RESNA
Working To Restore Nature

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

TRANSMITTAL

TO: Ms. Susan Hugo
Alameda County Health Care
Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94521

DATE: May 21, 1993
PROJECT NUMBER: 69028.08
SUBJECT: Final - ARCO Station No. 6113
785 East Stanley Boulevard, Livermore, California

FROM: John C. Young
TITLE: Project Manager

WE ARE SENDING YOU:

COPIES	DATED	NO.	DESCRIPTION
1	05/21/93	69028.08	Final Letter Report, First Quarter 1993 Groundwater Monitoring Report for ARCO Station No. 6113, 785 East Boulevard, Livermore, California.

THESE ARE TRANSMITTED as checked below:

[ ] For review and comment [ ] Approved as submitted [ ] Resubmit ___ copies for approval

[ ] As requested [ ] Approved as noted [ ] Submit___ copies for distribution

[ ] For approval [ ] Return for corrections [ ] Return ___ corrected prints

[X] For your files

REMARKS:
Copies: 1 to RESNA project file no. 69028.08

John C. Young, Project Manager

RESNA
Working To Restore Nature

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

LETTER REPORT
QUARTERLY GROUNDWATER MONITORING
First Quarter 1993
at
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

69028.08

RESNA
Working To Restore Nature

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

May 21, 1993
0416MWHE
69028.08

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

Subject: First Quarter 1993 Groundwater Monitoring Report for ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California.

Mr. Whelan:

As requested by ARCO Products Company (ARCO), RESNA Industries Inc. (RESNA) has prepared this letter report summarizing the results of first quarter 1993 groundwater monitoring performed by ARCO's contractor, EMCON Associates (EMCON) of San Jose, California, at the above-referenced site. The objectives of this quarterly groundwater monitoring are to evaluate changes in the groundwater flow direction and gradient, and changes in concentrations of petroleum hydrocarbons in the local groundwater associated with a former waste-oil and gasoline underground-storage tanks (USTs) at the site. The field work and laboratory analyses of groundwater samples during this quarter were performed under the direction of EMCON and included measuring depths to groundwater, subjectively analyzing groundwater for the presence of petroleum product, collecting groundwater samples from the wells for laboratory analyses, and directing a State-certified laboratory to analyze the groundwater samples. Field procedures and acquisition of field data were performed under the direction of EMCON. RESNA's scope of work was limited to interpretation of field and laboratory analytical data, which included evaluating trends in reported hydrocarbon concentrations in the local groundwater, the groundwater gradient, and direction of groundwater flow beneath the site.

The operating ARCO Station 6113 is located on the southwestern corner of the intersection of East Stanley and Murrieta Boulevards in Livermore, California, as shown on the Site Vicinity Map, Plate 1.

Results of previous environmental investigations at the site are summarized in the reports listed in the References section. The locations of the groundwater monitoring wells, borings, and pertinent site features are shown on the Generalized Site Plan, Plate 2.

Groundwater Sampling and Gradient Evaluation

Depth to water levels (DTW) were measured by EMCON field personnel on January 27, February 26, and March 30, 1993. Quarterly sampling was performed by EMCON field personnel on March 30 and 31, 1993. The results of EMCON's field work on the site, including DTW levels and subjective analyses for the presence of product in the wells, are presented on EMCON's Field Reports, Water Sample Field Data Sheets, and Summary of Groundwater Monitoring Data. These data are included in Appendix A.

The DTW levels, wellhead elevations, groundwater elevations, and subjective observations of product in the groundwater for this and previous quarterly groundwater monitoring events at the site are summarized in Table 1, Cumulative Groundwater Monitoring Data. EMCON's DTW levels were used to evaluate groundwater gradient and flow direction. The presence of floating product was noted in the purge water from MW-6, although no floating product was observed in the sample collected from this well for the subjective analyses during the March monitoring event. No visual evidence of floating product or product sheen was observed in the other wells during this quarter (see EMCON's Field Reports, Appendix A). Groundwater monitoring well MW-4 was dry during the January monitoring event. Well MW-6 could not be monitored during the January monitoring event, and well MW-2 could not be monitored during the February monitoring event because these wells were inaccessible due to construction activities associated with product line replacement. Based on EMCON's DTW levels the gradients for the first-encountered groundwater beneath the site were less than 0.1 ft/ft with flow directions toward the northwest in January and February, and toward the north in March. These interpreted groundwater gradients and flow directions are shown on the Groundwater Gradient Maps, Plates 3 through 5. Groundwater elevations in onsite wells increased an average of approximately 9 feet during this quarter. This significant increase appears to be a result of heavy precipitation during first quarter 1993.

Groundwater monitoring wells MW-1 through MW-5 and MW-7 through MW-12 were purged and sampled by EMCON field personnel on March 30 and 31, 1993. Groundwater monitoring well MW-6 was not sampled, because floating product came into well during purging. The purge water was removed from the site by a licensed hazardous waste hauler; the Monitoring Well Purge Water Transport Form is also included in Appendix A.

Laboratory Methods and Results

Under the direction of EMCON, water samples collected from the wells were analyzed by Columbia Analytical Services, Inc., located in San Jose, California (California Hazardous Waste Testing Laboratory Certification No. 1426). The water samples from MW-1 through MW-5 and MW-7 through MW-12 were analyzed for total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using modified Environmental Protection Agency (EPA) Methods 5030/8020/California DHS LUFT Method. Concentrations of TPHg and benzene in the groundwater are shown on Plate 6, TPHg Concentrations in Groundwater, and Plate 7, Benzene Concentrations in Groundwater. The Chain of Custody Records and Laboratory Analyses Reports are attached in Appendix A. Results of these and previous water analyses are summarized in Table 2, Cumulative Results of Laboratory Analyses of Groundwater Samples--TPHg and BTEX and Table 3, Cumulative Results of Laboratory Analyses of Groundwater Samples--VOCs, TPHd, TOG, and Metals.

The following general trends were noted in reported hydrocarbon concentrations in groundwater beneath the site since the last quarterly monitoring. Concentrations of TPHg and BTEX remained nondetectable in wells MW-8 and MW-9, and decreased in well MW-7. Groundwater monitoring well MW-6 continued to contain floating product. Trends could not be evaluated for MW-1 through MW-5 because they either were dry or contained only residual water during last quarter and thus were not sampled; and could not be evaluated for MW-10 through MW-12 because these wells were installed in March 1993.

Conclusions

Groundwater at this site has been impacted by gasoline-related hydrocarbons based on analytical results of groundwater samples collected from onsite wells. The highest TPHg and benzene concentrations in groundwater appear to be adjacent and immediately downgradient (to the west and north) of the existing gasoline USTs, situated in the northeastern portion of the site). The extent of gasoline hydrocarbons in the groundwater appears to be delineated to less than 50 ppb TPHg, except in the northeastern and northwestern vicinity of the site (see Plates 6 and 7).

Copies of this report should be forwarded to:

Ms. Susan Hugo
Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

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

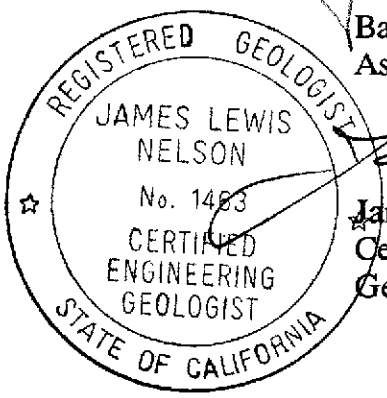
Ms. Danielle Stefani
Livermore Fire Department
4550 East Avenue
Livermore, California 94550

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

Sincerely,
RESNA Industries Inc.

JOHN C Young
FOR

Barbara Sieminski
Assistant Project Geologist



James L. Nelson
Certified Engineering
Geologist # 1463

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Groundwater Gradient Map, January 27, 1993
Plate 4, Groundwater Gradient Map, February 26, 1993
Plate 5, Groundwater Gradient Map, March 30, 1993
Plate 6, TPHg Concentrations in Groundwater, March 30 and 31, 1993
Plate 7, Benzene Concentrations in Groundwater, March 30 and 31, 1993

Table 1, Cumulative Groundwater Monitoring Data
Table 2, Cumulative Results of Laboratory Analyses of Groundwater Samples--TPHg and BTEX
Table 3, Cumulative Results of Laboratory Analyses of Groundwater Samples--VOCs, TPHd, TOG and Metals

Appendix A: EMCON's Field Reports, Summary of Groundwater Monitoring Data, Certified Analytical Reports with Chain-of-Custody, and Water Sample Field Data Sheets.

Monitoring Well Purge Water Transport Form

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.

Applied GeoSystems. April 16, 1991. Limited Subsurface Environmental Investigation Related to the Former Waste-Oil Tank at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-4.

Applied GeoSystems. April 24, 1991. Letter Report, Quarterly Ground-Water Monitoring First Quarter 1991 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-3.

Applied GeoSystems. July 11, 1991. Letter Report, Quarterly Ground-Water Monitoring Second Quarter 1991 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-5.

California Department of Health Services, Office of Drinking Water, October 22, 1990, "Summary of California Drinking Water Standards", Berkeley, California.

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

RESNA. October 17, 1991. Work Plan for Additional Subsurface Investigation and Vapor Extraction Test at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.06

REFERENCES
(Continued)

RESNA. October 18, 1991. Letter Report, Quarterly Groundwater Monitoring, Third Quarter 1991, at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.05

RESNA. March 3, 1991. Addendum to Work Plan for Additional Subsurface Investigation and Vapor Extraction Test at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.06

RESNA. March 6, 1992. Letter Report, Quarterly Groundwater Monitoring, Fourth Quarter 1991, at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.05

RESNA. May 4, 1992. Letter Report, Quarterly Groundwater Monitoring, First Quarter 1992, at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.05

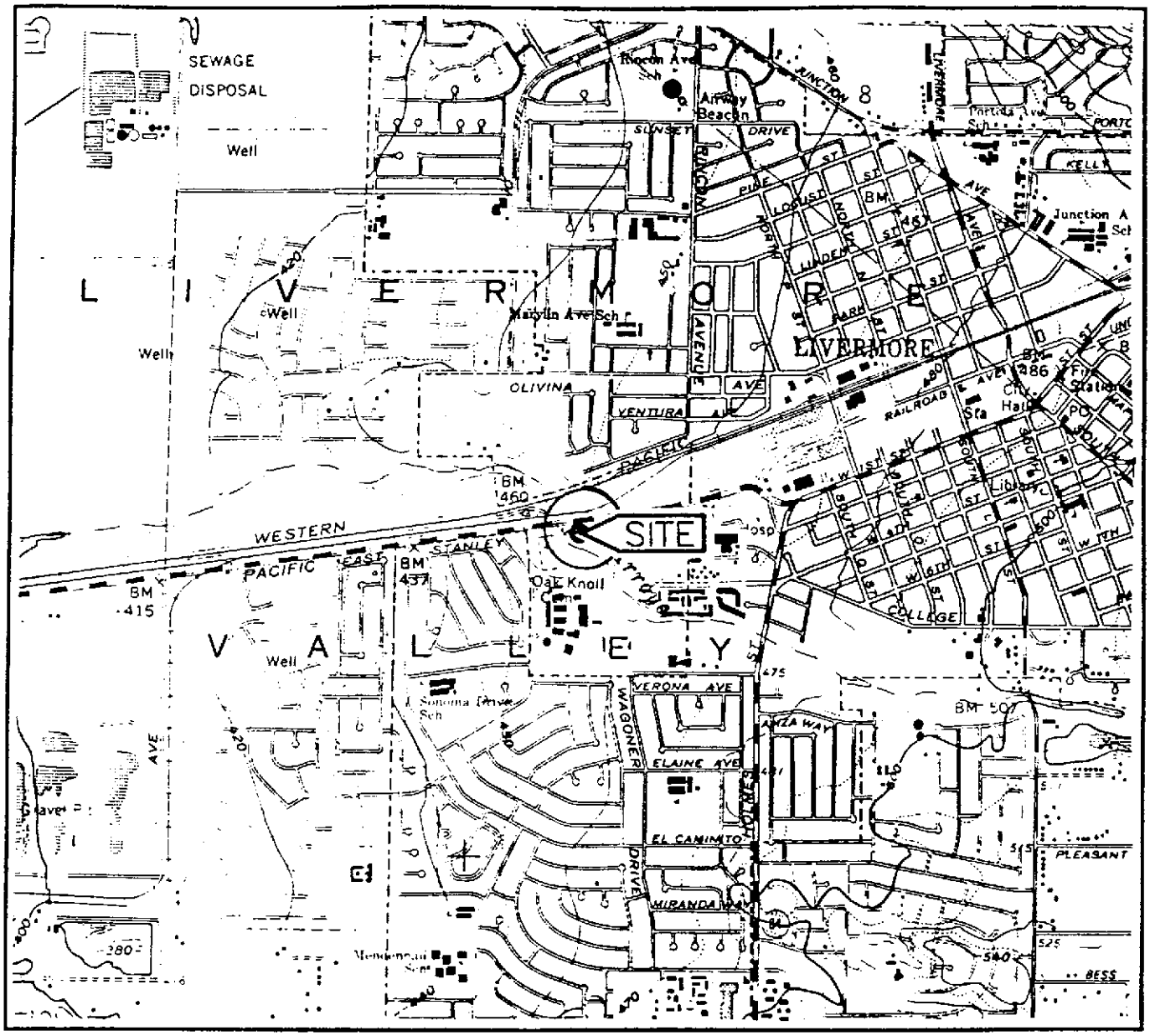
RESNA. September 28, 1992. Letter Report, Quarterly Groundwater Monitoring, Second Quarter 1992, at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.08

