EMCON ASSOCIATES
Consultants in Wastes Management and Environmental Control

Date December 18, 1992
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
	December 1992 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:

Jim Butera JB

Robert Porter

Robert Porter, Senior Project Engineer.

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

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
80 Swan Way, Room 200
Oakland, California 94621

DATE: March 16, 1993
PROJECT NUMBER: 69028.08
SUBJECT: Final - Fourth Quarter 1992 Quarterly Groundwater Monitoring at ARCO Station 6113, 785 E. Stanley Blvd., Livermore, California.

FROM: Barbara Sieminski
TITLE: Assistant Project Geologist

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	3/16/93	Final - Fourth Quarter 1992, Groundwater Monitoring at the above subject site.

THESE ARE TRANSMITTED as checked below:

[ ] For review and comment	[ ] Approved as submitted	[ ] Resubmit ___ copies for approval
[X] As requested	[ ] Approved as noted	[ ] Submit___ copies for distribution
[ ] For approval	[ ] Return for corrections	[ ] Return ___ corrected prints
[ ] For your files		

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

93 JAN 14 AM 6:00

January 13, 1993

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 fourth quarter of 1992; also included are projected site activities for the first quarter of 1993 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. Please do not hesitate to contact us with any questions regarding this submittal.

Sincerely yours,

for

Kyle A. Christie
Environmental Engineer

Attachments: ARCO Facility QSRs

agenqsr.ltr
50013-004-06

UST LEAK SITE UPDATE

Date of Last Review/Update: September 25, 1992

Current Date: December 28, 1992

SITE IDENTIFICATION

Name: ARCO Service Station 6113 Case No.:

Address: 785 East Stanley Boulevard
Street Number Street

Livermore
City ZIP Code

County: Alameda Substance: Gasoline

Local Agency: Alameda County Health Care Services Agency

Regional Board: Regional Water Quality Control Board - San Francisco Bay Area

LEAD STAFF PERSON

ACHCSA - Susan Hugo

CASE TYPE

____	Undetermined	____	Soil Only	X	Groundwater	____	Drinking Water

STATUS (Date indicates when case moved into status)

____	No Action Taken		
X	Leak Being Confirmed	Date	1/89
X	Preliminary Site Assessment Workplan Submitted	Date	7/10/89
X	Preliminary Site Assessment Underway	Date	8/89
X	Pollution Characterization	Date	2/92
____	Remediation Plan	Date	
____	Remedial Action Underway	Date	
____	Post Remedial Action Monitoring	Date	
____	Case Referred to Regional Board (ACHCSA)	Date	
____	Case Referred to Dept. of Health Services	Date	
____	Case Closed	Date	

COMMENTS/MILESTONES:

Waste-oil tank removed from site in January 1989. Installed five groundwater monitoring wells (MW-5 through MW-9) and one vapor extraction well (VW-1) in June 1992. Installed one vapor well (VW-2) and performed a vapor extraction test (VET) in August 1992. Initiated subsurface remediation piping installation in conjunction with product line removal and replacement.

RECENT ACTIVITIES/FINDINGS:

Last Quarter Activities: Drilled and installed one additional vapor extraction well (VW-2) on August 4, 1992. Performed a VET on August 11, 1992. Initiated preparation of a report on additional subsurface investigation and vapor extraction test. Performed quarterly groundwater monitoring. Submitted Second Quarter 1992 Quarterly Groundwater Monitoring Report to regulatory agencies on September 28, 1992.

Current Quarter Activities: Performed quarterly groundwater monitoring. Submitted Additional subsurface Investigation & VET Report and Addendum Two to Work Plan to regulatory agencies on December 22 and 30, 1992, respectively.

ANTICIPATED ACTIVITIES:

Next Quarter Activities: Continue to perform groundwater monitoring. Prepare quarterly groundwater monitoring report. Install three onsite vapor extraction wells (VW-3 through VW-5), one onsite (MW-10) and two offsite (MW-11 and MW-12) groundwater monitoring wells, and one onsite recovery well (RW-1). Perform pumping and recovery test. Initiate report on Supplemental Subsurface Investigation. Initiate Preliminary Design of Proposed Interim Soil & Groundwater Treatment System.

Reports Documenting the site's history are listed on page 2.

