



Working To Restore Nature

62507 11/12/92

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TRANSMITTAL

TO: Ms. Susan Hugo
Alameda County Health Care Services
80 Swan Way, Room 200
Oakland, California 94621

DATE: November 12, 1992
PROJECT NUMBER: 69028.08
SUBJECT: Final - Third Quarter 1992
Quarterly Groundwater Monitoring at
ARCO Station 6113, 785 E. Stanley Blvd.,
Livermore, California.

FROM: Barbara Sieminski
TITLE: Assistant Project Geologist

11/92

WE ARE SENDING YOU:

COPIES DATED

DESCRIPTION

1	11/12/92	Final - Third Quarter 1992, Groundwater Monitoring at the above subject site.
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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
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REMARKS: cc: Mr. Michael Whelan, Alameda County Health Care Services Agency
Mr. Eddy So, RWQCB, San Francisco Bay Region
Ms. Danielle Stefani, Livermore Fire Department
Mr. Joel Coffman, RESNA Industries Inc.

Copies: 1 to RESNA project file no. 69028.08

October 12, 1992

92 OCT 11 PM 12:55

Ms. Susan Hugo
Alameda County Department of Environmental Health
80 Swan Way
Oakland, California 94621

ARCO Products Company Facilities in Alameda County

Dear Ms. Hugo:

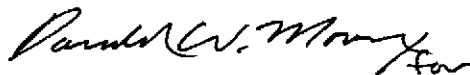
Please find attached, Quarterly Summary Reports (QSRs) for ARCO Products Company Service Stations in Alameda County. The QSRs summarize activities conducted by ARCO at the respective sites during the third quarter of 1992; also included are projected site activities for the fourth quarter of 1992 and a bibliography of reports submitted for each location.

The QSRs are classified by city and address within Alameda County. We are submitting this document and attached QSRs as agreed. Please note that we are forwarding copies of the QSRs to the Regional Water Quality Control Board (RWQCB).

Please note that ARCO Products Company has reviewed the RWQCB's February 19, 1991 printout of ARCO fuel leak sites. We have evaluated each site with respect to ARCO's responsibility for investigation, monitoring, and/or remediation. Those locations for which ARCO is not responsible were listed and described in the QSR package delivered to you on July 15, 1991. The attached QSRs therefore represent only those locations for which ARCO is responsible.

ARCO is planning the next comprehensive QSR submittal for ARCO sites on January 15, 1993. Please do not hesitate to contact us with any questions regarding this submittal.

Sincerely yours,



Kyle A. Christie
Environmental Engineer

Attachments: ARCO Facility QSRs

3315 Almaden Expressway, Suite 34
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LETTER REPORT
QUARTERLY GROUNDWATER MONITORING
Third Quarter 1992
at
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

69028.08



Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
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December 7, 1992
1106MWHE
69028.08

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

Subject: Third Quarter 1992 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 third quarter 1992 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 underground gasoline-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, shown on the Site Vicinity Map, Plate 1.

Previous Work

Prior to the present monitoring, Pacific Environmental Group (PEG) and RESNA performed limited subsurface environmental investigations related to the former waste-oil underground storage tank and existing gasoline USTs at the site. PEG performed soil sampling and observation during removal of the waste-oil UST in January 1989 (PEG, April 1989). Work by RESNA (formerly Applied GeoSystems [AGS]) included installation of three groundwater monitoring wells (MW-1, MW-2, and MW-3) in September 1989 (AGS, December 1989) and installation of one groundwater monitoring well (MW-4) in the approximate downgradient direction of the former waste-oil UST in February 1991 (AGS, April 16, 1991). In June and August 1992, RESNA performed an additional subsurface investigation which included drilling eight soil borings (B-5 through B-12) and installing five groundwater monitoring wells (MW-5 through MW-9) and two vapor extraction wells (VW-1 and VW-2); and performing a vapor extraction test. The results of this investigation will be presented in a forthcoming report. Quarterly groundwater sampling of wells MW-1 through MW-3 began in June 1990, quarterly groundwater sampling of well MW-4 began in February 1991, and quarterly groundwater sampling of wells MW-5 through MW-9 began in June 1992. The results of previous investigations and quarterly monitorings are presented in the reports listed in the References section. The locations of the groundwater monitoring wells 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 July 28, August 26, and September 11, 1992. Quarterly sampling was performed by EMCON field personnel on September 11, 1992. The results of EMCON's field work on the site, including DTW levels and subjective analyses for the presence of product in the groundwater in MW-1 through MW-9, are presented on EMCON's Field Reports 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 from MW-1 through MW-9 for this quarter and previous quarterly groundwater monitoring 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. Floating product approximately 0.04 feet thick was observed by EMCON's field personnel in groundwater monitoring well MW-6 during September monitoring. No visual evidence of floating product or product sheen was noted in the other wells during this quarter (see EMCON's Field Reports, Appendix A). Groundwater monitoring wells installed in the perched water bearing zone (MW-1 through MW-4) could

not be monitored this quarter because MW-1 and MW-4 were dry and wells MW-2 and MW-3 contained between ½ and 3 inches of water, which appeared to be residual water trapped at the tip of the well casing. As a result, groundwater gradients and flow directions for the perched water bearing zone could not be evaluated. Based on DTW levels in monitoring wells installed in the deeper water bearing zone (MW-5 through MW-9) the gradients and flow directions for the deeper water bearing zone were approximately 0.01 to the east. These interpreted groundwater gradients and flow directions are shown on the Groundwater Gradient Maps, Plates 3 through 5. Groundwater elevations in monitoring wells MW-5 through MW-9 decreased approximately 11 feet since the wells were installed in June 1992. This significant decrease may be the result of pumping of nearby existing irrigation wells in the vicinity of the site, that may produce artificial, temporary changes in the groundwater elevations and direction of flow of the deeper water bearing zone. Because the wells MW-5 through MW-9 were installed in June 1992, the trend in gradient and flow direction for deeper water bearing zone has not been established.

Groundwater monitoring wells MW-5 and MW-7 through MW-9 were purged and sampled by EMCON field personnel on September 11, 1992. Because wells MW-1 and MW-4 were dry, and wells MW-2 and MW-3 contained residual water, groundwater from the perched water bearing zone could not be sampled. Groundwater monitoring well MW-6 was not sampled due to the presence of floating product. EMCON's Water Sample Field Data Sheets are included in Appendix A. Approximately 1 to 3 well volumes were purged from wells MW-5, and MW-7 through MW-9 before they were sampled. 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-5, and MW-7 through MW-9 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/DHS LUFT Method. Well MW-8 was also analyzed for: 1) total petroleum hydrocarbons as diesel (TPHd) using EPA Method 3510; 2) total oil and grease (TOG) using EPA method 5520C&F; 3) total metals, which includes cadmium, chromium, nickel and zinc using EPA Method 6010, and lead using EPA Method 7421. 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 Groundwater Laboratory Analyses--TPHg and BTEX and Table 3, Cumulative Results of Groundwater Laboratory Analyses--VOC, TPHd, TOG, and metals.

Analytical results of groundwater samples from MW-5, and MW-7 through MW-9 for this quarter indicate:

- o TPHg was detected in wells MW-5 and MW-7, located in the vicinity of existing gasoline USTs, at concentrations of 13,000 parts per billion (ppb) and 420 ppb, respectively. TPHg was nondetectable (<50 ppb) in wells MW-8 and MW-9 located in the southern portion of the property.
- o Benzene was detected in wells MW-5 and MW-7, at concentrations 2,200 ppb and 20 ppb, respectively; and was nondetectable (less than 0.5 ppb) in wells MW-8 and MW-9. Concentrations of benzene in wells MW-5 and MW-7 are greater than the State Maximum Contaminant Level (MCL) of 1.0 ppb benzene in drinking water.
- o Toluene was detected in wells MW-5 and MW-7 at concentrations of 1,500 ppb and 0.7 ppb; and was nondetectable (less than 0.5 ppb) in wells MW-8 and MW-9. Concentration of toluene in MW-5 is greater than the Department of Health Services Drinking Water Action Level (DWAL) of 100 ppb toluene.
- o Ethylbenzene was detected in well MW-5 at a concentration of 130 ppb; and was nondetectable (less than 0.5 ppb) in wells MW-7 through MW-9. The concentration of ethylbenzene in MW-5 is less than the State MCL of 680 ppb ethylbenzene.
- o Total xylenes were detected in well MW-5 at a concentration of 930 ppb; and were nondetectable (less than 0.5 ppb) in groundwater samples from wells MW-7 through MW-9. The concentration of total xylenes in MW-5 is less than the State MCL of 1,750 ppb total xylenes.
- o TPHd was nondetectable (<50 ppb) in well MW-8, located next to the former waste-oil UST.
- o TOG was nondetectable (<500 ppb) in well MW-8.
- o Total metals including cadmium, chromium, lead, zinc and nickel were detected at concentrations of 13 ppb, 3,580 ppb, 308 ppb, 2,620 ppb, and 10,300 ppb, respectively,

in MW-8. Concentrations of cadmium, chromium lead and zinc are greater the Federal MCLs.

The following general trends were noted in reported hydrocarbon concentrations in groundwater in the deeper water bearing zone since the last quarterly monitoring. Concentrations of TPHg and BTEX remained nondetectable in wells MW-8 and MW-9. Concentrations of TPHg increased in groundwater monitoring wells MW-5 and MW-7 and concentrations of BTEX generally decreased in these wells (except benzene and toluene in MW-5). Floating product was present in groundwater monitoring well MW-6, which did not contain floating product during last quarter.

Because groundwater monitoring wells MW-1 through MW-4, installed in the perched water bearing zone, have been dry or contained residual water roughly since the second half of 1991, trends in this zone could not be evaluated.

Conclusions

Groundwater at this site has been impacted by gasoline-related hydrocarbons based on analytical results of groundwater samples from onsite wells. The highest TPHg and benzene concentrations in groundwater appear to be west and north of the existing gasoline USTs (northeastern portion of the site). The extent of gasoline hydrocarbons in the groundwater appears to be delineated to less than 50 ppb TPHg and less than 0.5 ppb benzene south (upgradient) of the existing gasoline USTs (see Plates 6 and 7).

The groundwater beneath the site does not appear to have been impacted by waste-oil related hydrocarbons, based on nondetectable TOG and TPHd in the water samples from monitoring well MW-8, located next to the former waste-oil UST.

Additional information about the natural background concentrations of metals at the site is necessary to evaluate whether concentrations of metals in groundwater from monitoring well MW-8 are significantly elevated.

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

December 7, 1992
69028.08

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

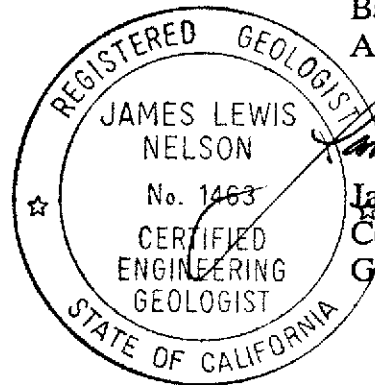
Mr. Eddy So
Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, California 94612

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.

Barbara Sieminski
Barbara Sieminski
Assistant Project Geologist



James L. Nelson
James L. Nelson
Certified Engineering
Geologist # 1463

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

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Groundwater Gradient Map, July 28, 1992
Plate 4, Groundwater Gradient Map, August 26, 1992
Plate 5, Groundwater Gradient Map, September 11, 1992
Plate 6, TPHg Concentrations in Groundwater, September 11, 1992
Plate 7, Benzene Concentrations in Groundwater, September 11, 1992

Table 1, Cumulative Groundwater Monitoring Data
Table 2, Cumulative Results of Groundwater Laboratory Analyses--TPHg
and BTEX
Table 3, Cumulative Results of Groundwater Laboratory Analyses--VOC,
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.