RESNA. December 7, 1992. Letter Report, Quarterly Groundwater Monitoring, Third Quarter 1992, at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.08

RESNA. December 21, 1992. Additional Subsurface Investigation and Vapor Extraction Test at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.07

RESNA. December 29, 1992. Addendum to Work Plan for Initial Offsite and Additional Onsite Subsurface Investigation and Aquifer Pumping Test at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.11

RESNA. March 16, 1993. Letter Report, Quarterly Groundwater Monitoring, Fourth Quarter 1992, at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.08



Base: U.S. Geological Survey
7.5-Minute Quadrangles
Livermore, California.
Photorevised 1980

LEGEND

⊙ = Site Location

N

Approximate Scale

2000 1000 0 2000 4000

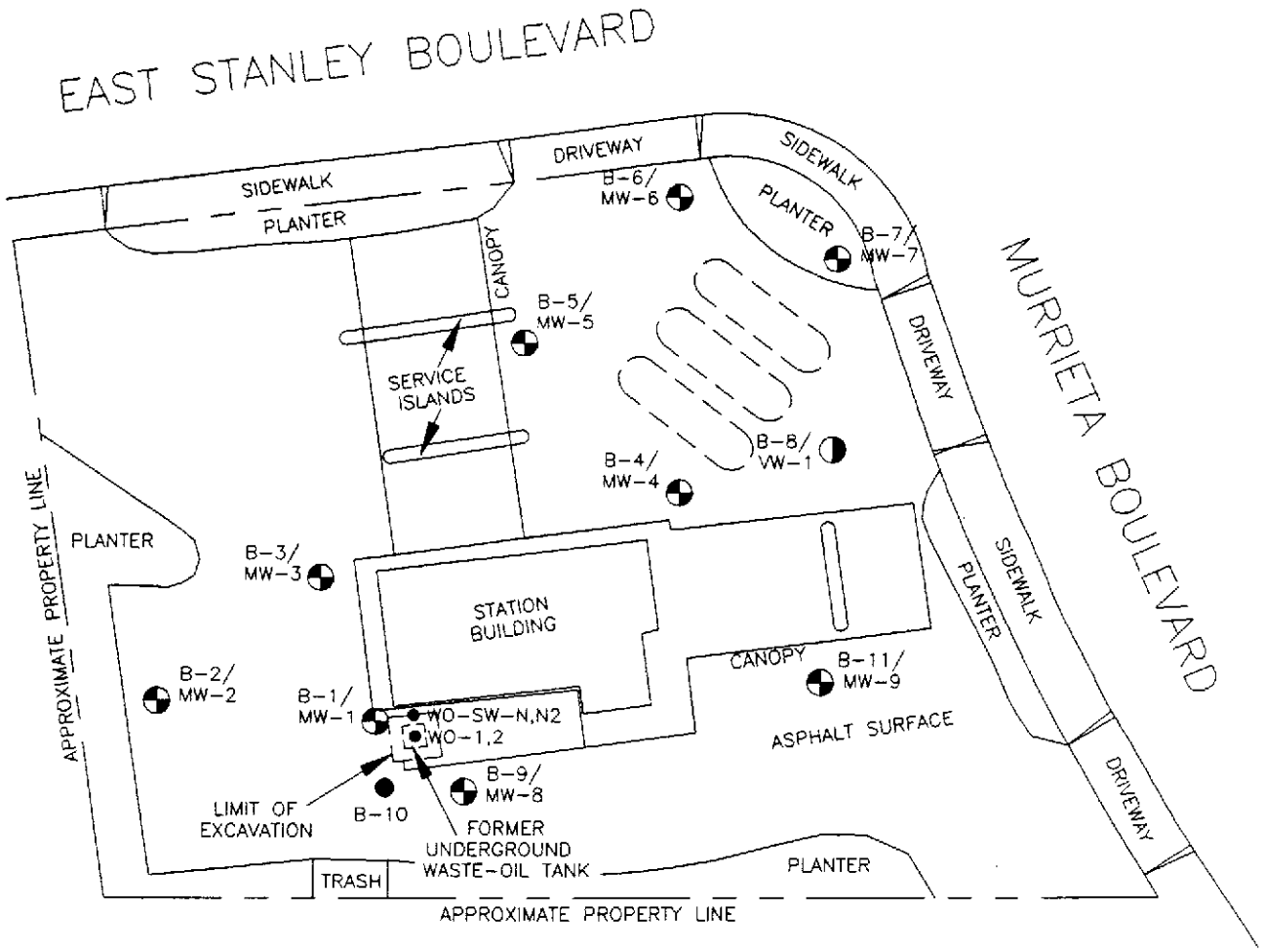
feet

RESNA
Working to Restore Nature

PROJECT 69028.08

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

PLATE
1



EXPLANATION

B-11/ MW-9 = Boring/monitoring well (RESNA, 09/89, 02/91, and 06/92)

B-8/ VW-1 = Boring/vapor extraction well (RESNA, 06/92)

B-10 = Boring (RESNA, 06/92)

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

= Existing underground gasoline storage tanks

Approximate Scale

40 20 0 40 80

feet

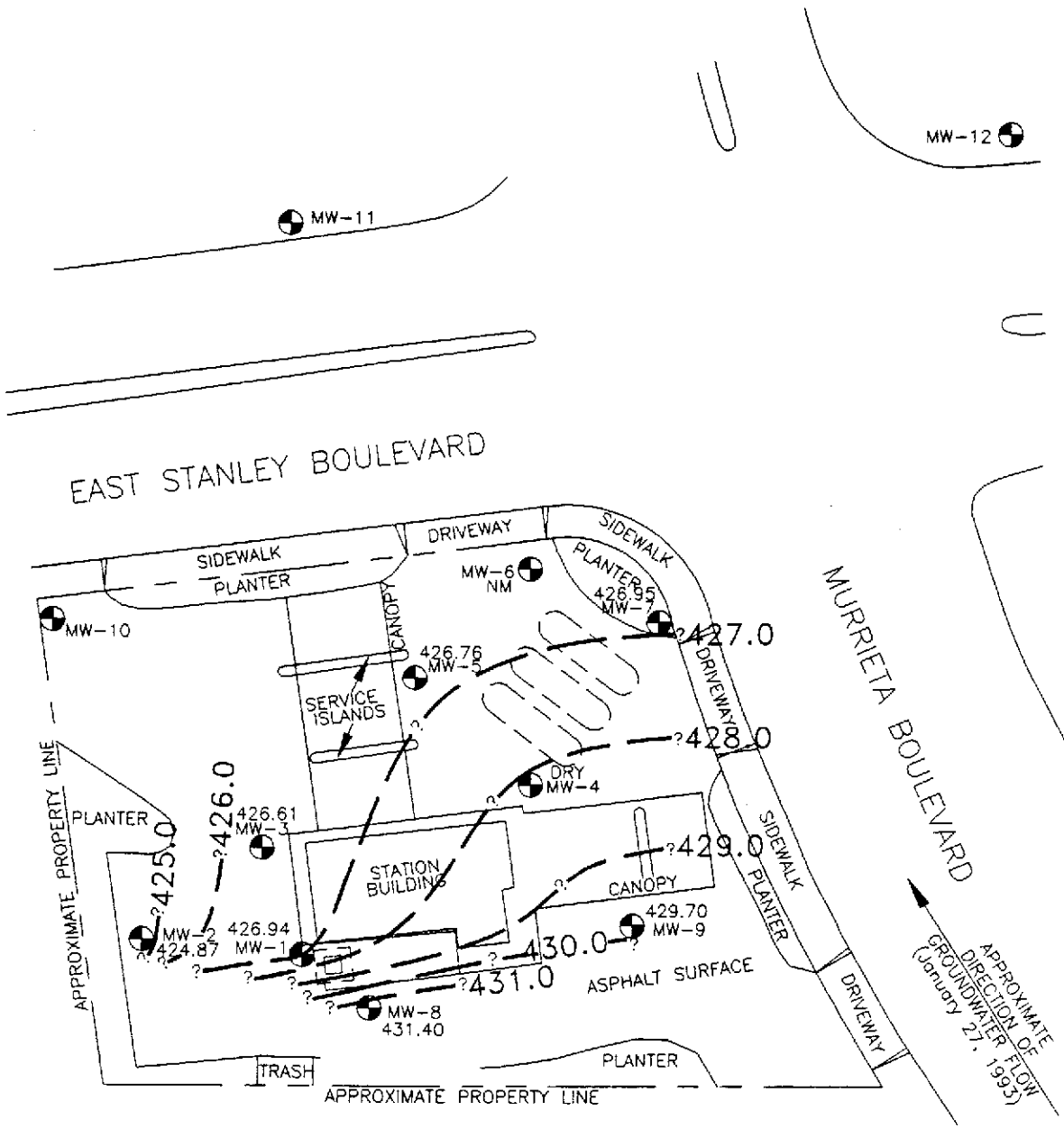
Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., Feb 1991 and John Koch, Land Suveyor, June 1992 and April 1993.

