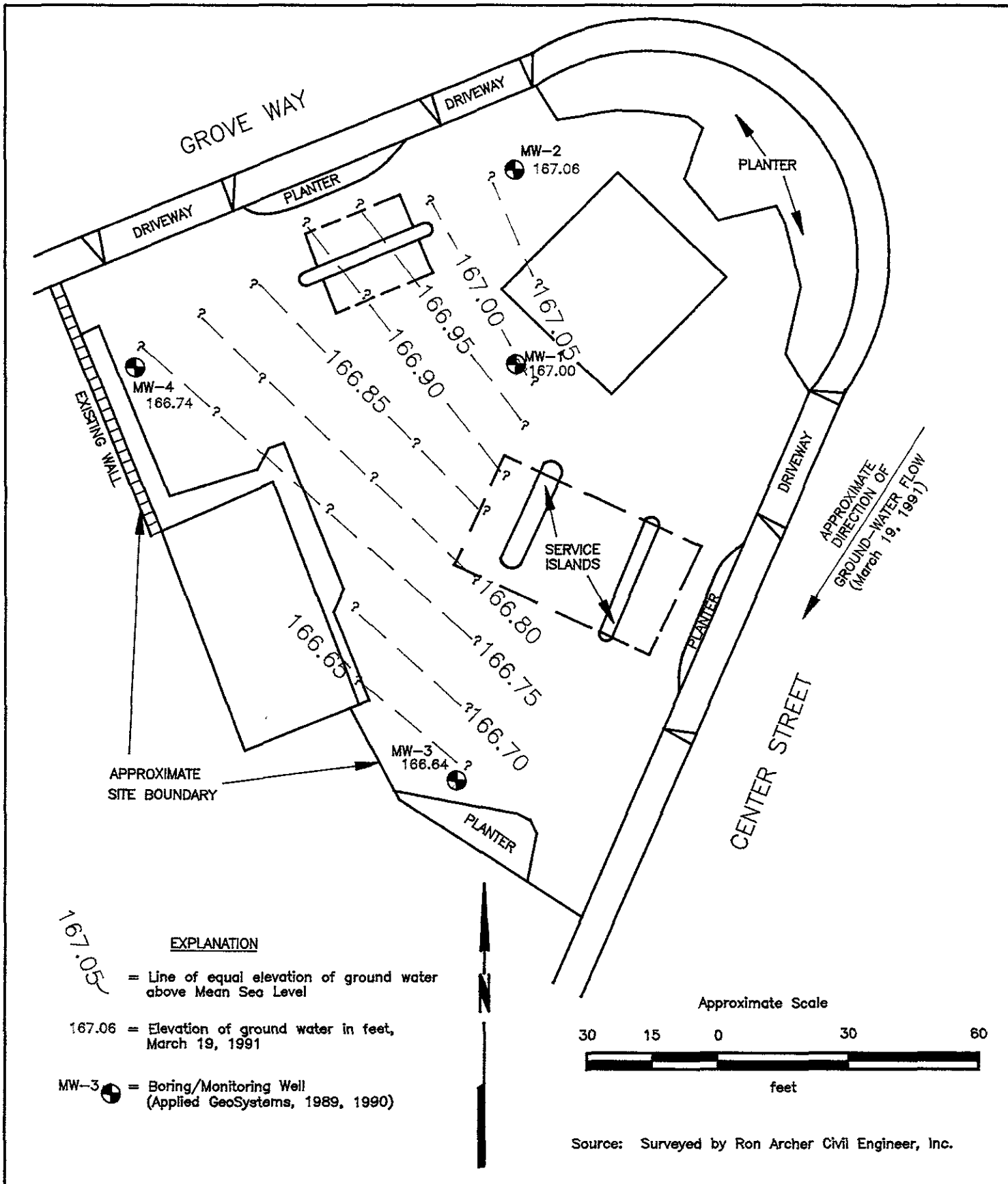
MW-3 = Boring/Monitoring Well (Applied GeoSystems, 1989, 1990)