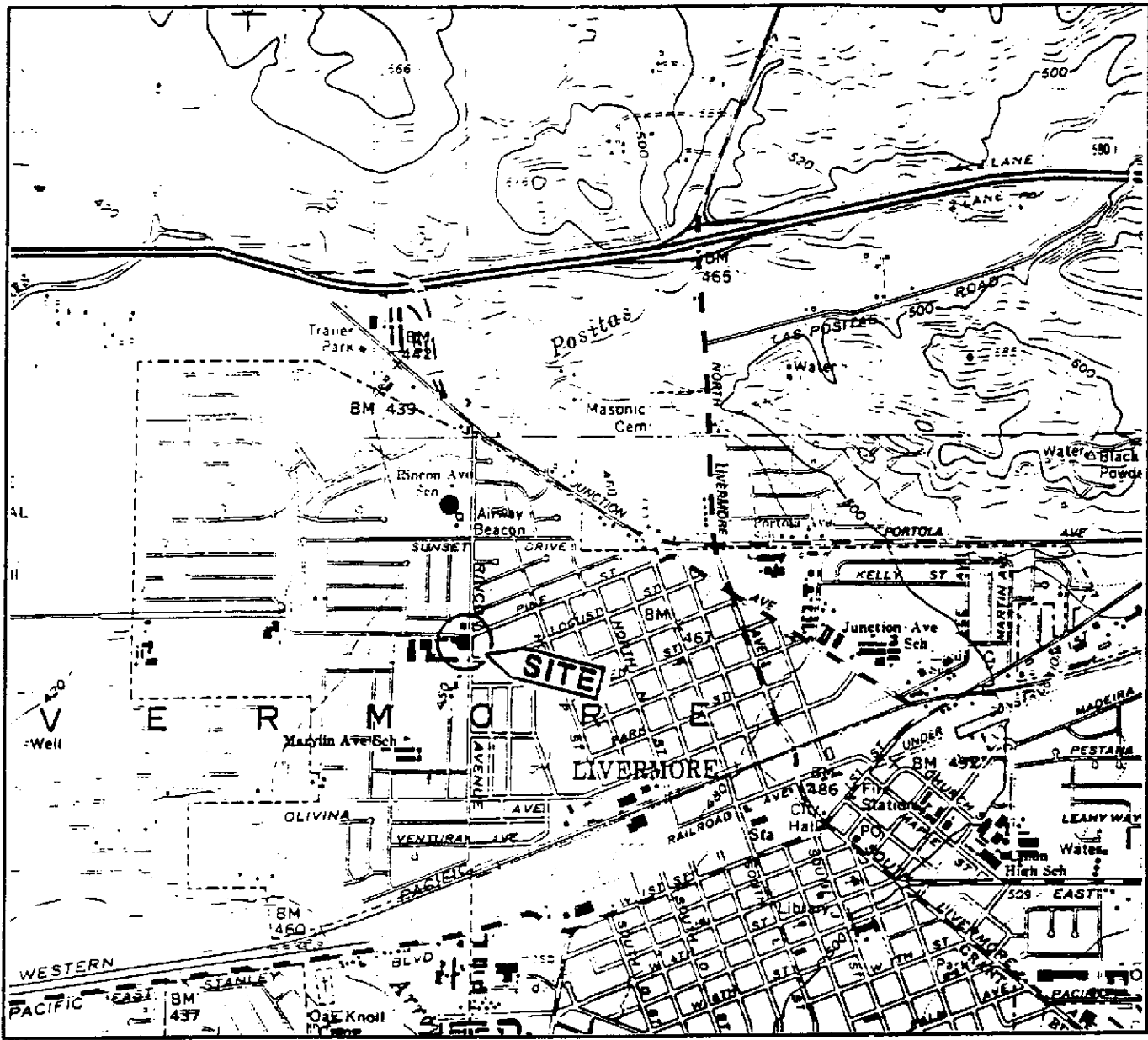
Monitoring Well Purge Water Transport Form

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



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

LEGEND

● = Site Location

Approximate Scale



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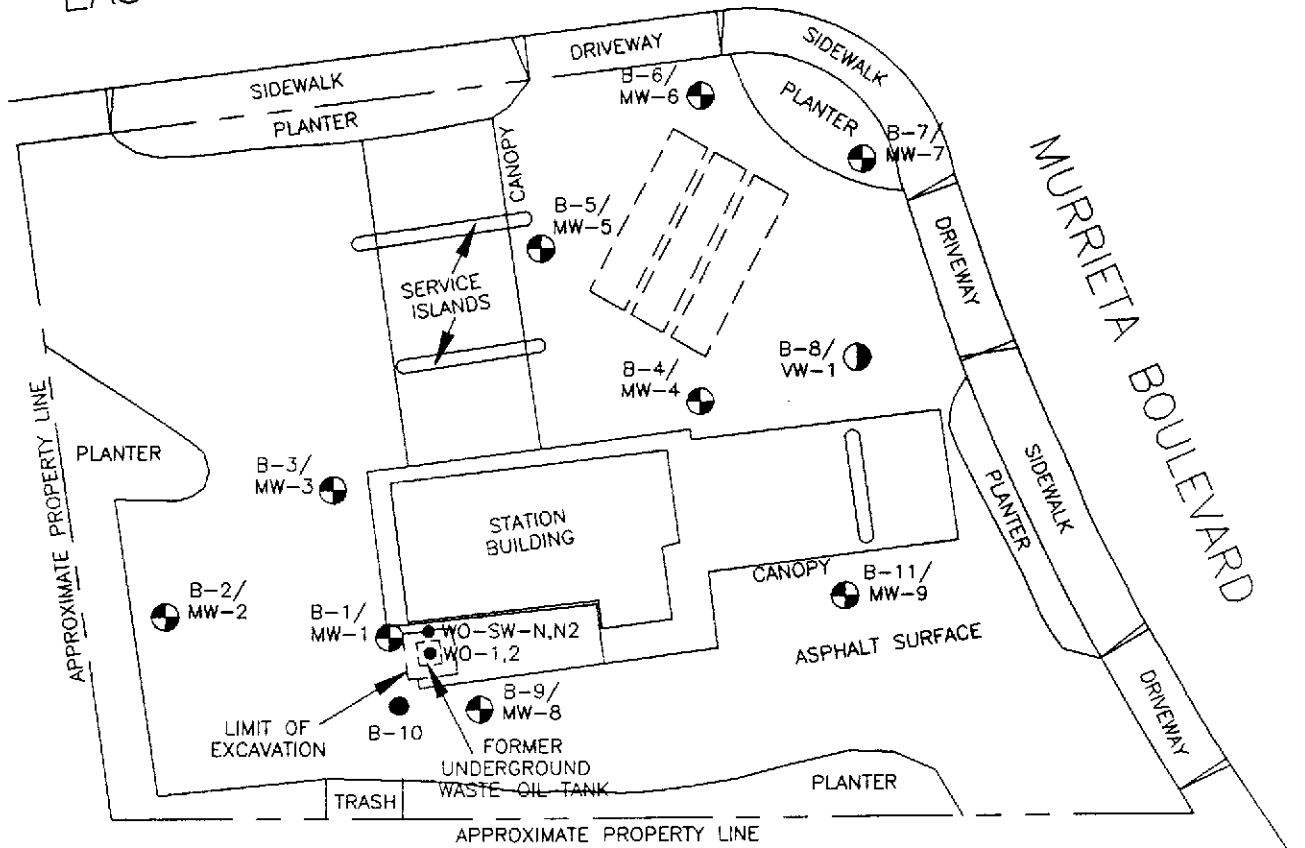
SITE VICINITY MAP
ARCO Station 771
899 Rincon Avenue
Livermore, California

PLATE






1

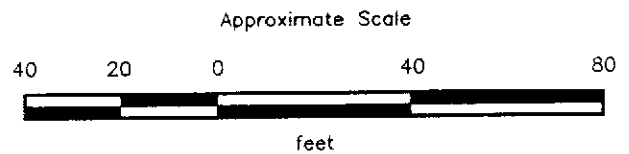
PROJECT 60000.13

EAST STANLEY BOULEVARD



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)
-  = Underground gasoline storage tanks



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

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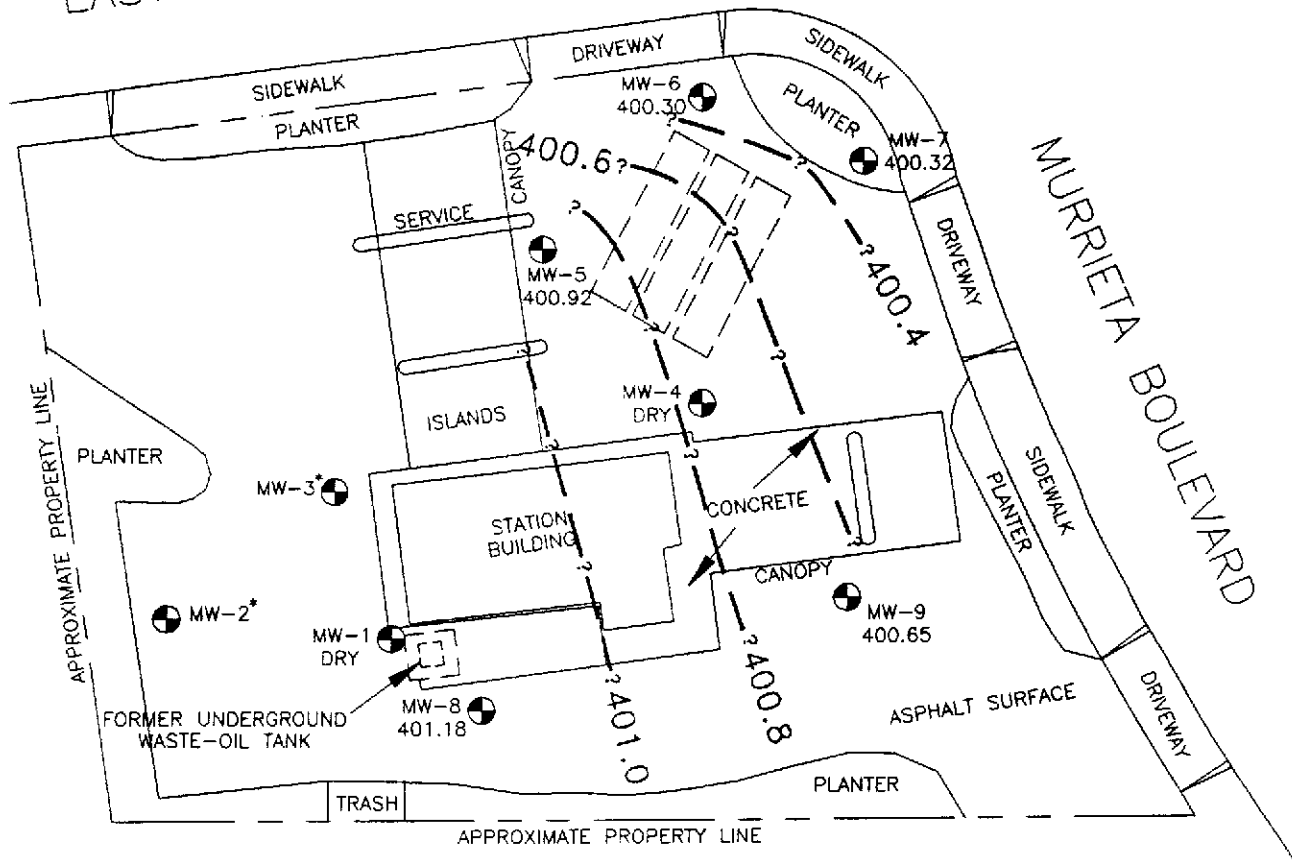
PROJECT: 69028.08