RESNA
Working to Restore Nature

PROJECT: 69028.08

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

PLATE
2



EXPLANATION

MW-9 = Monitoring well (RESNA, 09/89, 02/91 and 06/92)

431.0 = Line of equal elevation of groundwater in feet above mean sea level (MSL)

431.40 = Elevation of groundwater in feet above MSL, January 27, 1993

NM = Not monitored – well inaccessible due to construction activities

= Existing underground gasoline storage tanks

Approximate Scale

50 25 0 50 100

feet

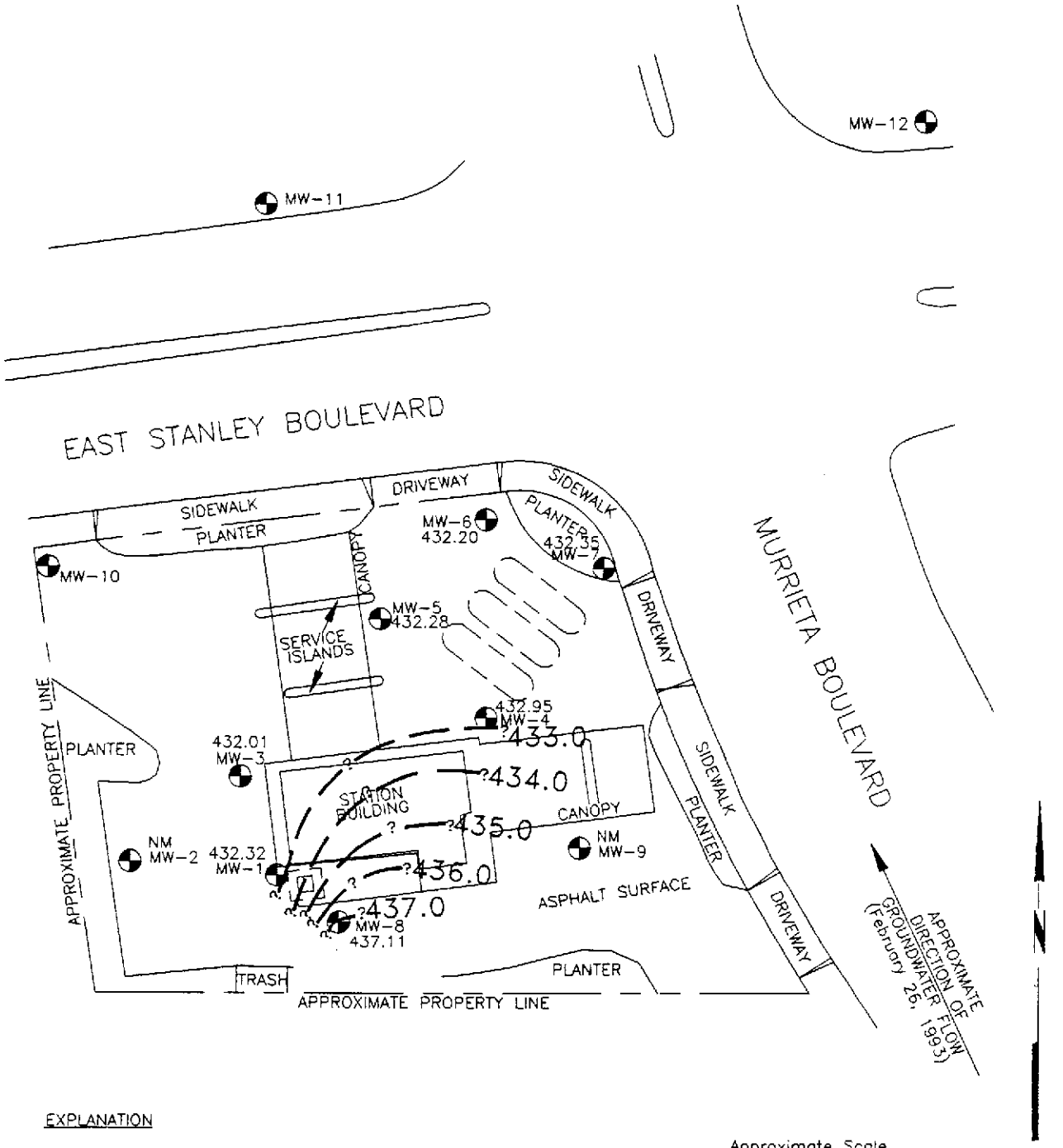
Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., Feb. 1991; and John Koch Land Surveyor, June 1992 and April 1993.

RESNA
Working to Restore Nature

PROJECT: 69028.08

GROUNDWATER GRADIENT MAP
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE 3



EXPLANATION

MW-9 = Monitoring well (RESNA, 09/89, 02/91, and 06/92)

437.0 = Line of equal elevation of groundwater in feet above mean sea level (MSL)

437.11 = Elevation of groundwater in feet above MSL, February 26, 1993

NM = Not monitored – well inaccessible due to construction activities

= Existing underground gasoline storage tanks

Approximate Scale

50 25 0 50 100

feet

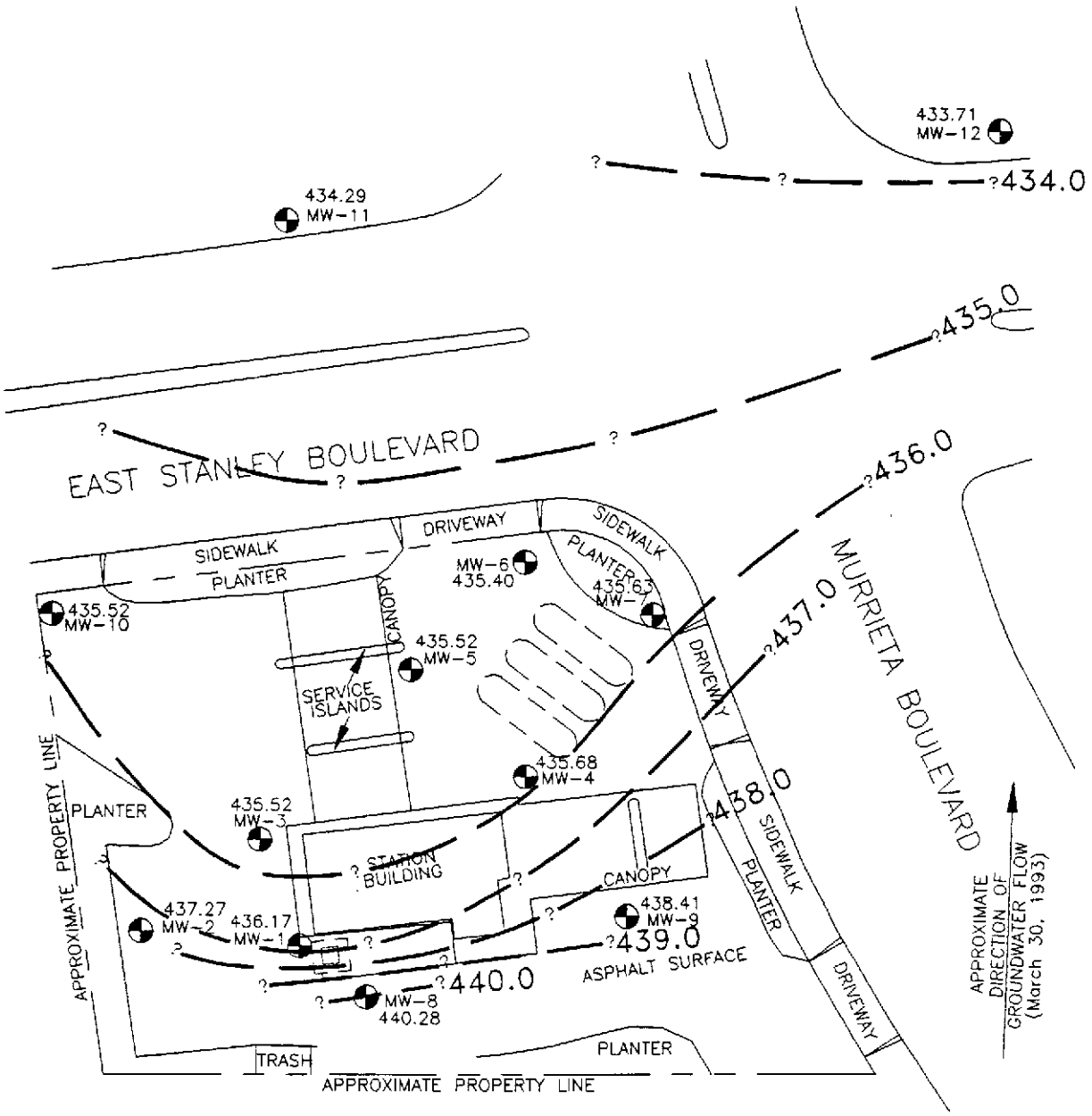
Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., Feb. 1991; and John Koch Land Surveyor, June 1992 and April 1993.

RESNA
Working to Restore Nature

PROJECT: 69028.08

GROUNDWATER GRADIENT MAP
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE
4



EXPLANATION

MW-12 = Monitoring well (RESNA, 09/89, 02/91, 06/92 and 03/93)

440.0 = Line of equal elevation of groundwater in feet above mean sea level (MSL)

440.28 = Elevation of groundwater in feet above MSL, March 30, 1993

= Existing underground gasoline storage tanks

Approximate Scale

50 25 0 50 100

feet

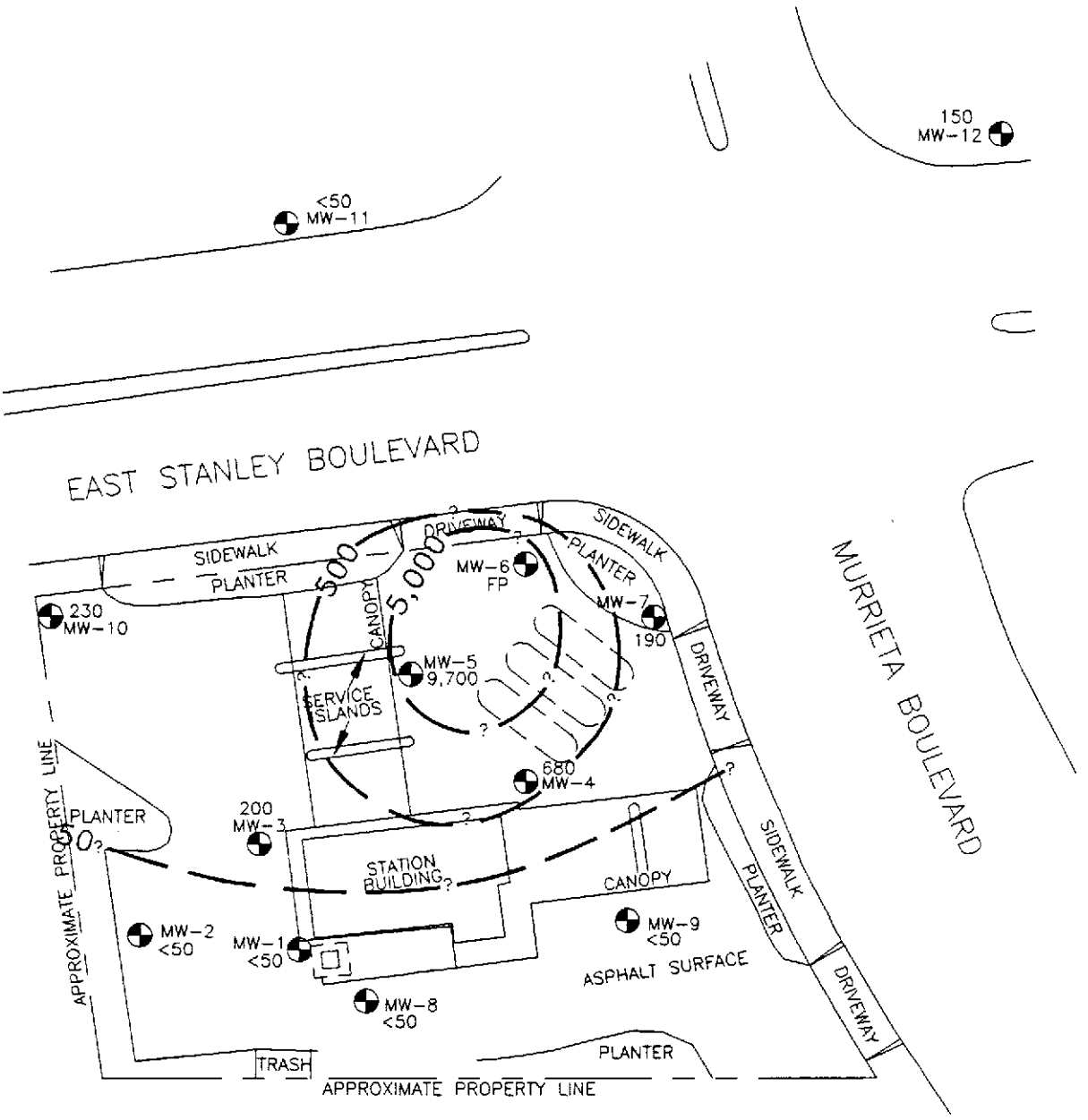
Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., Feb. 1991; and John Koch Land Surveyor, June 1992 and April 1993.

