Applied GeoSystems

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TRANSMITTAL

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

FROM: MARC A. BRIGGS
TITLE: GEOLOGICAL TECHNICIAN

DATE: 4/24/91
PROJECT NUMBER: AGS 69028.03
SUBJECT: ARCO STATION 6113, 785 EAST STANLEY BOULEVARD, LIVERMORE, CALIFORNIA

APR 25 9:10:55

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REMARKS: THIS REPORT HAS BEEN FORWARDED TO YOU (CERTIFIED) AT THE REQUEST OF MR. CHUCK CARMEL OF ARCO PRODUCTS COMPANY.

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LETTER REPORT
QUARTERLY GROUND-WATER MONITORING
First Quarter 1991
at
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

AGS 69028.03

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

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April 23, 1991
0401ccar
AGS 69028-3

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

Subject: First Quarter 1991 Ground-Water Monitoring Report for ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California.

Mr. Carmel:

As requested by ARCO Products Company (ARCO), 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 southwestern side of the intersection of East Stanley and Murrieta Boulevards in Livermore, California, as shown on the Site Vicinity Map (Plate 1). ARCO has contracted with AGS to perform monthly water level measurements and quarterly ground-water sampling and analyses to monitor fluctuations in the ground-water gradient and petroleum hydrocarbon concentrations ground water at the site, and to evaluate trends related to fluctuations over time.

Prior to the present monitoring, Pacific Environmental Group (Pacific) and AGS performed limited subsurface environmental investigations related to the former underground waste-oil storage tank at the site. Pacific performed soil sampling and observation during removal of the waste-oil tank in January 1989. Our work included the installation of three ground-water monitoring wells (MW-1, MW-2, and MW-3) in September 1989, and quarterly monitoring of these wells. 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).

Quarterly monitoring at this site is being performed in conjunction with a subsurface environmental investigation to evaluate the lateral and vertical extent of waste-oil related

hydrocarbons in the soil and ground water in the areas downgradient of the former waste-oil storage tank beneath the site. The investigation included the installation of one well (MW-4) at the site in February 1991. A report summarizing the results of this investigation will be submitted under separate cover.

Ground-Water Sampling and Gradient Evaluation

AGS personnel performed monthly water level measurements on February 21 and March 20, 1991 and quarterly ground-water monitoring and sampling on February 21, 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 sheen and floating product; and purging and sampling ground water from these monitoring wells for laboratory analysis. The ground-water sampling protocol is attached.

The ground-water elevations for each well were calculated by subtracting the February 21 and March 20, 1991 DTW measurements from the surveyed elevations of the wellheads. The DTW measurements, wellhead elevations, and ground-water elevations are presented in Table 1, Cumulative Ground-Water Monitoring Data. The ground-water gradient evaluated from the March 20, 1991 data is 0.009 to the northeast, as shown on the Ground-Water Gradient Map (Plate 3). This interpreted gradient is generally consistent with the previously interpreted ground-water gradient at this site. The ground-water gradient evaluated from the February 21, 1991 data, disregarding the newly installed well MW-4 [redacted] have stabilized when measured on the day of development, was [redacted] northeast.

Water samples were collected from wells MW-1, MW-2, MW-3, and MW-4 for subjective analysis before the monitoring wells were purged and sampled. No evidence of floating product or noticeable product odor was noted in the water samples from the wells. Cumulative results of subjective analyses are presented in Table 1.

Monitoring wells MW-1, MW-2, MW-3, and MW-4 were purged and sampled on February 21, 1991 in accordance with the attached protocol. Well purge data sheets for the parameters monitored are included in Attachment I.

Laboratory Methods

Water samples collected from the wells were delivered under Chain of Custody Record to Applied Analytical Environmental Laboratories in Fremont, California (Hazardous Waste Testing Laboratory Certification No. 1211). The water samples were analyzed for total oil and grease (TOG) using standard method 5520 B/F. The water samples were also analyzed

for total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using modified Environmental Protection Agency (EPA) Methods 5030/8015/602. An interpretation of the lateral extent of TPHg and benzene in the ground water, based on these laboratory analyses, are shown on Plate 4, TPHg Concentrations in Ground Water and Plate 5, Benzene Concentrations in Ground Water. Analyses for total petroleum hydrocarbons as diesel (TPHd) were not performed on water samples collected during this quarterly monitoring, per the letter from Mr. Gil Wistar of the Alameda County Department of Environmental Health, dated November 16, 1990, since previous analyses for these compounds in ground water at the site have reported nondetectable concentrations.

Results of Analyses

Results of these and previous water analyses are summarized in Table 2, Cumulative Results of Ground-Water Laboratory Analyses. The Chain of Custody Records and Laboratory Analysis Reports are included in Attachment I.