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

PLATE

2

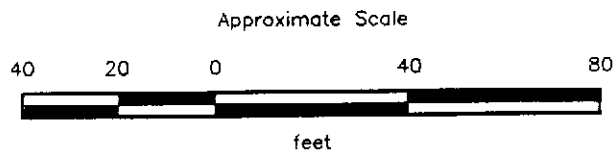
EAST STANLEY BOULEVARD



APPROXIMATE
DIRECTION OF
GROUNDWATER FLOW
(July 28, 1992)

EXPLANATION

- 401.1 = Line of equal elevation of groundwater in feet above mean sea level (MSL) lower water-bearing zone
- 401.18 = Elevation of groundwater in feet above MSL, July 28, 1992
- MW-9 = Monitoring well (RESNA, 09/89, 02/91, and 06/92)
- * = Well contained residual water only
- = Existing gasoline-storage tanks



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

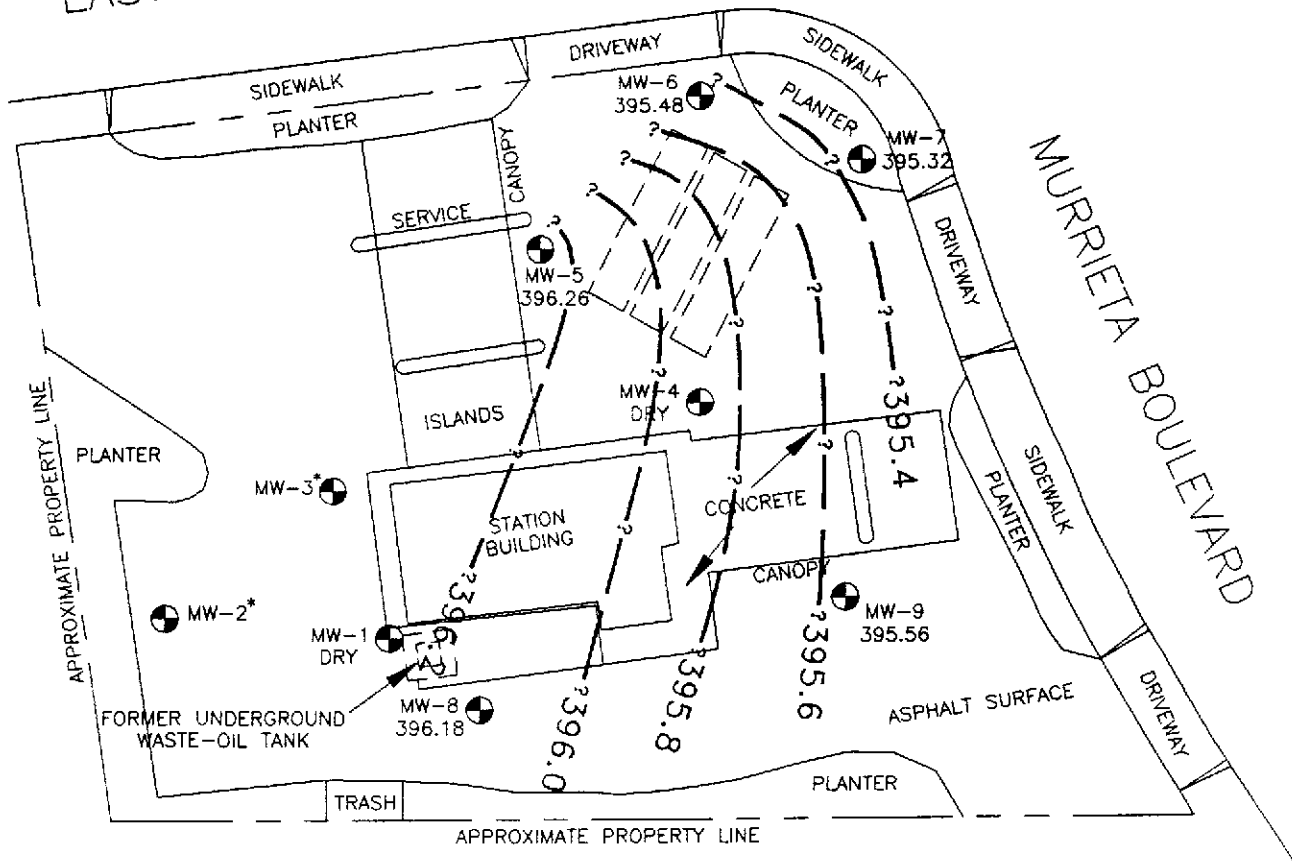
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PROJECT: 69028.08

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

PLATE
3

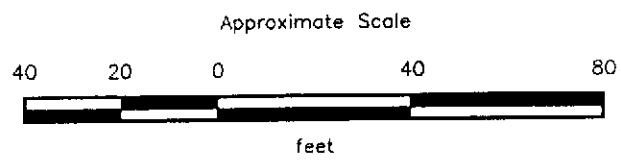
EAST STANLEY BOULEVARD



APPROXIMATE DIRECTION OF GROUNDWATER FLOW (August 26, 1992)

EXPLANATION

- = Line of equal elevation of groundwater in feet above mean sea level (MSL) in lower water-bearing zone
- 396.26 = Elevation of groundwater in feet above MSL, August 26, 1992
- MW-9 = Monitoring well (RESNA, 09/89, 02/91, and 06/92)
- * = Well contained residual water only
- = Existing gasoline-storage tanks



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

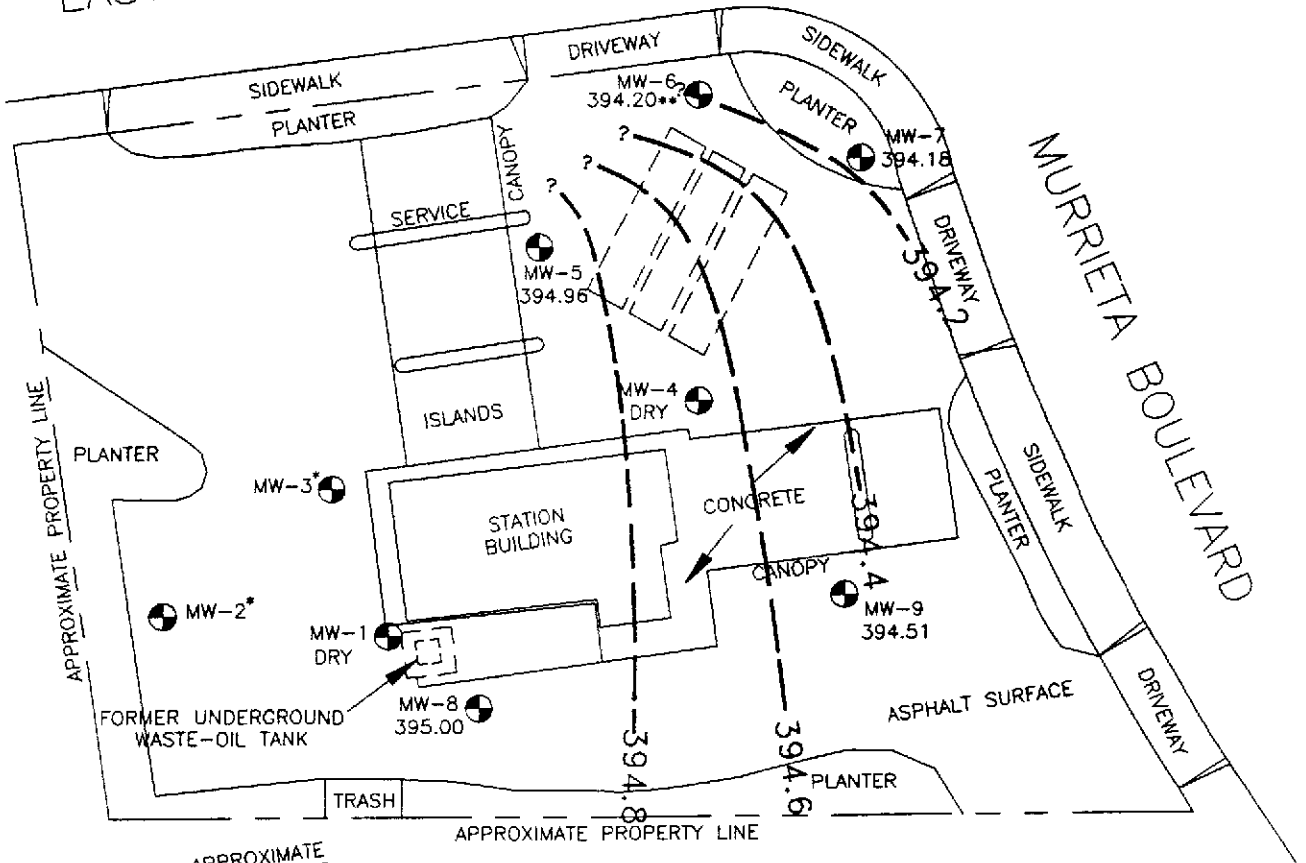


GROUNDWATER GRADIENT MAP
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE
4

PROJECT: 69028.08

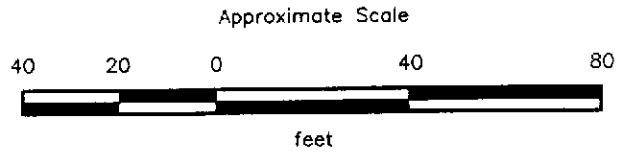
EAST STANLEY BOULEVARD



APPROXIMATE DIRECTION OF GROUNDWATER FLOW (September 11, 1992)

EXPLANATION

- 394.8 = Line of equal elevation of groundwater in feet above mean sea level (MSL) in lower water-bearing zone
- 395.00 = Elevation of groundwater in feet above MSL, September 11, 1992
- ** = Floating product
- MW-9 = Monitoring well (RESNA, 09/89, 02/91, and 06/92)
- * = Well contained residual water only
- = Existing gasoline-storage tanks