REPORT	DATE	CONSULTANT
Addendum Two to Work Plan 69028.11	12/30/92	RESNA
Additional Subsurface Investigation Report 69028.07	12/22/92	RESNA
Letter Report on Quarterly Groundwater Monitoring Third Quarter 1992 69028.08		
Letter Report on Quarterly Groundwater Monitoring Second Quarter 1992 69028.08	9/28/92	RESNA
Letter Report on Quarterly Groundwater Monitoring First Quarter 1992 69028.05	5/4/92	RESNA
Fourth Quarter 1991 Groundwater Monitoring Report 69028.05	3/6/92	RESNA
Addendum to Work Plan for Additional Subsurface Investigation and Vapor Extraction Test 69028.06	3/3/92	RESNA
Third Quarter 1991 Groundwater Monitoring Report 69028.05	10/18/91	RESNA/Applied GeoSystems
Work Plan for Additional Subsurface Investigation and Vapor Extraction Test 69028.06	10/17/91	RESNA
Letter Report Quarterly Groundwater Monitoring Second Quarter 1991 69028.03	7/11/91	RESNA
Letter Report Quarterly Groundwater Monitoring First Quarter 1991 69028.05	4/23/91	RESNA
Site Safety Plan for ARCO Station 6113 AGS 69028-4S	2/14/91	Applied GeoSystems
Letter Report, Quarterly Groundwater Monitoring Fourth Quarter 1990 AGS Report 69028-3	1/27/91	Applied GeoSystems
Addendum to Work Plan for ARCO Station 6113 AGS 69028-4	12/16/90	Applied GeoSystems
Letter Report, Quarterly Groundwater Monitoring Third Quarter 1990 AGS Report 69028-3	11/2/90	Applied GeoSystems
Letter Report, Quarterly Groundwater Monitoring Second Quarter 1990 AGS Report 69028-3	8/29/90	Applied GeoSystems
Limited Subsurface Environmental Investigation	12/6/89	Applied GeoSystems

REPORT	DATE	CONSULTANT
AGS Report 69028-2		
Work Plan - Limited Subsurface Environmental Investigation AGS Report 69028-1W	7/18/89	Applied GeoSystems
ARCO Station 6113, 785 E. Stanley Boulevard, Livermore, California Project 330-53.01	4/25/89	Pacific Environmental Group

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
Fourth Quarter 1992
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

March 16, 1993
0125MWHE
69028.08

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

Subject: Fourth 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 fourth 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 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 October 29 and November 11, 1992. December monitoring could not be performed because the wells were inaccessible due to construction activities associated with product line replacement. Quarterly sampling was performed by EMCON field personnel on November 12, 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 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 0.03 feet thick was observed by EMCON's field personnel in groundwater monitoring well MW-6 during November 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 they were dry. As a result, groundwater gradients and flow directions for the perched water bearing zone could not be evaluated. Groundwater monitoring well MW-5 installed in the deeper water bearing zone could not be monitored this quarter because it contained only residual water trapped at the tip of the well casing. Based on DTW levels in monitoring wells installed in the deeper water bearing zone (MW-6 through MW-9) the gradients and flow directions for the deeper water bearing zone were less than 0.01 ft/ft to the northeast. These interpreted groundwater gradients and flow directions are shown on the Groundwater Gradient Maps, Plates 3 and 4. Groundwater elevations in monitoring wells MW-6 through MW-9 decreased an average of approximately 2 feet since the last quarter. 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.

Groundwater monitoring wells MW-7 through MW-9 were purged and sampled by EMCON field personnel on November 12, 1992. Because wells MW-1 through MW-4 were dry,

groundwater from the perched water bearing zone could not be sampled. Groundwater monitoring well MW-5 was not sampled because it contained residual water only. Groundwater monitoring well MW-6 was not sampled due to the presence of floating product. 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-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/California DHS LUFT Method. Wells MW-8 and MW-9 were also analyzed for 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 5, TPHg Concentrations in Groundwater, and Plate 6, 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--VOCs, TPHd, TOG, and metals.

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, and increased slightly in well MW-7. Groundwater monitoring well MW-6 continued to contain floating product. The trend for MW-5 could not be evaluated because this well contained only residual water during this quarter and was not sampled.

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 collected from onsite wells. The highest TPHg and benzene concentrations in groundwater appear to be adjacent and immediately

downgradient (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 upgradient and crossgradient (southwest and south) of the existing gasoline USTs (see Plates 5 and 6).

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 (June and September 1992 sampling), located next to the former waste-oil tank.