Laboratory analysis of ground-water samples collected from monitoring wells MW-1 through MW-4 reported:

- concentrations of BTEX in the wells were below the State of California Department of Health Services Maximum Contaminant Levels (MCLs) and recommended action levels for drinking water, (which for BTEX are 1.0 parts per billion (ppb), 100 ppb, 680 ppb, and 1,750 ppb, respectively)(State of California Department of Health Services, October 1990), with the exception of benzene in wells MW-1 (1.2 ppb) and MW-4 (410 ppb);

- concentration of benzene has increased in MW-1 since the last monitoring episode;

- concentrations of TPHg and TOG continue to remain nondetectable in wells MW-1 through MW-3, which are generally upgradient or crossgradient of the former waste oil tank; and

- 3,500 ppb TPHg and nondetectable concentrations of TOG were reported in the water sample obtained from MW-4, downgradient of the former waste-oil tank, and near the existing underground gasoline storage tanks.

Conclusions and Recommendations

Based on this investigation and previous work at the site, AGS concludes:

- The vertical extent of waste-oil related hydrocarbons in the soil at the site has been delineated in the soil, with the exception of the immediate area under the station building.
- Waste-oil related hydrocarbons, as represented by TOG, were not detected in any ground-water samples collected at the site.
- Gasoline-related hydrocarbons appear to have impacted the ground-water in the vicinity of the underground gasoline storage tanks.

AGS will continue the quarterly ground-water monitoring at this site to evaluate trends in petroleum hydrocarbon concentrations and changes in the ground-water gradient with time. Routine well maintenance and quality control will be performed as necessary during these site visits.

Copies of this report should 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

REFERENCES

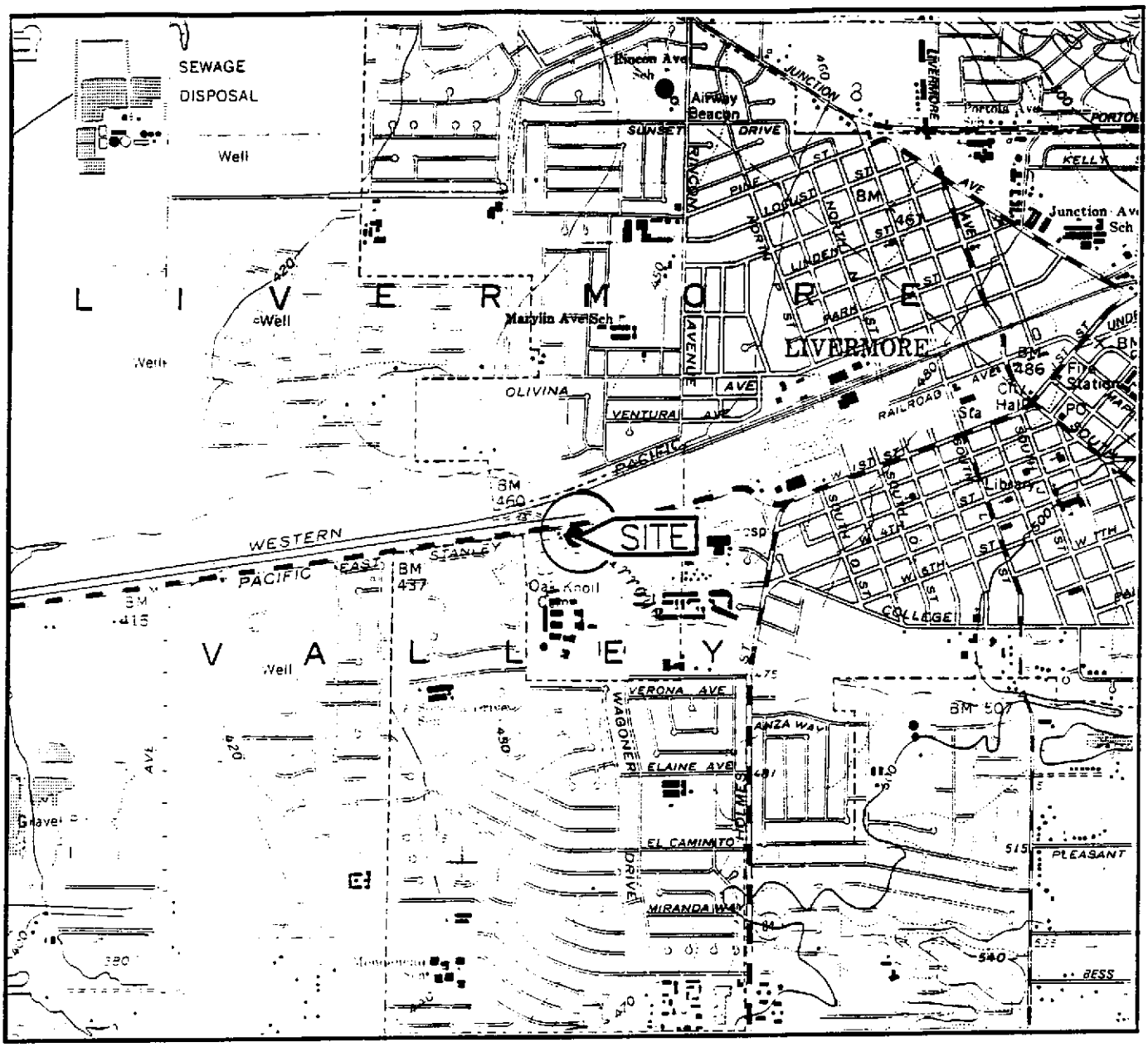
Applied GeoSystems. December 6, 1989. Limited Subsurface Environmental Investigation at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-2.