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

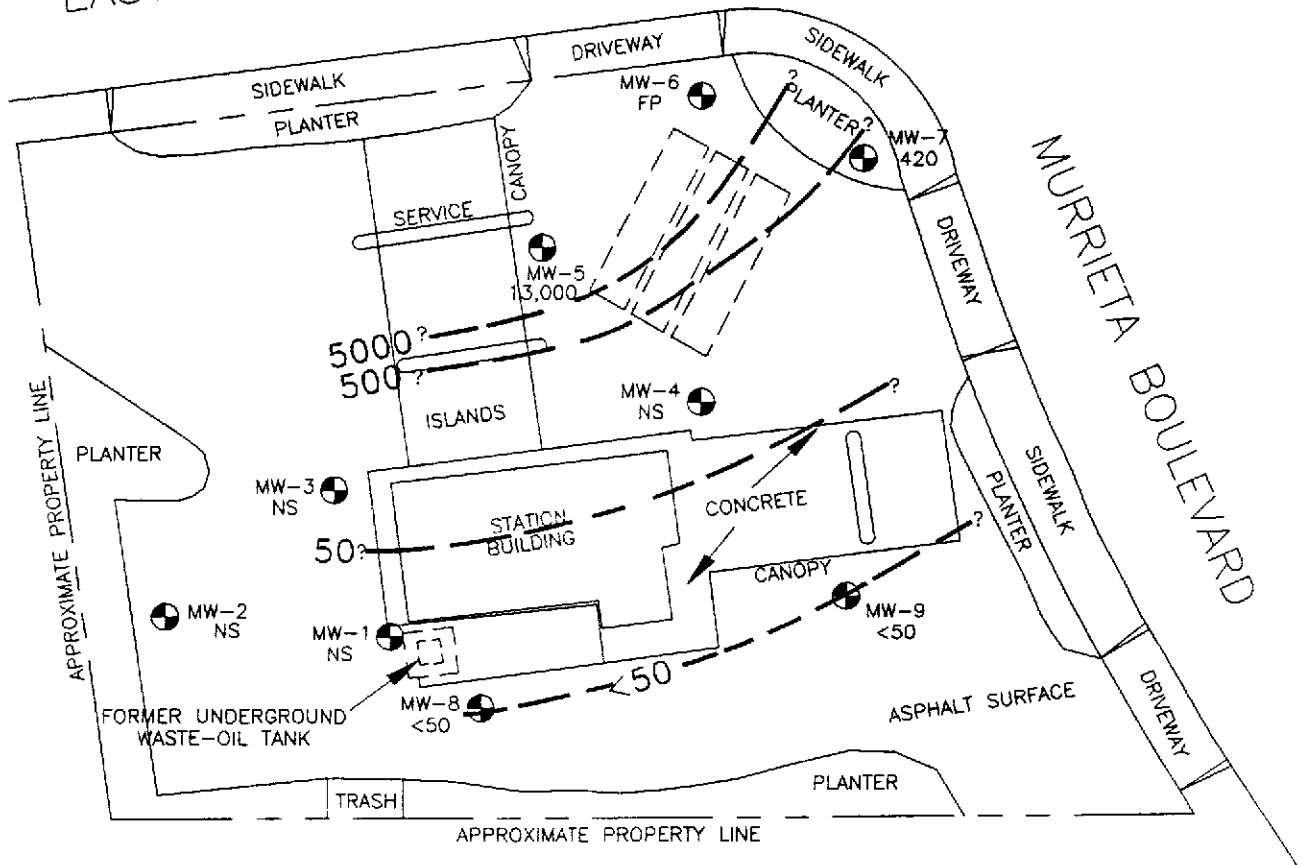
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GROUNDWATER GRADIENT MAP
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California



PLATE
5

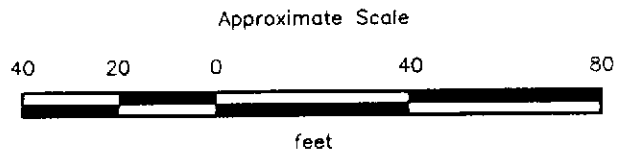
PROJECT: 69028.08

EAST STANLEY BOULEVARD



EXPLANATION

- 5000 — = Line of equal concentration of TPHg in groundwater in parts per billion (ppb)
- 13,000 = Concentration of TPHg in groundwater in ppb, September 11, 1992
- FP = Not sampled--floating product present
- MW-9  = Monitoring well (RESNA, 09/89, 02/91, and 06/92)
- NS = Not sampled--well dry or residual water only
-  = Existing gasoline-storage tanks



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

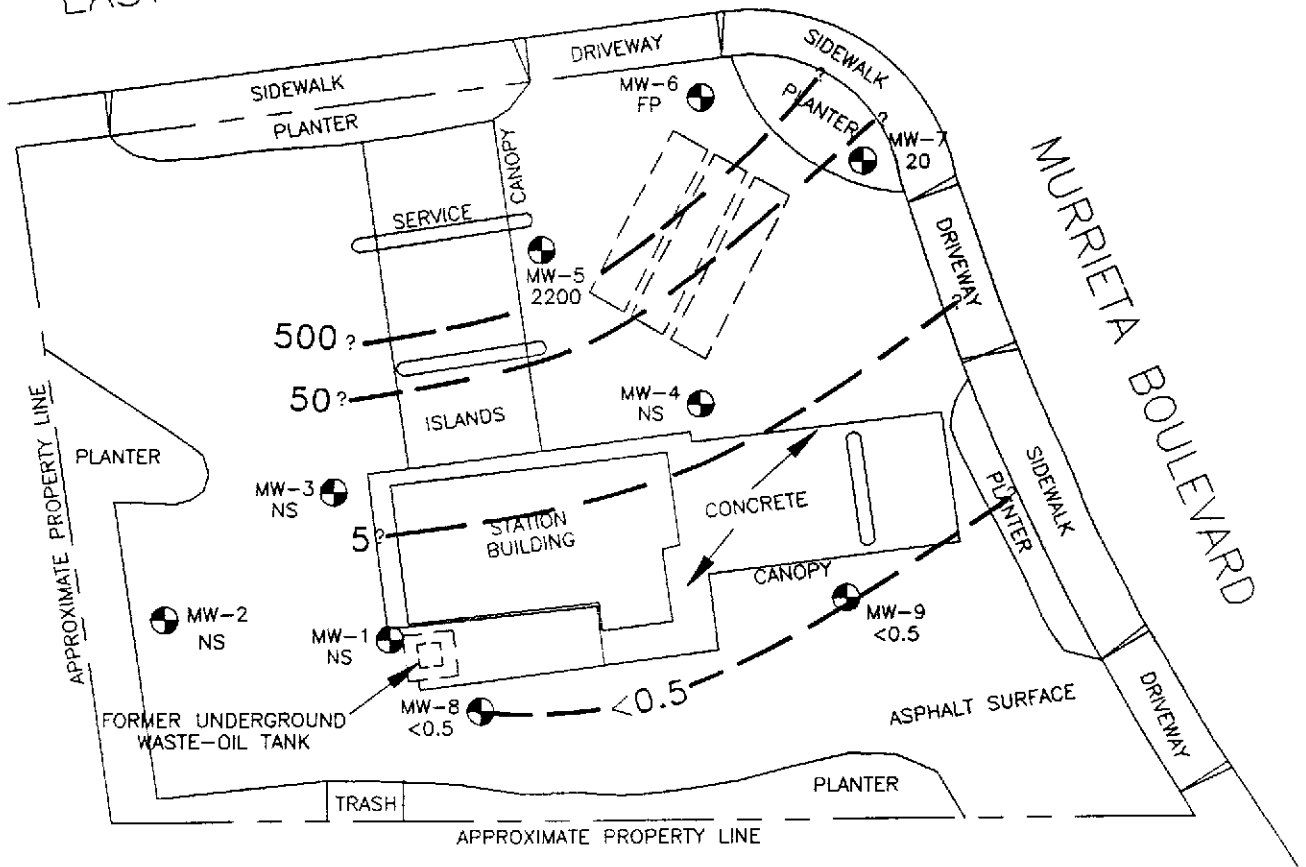
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**TPHg CONCENTRATIONS
IN GROUNDWATER
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California**

**PLATE
6**

PROJECT: 69028.08

EAST STANLEY BOULEVARD




EXPLANATION


5000 — = Line of equal concentration of benzene in groundwater in parts per billion (ppb)

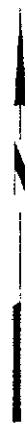
2200 = Concentration of benzene in groundwater in ppb, September 11, 1992

FP = Not sampled--floating product present

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

NS = Not sampled--well dry or residual water only

 = Existing gasoline-storage tanks



Approximate Scale



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

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

**PLATE
7**

PROJECT: 69028.08

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

December 7, 1992
69028.08

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

Well Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Floating Product
<u>MW-1</u>				
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
<u>MW-2</u>				
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
05/20/91		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

See notes on Page 4 of 4.

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

December 7, 1992
69028.08

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 2 of 4)

Well Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Floating Product
<u>MW-2cont.</u>				
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
<u>MW-3</u>				
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
01/18/92		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
<u>MW-4</u>				
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

See notes on Page 4 of 4.

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

December 7, 1992
69028.08

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 3 of 4)

Well Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Floating Product
<u>MW-4cont.</u>				
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
<u>MW-5</u>				
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
<u>MW-6</u>				
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
<u>MW-7</u>				
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
<u>MW-8</u>				
06/29/92	456.97	50.40	406.57	None
07/28/92		55.79	401.18	None
08/28/92		60.79	396.18	None
09/11/92		61.97	395.00	None

See notes on Page 4 of 4.

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

Well Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Floating Product
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

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) 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.

Depth-to-water measurements in feet below the top of the well casing.

* Residual water.

**Adjusted water level due to product. The static water level in each well that was suspected to contain floating product was measured with an ORS® interface probe; this instrument is accurate to the nearest 0.01 foot. The probe contains two different sensor units, one for detecting the liquid/air interface, and one for distinguishing between water and hydrocarbon. The thickness of the floating product and the groundwater depths in each well were recorded. The recorded thickness of the floating product was then multiplied by 0.80 to obtain an approximate value for the displacement of water by the floating product. This approximate displacement value 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 GROUNDWATER LABORATORY ANALYSES - TPHg and BTEX
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 1 of 2)

Well Date	TPHg	Benzene	Toluene	Ethyl- benzene	Total Xylenes
<u>MW-1</u>					
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			
<u>MW-2</u>					
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			
<u>MW-3</u>					
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			
<u>MW-4</u>					
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			

See notes on Page 2 of 2.

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

Well Date	TPHg	Benzene	Toluene	Ethyl- benzene	Total Xylenes
<u>MW-4cont.</u>					
11/13/91		Not sampled—dry			
03/19/92		Not sampled—dry			
06/29/92		Not sampled—dry			
09/11/92		Not sampled—dry			
<u>MW-5</u>					
06/29/92	8,900	1,700	640	310	1,100
09/11/92	13,000	2,200	1,500	130	930
<u>MW-6</u>					
06/29/92	8,600	1,800	460	52	450
09/11/92		Not sampled—floating product			
<u>MW-7</u>					
06/29/92	270	38	3.7	1.1	4.4
09/11/92	420	20	0.7	<0.5	<0.5
<u>MW-8</u>					
06/29/92	<50	<0.5	<0.5	<0.5	<0.5
09/11/92	<50	<0.5	<0.5	<0.5	<0.5
<u>MW-9</u>					
06/29/92	<50	<0.5	<0.5	<0.5	<0.5
09/11/92	<50	<0.5	<0.5	<0.5	<0.5
<u>October 1990</u>					
MCLs	None	1.0	None	680	1,750
DWAL	None	None	100	None	None

Results in parts per billion (ppb).

TPHg = Total petroleum hydrocarbons as gasoline

< = 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.

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

December 7, 1992
69028.08

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

Well Date	VOC	TPHd	TOG	Cd	Cr	Pb	Zn	Ni
<u>MW-1</u>								
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	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	NS	NS	NS	NS	NS	NS	NS	NS
09/11/92	NS	NS	NS	NS	NS	NS	NS	NS
<u>MW-2</u>								
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
<u>MW-3</u>								
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 GROUNDWATER LABORATORY ANALYSES – VOC, TPHd, TOG, and Metals
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 2 of 2)

Well Date	VOC	TPHd	TOG	Cd	Cr	Pb	Zn	Ni
<u>MW-4</u>								
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
<u>MW-8</u>								
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
MCL:	Varies	--	--	10	50	50	5,000	—

Results in micrograms per liter (ug/L) = parts per billion (ppb).