The concentrations of metals in groundwater from well MW-8, located next to the former waste-oil tank appear to be in good agreement with the natural background concentrations of metals in groundwater at the site based on analytical results obtained from well MW-9, which is located approximately 80 feet east of the former waste-oil tank. Well MW-9 was chosen to collect information about the natural background concentrations of metals in groundwater because: 1) the soil samples from this boring contained nondetectable concentrations of TPHg and BTEX, with the exception of 5.7 ppm TPHg reported in the soil sample from a depth of 30-1/2 feet; and 2) nondetectable concentrations of TPHg and BTEX have been reported in the groundwater samples from this well during each sampling episode.

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
Assistant Project Geologist

REGISTERED GEOLOGIST
JAMES LEWIS NELSON
No. 1463
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

James L. Nelson
Certified Engineering Geologist # 1463

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Groundwater Gradient Map, October 29, 1992
Plate 4, Groundwater Gradient Map, November 11, 1992
Plate 5, TPHg Concentrations in Groundwater, November 12, 1992
Plate 6, Benzene Concentrations in Groundwater, November 12, 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--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

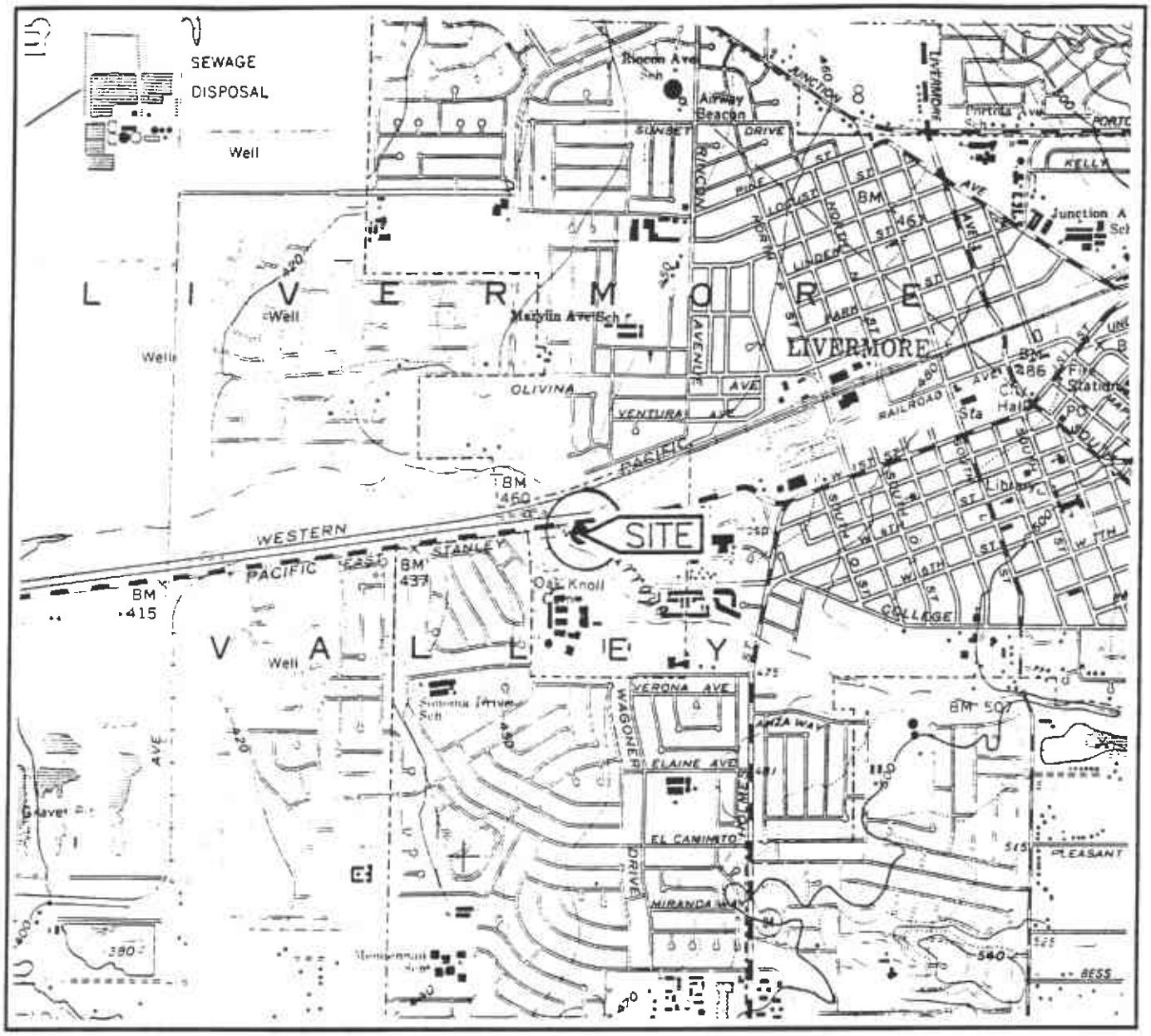
RESNA. May 4, 1992. Letter Report, Quarterly Groundwater Monitoring, First Quarter 1992, at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.05