Applied GeoSystems. August 29, 1990. Letter Report, Quarterly Ground-Water Monitoring Second Quarter 1990 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-3.

Applied GeoSystems. November 2, 1990. Letter Report, Quarterly Ground-Water Monitoring Third Quarter 1990 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-3.

Applied GeoSystems. January 27, 1991. Letter Report, Quarterly Ground-Water Monitoring Fourth Quarter 1990 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-3.

Pacific Environmental Group. April 25, 1989. ARCO Station 6113, 785 E. Stanley Boulevard, Livermore, California. Project 330-53.01



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

N

Approximate Scale

2000 1000 0 2000 4000

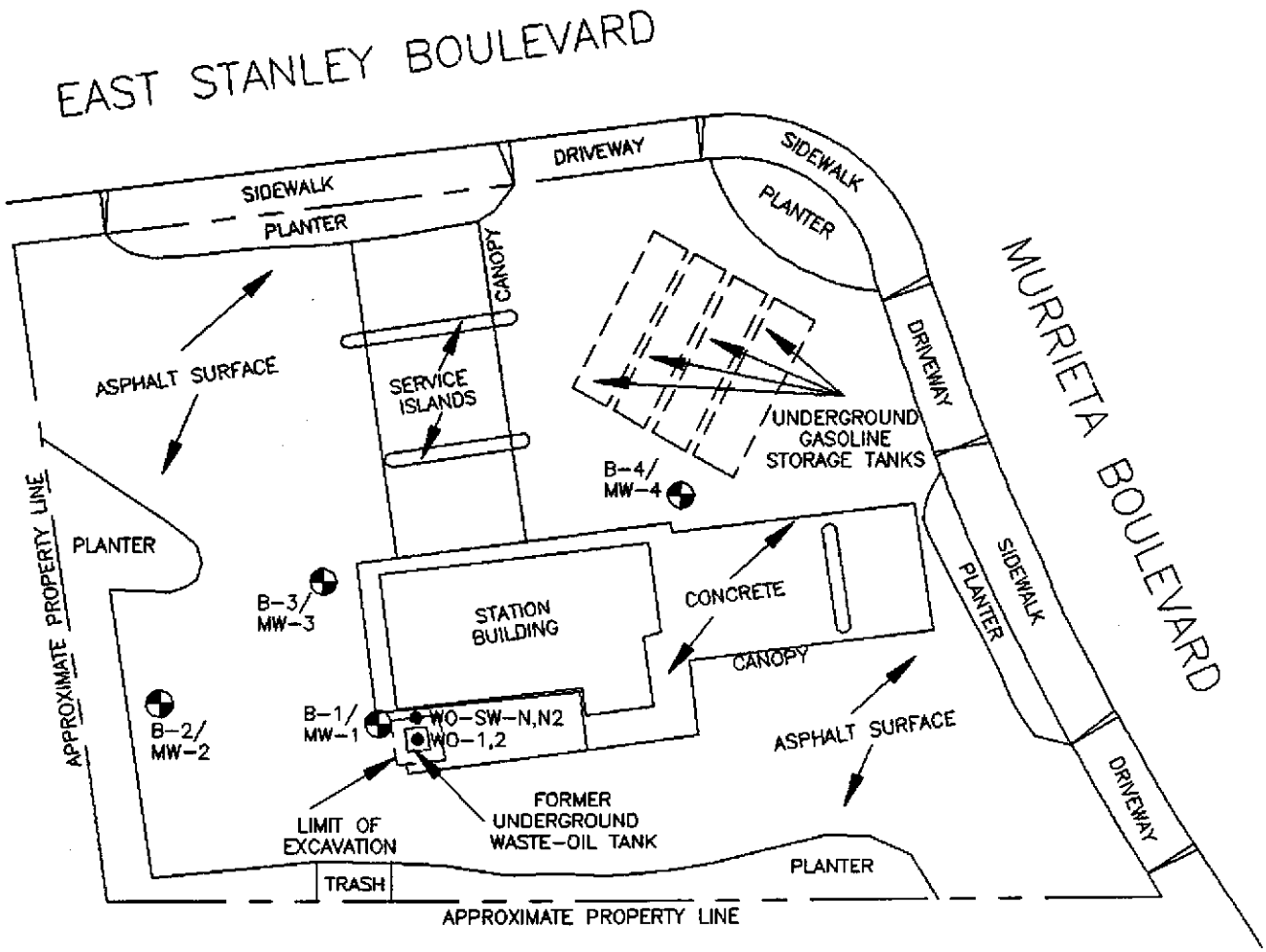
feet

Applied GeoSystems

PROJECT 69028-3

SITE VICINITY MAP
ARCO Service Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE
1