VOC: 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.

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

Consultants in Wastes
Management and
Environmental Control

Date Sept 01, 1992
Project G70-38.01

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

We are enclosing:

Copies	Description
<u>1</u>	<u>Depth To Water/Floating Product Survey Results</u>
<u> </u>	<u>August 1992 monthly water level survey, ARCO</u>
<u> </u>	<u>station 6113, 785 East Stanley Blvd., Livermore. CA</u>

For your: X Information Sent by: X Mail

Comments:

Monthly water level data for the above mentioned site are attached. Please call if you have any questions: (408) 453-2266.

Reviewed by:

6/30/96

Jim Butera JB

Robert Porter
Robert Porter, Senior Project
Engineer.





EMCON
ASSOCIATES

Consultants in Wastes
Management and
Environmental Control

Date July 30, 1992
Project G70-38.01

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

We are enclosing:

Copies	Description
<u>1</u>	<u>Depth To Water/Floating Product Survey Results</u>
<u> </u>	<u>July 1992 monthly water level survey, ARCO</u>
<u> </u>	<u>station 6113. 785 East Stanley Blvd., Livermore, CA</u>

For your: X Information Sent by: X Mail

Comments:

Monthly water level data for the above mentioned site are attached. Please call if you have any questions: (408) 453-2266.

Reviewed by:



Jim Butera JB

Robert Porter
Robert Porter, Senior Project
Engineer.



**FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY**

PROJECT # : G70-38.01

STATION ADDRESS : 785 East Stanley Blvd. Livermore

DATE : 7.28.92

ARCO STATION # : 6113

FIELD TECHNICIAN : Rich Schaeffer

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-2	Fine	Yes	Yes	3257	Fine	38.36	38.36	N.D	N.D	38.6	-
2	MW-3	Fine	Yes	Yes	3257	Fine	39.05	39.05	N.D	N.D	39.1	-
3	MW-8	Fine	Yes	Yes	3259	Fine	55.79	55.79	N.D	N.D	66.6	-
4	MW-1	Fine	Yes	Yes	3259	Fine	DRY	DRY	N.D	N.D	67.8	-
5	MW-9	Fine	Yes	Yes	3259	Fine	55.53	55.53	N.D	N.D	68.0	-
6	MW-7	Fine	Yes	Yes	3259	Fine	54.60	54.60	N.D	N.D	67.7	-
7	MW-6	Fine	Yes	Yes	3259	Fine	54.63	54.63	N.D	N.D	67.4	-
8	MW-5	Fine	Yes	Yes	3259	Fine	54.92	54.92	N.D	N.D	62.6	-
9	MW-4	Fine	Yes	Yes	3259	Fine	Dry	Dry	N.D	N.D	26.7	-

SURVEY POINTS ARE TOP OF WELL CASINGS

**FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY**

PROJECT # : G70-38.01

STATION ADDRESS : 785 East Stanley Blvd. Livermore

DATE : 8-26-92

ARCO STATION # : 6113

FIELD TECHNICIAN : Kirk Schaeffer

DAY : WED

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	FINE	YES	NONE	3259	YES	38.26	38.26	N.D	N.D	38.6	-
2	MW-3	FINE	YES	NONE	3259	YES	39.03	39.03	N.D	N.D	39.1	-
3	MW-8	FINE	YES	FINE	3259	YES	60.79	60.79	N.D	N.D	66.6	-
4	MW-1	FINE	YES	NONE	3259	YES	DK	DK	N.D	N.D	44.8	-
5	MW-9	FINE	YES	FINE	3259	YES	60.62	60.62	N.D	N.D	68.0	-
6	MW-7	FINE	YES	FINE	3259	YES	59.60	59.60	N.D	N.D	67.7	-
7	MW-6	FINE	YES	FINE	3259	YES	59.45	59.45	N.D	N.D	67.9	-
8	MW-5	FINE	YES	FINE	3259	YES	59.58	59.58	N.D	N.D	62.6	-
9	MW-4	FINE	YES	FINE	3259	YES	DK	DK	N.D	N.D	26.7	-

SURVEY POINTS ARE TOP OF WELL CASINGS



EMCON
ASSOCIATES

Consultants in Wastes
Management and
Environmental Control

RECEIVED

OCT 14 1992

RESNA
SAN JOSE

Date October 7, 1992

Project 0G70-038.01

To:

Mr. Joel Coffman

RESNA/ Applied Geosystems

3315 Almaden Expressway, Suite 34

San Jose, California 95050

We are enclosing:

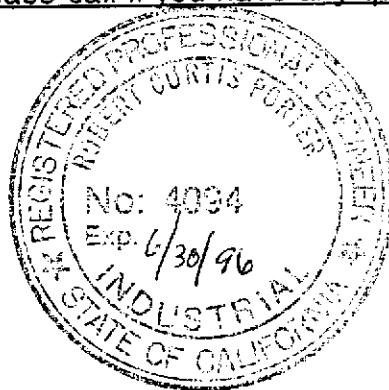
Copies	Description
<u>1</u>	<u>Depth To Water / Floating Product Survey Results</u>
<u>1</u>	<u>Summary of Groundwater Monitoring Data</u>
<u>2</u>	<u>Certified Analytical Reports with Chain-of-Custody</u>
<u>9</u>	<u>Water Sample Field Data Sheets</u>

For your: X Information Sent by: X Mail

Comments:

Enclosed are the data from the third quarter 1992 monitoring event at ARCO service station 6113, 785 East Stanley Boulevard, 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 Porter
Robert Porter, Senior Project
Engineer.



**FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY**

PROJECT # : G70-38.01

STATION ADDRESS : 785 East Stanley Blvd. Livermore

DATE : 9.11.92

ARCO STATION # : 6113

FIELD TECHNICIAN : M Adler

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	OK	Yes	OK	3259	OK	38.37	38.37	ND	ND	38.6	-
2	MW-3	OK	Yes	OK	3259	OK	39.02	39.02	ND	ND	39.1	-
3	MW-8	OK	Yes	OK	3259	OK	61.97	61.97	ND	ND	66.5	-
4	MW-1	OK	Yes	OK	3259	OK	NDRY	NDRY	ND	ND	44.8	well dry
5	MW-9	OK	Yes	OK	3259	OK	61.67	61.67	ND	ND	67.9	-
6	MW-7	OK	Yes	OK	3259	OK	60.74	60.74	ND	ND	67.6	-
7	MW-6	OK	Yes	OK	3259	OK	60.76	60.76	60.72	.04	67.4	.04' of product in well
8	MW-5	OK	Yes	OK	3259	OK	60.88	60.88	ND	ND	62.5	-
9	MW-4	OK	Yes	OK	3259	OK	NDRY	NDRY	ND	ND	26.7	well dry

SURVEY POINTS ARE TOP OF WELL CASINGS

Summary of Groundwater Monitoring Data
 Third Quarter 1992
 ARCO Service Station 6113
 785 East Stanley Boulevard, Livermore, California
 micrograms per liter ($\mu\text{g/l}$) 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 ($\mu\text{g/l}$)	Benzene ($\mu\text{g/l}$)	Toluene ($\mu\text{g/l}$)	Ethyl-benzene ($\mu\text{g/l}$)	Total Xylenes ($\mu\text{g/l}$)	TPH as Diesel (mg/l)	Total Oil and Grease, 5520C (mg/l)
MW-1	09/11/92	Dry	NA. ²	NS. ³	NS.	NS.	NS.	NS.	NS.	NS.
MW-2	09/11/92	38.37	ND. ⁴	NS.	NS.	NS.	NS.	NS.	NS.	NS.
MW-3	09/11/92	39.02	ND.	NS.	NS.	NS.	NS.	NS.	NS.	NS.
MW-4	09/11/92	Dry	NA.	NS.	NS.	NS.	NS.	NS.	NS.	NS.
MW-5(62)	09/11/92	60.88	ND.	13,000.	2,200.	1,500.	130.	930.	NR. ⁵	NR.
MW-6	09/11/92	60.76	ND.	NS.	NS.	NS.	NS.	NS.	NS.	NS.
MW-7(67)	09/11/92	60.74	ND.	420.	20.	0.7	<0.5	<0.5	NR.	NR.
MW-8(66)	09/11/92	61.97	ND.	<50	<0.5	<0.5	<0.5	<0.5	<50	<0.5
MW-9(67)	09/11/92	61.67	ND.	<50	<0.5	<0.5	<0.5	<0.5	NR.	NR.
FB-1. ⁶	09/11/92	NA.	NA.	<50	<0.5	<0.5	<0.5	<0.5	NR.	NR.

1. TPH. = Total petroleum hydrocarbons

2. NA. = Not applicable

3. NS. = Not sampled; dry well or well did not contain enough volume for sample collection

4. ND. = Not detected

5. NR. = Not reported; sample was not scheduled for analysis of the selected parameter

6. FB. = Field Blank

Summary of Groundwater Monitoring Data
Third Quarter 1992
ARCO Service Station 6113
785 East Stanley Boulevard, Livermore, California
micrograms per liter ($\mu\text{g/l}$) and milligrams per liter (mg/l)

Well ID and Sample Depth	Sampling Date	Cadmium ($\mu\text{g/l}$) (ppb)	Chromium ($\mu\text{g/l}$) (ppb)	Lead ($\mu\text{g/l}$) (ppb)	Nickel ($\mu\text{g/l}$) (ppb)	Zinc ($\mu\text{g/l}$) (ppb)
MW-8(66)	09/11/92	13.	3,580.	308.	10,300.	2,620.



September 25, 1992

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

Re: **EMCON Project No. G70-38.01**
Arco Facility No. 6113

Dear Mr. Butera:

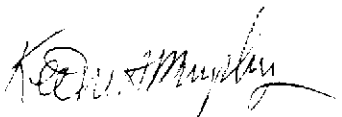
Enclosed are the results of the water samples submitted to our lab on September 11, 1992. For your reference, our service request number for this work is SJ92-1143.


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

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.


Keoni A. Murphy
Laboratory Manager


Annelise J. Bazar
Regional QA Coordinator

le/KAM

Analytical Report

Client: EMCON Associates
 Project: EMCON Project No. G70-38.01
 Arco Facility No. 6113

Date Received: 09/11/92
 Work Order #: SJ92-1143
 Sample Matrix: Water

Inorganic Parameters¹
 mg/L (ppm)

Sample Name: MW-8 (66) Method Blank
 Date Sampled: 09/11/92

<u>Analyte</u>	<u>Method</u>	<u>MRL</u>		
Total Oil and Grease	SM 5520C	0.5	ND	ND
Hydrocarbons, IR	SM 5520F	0.5	ND	ND

MRL Method Reporting Limit

ND None Detected at or above the method reporting limit

SM Standard Methods for the Examination of Water and Wastewater, 17th Ed., 1989

¹ Unless otherwise noted, all analyses were performed within EPA recommended maximum holding times specified in *Test Methods for Evaluating Solid Waste*, (SW-846, 3rd Edition) and *Methods for Chemical Analysis of Water and Waste* (EPA-600/4-79-020, Revised March 1983).