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**  
**3**



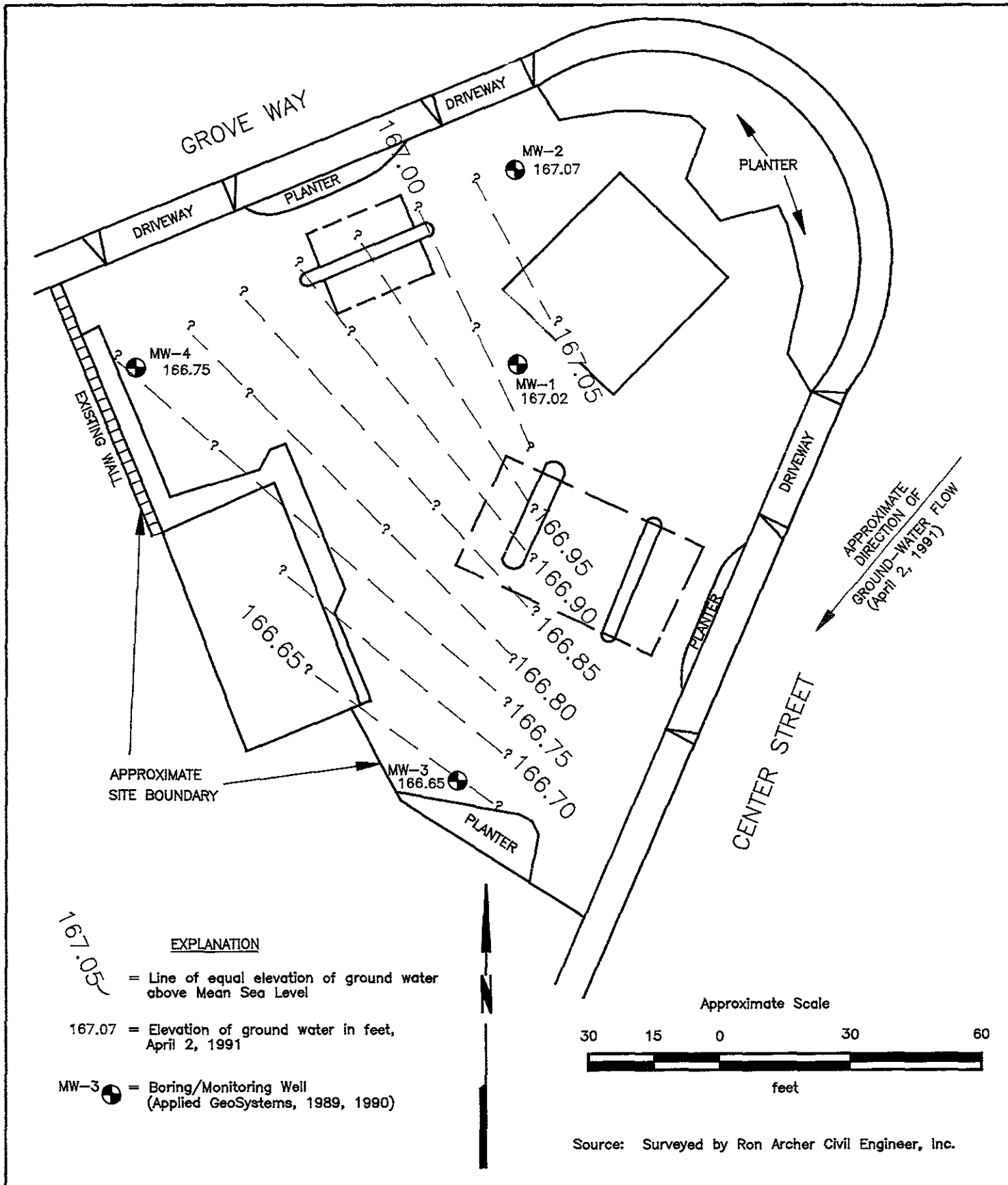
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**GROUND WATER GRADIENT MAP**  
**ARCO Station 2152**  
**22141 Center Street**  
**Castro Valley, California**

PLATE

4



**PROJECT 69013-5**

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

**PLATE  
5**

TABLE 1  
 CUMULATIVE GROUND-WATER MONITORING DATA  
 ARCO Station 2152  
 Castro Valley, California  
 (Page 1 of 2)

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
02/21/91			50.51	166.65
03/19/91			50.16	167.00
04/02/91			50.14	167.02
<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
02/21/91			49.77	166.73
03/19/91			49.44	167.06
04/02/91			49.43	167.07
<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
02/21/91			51.21	166.36
03/19/91			50.93	166.64
04/02/91			50.92	166.65

See notes on Page 2 of 2.