RESNA
Working to Restore Nature

PROJECT: 69028.08

GROUNDWATER GRADIENT MAP
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE
5



EXPLANATION

MW-12 = Monitoring well (RESNA, 09/89, 02/91, 06/92 and 03/93)

5,000 = Line of equal concentration of TPHg in groundwater in parts per billion (ppb)

9,700 = Concentration of TPHg in groundwater in ppb, March 30 and 31, 1993

FP = Not sampled – floating product present

= Existing underground gasoline storage tanks

Approximate Scale

50 25 0 50 100

feet

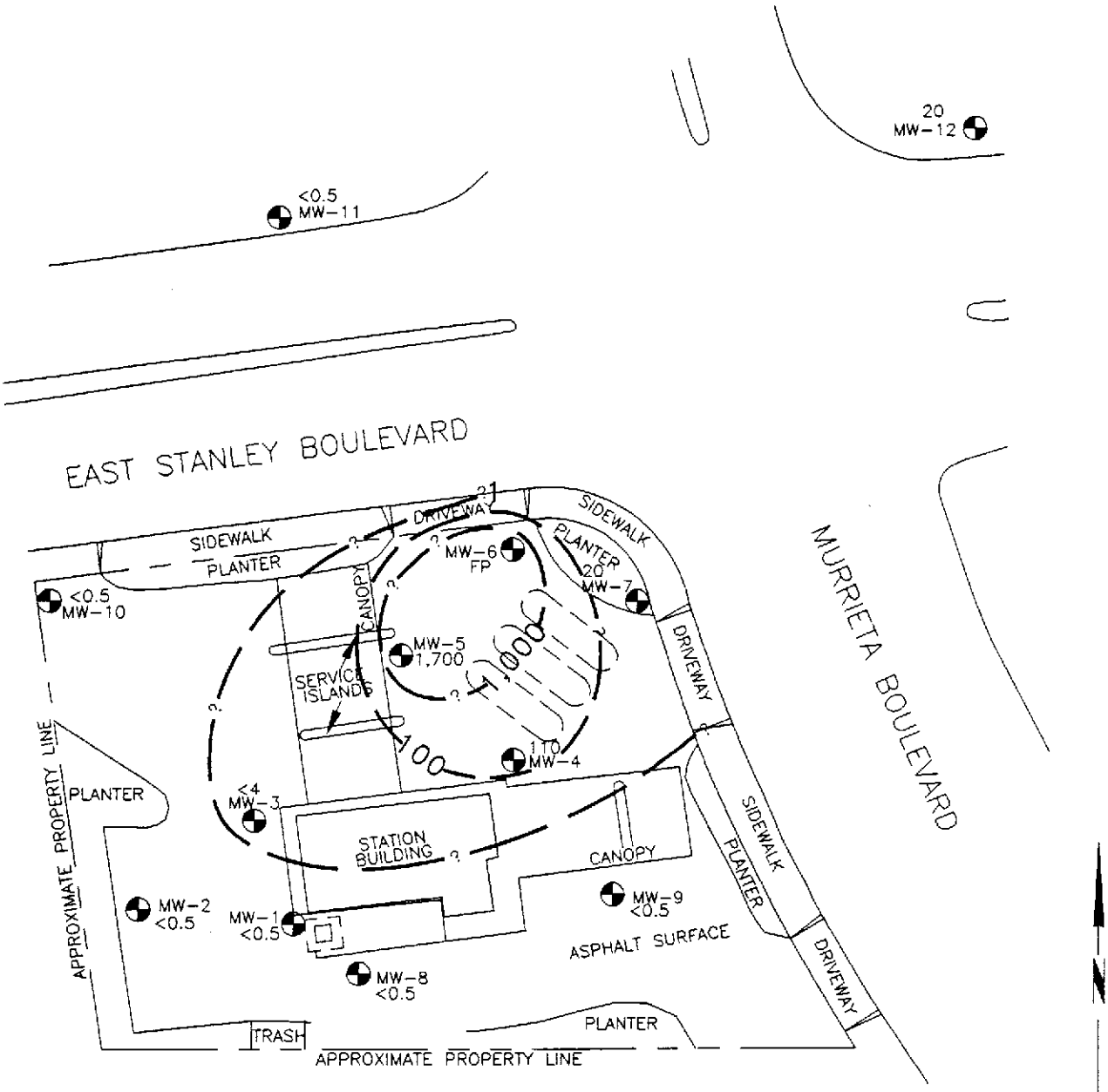
Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., Feb. 1991; and John Koch Land Surveyor, June 1992 and April 1993.

RESNA
Working to Restore Nature

PROJECT: 69028.08

TPHg CONCENTRATIONS IN GROUNDWATER
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE 6



EXPLANATION

MW-12 = Monitoring well (RESNA, 09/89, 02/91, 06/92 and 03/93)

1,000 = Line of equal concentration of benzene in groundwater in parts per billion (ppb)

1,700 = Concentration of benzene in groundwater in ppb, March 30 and 31, 1993

FP = Not sampled – floating product present

= Existing underground gasoline storage tanks

Approximate Scale

50 25 0 50 100

feet

Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., Feb. 1991; and John Koch Land Surveyor, June 1992 and April 1993.

RESNA
Working to Restore Nature

PROJECT: 69028.08

BENZENE CONCENTRATIONS IN GROUNDWATER
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE 7

RESNA
Working to Restore Nature

Quarterly Groundwater Monitoring
ARCO Station 6113, 785 East Stanley Boulevard, Livermore, CA

May 21, 1993
69028.08

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 1 of 5)

Well / Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	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
04/10/91		19.42	437.62	None
05/20/91		25.95	431.09	None
06/20/91		32.55	424.49	None
07/25/91		38.22	418.82	None
08/13/91		40.74	416.30	None
09/12/91		43.16	413.88	None
10/22/91		Dry	Dry	None
11/13/91		Dry	Dry	None
12/21/91		Dry	Dry	None
01/18/92		Dry	Dry	None
02/21/92		Dry	Dry	None
03/19/92		36.16	420.88	None
04/24/92		38.14	418.90	None
05/20/92		40.74	416.30	None
06/29/92		43.80*	–	None
07/28/92		Dry	Dry	None
08/26/92		Dry	Dry	None
09/11/92		Dry	Dry	None
10/29/92		Dry	Dry	None
11/11/92		Dry	Dry	None
12/14/92	Not monitored due to construction activities			
01/27/93		30.10	426.94	None
02/26/93		24.72	432.32	None
03/30/93		20.87	436.17	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
04/10/91		19.81	437.93	None

See notes on Page 5 of 5.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 2 of 5)

Well / Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Floating Product
MW-2 cont.				
05/20/91	457.74	26.62	431.12	None
06/20/91		33.15	424.59	None
07/25/91		37.10	420.64	None
08/13/91		37.20	420.54	None
09/12/91		37.44*	—	None
10/22/91		37.38*	—	None
11/13/91		37.39*	—	None
12/21/91		Dry	Dry	None
01/18/92		37.65*	—	None
02/21/92		37.75*	—	None
03/19/92		35.82	421.92	None
04/24/92		36.64	421.10	None
05/20/92		37.23	420.51	None
06/29/92		37.67*	—	None
07/28/92		38.36*	—	None
08/26/92		38.26*	—	None
09/11/92		38.37*	—	None
10/29/92		Dry	Dry	None
11/11/92		Dry	Dry	None
12/14/92	Not monitored due to construction activities			
01/27/93		32.87	424.87	None
02/26/93	Not monitored due to construction activities			
03/30/93		20.47	437.27	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
04/10/91		19.35	437.62	None
05/20/91		25.86	431.11	None
06/20/91		32.45	424.52	None
07/25/91		38.06	418.91	None
08/13/91		38.40	418.57	None
09/12/91		Dry	Dry	None
10/22/91		Dry	Dry	None
11/13/91		Dry	Dry	None
12/21/92		Dry	Dry	None

See notes on Page 5 of 5.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 3 of 5)

Well / Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Floating Product
MW-3 cont.				
01/18/92	456.97	38.90*	—	None
02/21/92		38.88*	—	None
03/19/92		36.03	420.94	None
04/24/92		37.92	419.05	None
05/20/92		38.57*	—	None
06/29/92		38.70*	—	None
07/28/92		39.05*	—	None
08/26/92		39.03*	—	None
09/11/92		39.02*	—	None
10/29/92		Dry	Dry	None
11/11/92		Dry	Dry	None
12/14/92	Not monitored due to construction activities			
01/27/93		30.36	426.61	None
02/26/93		24.96	432.01	None
03/30/93		21.45	435.52	None
MW-4				
02/21/91	456.97	22.01	434.96	None
03/20/91		20.31	436.66	None
04/10/91		19.55	437.42	None
05/20/91		25.24	431.73	None
06/20/91		Dry	Dry	None
07/25/91		Dry	Dry	None
08/13/91		Dry	Dry	None
09/12/91		Dry	Dry	None
10/22/91		Dry	Dry	None
11/13/91		Dry	Dry	None
12/21/92		Dry	Dry	None
01/18/92		Dry	Dry	None
02/21/92		Dry	Dry	None
03/19/92		Dry	Dry	None
04/24/92		Dry	Dry	None
05/20/92		Dry	Dry	None
06/29/92	456.55	Dry	Dry	None
07/28/91		Dry	Dry	None
08/26/92		Dry	Dry	None
09/11/92		Dry	Dry	None
10/29/92		Dry	Dry	None
11/11/92		Dry	Dry	None
12/14/92	Not monitored due to construction activities			
01/27/93		Dry	Dry	None

See notes on Page 5 of 5.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 4 of 5)

Well / Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Floating Product
MW-4 cont.				
02/26/93	456.55	23.60	432.95	None
03/30/93		20.87	435.68	None
MW-5				
06/29/92	455.84	50.53	405.31	Odor
07/28/92		54.92	400.92	None
08/26/92		59.58	396.26	None
09/11/92		60.88	394.96	None
10/29/92		61.86*	—	None
11/11/92		62.53*	—	None
12/14/92	Not monitored due to construction activities			
01/27/93		29.08	426.76	None
02/26/93		23.56	432.28	None
03/30/93		20.32	435.52	None
MW-6				
06/29/92	454.93	49.72	405.21	None
07/28/92		54.63	400.30	None
08/26/92		59.45	395.48	None
09/11/92		60.73**	394.20**	0.04
10/29/92		62.14	392.79	None
11/11/92		62.42**	392.51**	0.03
12/14/92	Not monitored due to construction activities			
01/27/93	Not monitored due to construction activities			
02/26/93		22.73	432.20	None
03/30/93		19.53	435.40	None
MW-7				
06/29/92	454.92	49.57	405.35	None
07/28/92		54.60	400.32	None
08/26/92		59.60	395.32	None
09/11/92		60.74	394.18	None
10/29/92		62.23	392.69	None
11/11/92		62.69	392.23	None
12/14/92	Not monitored due to construction activities			
01/27/93		27.97	426.95	None
02/26/93		22.57	432.35	None
03/30/93		19.29	435.63	None
MW-8				
06/29/92	456.97	50.40	406.57	None

See notes on Page 5 of 5.