Approved by _____

Date _____

Analytical Report

Client: EMCON Associates
 Project: EMCON Project No. G70-38.01
 Arco Facility No. 6113
 Sample Matrix: Water

Date Received: 09/11/92
 Date Extracted: 09/15/92
 Date Analyzed: 09/16/92
 Work Order #: SJ92-1143

TPH as Diesel
 EPA Method 3510/California DHS LUFT Method
 $\mu\text{g/L}$ (ppb)

<u>Sample Name</u>	<u>MRL</u>	<u>TPH as Diesel</u>
MW-8 (66)	50	ND
Method Blank	50	ND

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

Approved by

Kenneth McKinley

Date

September 25, 1992

Analytical Report

Client: EMCON Associates
 Project: EMCON Project No. G70-38.01
 Arco Facility No. 6113

Date Received: 09/11/92
 Work Order #: SJ92-1143
 Sample Matrix: Water

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

Sample Name: MW-5 (62) MW-7 (67) MW-8 (66)
 Date Analyzed: 09/15/92 * 09/15/92 * 09/15/92 *

<u>Analyte</u>	<u>MRL</u>	<u>MW-5 (62)</u>	<u>MW-7 (67)</u>	<u>MW-8 (66)</u>
Benzene	0.5	2,200.	20.	ND
Toluene	0.5	1,500.	0.7	ND
Ethylbenzene	0.5	130.	ND	ND
Total Xylenes	0.5	930.	ND	ND
TPH as Gasoline	50	13,000.	420.	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 September 15, 1992. However it was analyzed after midnight so the actual date analyzed is September 16, 1992.

Approved by

[Signature]

Date

September 25, 1992

Analytical Report



Client: EMCON Associates
 Project: EMCON Project No. G70-38.01
 Arco Facility No. 6113

Date Received: 09/11/92
 Work Order #: SJ92-1143
 Sample Matrix: Water

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

Sample Name: MW-9 (67) FB-1 Method Blank
 Date Analyzed: 09/15/92 * 09/15/92 * 09/15/92

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

TPH Total Petroleum Hydrocarbons

MRL Method Reporting Limit

ND None Detected at or above the method reporting limit

* This sample was part of the analytical batch started on September 15, 1992. However it was analyzed after midnight so the actual date analyzed is September 16, 1992.

Approved by

Kevin A. Murphy

Date

September 25, 1992



Client: EMCON Associates
 Project: EMCON Project No. G70-38.01
 Arco Facility No. 6113

Date Received: 09/11/92
 Work Order #: SJ92-1143
 Sample Matrix: Water

QA/QC Report
 Continuing Calibration Summary
 Inorganics
 SM 5520 F
 mg/L

<u>Analyte</u>	<u>True Value</u>	<u>Result</u>	<u>Percent Recovery</u>	<u>CAS Percent Recovery Acceptance Criteria</u>
Hydrocarbons, IR	100.	110.	110.	80-120

SM Standard Methods for the Examination of Water and Wastewater, 17th Ed., 1989

Approved by Kee M. Murphy Date September 25, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Client: EMCON Associates
 Project: EMCON Project No. G70-38.01
 Arco Facility No. 6113

Date Received: 09/11/92
 Work Order #: SJ92-1143
 Sample Matrix: Water

QA/QC Report
 Matrix Spike Summary
 Inorganic Parameters
 mg/L (ppm)

Sample Name: MW-8 (66)
 Date Sampled: 09/11/92

Parameter	Spike Level	Sample Result	Spike Result		Percent		Recovery Acceptance Criteria
			MS	DMS	MS	DMS	
Oil and Grease, IR	4.0	ND	3.98	4.07	99.	102.	53-149

ND None Detected at or above the method reporting limit

Approved by *[Signature]* Date September 25, 1992



Client: EMCON Associates
 Project: EMCON Project No. G70-38.01
 Arco Facility No. 6113

Date Received: 09/11/92
 Work Order #: SJ92-1143
 Sample Matrix: Water

QA/QC Report
 Initial Calibration Verification
 TPH as Diesel
 EPA Methods 3510/DHS LUFT Method
 mg/L (ppm)

Date Analyzed: 09/16/92

<u>Analyte</u>	<u>True Value</u>	<u>Result</u>	<u>Percent Recovery</u>	<u>CAS Percent Recovery Acceptance Criteria</u>
TPH as Diesel	1,000.	1,041.	104.	90-110

TPH Total Petroleum Hydrocarbons

Approved by K. Edmund Wrayman Date September 25, 1992

Client: EMCON Associates
 Project: EMCON Project No. G70-38.01
 Arco Facility No. 6113

Date Received: 09/11/92
 Work Order #: SJ92-1143
 Sample Matrix: Water

QA/QC Report
 Surrogate Recovery Summary
 TPH as Diesel
 EPA Method 3510/DHS LUFT Method

<u>Sample Name</u>	<u>Date Analyzed</u>	<u>Percent Recovery</u> P-Terphenyl
MW-8 (66)	09/16/92	97.
MW-8 (66) MS	09/16/92	100.
MW-8 (66) DMS	09/16/92	97.
Method Blank	09/16/92	107.
	CAS Acceptance Criteria	55-145

TPH Total Petroleum Hydrocarbons

Approved by *[Signature]* Date September 25 1992



Client: EMCON Associates
 Project: EMCON Project No. G70-38.01
 Arco Facility No. 6113

Date Received: 09/11/92
 Work Order #: SJ92-1143
 Sample Matrix: Water

QA/QC Report
 Matrix Spike/Duplicate Matrix Spike Summary
 Total Petroleum Hydrocarbons as Diesel
 DHS LUFT Method
 µg/L (ppb)

Sample Name: MW-8 (66)
 Date Analyzed: 09/16/92

Percent Recovery

<u>Parameter</u>	<u>Spike Level</u>	<u>Sample Result</u>	<u>Spike Result</u>		<u>Percent Recovery</u>		<u>Acceptance Criteria</u>
			<u>MS</u>	<u>DMS</u>	<u>MS</u>	<u>DMS</u>	
Diesel	4,000.	ND	4,120.	3,990.	103.	100.	55-145

ND None Detected at or above the method reporting limit

Approved by *R. E. W. [Signature]* Date *September 25, 1992*

Client: EMCON Associates
 Project: EMCON Project No. G70-38.01
 Arco Facility No. 6113

Date Received: 09/11/92
 Work Order #: SJ92-1143

QA/QC Report
 Initial Calibration Verification
 BTEX and TPH as Gasoline
 EPA Methods 5030/8020/DHS LUFT Method
 Nanograms

Date Analyzed: 09/15/92

<u>Analyte</u>	<u>True Value</u>	<u>Result</u>	<u>Percent Recovery</u>	<u>CAS Percent Recovery Acceptance Criteria</u>
Benzene	250.	246.	98.	85-115
Toluene	250.	259.	103.	85-115
Ethylbenzene	250.	245.	98.	85-115
Total Xylenes	750.	711.	95.	85-115
TPH as Gasoline	2,500.	2,557.	102.	90-110

TPH Total Petroleum Hydrocarbons

Approved by *[Signature]* Date *September 25, 1992*



Client: EMCON Associates
 Project: EMCON Project No. G70-38.01
 Arco Facility No. 6113

Date Received: 09/11/92
 Work Order #: SJ92-1143
 Sample Matrix: Water

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

<u>Sample Name</u>	<u>Date Analyzed</u>	<u>Percent Recovery</u> <i>α,α,α-Trifluorotoluene</i>
MW-5 (62)	09/15/92	93.
MW-7 (67)	09/15/92	105. *
MW-8 (66)	09/15/92	92.
MW-9 (67)	09/15/92	91.
FB-1	09/15/92	96.
MS	09/15/92	114.
DMS	09/15/92	128. *
Method Blank	09/15/92	97.

CAS Acceptance Criteria 70-130

TPH Total Petroleum Hydrocarbons
 * The surrogate used on this sample was 4-Bromofluorobenzene.

Approved by *K. E. M. [Signature]* Date *September 25 1992*

Client: EMCON Associates
 Project: EMCON Project No. G70-38.01
 Arco Facility No. 6113

Date Received: 09/11/92
 Work Order #: SJ92-1143
 Sample Matrix: Water

QA/QC Report
 Matrix Spike/Duplicate Matrix Spike Summary
 TPH as Gasoline
 EPA Methods 5030/DHS LUFT Method
 µg/L (ppb)

Date Analyzed: 09/15/92

<u>Analytes</u>	<u>Spike Level</u>	<u>Sample Result</u>	<u>Spike Result</u>		<u>Percent Recovery</u>		<u>Acceptance Criteria</u>
			<u>MS</u>	<u>DMS</u>	<u>MS</u>	<u>DMS</u>	
TPH as Gasoline	250.	ND	287.	294.	115.	118.	70-130

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

Approved by *K. M. [Signature]* Date *September 25, 1992*

RECEIVED

SEP 25 1992

CAS 611



September 24, 1992

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

Re: ARCO #6113 - Livermore/Project #G70-38.01/SJ921143

Dear Jim:

Enclosed are the results of the sample submitted to our lab on September 11, 1992. For your reference, these analyses have been assigned our work order number K925689C.

All analyses were performed in accordance with our laboratory's quality assurance program. Reproduction of reports is allowed only in whole, not in part. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

A handwritten signature in cursive script, appearing to read "Colin B. Elliott".

Colin B. Elliott
Senior Project Chemist

CBE/akn

Columbia Analytical Services, Inc.

A handwritten signature in cursive script, appearing to read "Lawrence J. Jacoby".

Lawrence J. Jacoby, Ph.D.
Director of Quality Assurance

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: ARCO #6113 - Livermore
Sample Matrix: Water

Date Received: 09/11/92
Work Order No.: K925689C

Total Metals
µg/L (ppb)

Sample Name:
Lab Code:

MW-8
K5689-1

Method Blank
K5689-MB

Analyte	EPA Method	MRL		
Cadmium	6010	3	13	ND
Chromium	6010	5	3,580	ND
Lead	7421	2	308	ND
Nickel	6010	20	10,300	ND
Zinc	6010	10	2,620	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by

Alan Elliott

Date

9/24/92

00001

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
 Project: ARCO #6113 - Livermore
 Sample Matrix: Water

Date Received: 09/11/92
 Work Order No.: K925689C

Matrix Spike/Duplicate Matrix Spike Summary
 Total Metals
 µg/L (ppb)

Sample Name: MW-8
 Lab Code: K5689-1

Percent Recovery

Analyte	MRL	Spike Level	Sample Result	Spiked Sample Result	Duplicate Spiked Sample Result	Spiked Sample	Duplicate Spiked Sample	CAS Acceptance Criteria	Relative Percent Difference
Cadmium	3	50	13	61	57	96	88	75-125	7
Chromium	5	200	3,580	3,730	3,930	NA	NA	75-125	5
Lead	2	20	308	334	348	NA	NA	75-125	4
Nickel	20	500	10,300	11,100	11,500	NA	NA	75-125	4
Zinc	10	500	2,620	3,130	3,220	NA	NA	75-125	3

MRL Method Reporting Limit

NA Not Applicable because of the sample matrix. Accuracy of the spike recovery value is reduced, since the sample concentration was greater than four times the amount spiked.