N

Approximate Scale

40 20 0 40 80

feet

EXPLANATION

WO-SW-N,N2 ● = Soil sample collected by Pacific (1989)

B-4/MW-4 ⊕ = Boring/monitoring well (Applied GeoSystems, September 1989 and February 1991)

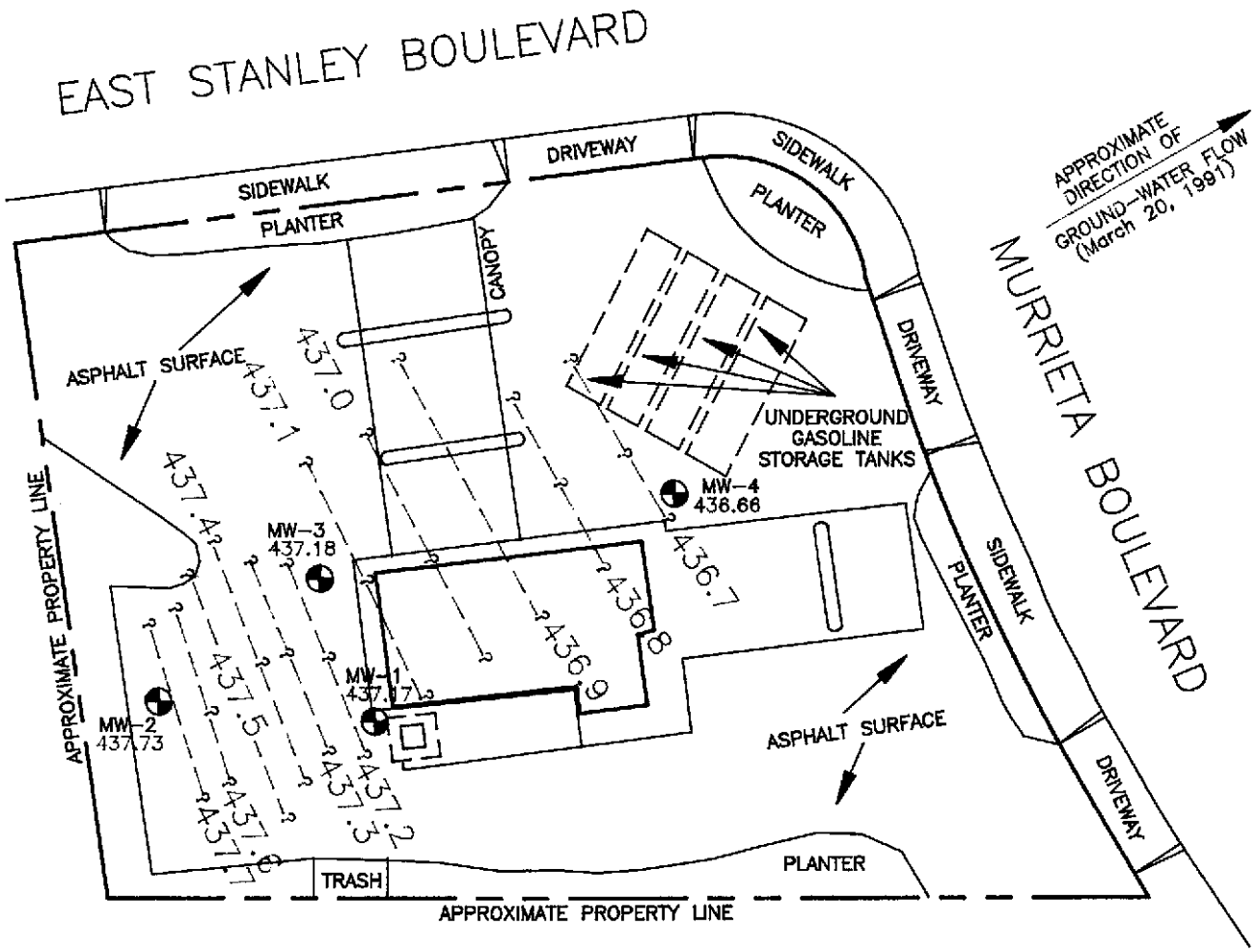
Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., February 1991

Applied GeoSystems

PROJECT: 69028-3

GENERALIZED SITE PLAN
ARCO Service Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE 2



437.7

EXPLANATION

= Line of equal elevation of ground water above Mean Sea Level (MSL)

437.73 = Elevation of ground water in feet (March 20, 1991)

MW-4 = Boring/monitoring well (Applied GeoSystems, September 1989 and February 1991)