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



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

N

LEGEND

⊙ = Site Location

Approximate Scale

2000 1000 0 2000 4000

feet

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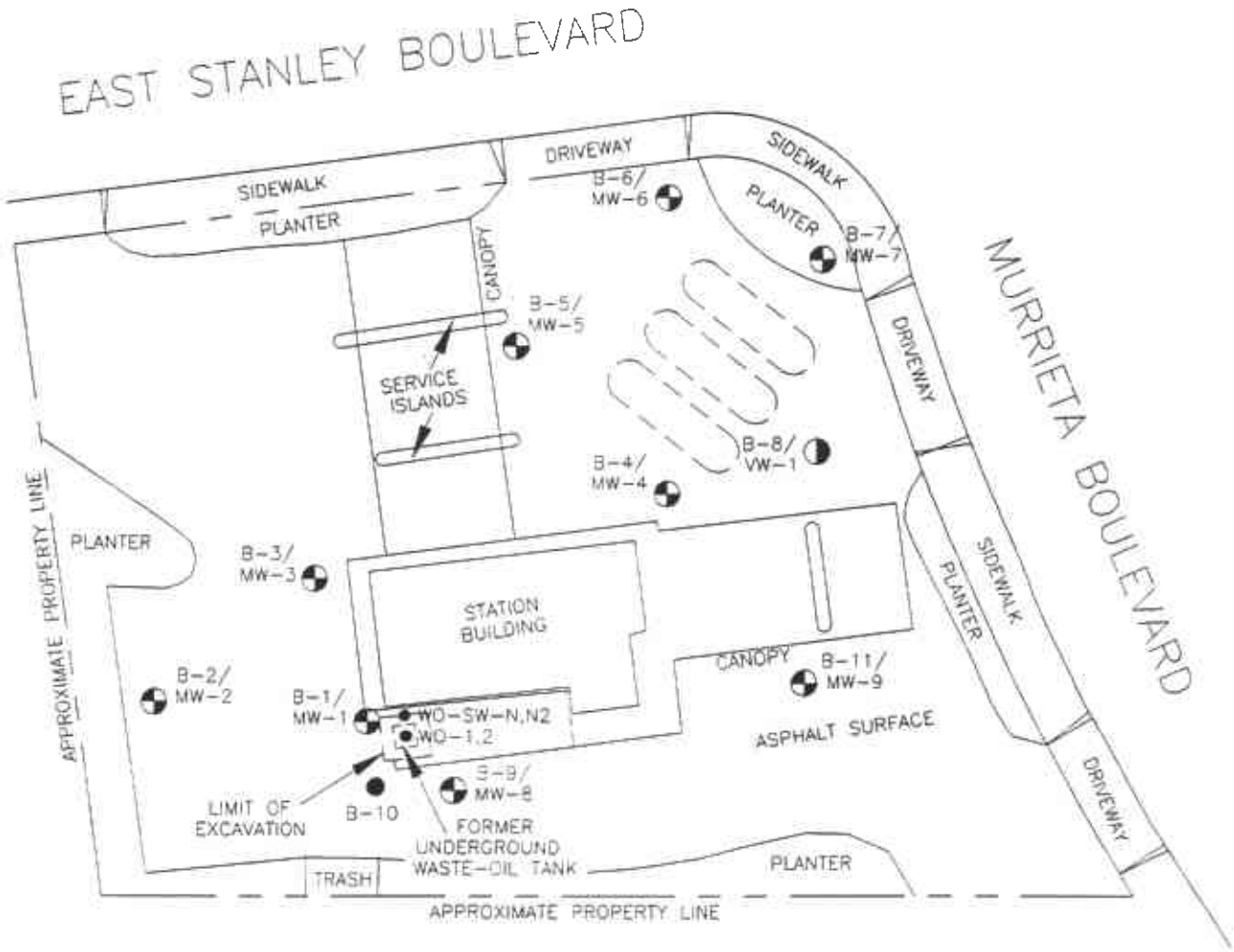
PROJECT 69028.08

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.