ND None Detected at or above the method reporting limit

Approved by C. Elliott Date 9/24/92

00002

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: ARCO #6113 - Livermore

Date Analyzed: 09/19/92
Work Order No.: K925689C

Initial Calibration Verification (ICV) Summary
 $\mu\text{g/L}$ (ppb)

Analyte	EPA Method	True Value	Result	Percent Recovery
Cadmium	6010	1,250	1,300	104
Chromium	6010	500	521	104
Lead	7421	98.4	102	104
Nickel	6010	1,250	1,300	104
Zinc	6010	1,250	1,260	101

ICV Source: EPA ICV

Approved by Colin Elliott Date 9/24/92

00003

ARCO Products Company

Division of AtlanticRichfieldCompany

Task Order No. **EMCGC-92-1**

Chain of Custody

ARCO Facility no. **G113** City (Facility) **LIVERMORE** Project manager (Consultant) **JIM Bukera**
 ARCO engineer **Fyle Christie** Telephone no (ARCO) **415 571-2434** Telephone no (Consultant) **408 453-7319** Fax no. (Consultant) **408 453-0452**
 Consultant name **EMCON ASSOCIATES** Address (Consultant) **1938 JUNCTION AVE SAN JOSE**

Laboratory name **CAS**
 Contract number **07077**

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX EPA 802	BTEX/TPH/PAHs EPA 801/802/803	TPH Modified 8015 Gas Diesel	Oil and Grease 413.1 413.2	TPH EPA 418.1/SM500E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals VOA	Semi Metals VOA	CMI Metals EPA 8210/7000	ITLC STLC	Lead Org./DHS Lead EPA 7420/7421	C.A.C. N.I. METALS 2.0 EPA 2.0 200.7	
			Soil	Water	Other	Ice	Acid																	
MW 1		2		X		X	HCl			X														
MW 2		2		X		X	HCl			X														
MW 3		2		X		X	HCl			X														
MW 4		2		X		X	HCl			X														
MW 5 (67)	1-2	2		X		X	HCl	9-11-92	1505	X														
MW 6		2		X		X	HCl			X														
MW 7 (67)	3-4	2		X		X	HCl	9-11-92	1400	X														
MW 8 (66)	5-8	6		X		X	HCl	9-11-92	1232	X		X												
MW 9 (67)	9-12	2		X		X	HCl	9-11-92	1308	X														
FB-1	1-12	2		X		X	HCl	9-11-92	1503	X														
MW 8 (66)	1						HNO ₃	9-11-92	1232													X	X	
MW 8 (66)	13-14	2					NP	9-11-92	1232			X												

Method of shipment **Sampler will deliver**

Special detection Limit/reporting **Lowest Possible**

Special QA/QC **AS Normal**

Remarks **2-40ml HCl VOA'S**
2 - liter NP GLASS
1 - 500ml HNO₃
4 - liter HCl GLASS
670-380

Lab number **592-1143**

Turnaround time
 Priority Rush
 1 Business Day
 Rush
 2 Business Days
 Expedited
 5 Business Days
 Standard
 10 Business Days

Condition of sample: **MW 5 is over ground, MW 8 litres are 500ml** Temperature received: **6K**

Relinquished by sampler **EMANUEL Mide** Date **9-11-92** Time **1630** Received by **Ruth Peterson** Date **9/15/92** Time **0900**

Relinquished by **EMANUEL Mide** Date **9-11-92** Time **1630** Received by laboratory **EMANUEL Mide** Date **9-11-92** Time **1630**



EMCON ASSOCIATES

WATER SAMPLE FIELD DATA SHEET

REV. 2, 1991

PROJECT NO: 170-38.01
PURGED BY: K REICHELDERFER
SAMPLED BY: ✓

SAMPLE ID: MW-2 (38)
CLIENT NAME: ARCO 6113
LOCATION: 785 L. STANLEY BL
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.): 3.03
DEPTH TO WATER (feet): 38.42 CALCULATED PURGE (gal.): 0.15
DEPTH OF WELL (feet): 38.6 ACTUAL PURGE VOL. (gal.): < 0.50

DATE PURGED: 9-11-92 Start (2400 Hr) 11:36 End (2400 Hr) 11:39
DATE SAMPLED: NA Start (2400 Hr) NA End (2400 Hr) NA

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	EC. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>11:39</u>	<u>< 0.50</u>	<u>7.27</u>	<u>1664</u>	<u>79.1</u>	<u>GREY</u>	<u>HEAVY</u>
<u>11:39</u>	<u>WELL DRIED @ < 0.50 GALLON</u>					
	<u>RECHARGE</u>					

WELL DID NOT RECHARGE - NO SAMPLE

D. O. (ppm): NR ODOR: MILD NR NR
(COBALT 0 - 100) (NTU 0 - 200)

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

PURGING EQUIPMENT

SAMPLING EQUIPMENT

- | | | | |
|---|--|--|--|
| <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump | <input checked="" type="checkbox"/> Bailer (PVC) | <input type="checkbox"/> DDL Sampler | <input type="checkbox"/> Bailer (Stainless Steel) |
| <input type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated |
| Other: _____ | | Other: _____ | |

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: WELL TRIED @ < 0.50 GALLON (VERY LITTLE WATER)
WELL DID NOT RECHARGE BY THE END OF THE DAY. NO SAMPLE
Very small amount of water was purged out - enough to get reading

Meter Calibration: Date: 9-11-92 Time: 11:18 Meter Serial #: 9203 Temperature °F: 77.2
(EC 1000 0.00 / 1000) (DI _____) (pH 7 7.06 / 7.00) (pH 10 9.98 / 10.00) (pH 4 3.88 / _____)

Location of previous calibration: _____

Signature: Kevin Reichelderfer Reviewed By: JB Page 2 of 9



EMCON ASSOCIATES

PROJECT NO: 670-38.01 SAMPLE ID: MW-3
 PURGED BY: K REICHELDERFER CLIENT NAME: ARCO 10113
 SAMPLED BY: ↓ LOCATION: 785 E. STANLEY 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.): NA
 DEPTH TO WATER (feet): 39.07 CALCULATED PURGE (gal.): NA
 DEPTH OF WELL (feet): 39.1 ACTUAL PURGE VOL (gal.): NA

DATE PURGED: 9-11-92 Start (2400 Hr) NA End (2400 Hr) NA
 DATE SAMPLED: NA Start (2400 Hr) NA End (2400 Hr) NA

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	EC. (umhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
	<u>NOT ENOUGH WATER TO SAMPLE</u>					
	<u>too little</u>					
D. O. (ppm):	<u>NR</u>				<u>NR</u>	<u>NR</u>
ODOR:		<u>NA</u>				

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

PURGING EQUIPMENT

SAMPLING EQUIPMENT

- | | | | |
|---|--|--|--|
| <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailer (PVC) | <input type="checkbox"/> DDL Sampler | <input type="checkbox"/> Bailer (Stainless Steel) |
| <input type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated |
| Other: _____ | | Other: <u>NA</u> | |

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: ATTEMPTED TO PURGE, YET NOTHING CAME OUT OF WELL
NO SAMPLE TAKEN

Meter Calibration: Date: 9-11-92 Time: 11:18 Meter Serial #: 9203 Temperature °F: _____
 (EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____) (pH 10 _____ / _____) (pH 4 _____ / _____)
 Location of previous calibration: MW-2

Signature: Karl Reichelderfer Reviewed By: JB Page 3 of 9



WATER SAMPLE FIELD DATA SHEET

Rev. 2, 1991

EMCON
ASSOCIATES

PROJECT NO: G70-38.01

SAMPLE ID: MW-4

PURGED BY: M. Adair

CLIENT NAME: Arco 6113

SAMPLED BY: NA

LOCATION: 785 E. Stanley Blvd.
Livermore, CA.

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

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

CASING ELEVATION (feet/MSL): <u>NR</u>	VOLUME IN CASING (gal.): <u>NA</u>
DEPTH TO WATER (feet): <u>ND</u>	CALCULATED PURGE (gal.): _____
DEPTH OF WELL (feet): <u>26.7</u>	ACTUAL PURGE VOL (gal.): _____

DATE PURGED: <u>9-11-93</u>	Start (2400 Hr) <u>NA</u>	End (2400 Hr) <u>NA</u>
DATE SAMPLED: _____	Start (2400 Hr) <u>NA</u>	End (2400 Hr) <u>NA</u>

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
_____	_____	_____	_____	_____	_____	_____
_____	<u>NO</u>	<u>Samples</u>	<u>- well</u>	<u>dry</u>	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
D. O. (ppm): _____	ODOR: _____	(COBALT 0 - 100) (NTU 0 - 200)				

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

PURGING EQUIPMENT

SAMPLING EQUIPMENT

- | | | | |
|---|---|--|---|
| <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailor (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailor (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailor (PVC) | <input type="checkbox"/> DDL Sampler | <input type="checkbox"/> Bailor (Stainless Steel) |
| <input type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailor (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated |
| Other: _____ | | Other: _____ | |

WELL INTEGRITY: Good LOCK #: 3259

REMARKS: No Samples - well dry

Meter Calibration: Date: _____ Time: _____ Meter Serial #: _____ Temperature °F: _____
 (EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____) (pH 10 _____ / _____) (pH 4 _____ / _____)
 Location of previous calibration: _____

Signature: M. Adair Reviewed By: JB Page 4 of 9



WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 970-38.01
 PURGED BY: K REICHELDERFER
 SAMPLED BY: V

SAMPLE ID: MW-5 (62)
 CLIENT NAME: ARCO 6113
 LOCATION: 785 E. STANLEY E. 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.): 1.05
 DEPTH TO WATER (feet): 60.90 CALCULATED PURGE (gal.): 5.25
 DEPTH OF WELL (feet): 62.5 ACTUAL PURGE VOL. (gal.): 1.50

DATE PURGED: 9-11-92 Start (2400 Hr) 13:52 ^{14:43} End (2400 Hr) 14:48
 DATE SAMPLED: 9-11-92 Start (2400 Hr) 15:05 End (2400 Hr) 15:41

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	EC. (umhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
14:48	1.50	7.08	940	73.7	BROWN	HEAVY
14:48	WELL DRIED @ 1.50 GALLONS					
15:10	RECHARGE	7.21	898	70.4	↓	↓

D. O. (ppm): NR ODOR: MILD (COBALT 0 - 100) NR (NTU 0 - 200) NR

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

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
<input type="checkbox"/> 2" Bladder Pump	<input type="checkbox"/> Bailer (Teflon®)	<input type="checkbox"/> 2" Bladder Pump	<input checked="" type="checkbox"/> Bailer (Teflon®)
<input type="checkbox"/> Centrifugal Pump	<input checked="" type="checkbox"/> Bailer (PVC)	<input type="checkbox"/> DDL Sampler	<input type="checkbox"/> Bailer (Stainless Steel)
<input checked="" type="checkbox"/> Submersible Pump	<input type="checkbox"/> Bailer (Stainless Steel)	<input type="checkbox"/> Dipper	<input type="checkbox"/> Submersible Pump
<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated	<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated
Other: _____		Other: _____	

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: DID NOT USE SUBMERSIBLE PUMP BECAUSE THERE WAS NOT AN ADEQUATE SUPPLY OF WATER TO RUN PUMP
WELL DRIED @ 1.50 GALLONS 14:48 WIL 62.95
15:03 WIL 62.21
LONG SAMPLE TIME DUE TO HEAVY SILT CLOGGING BAILER

Meter Calibration: Date: 9-11-92 Time: 11:18 Meter Serial #: 9203 Temperature °F: _____
 (EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____) (pH 10 _____ / _____) (pH 4 _____ / _____)
 Location of previous calibration: MW-2
 Signature: K Reichelderfer Reviewed By: JB Page 5 of 9



WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: G70-38.01
PURGED BY: M Adler
SAMPLED BY: NA