N

Approximate Scale

40 20 0 40 80

feet

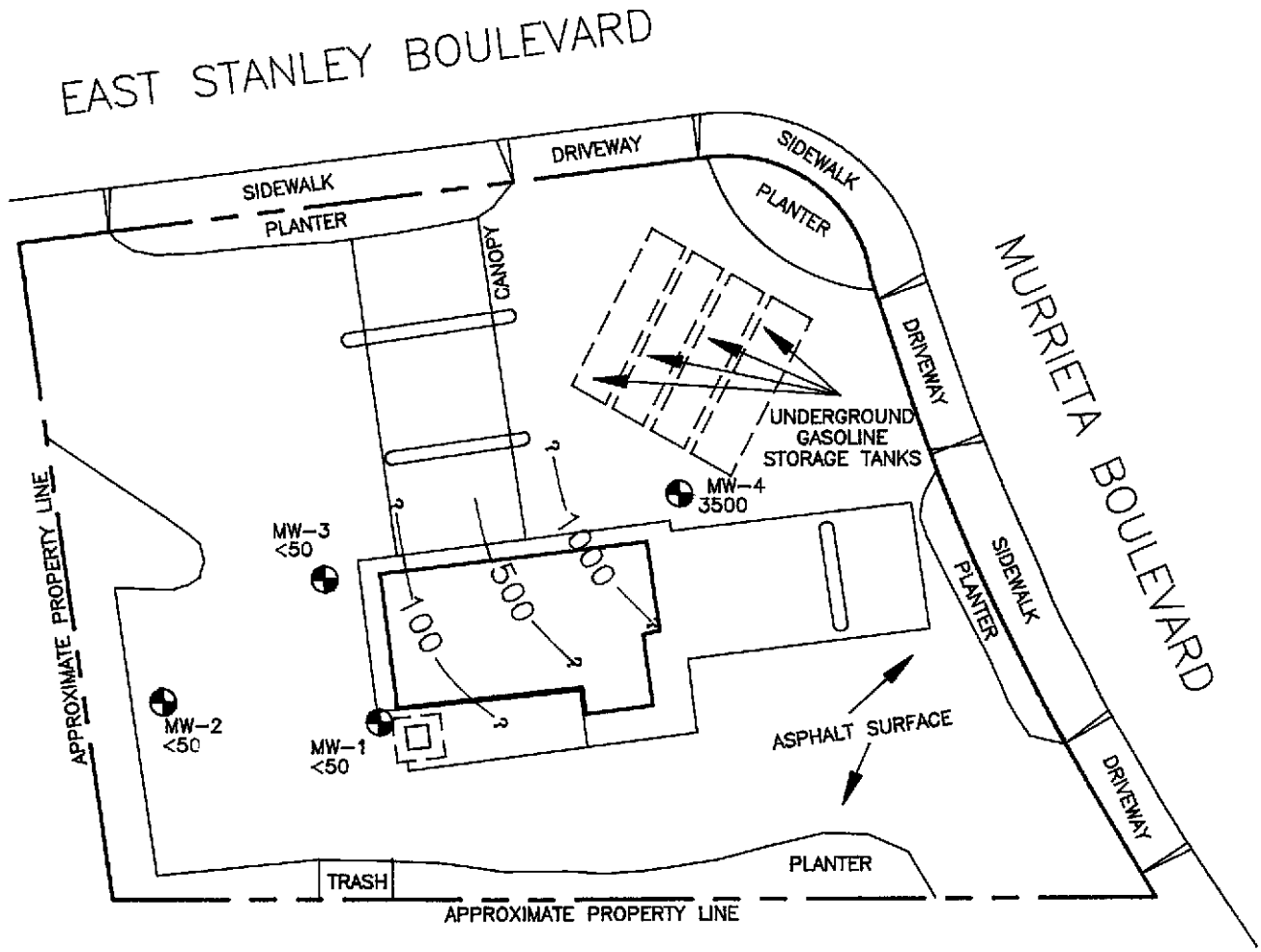
Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., February 1991

Applied GeoSystems

PROJECT: 69028-3

GROUND-WATER GRADIENT MAP
ARCO Service Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE
3



1000 = Line of equal concentration of TPHg in ground water

EXPLANATION

3500 = Concentration of TPHg in ground water, in ppb, February 1991

MW-4 = Boring/monitoring well (Applied GeoSystems, September 1989 and February 1991)