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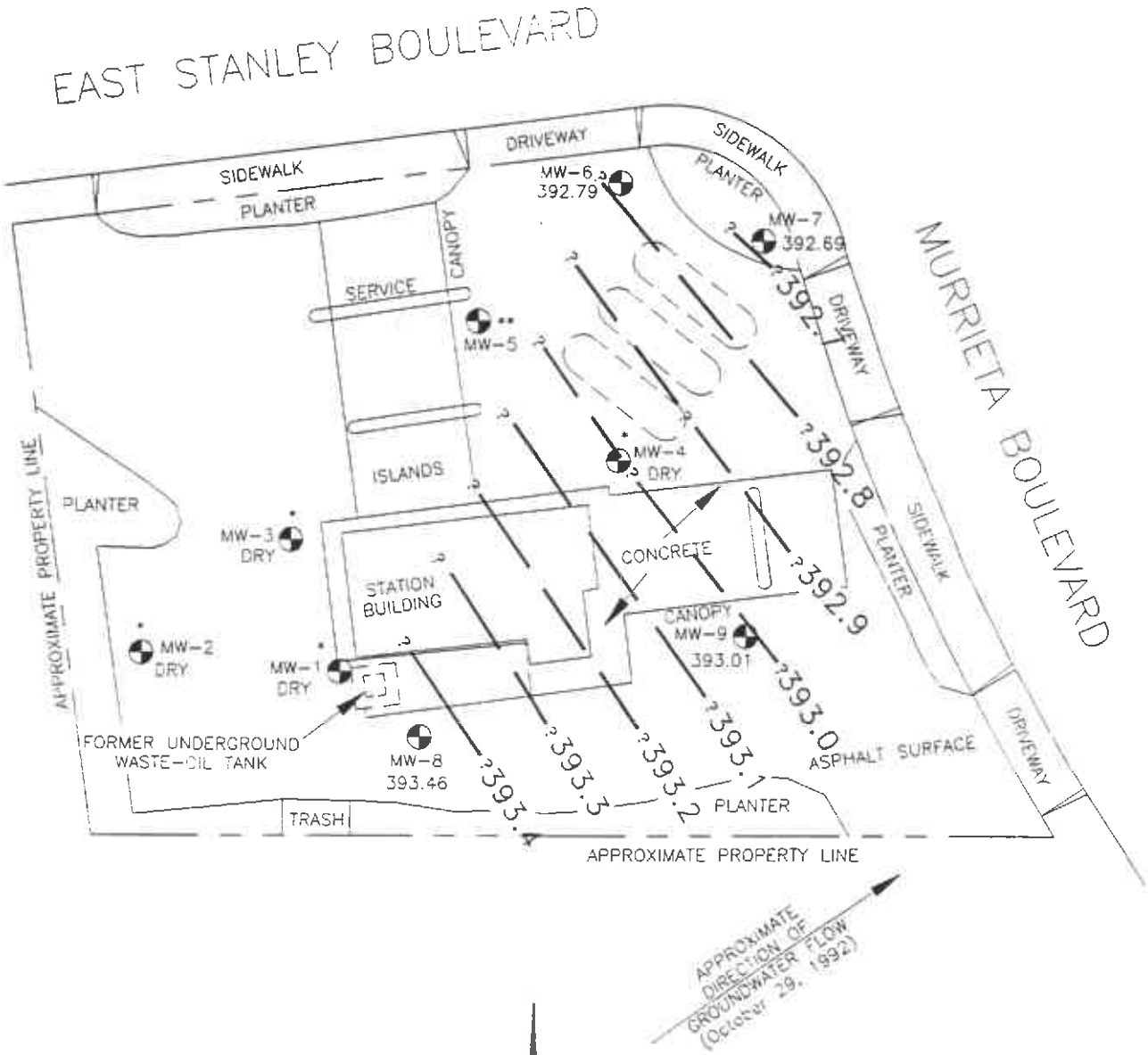
PROJECT: 69028.08

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

PLATE
2



EXPLANATION

393.4 = Line of equal elevation of groundwater in feet above mean sea level (MSL) in deeper water-bearing zone

393.46 = Elevation of groundwater in feet above MSL, October 29, 1992

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

** = Well contained residual water only

* = Well screened in upper perched zone

= Existing 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 Surveyor, June 1992.