RESNA
Working to Restore Nature

Quarterly Groundwater Monitoring
ARCO Station 6113, 785 East Stanley Boulevard, Livermore, CA

May 21, 1993
69028.08

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 5 of 5)

Well Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Floating Product
MW-8 cont.				
07/28/92	456.97	55.79	401.18	None
08/28/92		60.79	396.18	None
09/11/92		61.97	395.00	None
10/29/92		63.51	393.46	None
11/11/92		64.21	392.76	None
12/14/92	Not monitored due to construction activities			
01/27/93		25.57	431.40	None
02/26/93		19.86	437.11	None
03/30/93		16.69	440.28	None
MW-9				
06/29/92	456.18	50.29	405.89	None
07/28/92		55.53	400.65	None
08/26/92		60.62	395.56	None
09/11/92		61.67	394.51	None
10/29/92		63.17	393.01	None
11/11/92		63.68	392.50	None
12/14/92	Not monitored due to construction activities			
01/27/93		26.48	429.70	None
02/26/93	Not monitored due to construction activities			
03/30/93		17.77	438.41	None
MW-10				
03/30/93	456.85	21.33	435.52	None
MW-11				
03/30/93	455.07	20.78	434.29	None
MW-12				
03/30/93	455.04	21.33	433.71	None

For MW-1 through MW-3 (surveyed by Ron Archer in October 1988) and MW-4 (surveyed by Ron Archer in February 1991) 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.
For MW-4 through MW-9 (surveyed by John Koch in June 1992) and MW-10 through MW-12 (surveyed by John Koch in April 1993) wellhead elevation based on benchmark: Top of pin in standard monument, at intersection of El Rancho Drive and Albatross Ave. Elevation taken as 448.218'. City of Livermore Datum.
Measurements in feet.
* Residual water.
**Adjusted water level due to product. 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 was then subtracted from the measured depth to water to obtain a calculated depth to water. These calculated groundwater depths were subtracted from surveyed wellhead elevations to calculate the differences in groundwater elevations.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES -- TPHg and BTEX
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 1 of 3)

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
05/20/91	<30	<0.30	<0.30	<0.30	<0.30
08/13/91		Not sampled--dry			
11/13/91		Not sampled--dry			
03/19/92	400	<3.5*	<1.2*	<0.8*	<1.0*
06/29/92		Not sampled--residual water only			
09/11/92		Not sampled--dry			
11/12/92		Not sampled--dry			
03/30/93	<50	<0.5	<0.5	<0.5	<0.5
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
05/20/91	<30	<0.30	<0.30	<0.30	<0.30
08/13/91		Not sampled--dry			
11/13/91		Not sampled--dry			
03/19/92	<50	<0.5	<0.5	<0.5	<0.5
06/29/92	<50	<0.5	<0.5	<0.5	<0.5
09/11/92		Not sampled--residual water only			
11/12/92		Not sampled--dry			
03/30/93	<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
05/20/91	97	1.3	1.1	6.2	8.4
08/13/91		Not sampled--dry			
11/13/91		Not sampled--dry			
03/19/92	220	<1.1*	<1.9	<0.6*	<0.8*
06/29/92		Not sampled --residual water only			
09/11/92		Not sampled --residual water only			

See notes on Page 3 of 3.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER – TPHg and BTEX
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 2 of 3)

Well Date	TPHg	Benzene	Toluene	Ethyl-benzene	Total Xylenes
MW-3 cont.					
11/12/92		Not sampled--dry			
03/30/93	200**	<4.0*	<0.5	<0.5	<0.5
MW-4					
02/21/91	3,500	410	7.6	30	47
05/20/91	1,400	150	6.0	4.4	3.1
08/13/91		Not sampled--dry			
11/13/91		Not sampled--dry			
03/19/92		Not sampled--dry			
06/29/92		Not sampled--dry			
09/11/92		Not sampled--dry			
11/12/92		Not sampled--dry			
03/31/93	680	110	5.2	3.0	7.4
MW-5					
06/29/92	8,900	1,700	640	310	1,100
09/11/92	13,000	2,200	1,500	130	930
11/12/92		Not sampled--residual water only			
03/31/93	9,700	1,700	430	220	880
MW-6					
06/29/92	8,600	1,800	460	52	450
09/11/92		Not sampled--floating product			
11/12/92		Not sampled--floating product			
03/31/93		Not sampled--floating product			
MW-7					
06/29/92	270	38	3.7	1.1	4.4
09/11/92	420	20	0.7	<0.5	<0.5
11/12/92	470	31	1.0	<0.5	0.8
03/31/93	190	20	1.0	<0.5	<0.5
MW-8					
06/29/92	<50	<0.5	<0.5	<0.5	<0.5
09/11/92	<50	<0.5	<0.5	<0.5	<0.5
11/12/92	<50	<0.5	<0.5	<0.5	<0.5
03/30/93	<50	<0.5	<0.5	<0.5	<0.5

See notes on Page 3 of 3.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES – TPHg and BTEX
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 3 of 3)

MW-9					
06/29/92	<50	<0.5	<0.5	<0.5	<0.5
09/11/92	<50	<0.5	<0.5	<0.5	<0.5
11/12/92	<50	<0.5	<0.5	<0.5	<0.5
03/31/93	<50	<0.5	<0.5	<0.5	<0.5
MW-10					
03/31/93	230**	<0.5	<0.5	<1.0*	0.6
MW-11					
03/31/93	<50	<0.5	<0.5	<0.5	<0.5
MW-12					
03/31/93	150	20	<0.5	<0.5	<0.5
MCLs	None	1.0	None	680	1,750
DWAL	None	None	100	None	None

Results in parts per billion (ppb). Benzene, toluene, ethylbenzene and total xylenes by EPA Method 5030/8020/DHS LUFT Method.
TPHg = Total petroleum hydrocarbons as gasoline by EPA Method 5030/8020/DHS LUFT Method.
< = Less than the detection limits shown.
MCLs = Adopted Maximum Contaminant Levels in Drinking Water, DHS (October 1990)
DWAL = Recommended Drinking Water Action Level, DHS (October 1990)
* = Laboratory reportedly raised detection limit due to matrix interference.
** = The sample contains components eluting in the gasoline range that were quantitated as gasoline. The chromatogram does not match the typical gasoline fingerprint.

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES -- VOCs, TPHd, TOG, and Metals
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 1 of 2)

Well Date	VOCs	TPHd	TOG	Cd	Cr	Pb	Zn	Ni
MW-1								
09/20/89	NA	<50	<5,000	NA	NA	NA	NA	NA
06/21/90	NA	<100	13,000	NA	NA	NA	NA	NA
09/20/90	NA	<50	<5,000	NA	NA	NA	NA	NA
12/18/90	NA		<5,000	NA	NA	NA	NA	NA
02/21/91	NA		<5,000	NA	NA	NA	NA	NA
05/20/91	NA		<75,000	NA	NA	NA	NA	NA
08/13/91	NS		NS	NS	NS	NS	NS	NS
11/13/91	NS	NS	NS	NS	NS	NS	NS	NS
03/19/92	NA	NA	NA	NA	NA	NA	NA	NA
06/29/92	NS	NS	NS	NS	NS	NS	NS	NS
09/11/92	NS	NS	NS	NS	NS	NS	NS	NS
11/12/92	NS	NS	NS	NS	NS	NS	NS	NS
03/30/93	NA	NA	NA	NA	NA	NA	NA	NA
MW-2								
09/20/89	NA	<50	<5,000	NA	NA	NA	NA	NA
06/21/90	NA	<100	<5,000	NA	NA	NA	NA	NA
09/20/90	NA	<50	<5,000	NA	NA	NA	NA	NA
12/18/90	NA	NA	<5,000	NA	NA	NA	NA	NA
02/21/91	NA	NA	<5,000	NA	NA	NA	NA	NA
05/20/91	NA	NA	<75,000	NA	NA	NA	NA	NA
08/13/91	NS	NS	NS	NS	NS	NS	NS	NS
11/13/91	NS	NS	NS	NS	NS	NS	NS	NS
03/19/92	NA	NA	NA	NA	NA	NA	NA	NA
06/29/92	NA	NA	NA	NA	NA	NA	NA	NA
09/11/92	NS	NS	NS	NS	NS	NS	NS	NS
11/12/92	NS	NS	NS	NS	NS	NS	NS	NS
03/30/93	NA	NA	NA	NA	NA	NA	NA	NA
MW-3								
09/20/89	NA	<50	<5,000	NA	NA	NA	NA	NA
06/21/90	NA	<100	10,000	NA	NA	NA	NA	NA
09/20/90	NA	<50	<5,000	NA	NA	NA	NA	NA
12/18/90	NA	NA	<5,000	NA	NA	NA	NA	NA
02/21/91	NA	NA	<5,000	NA	NA	NA	NA	NA
05/20/91	NA	NA	<75,000	NA	NA	NA	NA	NA
08/13/91	NS	NS	NS	NS	NS	NS	NS	NS
11/13/91	NS	NS	NS	NS	NS	NS	NS	NS
03/19/92	NA	<50	<5,000	NA	NA	NA	NA	NA
06/29/92	NS	NS	NS	NS	NS	NS	NS	NS
09/11/92	NS	NS	NS	NS	NS	NS	NS	NS

See notes on Page 2 of 2.

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES – VOCs, TPHd, TOG, and Metals
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 2 of 2)

Well Date	VOCs	TPHd	TOG	Cd	Cr	Pb	Zn	Ni
MW-3 cont.								
11/12/92	NS	NS	NS	NS	NS	NS	NS	NS
03/30/93	NA	NA	NA	NA	NA	NA	NA	NA
MW-4								
02/21/91	NA	NA	<5,000	NA	NA	NA	NA	NA
05/20/91	NA	NA	<75,000	NA	NA	NA	NA	NA
08/13/91	NS	NS	NS	NS	NS	NS	NS	NS
11/13/91	NS	NS	NS	NS	NS	NS	NS	NS
03/19/92	NS	NS	NS	NS	NS	NS	NS	NS
06/29/92	NS	NS	NS	NS	NS	NS	NS	NS
09/29/92	NS	NS	NS	NS	NS	NS	NS	NS
11/12/92	NS	NS	NS	NS	NS	NS	NS	NS
03/31/93	NA	NA	NA	NA	NA	NA	NA	NA
MW-8								
06/29/92	ND*	<50	<500	<3	1,780	143	1,310	5,100
09/11/92	NA	<50	<500	13	3,580	308	2,620	10,300
11/12/92	NA	NA	NA	28	3,440	221	2,550	9,840
03/31/93	NA	NA	NA	NA	NA	NA	NA	NA
MW-9								
11/12/92	NA	NA	NA	10	1,080	101	859	3,070
03/31/93	NA	NA	NA	NA	NA	NA	NA	NA
MCL:	Varies	—	—	10	50	50	5,000	—

Results in micrograms per liter (ug/L) = parts per billion (ppb).
VOCs: Halogenated Volatile Organic Compounds by EPA Method 5030/601.
TPHd: Total petroleum hydrocarbons as diesel by EPA Methods 3510/California DHS LUFT Method.
TOG: Total oil and grease measured by EPA Method 5520C&F.
Cd: Cadmium by EPA Method 6010.
Cr: Chromium by EPA Method 6010.
Ni: Nickel by EPA Method 6010.
Zn: Zinc by EPA Method 6010.
Pb: Lead by EPA Method 7421.
NA: Not analyzed.
<: Results reported as less than the detection limit.
NS: Well not sampled.
ND: Not detected.
*: 31 compounds tested were nondetectable.
MCL: Adopted Maximum Contaminant Levels in Drinking Water (October 1990)