N

Approximate Scale

40 20 0 40 80

feet

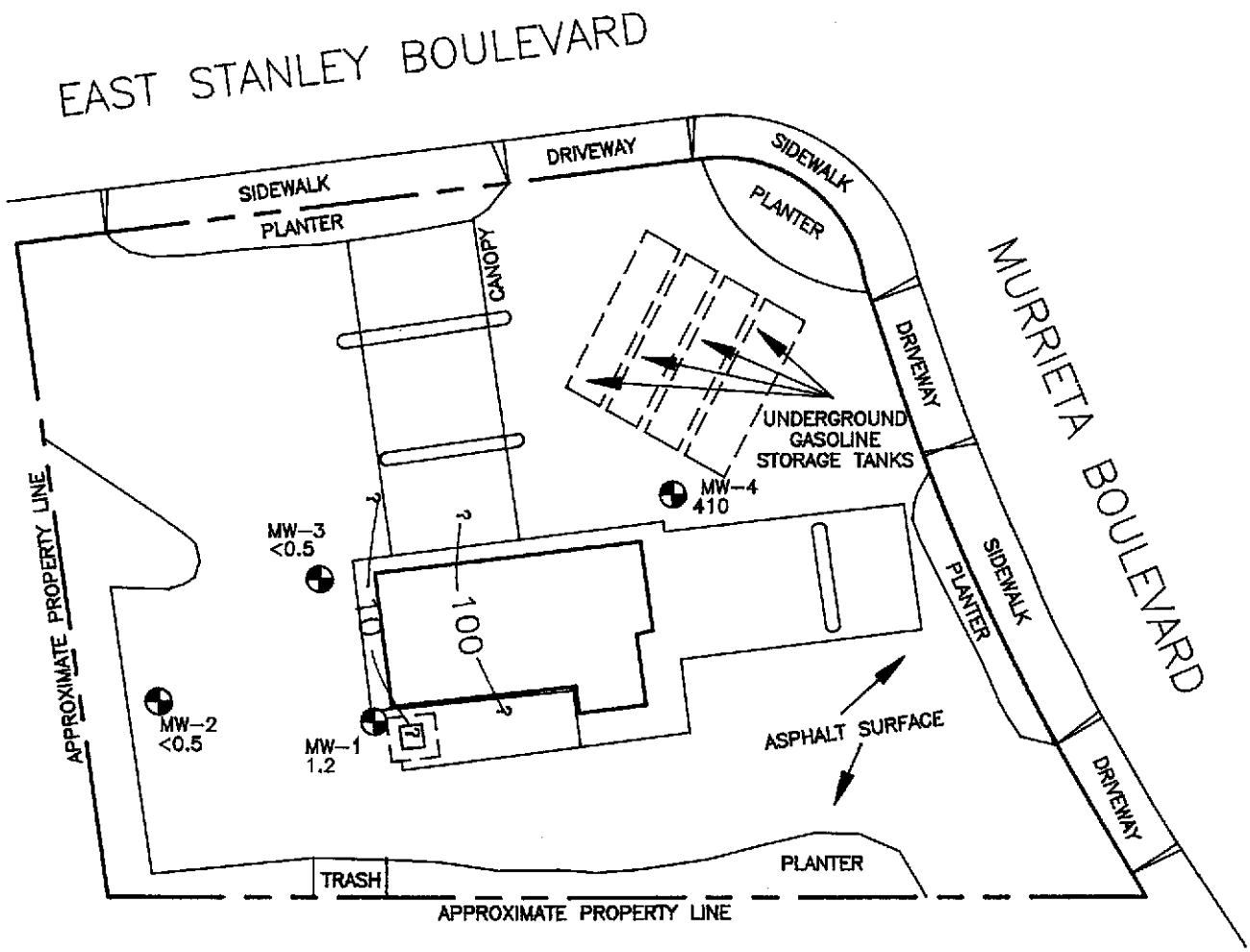
Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., February 1991

Applied GeoSystems

PROJECT: 69028-3

TPHg CONCENTRATIONS IN GROUND WATER
ARCO Service Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE 4



EXPLANATION

100 = Line of equal concentration of Benzene in ground water

410 = Concentration of Benzene in ground water in ppb, February 1991

MW-4 = Boring/monitoring well (Applied GeoSystems, September 1989 and February 1991)

N

Approximate Scale

40 20 0 40 80

feet

Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., February 1991

Applied GeoSystems

PROJECT: 69028-3

BENZENE CONCENTRATIONS IN GROUND WATER
ARCO Service Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE 5

TABLE 1
CUMULATIVE GROUND-WATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

Well Date	Elevation of Wellhead	Depth to Water	Elevation of Ground-Water	Floating Product
MW-1				
09/20/89	457.04	21.03	436.01	NONE
10/12/89		19.64	437.40	NONE
06/21/90		21.72	435.32	NONE
09/20/90		19.79	437.25	NONE
12/18/90		19.28	437.76	NONE
02/21/91		22.45	434.59	NONE
03/20/91		19.87	437.17	NONE
MW-2				
09/20/89	457.74	20.67	437.07	NONE
10/12/89		18.98	438.76	NONE
06/21/90		21.88	435.86	NONE
09/20/90		19.90	437.84	NONE
12/18/90		19.32	438.42	NONE
02/21/91		23.02	434.72	NONE
03/20/91		20.01	437.73	NONE
MW-3				
09/20/89	456.97	20.98	435.99	NONE
10/12/89		19.66	437.31	NONE
06/21/90		21.72	435.25	NONE
09/20/90		19.72	437.25	NONE
12/18/90		19.21	437.76	NONE
02/21/91		22.36	434.61	NONE
03/20/91		19.79	437.18	NONE
MW-4				
02/21/91	456.97	22.01	434.96	NONE
03/20/91		20.31	436.66	NONE

Wellhead Elevation based on benchmark: Top of pin set in concrete in the most westerly monument at the intersection of East Stanley Boulevard and Fenton Avenue. Elevation taken as 455.896 mean sea level, City of Livermore datum.
Measurements in feet.