RESNA
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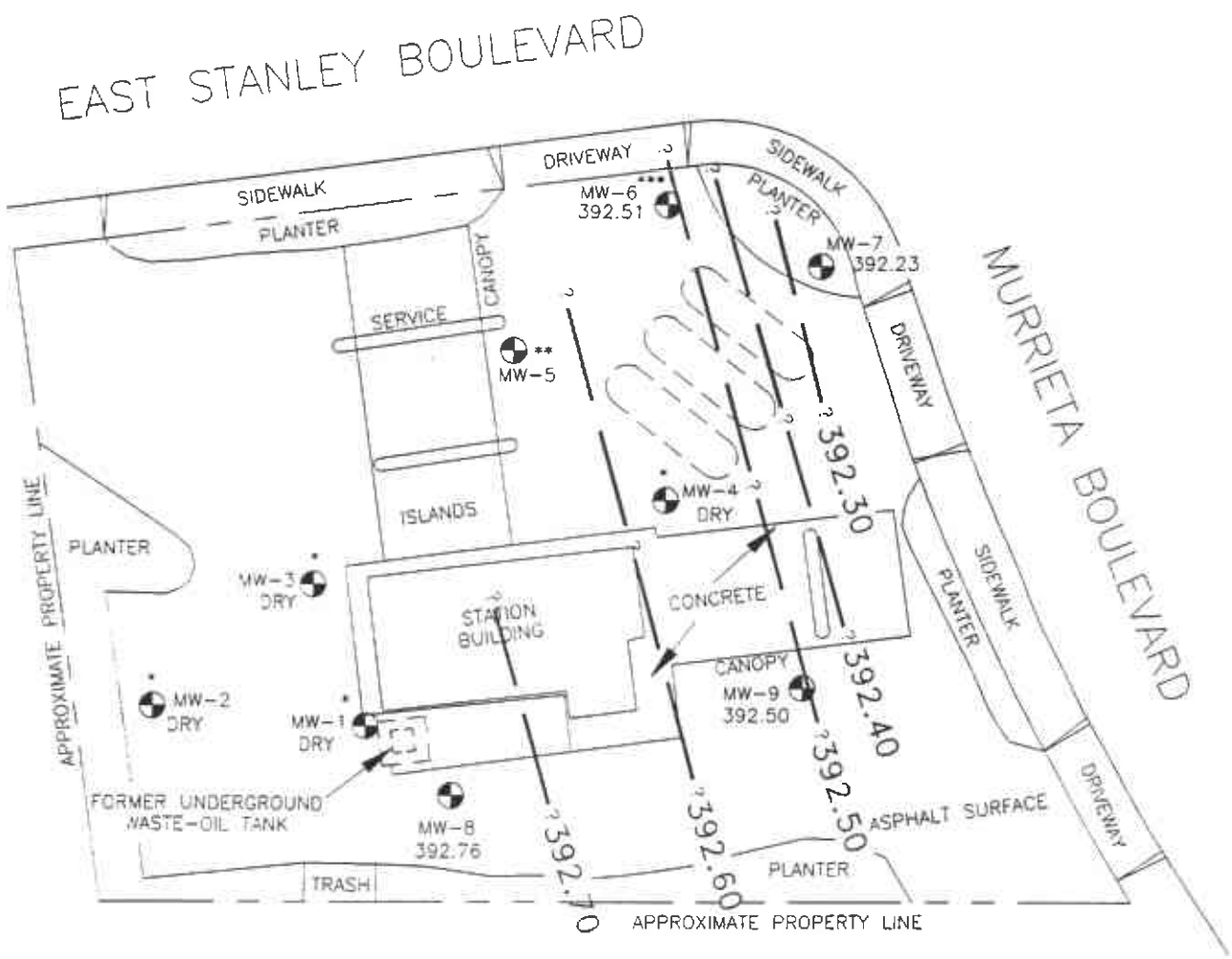
PROJECT: 69028.08

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

PLATE 3



EXPLANATION

392.70 = Line of equal elevation of groundwater in feet above mean sea level (MSL) in deeper water-bearing zone

392.76 = Elevation of groundwater in feet above MSL, November 11, 1992

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

* = Well screened in upper perched zone

** = Well contained residual water only

*** = Well contained floating product

= Existing gasoline-storage tanks

N

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 Surveyor, June 1992.