APPENDIX A

EMCON'S FIELD REPORTS, SUMMARY OF GROUNDWATER MONITORING DATA, CERTIFIED ANALYTICAL REPORTS WITH CHAIN-OF-CUSTODY, AND WATER SAMPLE FIELD DATA SHEETS

MONITORING WELL PURGE WATER TRANSPORT FORM

EMCON Associates

1938 Junction Avenue • San Jose, California 95131-2102 • **(408) 453-0719** • Fax (408) 453-0452

Date April 16, 1993
Project 0G70-038.01

To:
Mr. Joel Coffman
RESNA/ Applied Geosystems
3315 Almaden Expressway, Suite 34
San Jose, California 95118

We are enclosing:

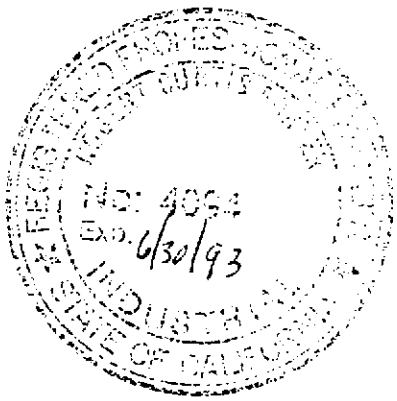
Copies	Description
1	Depth To Water / Floating Product Survey Results
1	Summary of Groundwater Monitoring Data
1	Certified Analytical Reports with Chain-of-Custody
12	Water Sample Field Data Sheets

For your: X Information Sent by: X Mail

Comments:

Enclosed are the data from the second quarter 1993 monitoring event at ARCO service station 6113, 785 East Stanley Blvd, Livermore, CA. Groundwater monitoring is conducted consistent with applicable regulatory guidelines. Please call if you have any questions: (408) 453-2266.

Reviewed by:



Jim Butera JB

Robert C Porter

Robert Porter, Senior Project Engineer.

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 0G70-038.01 STATION ADDRESS : 785 East Stanley Blvd. Livermore DATE : 3-30-93

ARCO STATION # : 6113 FIELD TECHNICIAN : P. Stafford DAY : Tuesday

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket	Lock	Locking Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	MW-12	ok	Yes	ok	Dolphin	Yes	21.33	21.33	ND	ND	34.0	H2O in C Box.
2	MW-11	ok	Yes	ok	Dolphin	Yes	20.78	20.78	ND	ND	44.0	well under pressure.
3	MW-10	ok	Yes	ok	Dolphin	Yes	21.33	21.34	ND	ND	50.6	—
4	MW-2	ok	ND	ok	3259	Yes	20.47	20.46	ND	ND	38.7	ND Diversified screws to hold Drive Lid.
5	MW-3	ok	Yes	ok	3259	Yes	21.45	21.44	ND	ND	39.1	
6	~~MW-4~~ MW-1	ok	Yes	ok	3259	Yes	20.87	20.87	ND	ND	44.9	L.W.C. was off well.
7	~~MW-1~~ MW-8	ok	Yes	ok	3259	Yes	16.69	16.69	ND	ND	66.6	—
8	MW-9	ok	Yes	ok	3259	Yes	17.77	17.77	ND	ND	68.0	—
9	MW-7	ok	Yes	ok	3258	Yes	19.29	19.29	ND	ND	67.7	well under pressure
10	MW-6	ok	Yes	ok	3259	Yes	19.53	19.53	ND*	ND	66.7	slight odor * Product using bailing purge
11	MW-5	ok	Yes	ok	Nine	slip cap	20.32	20.32	ND	ND	62.6	—
12	MW-4	ok	Yes	ok	Dolphin 3259	ok	20.87	20.87	ND	ND	26.7	—

18.45 92 81 12.6

SURVEY POINTS ARE TOP OF WELL CASINGS

Summary of Groundwater Monitoring Data
Second Quarter 1993
ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California
micrograms per liter (µg/l) and milligrams per liter (mg/l)

Well ID and Sample Depth	Sampling Date	Depth To Water (feet)	Floating Product Thickness (feet)	TPH[1] as Gasoline (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)
MW-1(43)	03/30/93	20.87	ND.[2]	<50	<0.5	<0.5	<0.5	<0.5
MW-2(37)	03/30/93	20.47	ND.	<50	<0.5	<0.5	<0.5	<0.5
MW-3(38)	03/30/93	21.45	ND.	200.	<4.	<0.5	<0.5	<0.5
MW-4(25)	03/31/93	20.87	ND.	680.	110.	5.2	3.0	7.4
MW-5(61)	03/31/93	20.32	ND.	9,700.	1,700.	430.	220.	880.
MW-6	03/31/93	19.53	0.01	FP.[3]	FP.	FP.	FP.	FP.
MW-7(66)	03/31/93	19.23	ND.	190.	20.	1.0	<0.5	<0.5
MW-8(65)	03/30/93	16.69	ND.	<50	<0.5	<0.5	<0.5	<0.5
MW-9(67)	03/31/93	17.77	ND.	<50	<0.5	<0.5	<0.5	<0.5
MW-10(49)	03/31/93	21.33	ND.	230.	<0.5	<0.5	<1.	0.6
MW-11(43)	03/31/93	20.78	ND.	<50	<0.5	<0.5	<0.5	<0.5
MW-12(33)	03/3193	21.33	ND.	150.	20.	<0.5	<0.5	<0.5
FB-1.[4]	03/3193	NA[5].	NA.	<50	<0.5	<0.5	<0.5	<0.5

1. TPH. = Total petroleum hydrocarbons
2. ND. = Not detected
3. FP. = Floating product detected in well after puring was started, no samples taken
4. FB. = Field Blank
5. NA. = Not applicable

Columbia Analytical Services, Inc.

April 14, 1993

Service Request No. SJ93-0443

Jim Butera
EMCON Associates
1921 Ringwood Avenue
San Jose, CA 95131

Re: **EMCON Project No. 0G70-038.01**
ARCO Facility No. 6113

Dear Mr. Butera:

Attached are the results of the water samples submitted to our lab on April 1, 1993. For your reference, these analyses have been assigned our service request number SJ93-0443.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Keoni A. Murphy
Laboratory Manager

Annelise J. Bazar
Regional QA Coordinator

KAM/kt

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	04/01/93
Project:	EMCON Project No. 0G70-038.01	**Service Request No.:**	SJ93-0443
	ARCO Facility No. 6113	**Sample Matrix:**	Water

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

Sample Name:		MW-1 (43)	MW-2 (37)	MW-3 (38)
Date Analyzed:		04/06/93	04/06/93	04/06/93
Analyte	**MRL**			
Benzene	0.5	ND	ND	<4. *
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	200. **

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Raised MRL due to matrix interference.
** The sample contains components eluting in the gasoline range that were quantitated as gasoline. The chromatogram does not match the typical gasoline fingerprint.

Approved by: Kevin Murphy Date: April 15, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	04/01/93
Project:	EMCON Project No. 0G70-038.01	**Service Request No.:**	SJ93-0443
	ARCO Facility No. 6113	**Sample Matrix:**	Water

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

Sample Name:		MW-4 (25)	MW-5 (61)	MW-7 (66)
Date Analyzed:		04/07/93	04/06/93	04/06/93
Analyte	**MRL**			
Benzene	0.5	110.	1,700.	20.
Toluene	0.5	5.2	430.	1.0
Ethylbenzene	0.5	3.0	220.	ND
Total Xylenes	0.5	7.4	880.	ND
TPH as Gasoline	50	680.	9,700.	190.

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

Approved by: Kenneth Murphy Date: April 15, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	04/01/93
Project:	EMCON Project No. 0G70-038.01	**Service Request No.:**	SJ93-0443
	ARCO Facility No. 6113	**Sample Matrix:**	Water

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

Sample Name:		MW-8 (65)	MW-9 (67)	MW-10 (49)
Date Analyzed:		04/06/93	04/06/93	04/06/93
Analyte	**MRL**			
Benzene	0.5	ND	ND	ND
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	ND	<1. *
Total Xylenes	0.5	ND	ND	0.6
TPH as Gasoline	50	ND	ND	230. **

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Raised MRL due to matrix interference.
** The sample contains components eluting in the gasoline range that were quantitated as gasoline. The chromatogram does not match the typical gasoline fingerprint.

Approved by: _____ Date: April 15, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	04/01/93
Project:	EMCON Project No. 0G70-038.01	**Service Request No.:**	SJ93-0443
	ARCO Facility No. 6113	**Sample Matrix:**	Water

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

Sample Name:		MW-11 (43)	MW-12 (33)	FB-1
Date Analyzed:		04/06/93 *	04/06/93 *	04/06/93 *
Analyte	**MRL**			
Benzene	0.5	ND	20.	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	150.	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* This sample was part of the analytical batch started on April 6, 1993. However, it was analyzed after midnight so the actual date analyzed is April 7, 1993.

Approved by: Kenneth Murphy Date: April 15, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	04/01/93
Project:	EMCON Project No. 0G70-038.01	**Service Request No.:**	SJ93-0443
	ARCO Facility No. 6113	**Sample Matrix:**	Water

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

Sample Name:		Method Blank	Method Blank
Date Analyzed:		04/06/93	04/07/93
Analyte	**MRL**		
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: Kenneth Murphy Date: April 15, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-038.01
ARCO Facility No. 6113

Date Received: 04/01/93
Service Request No.: SJ93-0443

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

Date Analyzed: 04/06/93

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	25.	24.9	100.	85-115
Toluene	25.	26.3	105.	85-115
Ethylbenzene	25.	24.4	98.	85-115
Total Xylenes	75.	79.1	105.	85-115
TPH as Gasoline	250.	246.	98.	90-110

TPH Total Petroleum Hydrocarbons

Approved by: Kenneth Murphy Date: April 15, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Date Received:**	04/01/93
Project:	EMCON Project No. 0G70-038.01	**Service Request No.:**	SJ93-0443
	ARCO Facility No. 6113	**Sample Matrix:**	Water

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

Sample Name	Date Analyzed	Percent Recovery *a,a,a*-Trifluorotoluene
MW-1 (43)	04/06/93	94.
MW-2 (37)	04/06/93	97.
MW-3 (38)	04/06/93	122.
MW-4 (25)	04/07/93	101.
MW-5 (61)	04/06/93	103.
MW-7 (66)	04/06/93	113.
MW-8 (65)	04/06/93	98.
MW-9 (67)	04/06/93	102.
MW-10 (49)	04/06/93	117.
MW-11 (43)	04/06/93	97.
MW-12 (33)	04/06/93	107.
FB-1	04/06/93	98.
MW-1 (43) MS	04/06/93	102.
MW-1 (43) DMS	04/06/93	97.
Method Blank	04/06/93	95.
Method Blank	04/07/93	95.
CAS Acceptance Criteria		70-130

TPH Total Petroleum Hydrocarbons

Approved by: Kevin Murphy Date: April 15, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Date Received:**	04/01/93
Project:	EMCON Project No. 0G70-038.01	**Service Request No.:**	SJ93-0443
	ARCO Facility No. 6113	**Sample Matrix:**	Water

Matrix Spike/Duplicate Matrix Spike Summary
Total Petroleum Hydrocarbons as Gasoline
EPA Methods 5030/California DHS LUFT Method
µg/L (ppb)

Sample Name: MW-1 (43)
Date Analyzed: 04/06/93

			Spike Result		Percent Recovery		CAS Acceptance
Analyte	Spike Level	Sample Result	MS	DMS	MS	DMS	Criteria
TPH as Gasoline	250.	ND	257.	246.	103.	98.	70-130

TPH Total Petroleum Hydrocarbons
ND None Detected at or above the method reporting limit