TABLE 1  
CUMULATIVE GROUND-WATER MONITORING DATA  
ARCO Station 2152  
Castro Valley, California  
(Page 2 of 2)

Date Well Measured	Depth of Well	Well Elevation	Static Water Depth	Water Elevation
<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
02/21/91			48.76	166.42
03/19/91			48.44	166.74
04/02/91			48.43	166.75

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

	Date	TPHg	B	T	E	X
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
	04/02/91	<50	<0.05	<0.05	<0.05	<0.05
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
	04/02/91	<50	<0.05	<0.05	<0.05	<0.05
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
	04/02/91	<50	<0.05	<0.05	<0.05	<0.05
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
	04/02/91	<50	<0.05	<0.05	<0.05	<0.05

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 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).

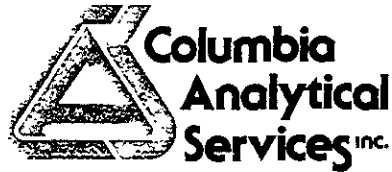
7.48 = conversion constant from cubic  
feet to gallons

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.







April 11, 1991

Mr. Mike Barminsky  
Applied Geosystems  
3315 Almaden Expy., S-34  
San Jose, CA 95118

RE: Arco Facility No. 2152

Dear Mr. Barminski:

Enclosed are the results of the water samples submitted to our lab on April 4, 1991. For your reference, our service request number for this work is SJ91-0477.

All analyses were performed in accordance with the laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted:

A handwritten signature in cursive script, reading "Keoni A. Murphy". The signature is fluid and includes a long, sweeping underline that extends to the right.

Keoni A. Murphy  
COLUMBIA ANALYTICAL SERVICES, INC.

le/KAM

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Applied Geosystems  
 Submitted By: Client  
 Project: Arco Facility No. 2152

Date Received: 04/04/91  
 Work Order #: SJ91-0477  
 Sample Matrix: Water

BTEX and TPH as Gasoline  
 EPA Methods 5030/8020/DHS LUFT Method  
 µg/L (ppb)

Sample Name:	<u>W-50-MW1</u>	<u>W-49-MW4</u>	<u>W-51-MW3</u>
Date Analyzed:	04/09/91	04/09/91	04/09/91

<u>Analytes</u>	<u>MRL</u>			
Benzene	0.5	ND	ND	ND
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	ND	ND
Total Xylenes	0.5	ND	ND	ND
TPH as Gasoline	50	ND	ND	ND

TPH Total Petroleum Hydrocarbons  
 MRL Method Reporting Limit  
 ND None Detected at or above the method reporting limit

Approved by *Kenneth Murphy* Date April 11, 1991

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Applied Geosystems  
Submitted By: Client  
Project: Arco Facility No. 2152

Date Received: 04/04/91  
Work Order #: SJ91-0477  
Sample Matrix: Water

BTEX and TPH as Gasoline  
EPA Methods 5030/8020/DHS LUFT Method  
 $\mu\text{g/L}$  (ppb)

Sample Name: W-50-MW2      Method Blank  
Date Analyzed: 04/09/91      04/09/91

<u>Analytes</u>	<u>MRL</u>		
Benzene	0.5	ND	ND
Toluene	0.5	ND	ND
Ethylbenzene	0.5	ND	ND
Total Xylenes	0.5	ND	ND
TPH as Gasoline	50	ND	ND

TPH      Total Petroleum Hydrocarbons  
MRL      Method Reporting Limit  
ND      None Detected at or above the method reporting limit

Approved by K. E. Murphy      Date April 11, 1991

APPENDIX A  
LABORATORY QC RESULTS

Client: Applied Geosystems  
 Submitted By: Client  
 Project: Arco Facility No. 2152

Date Received: 04/04/91  
 Work Order #: SJ91-0477  
 Sample Matrix: Water

QA/QC Report  
 Surrogate Recovery Summary  
 BTEX and TPH as Gasoline  
 EPA Methods 5030/8020/DHS LUFT Method

<u>Sample Name</u>	<u>Date Analyzed</u>	<u>Percent Recovery</u> $\alpha, \alpha, \alpha$ -Trifluorotoluene
W-50-MW1	04/09/91	86.
W-49-MW4	04/09/91	80.
W-51-MW3	04/09/91	73.
W-50-MW2	04/09/91	91.
Method Blank	04/09/91	82.

CAS Acceptance Criteria 70-130

TPH Total Petroleum Hydrocarbons  
 MB Method Blank

Approved by K. E. Smith Date April 11, 1991