SAMPLE ID: MW-6
CLIENT NAME: Arco 6113
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.): NA
DEPTH TO WATER (feet): 60.76 CALCULATED PURGE (gal.): /
DEPTH OF WELL (feet): 67.4 ACTUAL PURGE VOL (gal.): /

DATE PURGED: 9-11-92 Start (2400 Hr) NA End (2400 Hr) NA
DATE SAMPLED: - Start (2400 Hr) / End (2400 Hr) /

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>No Samples - Product in well</u>						
D. O. (ppm): _____ ODOR: <u>Strong</u>						
(COBALT 0 - 100) (NTU 0 - 200)						

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

PURGING EQUIPMENT

SAMPLING EQUIPMENT

- | | | | |
|---|---|---|---|
| <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailer (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailer (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailer (PVC) | <input type="checkbox"/> DDL Sampler | <input type="checkbox"/> Bailer (Stainless Steel) |
| <input type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ <u>NA</u> | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ <u>NA</u> | <input type="checkbox"/> Dedicated |
| Other: _____ | | Other: _____ | |

WELL INTEGRITY: Good LOCK #: 3259

REMARKS: .04' product in well - No Samples

Meter Calibration: Date: _____ Time: _____ Meter Serial #: _____ Temperature °F: _____
(EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____) (pH 10 _____ / _____) (pH 4 _____ / _____)
Location of previous calibration: _____

Signature: M Adler Reviewed By: JB Page 6 of 9



WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: G70-38.01

SAMPLE ID: Mw-7(67)

PURGED BY: M Adler

CLIENT NAME: Arco 6113

SAMPLED BY: M Adler

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): <u>NR</u>	VOLUME IN CASING (gal.): <u>4.43</u>
DEPTH TO WATER (feet): <u>60.84</u>	CALCULATED PURGE (gal.): <u>22.17</u>
DEPTH OF WELL (feet): <u>67.6</u>	ACTUAL PURGE VOL (gal.): <u>13.0</u>

DATE PURGED: <u>9-11-92</u>	Start (2400 Hr) <u>1333</u>	End (2400 Hr) <u>1349</u>
DATE SAMPLED: <u>9-11-92</u>	Start (2400 Hr) <u>1400</u>	End (2400 Hr) <u>1401</u>

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1338</u>	<u>4.5</u>	<u>7.11</u>	<u>843</u>	<u>73.5</u>	<u>TAN</u>	<u>Moderate</u>
<u>1343</u>	<u>9.0</u>	<u>7.16</u>	<u>821</u>	<u>69.5</u>	<u>TAN</u>	<u>Moderate</u>
<u>1349</u>	<u>13.0</u>	<u>Well dried</u>	<u>DTW</u>	<u>66.00</u>		
<u>1359</u>	<u>recharge</u>	<u>7.21</u>	<u>796</u>	<u>70.9</u>	<u>TAN</u>	<u>heavy</u>

D. O. (ppm): NR ODOR: strong COLOR: NR TURBIDITY: NR
(COBALT 0 - 100) (NTU 0 - 200)

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

PURGING EQUIPMENT

SAMPLING EQUIPMENT

- | | | | |
|------------------------------|--------------------------------------|-----------------------------|--------------------------------------|
| <u> </u> 2" Bladder Pump | <u> </u> Bailor (Teflon®) | <u> </u> 2" Bladder Pump | <u>X</u> Bailor (Teflon®) |
| <u> </u> Centrifugal Pump | <u> </u> Bailor (PVC) | <u> </u> DDL Sampler | <u> </u> Bailor (Stainless Steel) |
| <u>X</u> Submersible Pump | <u> </u> Bailor (Stainless Steel) | <u> </u> Dipper | <u> </u> Submersible Pump |
| <u> </u> Well Wizard™ | <u> </u> Dedicated | <u> </u> Well Wizard™ | <u> </u> Dedicated |
- Other: Other:

WELL INTEGRITY: Good LOCK #: 3259

REMARKS: recharge @ 1359 (DTW 63.77)

Meter Calibration: Date: 9-11-92 Time: 1137 Meter Serial #: 9112 Temperature °F:
 (EC 1000 /) (DI) (pH 7 /) (pH 10 /) (pH 4 /)
 Location of previous calibration: Mw-8 (66)

Signature: M Adler Reviewed By: JB Page 7 of 9



WATER SAMPLE FIELD DATA SHEET

EMCON
ASSOCIATES

PROJECT NO: G70-38.01
PURGED BY: MAdler
SAMPLED BY: MAdler

SAMPLE ID: MW-8 (66)
CLIENT NAME: Arco 6113
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.): 2.97
DEPTH TO WATER (feet): 61.97 CALCULATED PURGE (gal.): 14.85
DEPTH OF WELL (feet): 66.5 ACTUAL PURGE VOL (gal.): 4.5

DATE PURGED: 9-11-92 Start (2400 Hr) 1156 End (2400 Hr) 1204
DATE SAMPLED: 9-11-92 Start (2400 Hr) 1232 End (2400 Hr) 1302

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1201</u>	<u>3.0</u>	<u>6.77</u>	<u>735</u>	<u>66.7</u>	<u>red/brown</u>	<u>heavy</u>
<u>1204</u>	<u>Well drilled @ 4.5 gallons</u>			<u>DTW 65.52</u>		
<u>1223</u>	<u>recharge</u>	<u>7.15</u>	<u>762</u>	<u>66.6</u>	<u>red/brown</u>	<u>heavy</u>
D. O. (ppm):	<u>NR</u>	ODOR:	<u>NONE</u>		<u>NR</u>	<u>NR</u>
					(COBALT 0 - 100)	(NTU 0 - 200)

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

PURGING EQUIPMENT

SAMPLING EQUIPMENT

- | | | | |
|--|---|--|--|
| <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailer (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailer (PVC) | <input type="checkbox"/> DDL Sampler | <input type="checkbox"/> Bailer (Stainless Steel) |
| <input checked="" type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated |
| Other: _____ | | Other: _____ | |

WELL INTEGRITY: Good LOCK #: 3259

REMARKS: DTW 64.23 @ 1223

Meter Calibration: Date: 9-11-92 Time: 1137 Meter Serial #: 9112 Temperature °F: 70.8
(EC 1000 1027 / 1000) (DI 24.1) (pH 76.82 / 7.00) (pH 10 0.02 / 10.00) (pH 4 3.95 /)
Location of previous calibration: MW-8 (66)

Signature: MAdler Reviewed By: JB Page 8 of 9



WATER FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: G70-35.01 SAMPLE ID: MW-9 (2-1)
 PURGED BY: K REICHELDERFER CLIENT NAME: ARCO 3113
 SAMPLED BY: ✓ LOCATION: 785 E. STANLEY BLVD
SILVERDALE, 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.): 4.09
 DEPTH TO WATER (feet): 61.67 CALCULATED PURGE (gal.): 20.43
 DEPTH OF WELL (feet): 67.9 ACTUAL PURGE VOL (gal.): 7.50

DATE PURGED: 9-11-92 Start (2400 Hr) 12:42 End (2400 Hr) 12:51
 DATE SAMPLED: 9-11-92 Start (2400 Hr) 13:08 End (2400 Hr) 13:10

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>12:47</u>	<u>4.50</u>	<u>7.22</u>	<u>852</u>	<u>72.3</u>	<u>BROWN</u>	<u>HEAVY</u>
<u>WELL DRIED @ 7.50 GALLONS</u>						
<u>13:13</u>	<u>RECHARGE</u>	<u>7.13</u>	<u>877</u>	<u>69.4</u>	<u>✓</u>	<u>✓</u>
D. O. (ppm): <u>NR</u> ODOR: <u>NONE</u> <u>VR</u> <u>NR</u> (COBALT 0-100) (NTU 0-200)						

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

PURGING EQUIPMENT

SAMPLING EQUIPMENT

- | | | | |
|--|---|--|--|
| <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailer (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) |
| <input type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailer (PVC) | <input type="checkbox"/> DDL Sampler | <input type="checkbox"/> Bailer (Stainless Steel) |
| <input checked="" type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated |
| Other: _____ | | Other: _____ | |

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: 12:51 WELL DRIED @ 7.50 GALLONS; WL 65.08
12 WL 63.64 @ 13:06

Meter Calibration: Date: 9-11-92 Time: 11:08 Meter Serial #: 9203 Temperature °F: _____
 (EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____) (pH 10 _____ / _____) (pH 4 _____ / _____)
 Location of previous calibration: MW-2

Signature: Karin Reichelderfer Reviewed By: JB Page 9 of 9

MONITORING WELL PURGE WATER TRANSPORTER FORM

RECEIVED

OCT 3 2 1992

RESNA
SAN JOSE

GENERATOR INFORMATION

NAME: ARCO PRODUCTS

ADDRESS: P.O. BOX 5811

CITY, STATE, ZIP: SAN MATEO, CA 94402 PHONE #: (415) 571-2434

DESCRIPTION OF WATER: PURGE WATER GENERATED DURING SAMPLING OR DEVELOPMENT OF MONITORING WELLS LOCATED AT VARIOUS SITES. AUGER RINSATE GENERATED DURING THE INSTALLATION OF MONITORING WELLS AT VARIOUS SITES. THE WATER MAY CONTAIN DISSOLVED HYDROCARBONS.

THE GENERATOR CERTIFIES THAT THIS WATER AS DESCRIBED IS NON-HAZARDOUS

Kyle Christie by Stephen R. Yafida 9-24-92
(Typed or printed full name & signature) (Date)

SITE INFORMATION

	STA #	JOB #	ADDRESS	GALS
1	A-2092	21073-DW	5498 MONTEREY HWY., SAN JOSE, CA	401
2	A-6113	21053-PW	785 E. STANLEY, LIVERMORE, CA	30
3	A-771	21088-PW	899 RINCON AVE., LIVERMORE, CA	98
4	A-6201	20916-PW	40077 MISSION BLVD., FREMONT, CA	8
5	A-2152	21045-PW	22141 CENTER ST., CASTRO VALLEY, CA	123
6	A-6041	21050-PW	7249 VILLAGE PKWY., DUBLIN, CA	27
7	A-4495	21038	1950 S. DELAWARE, SAN MATEO, CA	46
8	A-4430	21010-PW	2995 MIDDLEFIELD RD., PALO ALTO, CA	173
9	A-2010	21090-PW	2110 OLD MIDDLEFIELD RD., MOUNTAIN VIEW, CA	415
10	A-1319	21054-PW	365 JACKSON ST., HAYWARD, CA	346
11	A-5387	21087-PW	20200 HESPERIAN BLVD., HAYWARD, CA	328
TOTAL GALLONS:				1,995

TRANSPORTER INFORMATION

NAME: BALCH PETROLEUM

ADDRESS: 930 AMES AVE.

CITY, STATE, ZIP: MILPITAS, CA 95035 PHONE #: (408) 942-8686

TRUCK ID #: PETERBILT HURSHEL WARD *Hurschel Ward 9-24-92*
(Typed or printed full name & signature) (Date)

TSD FACILITY INFORMATION

NAME: GIBSON ENVIRONMENTAL *Env 1464*

ADDRESS: 475 SEAPORT BLVD

CITY, STATE, ZIP: REDWOOD CITY, CA 94063 PHONE #: (415) 368-5511

RELEASE #: 11320 *Shawn Raskin Shawn Raskin 9-24-92*
(Typed or printed full name & signature) (Date)

Dr. G. R. 92-074 92