Approved by: Kevin Murphy Date: April 15, 1993

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. EMCGC-93-1

Chain of Custody

ARCO Facility no. 6113	City (Facility) Livermore	Project manager (Consultant) Jim Bateva	Laboratory name CAS
ARCO engineer Kyle Christie	Telephone no. (ARCO) 571-2434	Telephone no. (Consultant) 453-0719	Fax no. (Consultant) 453-0452
Consultant name EMCON Associates	Address (Consultant) 1938 Junction Avenue San Jose		Contract number 07077

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 2 40ml HCl VOA's

OG70-038.01

Lab number: 5593-0443

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015 G/BS	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
MW-1(43)	1-2	2		X		X	HCl	3-30-93	1506		X											
MW-2(37)	3-4	2		↓		↓	↓	3-30-93	1158		X											
MW-3(38)	5-6	2						3-30-93	1239		X											
MW-4(25)	7-8	2						3-31-93	1815		X											
MW-5(61)	9-10	2						3-31-93	1735		X											
~~MW-6~~	~~12~~	~~2~~	No Sample			Product		came into	well.		X				0.01"		thick.					
MW-7(66)	11-12	2						3-31-93	1435		X											
MW-8(65)	13-14	2						3-30-93	1420		X											
MW-9(67)	15-16	2						3-31-93	1225		X											
MW-10(49)	17-18	2						3-31-93	1045		X											
MW-11(43)	19-20	2						3-31-93	926		X											
MW-12(33)	21-22	2						3-31-93	848		X											
EB-1	23-24	2		↓		↓	↓	3-31-93	1608		X											

Condition of sample: OK

Temperature received: cool

Relinquished by sampler	Date 4-1-93	Time 1035	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory — Date 4-1-93 — Time 10:45

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant

APPC 3292 (2-91)

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 | SAMPLE ID: MW-1 (43)

PURGED BY: B. Stafford | CLIENT NAME: Arco 6113

SAMPLED BY: B. Stafford | LOCATION: 785 E. Stanley Blvd Livermore, CA

TYPE: Ground Water X | Surface Water ___ | Treatment Effluent ___ | Other ___

CASING DIAMETER (inches): 2 X | 3 ___ | 4 ___ | 4.5 ___ | 6 ___ | Other ___

CASING ELEVATION (feet/MSL): NR | VOLUME IN CASING (gal.): 3.92

DEPTH TO WATER (feet): 20.84 | CALCULATED PURGE (gal.): 11.78

DEPTH OF WELL (feet): 44.9 (24.06) | ACTUAL PURGE VOL. (gal.): 12.0

DATE PURGED: 3-30-93 | Start (2400 Hr) 1445 | End (2400 Hr) 1503

DATE SAMPLED: 3-30-93 | Start (2400 Hr) 1506 | End (2400 Hr) 1510

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1450	4.0	6.84	1007.	64.1	Brown	High
1457	8.0	6.89	1007.	63.7	"	"
1502	12.0	6.92	1017.	63.2	"	"

D. O. (ppm): NA | ODOR: None | COLOR: NA (COBALT 0 - 100) | TURBIDITY: NA (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NA

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: OK | LOCK #: 3283

REMARKS: ___

Meter Calibration: Date: 3-30-93 | Time: 1122 | Meter Serial #: 9204 | Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-2

Signature: [signature] | Reviewed By: [signature] | Page 1 of 12

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 SAMPLE ID: MW-2 (37)

PURGED BY: B. Stafford CLIENT NAME: Arco 6113

SAMPLED BY: B. Stafford LOCATION: 785 E. Stanley Blvd. Livermore, CA

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 X 3 ___ 4 ___ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL):	NR	VOLUME IN CASING (gal.):	2.97
DEPTH TO WATER (feet):	20.48	CALCULATED PURGE (gal.):	8.91
18.22 DEPTH OF WELL (feet):	38.7	ACTUAL PURGE VOL. (gal.):	9.0

DATE PURGED: 3-30-93 Start (2400 Hr) 1135 End (2400 Hr) 1157

DATE SAMPLED: 3-30-93 Start (2400 Hr) 1158 End (2400 Hr) 1200

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1140	3.0	6.47	1024.	65.0	Brown	Moderate
1145	6.0	6.59	1021.	65.1	"	"
1151	9.0	6.61	1024.	64.5	"	"

D. O. (ppm): NA ODOR: None NA (CCBALT 0 - 100) NA (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NA

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	✓ Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ QDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 3-30-93 Time: 11:22 Meter Serial #: 9209 Temperature °F: 68.6

(EC 1000 1009 / ___) (DI 1000.) (pH 7 6.99 / 7.00) (pH 10 10.06 / 10.00) (pH 4 3.98 / ___)

Location of previous calibration: NA

Signature: [signature] Reviewed By: JB Page 2 of 12

WATER SAMPLE FIELD DATA SHEET

Rev. 2. 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 SAMPLE ID: MW-3 (38)

PURGED BY: B. Stafford CLIENT NAME: Arco 6113

SAMPLED BY: B. Stafford LOCATION: 785 E. Stanley Blvd Livermore, CA

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 X 3 ___ 4 ___ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 2.93

DEPTH TO WATER (feet): ~~20.46~~ 21.16 CALCULATED PURGE (gal.): 8.77

17.94 DEPTH OF WELL (feet): 38.1 ACTUAL PURGE VOL. (gal.): 9.0

DATE PURGED: 3-30-93 Start (2400 Hr) 1221 End (2400 Hr) 1236

DATE SAMPLED: 3-30-93 Start (2400 Hr) 1239 End (2400 Hr) 1241

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1224	3.0	6.56	1218.	67.1	Brown	Moderate
1229	6.0	6.68	1219.	64.8	〃	〃
1234	9.0	6.70	1226.	64.0	〃	〃

D. O. (ppm): NA ODOR: None COLOR (COBALT 0 - 100): NA TURBIDITY (NTU 0 - 200): NA

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): N/A

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: OK LOCK #: 3255

REMARKS: ___

Meter Calibration: Date: 3-30-93 Time: 11:22 Meter Serial #: 9204 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-2

Signature: Bart Stafford Reviewed By: JB Page 3 of 12

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 SAMPLE ID: MW-4 (25)

PURGED BY: B. Stafford CLIENT NAME: Arco 6113

SAMPLED BY: B. Stafford LOCATION: 785 E. Stanley Blvd Livermore, CA

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 X 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 3.92

DEPTH TO WATER (feet): 20.68 CALCULATED PURGE (gal.): 11.78

6.02 DEPTH OF WELL (feet): 26.7 ACTUAL PURGE VOL. (gal.): 12.0

DATE PURGED: 3-31-93 Start (2400 Hr) 1755 End (2400 Hr) 1813

DATE SAMPLED: 3-31-93 Start (2400 Hr) 1815 End (2400 Hr) 1816

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1803	4.0	6.90	1051.	61.5	Brown	Heavy
1807	8.0	6.55	1054.	63.0	↓	↓
1811	12.0	6.60	1071.	63.5	↓	↓

D. O. (ppm): NA ODOR: None COLOR: NA (COBALT 0 - 100) TURBIDITY: NA (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NA

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: OK LOCK #: Dolphin

REMARKS: ___

Meter Calibration: Date: 3-31-93 Time: 1322 Meter Serial #: 9209 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-7

Signature: [signature] Reviewed By: [signature] Page 4 of 12

WATER SAMPLE FIELD DATA SHEET

Rev. 2. 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 SAMPLE ID: MW-5 (61)

PURGED BY: B. Stafford CLIENT NAME: Arco 6113

SAMPLED BY: B. Stafford LOCATION: 785 E. Stanley Blvd Livermore, CA

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 X 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 27.66

DEPTH TO WATER (feet): 20.21 CALCULATED PURGE (gal.): 83.0

62.39 DEPTH OF WELL (feet): 62.6 ACTUAL PURGE VOL. (gal.): 83.0

DATE PURGED: 3-31-93 Start (2400 Hr) 16:26 End (2400 Hr) 1731

DATE SAMPLED: 3-31-93 Start (2400 Hr) 1735 End (2400 Hr) 1738

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1617	28.0	7.03	906.	64.2	Gray	Heavy
1714	56.0	7.01	905.	62.4	"	"
1730	83.0	6.98	896.	~~60~~ 61.9 DS	"	"

D. O. (ppm): NA ODOR: Slight to Strong COLOR: NA (COBALT 0 - 100) TURBIDITY: NA (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): N/A

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: OK LOCK #: Slip GD No lock

REMARKS: Sheen on purge H2O

Meter Calibration: Date: 3-31-93 Time: 1322 Meter Serial #: 9204 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-7

Signature: Brett Stafford Reviewed By: ___ Page 5 of 12

WATER SAMPLE FIELD DATA SHEET

Rev. 2. 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 SAMPLE ID: MW-6 (65)

PURGED BY: B. Stafford CLIENT NAME: Arco 6113

SAMPLED BY: B. Stafford LOCATION: 785 E. Stanley Blvd Livermore, CA

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 X 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 30.8

DEPTH TO WATER (feet): 19.44 CALCULATED PURGE (gal.): 92.5

47.26 DEPTH OF WELL (feet): 66.7 ACTUAL PURGE VOL. (gal.): 31.0

DATE PURGED: 3-31-93 Start (2400 Hr) 1540 End (2400 Hr) 1602

DATE SAMPLED: 3-31-93 Start (2400 Hr) NA End (2400 Hr) NA

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmnos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1558	31.0	7.35	799.	65.7	Brown	Heavy
Product	~~120~~	Came	into well	during	Purging.	
	~~92.5~~	No	Sample			

D. O. (ppm): NA ODOR: V. Strong COLOR (COBALT 0 - 100): NA TURBIDITY (NTU 0 - 200): NA

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): FB-1

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ DDL Sampler NA	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: OK LOCK #: 3257

REMARKS: Product Came into well during purging. 0.01' thick
No Sample

Meter Calibration: Date: 3-31-93 Time: 1322 Meter Serial #: 9209 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-7

Signature: Bart Stafford Reviewed By: JPS Page 6 of 17

WATER SAMPLE FIELD DATA SHEET

Rev. 2. 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 SAMPLE ID: MW-7 (66)

PURGED BY: B. Stafford CLIENT NAME: Arco 6113

SAMPLED BY: B. Stafford LOCATION: 785 E. Stanley Blvd Livermore, CA

TYPE: Ground Water ☒ Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ☒ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 31.6

DEPTH TO WATER (feet): 19.28 CALCULATED PURGE (gal.): 94.8

4/3/93 DEPTH OF WELL (feet): 67.7 ACTUAL PURGE VOL. (gal.): 95.0

DATE PURGED: 3-31-93 Start (2400 Hr) 1338 End (2400 Hr) 1433

DATE SAMPLED: 3-31-93 Start (2400 Hr) 1435 End (2400 Hr) 1438

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1400	32.0	7.01	766	63.9	Brown	Heavy
1414	64.0	6.96	723	63.0	↓	↓
1432	95.0	6.94	720	63.0	↓	↓

D. O. (ppm): NA ODOR: None COLOR (COBALT 0 - 100): NA TURBIDITY (NTU 0 - 200): NA

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): N/A

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	☒ Bailer (Teflon®)
___ Centrifugal Pump	☒ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 3-31-93 Time: 1322 Meter Serial #: 9204 Temperature °F: 69.1

(EC 1000 1056 / 1001) (DI 3.00) (pH 7 7.04 / 7.01) (pH 10 10.08 / 10.00) (pH 4 3.96 / ___)

Location of previous calibration: MW-12

Signature: [signature] Reviewed By: [signature] Page 7 of 12

WATER SAMPLE FIELD DATA SHEET

Rev. 2. 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 SAMPLE ID: MW-8 (65)