TABLE 2
CUMULATIVE RESULTS OF GROUND-WATER LABORATORY ANALYSES
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 1 of 2)

Well Date	TPHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes
MW-1					
09/20/89	80	3.0	1.0	0.7	1
06/21/90	<20	<0.50	0.66	<0.50	<0.50
09/20/90	<50	<0.5	1.0	<0.5	1.8
12/18/90	<50	<0.5	1.8	<0.5	1.7
02/21/91	<50	1.2	2.3	<0.5	2.2
MW-2					
09/20/89	<50	<0.5	<0.5	<0.5	<1
06/21/90	<20	<0.50	<0.50	<0.50	<0.50
09/20/90	<50	<0.5	0.7	<0.5	1.4
12/18/90	<50	0.6	1.5	<0.5	1.9
02/21/91	<50	<0.5	<0.5	<0.5	<0.5
MW-3					
09/20/89	170	8.9	0.6	1.1	<1
06/21/90	<20	<0.50	1.0	<0.50	<0.50
09/20/90	<50	<0.5	1.0	<0.5	1.9
12/18/90	<50	<0.5	1.7	<0.5	2.0
02/21/91	<50	<0.5	<0.5	<0.5	<0.5
MW-4					
02/21/91	3,500	410	7.6	30	47
Jan. 1990					
MCLs	—	1.0	—	680	1,750
ALs	—	-.-	100	—	—

See Notes on Page 2 of 2

TABLE 2
CUMULATIVE RESULTS OF GROUND-WATER LABORATORY ANALYSES
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 2 of 2)

Well Date	TPHd	Total Oil & Grease
MW-1		
09/20/89	<50	<5000
06/21/90	<100	13,000
09/20/90	<50	<5000
12/18/90	NA	<5000
02/21/91	NA	<5000
MW-2		
09/20/89	<50	<5000
06/21/90	<100	<5000
09/20/90	<50	<5000
12/18/90	NA	<5000
02/21/91	NA	<5000
MW-3		
09/20/89	<50	<5000
06/21/90	<100	10,000
09/20/90	<50	<5000
12/18/90	NA	<5000
02/21/91	NA	<5000
MW-4		
02/21/91	NA	<5000

Results in parts per billion (ppb).
TPHg = Total petroleum hydrocarbons as gasoline
TPHd = Total petroleum hydrocarbons as diesel
< = Less than the detection limits shown.
MCLs = Adopted Maximum Contaminant Levels in Drinking Water, DHS (July 1989)
AIs = Recommended Drinking Water Action Levels, DHS (January 1990)
NA = Not Analyzed

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 February 1991 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. Approximately 6 to 23 well casing volumes of water were purged before these characteristics stabilized. Turbidity measurements were also collected from the purged well water. 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 the approximate 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 6113 Job No. 69028-4

Date: February 21, 1991 Page 1 of 1

Well No. MW-1 Time Started 12:50

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)
13:50	Begin purging MW-1			
13:50	5	65.2	8.21	7.08
13:56	10	64.4	8.29	6.71
14:04	15	64.3	8.23	6.69
14:11	20	64.9	8.33	6.70
14:18	25	64.8	8.23	6.67
14:24	30	64.5	8.30	6.43
14:30	35	65.3	8.26	6.67
14:36	40	65.0	8.39	6.60
14:41	45	64.9	8.31	6.58
14:48	50	64.1	8.26	6.53
14:54	55	63.6	8.34	6.38
14:55	Stop purging MW-1			

Notes:

Depth to Bottom (feet)	:	43.0
Depth to Water - initial (feet)	:	22.45
Depth to Water - final (feet)	:	22.55
% recovery	:	99.5%
Time Sampled	:	16:15
Gallons per Well Casing Volume	:	3.35
Gallons Purged	:	55.0
Well Casing Volumes Purged	:	16.40
Approximate Pumping Rate (gpm)	:	0.80

WELL PURGE DATA SHEET

Project Name: ARCO 6113 Job No. 69028-4

Date: February 21, 1991 Page 1 of 1

Well No. MW-2 Time Started 12:20

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)
12:20	Begin purging MW-2			
12:27	5	62.5	8.38	7.47
12:33	10	62.7	8.33	7.39
12:39	15	63.3	8.23	7.29
12:45	20	63.2	8.02	7.26
12:51	25	63.3	8.12	7.32
12:57	30	63.5	8.06	7.23
13:03	35	64.0	8.07	7.28
13:10	40	63.8	7.99	7.20
13:17	45	63.9	8.09	7.24
13:23	50	64.6	8.07	7.31
13:30	55	63.5	8.06	7.26
13:30	Stop purging MW-2			

Notes:

Depth to Bottom (feet) :	37.8
Depth to Water - initial (feet) :	23.02
Depth to Water - final (feet) :	23.31
% recovery :	98.0%
Time Sampled :	14:30
Gallons per Well Casing Volume :	2.41
Gallons Purged :	55.0
Well Casing Volumes Purged :	22.80
Approximate Pumping Rate (gpm) :	0.79

WELL PURGE DATA SHEET

Project Name: ARCO 6113 Job No. 69028-4

Date: February 21, 1991 Page 1 of 1

Well No. MW-3 Time Started 9:35

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)
9:35	Begin purging MW-3			
9:55	5	61.5	8.28	6.68
11:11	10	61.7	8.12	7.44
11:17	15	61.0	8.08	6.77
11:24	20	61.6	8.27	7.22
11:29	25	62.1	8.30	7.19
11:36	30	62.2	8.32	7.22
11:43	35	62.1	8.20	7.16
11:50	40	62.5	8.21	7.14
11:56	45	62.8	8.20	7.20
12:02	50	62.8	8.21	7.19
12:07	55	63.1	8.230	7.23
12:07	Stop purging MW-3			

Notes:

Depth to Bottom (feet) :	38.1
Depth to Water - initial (feet) :	22.36
Depth to Water - final (feet) :	22.52
% recovery :	99.0%
Time Sampled :	12:45
Gallons per Well Casing Volume :	2.57
Gallons Purged :	55.0
Well Casing Volumes Purged :	21.41
Approximate Pumping Rate (gpm) :	0.88

WELL PURGE DATA SHEET

Project Name: ARCO 6113 Job No. 69028-4

Date: February 21, 1991 Page 1 of 1

Well No. MW-4 Time Started 15:10

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromoh)
15:10	Begin purging MW-4			
15:18	3	64.3	8.02	8.63
13.20	5	64.4	7.78	8.52
15:25	7	64.0	7.63	8.70
15:30	10	63.3	7.49	8.84
15:36	13	64.0	7.49	8.78
15:40	15	63.4	7.51	8.63
15:53	17	63.2	7.55	8.72
15:00	20	63.3	7.50	8.89
15:00	Stop purging MW-4			

Notes:

Depth to Bottom (feet)	:	26.8
Depth to Water - initial (feet)	:	22.01
Depth to Water - final (feet)	:	23.00
% recovery	:	79.3%
Time Sampled	:	17:00
Gallons per Well Casing Volume	:	3.17
Gallons Purged	:	20.0
Well Casing Volumes Purged	:	6.40
Approximate Pumping Rate (gpm)	:	0.40

Applied GeoSystems

CHAIN-OF-CUSTODY RECORD

9/245

PROJ. NO.	PROJECT NAME
69028-4	ARCO 6113
P.O. NO.	SAMPLERS (Signature)
	Marc A Briggs

DATE MM/DD/YY	TIME		No. of Containers	TPHgasoline (8015)	BTEX (602/8020)	TPHdiesel (8015)	TOG					Preserved? ICED	REMARKS	LABORATORY I.D. NUMBER
2/21/91	12:45	W-RINSATE-MW3	1									HCl		
	12:45	W-22-MW3	3	X	X							HCl		
	12:45	W-22-MW3	2				X					X		
	14:30	W-RINSATE-MW2	1									HCl		
	14:30	W-23-MW2	4	X	X							HCl		
	14:30	W-23 MW2	2				X					X		
	16:15	W-RINSATE MW1	1									HCl		
	16:15	W-22-MW1	4	X	X							HCl		
	16:15	W 22-MW1	2				X					X		
	17:00	W-RINSATE-MW4	1									HCl		
	17:00	W-23-MW4	4	X	X							HCl		
2/21/91	17:00	W-23-MW4	2				X					X		
2/21/91		S-0221-SP/A,B,C,D	4	X	X								COMPOSITE	

RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
Steve Bothun	2-22 1705	EXPRESS-IT
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):
	2/24	Anthony Nievo

Laboratory: Applied Analytical

Turn Around: 2 Week

SEND RESULTS TO:

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

Proj. Mgr.: MARC BRIGGS

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. Mark Briggs	Date Sampled:	02-21-91
	Applied GeoSystems	Date Received:	02-22-91
	3315 Almaden Expressway	BTEX Analyzed:	03-06-91
	San Jose, CA 95811	TPHg Analyzed:	03-06-91
Project:	AGS 69028-4	TPHd Analyzed:	NR
		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-22-MW3 W1102416	ND	ND	ND	ND	ND	NR
W-23-MW2 W1102419	ND	ND	ND	ND	ND	NR
W-22-MW1 W1102422	1.2	2.3	ND	2.2	ND	NR
W-23-MW4 W1102425	410	7.6	30	47	3500	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

March 7, 1991
Date Reported