PURGED BY: B. Stafford CLIENT NAME: Arco 6113

SAMPLED BY: B. Stafford LOCATION: 785 E. Stanley Blvd Livermore, CA

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 X 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 32.57

DEPTH TO WATER (feet): 16.67 CALCULATED PURGE (gal.): 97.73

49.93 DEPTH OF WELL (feet): 66.6 ACTUAL PURGE VOL. (gal.): 98.0

DATE PURGED: 3-30-93 Start (2400 Hr) 1316 End (2400 Hr) 1417

DATE SAMPLED: 3-30-93 Start (2400 Hr) 1420 End (2400 Hr) 1424

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1341	33.0	7.09	754	64.9	Brown	Moderate
1400	66.0	6.97	738	63.2	Tan	↓
1417	98.0	6.99	735	63.0	↓	↓

D. O. (ppm): NA ODOR: None COLOR: NA (COBALT 0 - 100) TURBIDITY: NA (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NA

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 3-30-93 Time: 11:22 Meter Serial #: 9209 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-2

Signature: Brent Stafford Reviewed By: JB Page 3 of 12

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 SAMPLE ID: MW-9 (67)

PURGED BY: B. Stafford CLIENT NAME: Arco 6113

SAMPLED BY: B. Stafford LOCATION: 785 E. Stanley Blvd Livermore, CA

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 X 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 33.0

DEPTH TO WATER (feet): 17.67 CALCULATED PURGE (gal.): 98.5

DEPTH OF WELL (feet): 68.0 (50.33) ACTUAL PURGE VOL. (gal.): 98.5

DATE PURGED: 3-31-93 Start (2400 Hr) 11:16 End (2400 Hr) 1223

DATE SAMPLED: 3-31-93 Start (2400 Hr) 1225 End (2400 Hr) 1229

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1195	33.0	7.05	798.	68.9	Brown	High
1204	66.0	6.98	758.	64.8	"	"
1222	98.5	6.94	769.	65.1	"	"

D. O. (ppm): NA ODOR: None COLOR: NA (COBALT 0 - 100) TURBIDITY: NA (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NA

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 3-31-93 Time: 8:05 Meter Serial #: 9204 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-12

Signature: Brent Stafford Reviewed By: [illegible] Page 9 of 12

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 | SAMPLE ID: MW-10 (97)

PURGED BY: B. Stafford | CLIENT NAME: Arco 6113

SAMPLED BY: B. Stafford | LOCATION: 785 E. Stanley Blvd Livermore, CA

TYPE: Ground Water X | Surface Water ___ | Treatment Effluent ___ | Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 X 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR | VOLUME IN CASING (gal.): 15.22

DEPTH TO WATER (feet): 21.14 | CALCULATED PURGE (gal.): 57.66

DEPTH OF WELL (feet): 50.6 (29.46) | ACTUAL PURGE VOL. (gal.): 58.0

DATE PURGED: 3-31-93 | Start (2400 Hr) 10:00 | End (2400 Hr) 1043

DATE SAMPLED: 3-31-93 | Start (2400 Hr) 10:45 | End (2400 Hr) 10:48

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1014	19.5	7.32	795.	62.8	Brown	High
1027	39.0	7.10	777.	60.5	↓	↓
1042	58.0	7.07	767.	60.7	↓	↓

D. O. (ppm): NA | ODOR: None | COLOR: NA (COBALT 0 - 100) | TURBIDITY: NA (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): N/A

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ QDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: OK | LOCK #: Dolphin

REMARKS: ___

Meter Calibration: Date: 3-31-93 Time: 8:05 Meter Serial #: 9204 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-12

Signature: [signature] | Reviewed By: [signature] | Page 10 of 12

WATER SAMPLE FIELD DATA SHEET

Rev. 2. 5/9

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 SAMPLE ID: MW-11 (43)

PURGED BY: B. Stafford CLIENT NAME: Arco 6113

SAMPLED BY: B. Stafford LOCATION: 785 E. Stanley Blvd Livermore, CA

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 X 3 ___ 4 ___ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 3.75

DEPTH TO WATER (feet): 20.76 CALCULATED PURGE (gal.): 11.37

DEPTH OF WELL (feet): 44.0 ACTUAL PURGE VOL. (gal.): ~~6.5~~ 9.0

DATE PURGED: 3-31-93 Start (2400 Hr) 9:04 End (2400 Hr) 9:16

DATE SAMPLED: 3-31-93 Start (2400 Hr) 9:26 End (2400 Hr) 9:29

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
9:09	4.0	6.78	944.	63.2	Brown	High
Well	~~8.0~~	dried	at 6.5 gallons at 9:14.			
	~~11.50~~					
9:30	Recharge	7.13	848.	63.0	Brown	High

D. O. (ppm): NA ODOR: None COLOR: NA (CCOBALT 0 - 100) TURBIDITY: NA (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NA

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: OK LOCK #: Dolphin

REMARKS: Well dried at 6.5 gallons at 9:14
DTW = ~~40.79~~ 41.36 at 9:16 Quick recharge so I dried it again for a total of 8.0 gallons. Sampling. Total Gallons purged = 9.0 gallons

Meter Calibration: Date: 3-31-93 Time: 8:05 Meter Serial #: 9204 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-12

Signature: [signature] Reviewed By: [signature] Page 11 of 12

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 | SAMPLE ID: MW-12 (33)

PURGED BY: B. Stafford | CLIENT NAME: Arco 6113

SAMPLED BY: B. Stafford | LOCATION: 785 E. Stanley Blvd Livermore, CA

TYPE: Ground Water V | Surface Water ___ | Treatment Effluent ___ | Other ___

CASING DIAMETER (inches): 2 V | 3 ___ | 4 ___ | 4.5 ___ | 6 ___ | Other ___

CASING ELEVATION (feet/MSL): NR | VOLUME IN CASING (gal.): 2.09

DEPTH TO WATER (feet): 21.16 | CALCULATED PURGE (gal.): 6.28

12.84 DEPTH OF WELL (feet): 34.0 | ACTUAL PURGE VOL. (gal.): 6.50

DATE PURGED: 3-31-93 | Start (2400 Hr) 8:14 | End (2400 Hr) 8:45

DATE SAMPLED: 3-31-93 | Start (2400 Hr) 8:40 | End (2400 Hr) 8:50

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
8:30	2.0	6.48	1118.	65.1	Brown	High
8:36	4.0	6.59	1093	64.7	"	"
8:44	6.5	6.61	1085.	63.7	"	"

D. O. (ppm): NA | ODOR: None | COLOR: NA (COBALT 0 - 100) | TURBIDITY: NA (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NA

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	V Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: OK | LOCK #: Dolphin

REMARKS: Casing is slightly bent at ~15 feet. A stuck PVC Bailer Well Work

Meter Calibration: Date: 3-31-93 | Time: 8:05 | Meter Serial #: 9209 | Temperature °F: 65.0

(EC 1000 1006 / 1000.) (DI 3.72) (pH 7 7.04 / 7.00) (pH 10 9.93 / 10.00) (pH 4 3.95 / ___)

Location of previous calibration: NA

Signature: Bart Stafford | Reviewed By: JB | Page 12 of 12

EMCON Associates
1938 Junction Avenue • San Jose, California 95131-2102 • (408) 453-0719 • Fax (408) 453-0452

MAR [illegible] 1993

Date March 02, 1993
Project 0G70-038.01

To:
Mr. Joel Coffman
RESNA/ Applied Geosystems
3315 Almaden Expressway, Suite 34
San Jose, California 95118

We are enclosing:

Copies	Description
1	Depth To Water/Floating Product Survey Results
	February 1993 monthly water level survey, ARCO
	station 6113, 785 East Stanley Blvd., Livermore, CA

For your: X Information Sent by: X Mail

Comments:
Monthly water level data for the above mentioned site could not be performed due to site construction. Please call if you have any questions: (408) 453-2266.

Reviewed by:

REGISTERED PROFESSIONAL ENGINEER ROBERT CURTIS PORTER No: 4094 Exp. 4/30/94 INDUSTRIAL STATE OF CALIFORNIA

Jim Butera JB

Robert Porter, Senior Project Engineer.

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 0G70-038.01 STATION ADDRESS : 785 East Stanley Blvd. Livermore DATE : 2-26-93

ARCO STATION # : 6113 FIELD TECHNICIAN : B. Stafford DAY : Friday

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket	Lock	Locking Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	MW-2	Covered	by	Gravel	—	NR	NR	NR	NR	NR	Well covered by Gravel. WD Readings	
2	MW-3	OK	Yes	OK	3259	Yes	24.96	24.96	ND	ND	39.1	—
3	MW-8	OK	Yes	OK	3259	Yes	19.86	19.86	ND	ND	66.7	—
4	MW-1	OK	Yes	OK	3259	Yes	24.72	24.72	ND	ND	44.9	—
5	MW-9	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Covered w/mud & Rocks Could not locate.
6	MW-7	OK	Yes	OK	3259	Yes	22.57	22.57	ND	ND	67.8	lid under pressure.
7	MW-5	OK	Yes	OK	3259	Yes	23.56	23.56	ND	ND	62.6	4" ☐ lid. Need Threaded handle to open.
8	MW-4	OK	GOOD	OK	3259	Yes	23.60	23.60	ND	ND	26.7	~~lid~~ Bolt threads Broken of C.Box of 1 Bolt.
9	MW-6	None	No	Gone	3259	Yes	22.73	22.73	ND	ND	66.7	C.Box Destroyed.

SURVEY POINTS ARE TOP OF WELL CASINGS

EMCON ASSOCIATES
Consultants in Wastes Management and Environmental Control

FEB 1993

Date January 28, 1993
Project 0G70-038.01

To:
Mr. Joel Coffman
RESNA/ Applied Geosystems
3315 Almaden Expressway, Suite 34
San Jose, California 95118

We are enclosing:

Copies	Description
1	Depth To Water/Floating Product Survey Results
	January 1993 monthly water level survey, ARCO
	station 6113, 785 East Stanley Blvd., Livermore, CA

For your: X Information Sent by: X Mail

Comments:
Monthly water level data for the above mentioned site could not be performed due to site construction. Please call if you have any questions: (408) 453-2266.

Reviewed by:

REGISTERED PROFESSIONAL ENGINEER No: 4084 Exp. 6/30/94 INDUSTRIAL STATE OF CALIFORNIA

Jim Butera JB

Robert Porter, Senior Project Engineer.

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 0G70-038.01 STATION ADDRESS : 785 East Stanley Blvd. Livermore DATE : 1-27-93

ARCO STATION # : 6113 FIELD TECHNICIAN : B. Stafford DAY : Wednesday

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket	Lock	Locking Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	MW-2	ok	Yes	ok	3259	Yes	32.87	32.88	ND	ND	38.6	☐
2	MW-3	ok	Yes	ok	3259	Yes	30.36	30.37	ND	ND	39.1	☐
3	MW-8	ok	Yes	ok	3259	Yes	25.57	25.57	ND	ND	66.6	—
4	MW-1	ok	Yes	ok	3259	Yes	30.11	30.10	ND	ND	44.8	☐
5	MW-9	ok	Yes	ok	3259	Yes	26.48	26.48	ND	ND	68.0	—
6	MW-7	ok	Yes	ok	3259	Yes	27.97	27.97	ND	ND	67.6	L.I.D.C. Was off when I opened the lid.
7	MW-5	ok	Yes	ok	3259	Yes	29.08	29.07	ND	ND	62.6	—
8	MW-4	ok	Yes	ok	3259	Yes	Dry	Dry	ND	ND	26.7	—
9	MW-6	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Well Buried under gravel. No readings.

SURVEY POINTS ARE TOP OF WELL CASINGS

☐ Need Diversified Key to open lids.