RESNA
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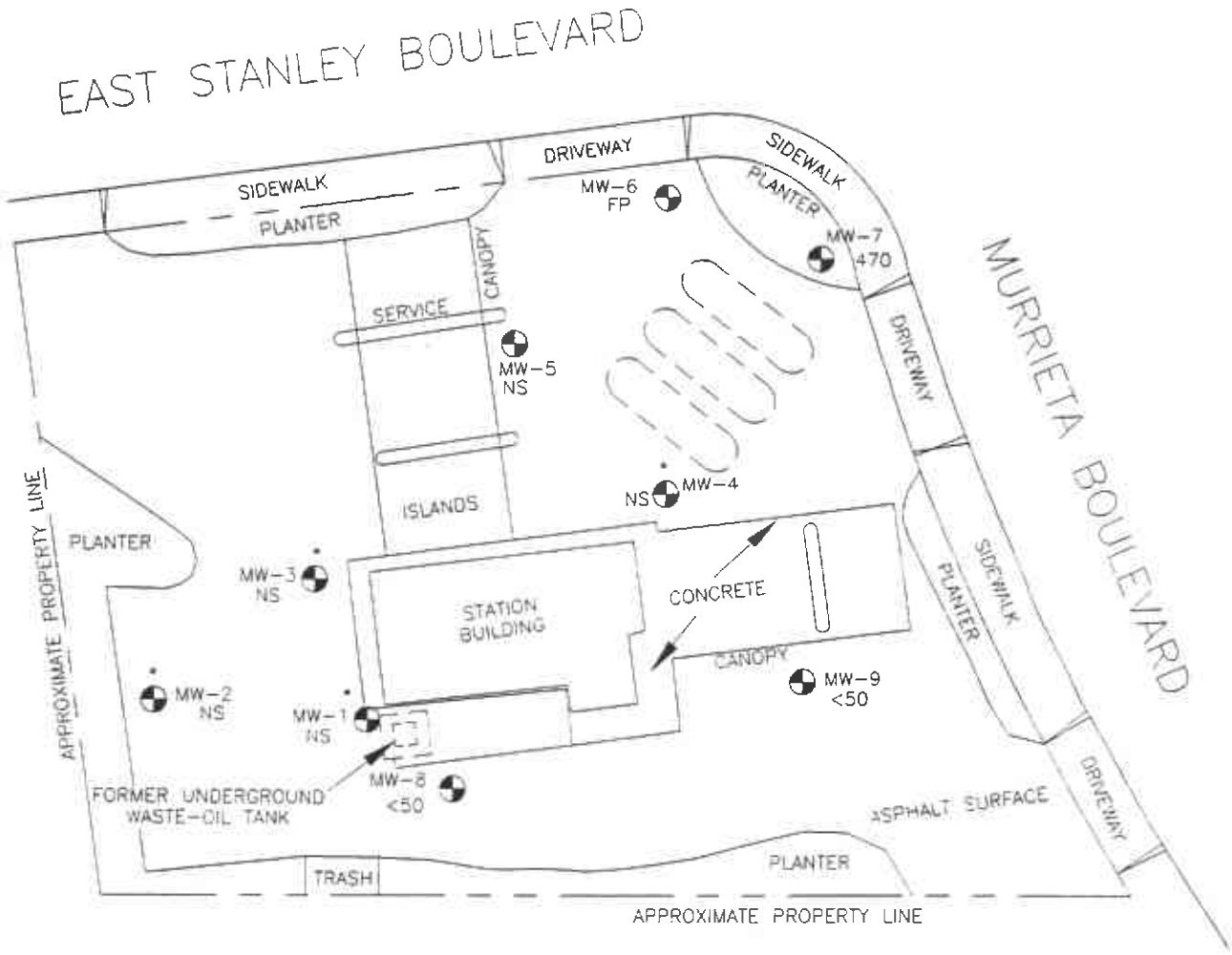
PROJECT: 69028.08

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

PLATE
4



EXPLANATION

470 = Concentration of TPHg in groundwater in ppb, November 12, 1992

FP = Not sampled--floating product present

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

* = Well screened in upper perched zone

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

= Existing gasoline-storage tanks

N

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 Surveyor, June 1992.

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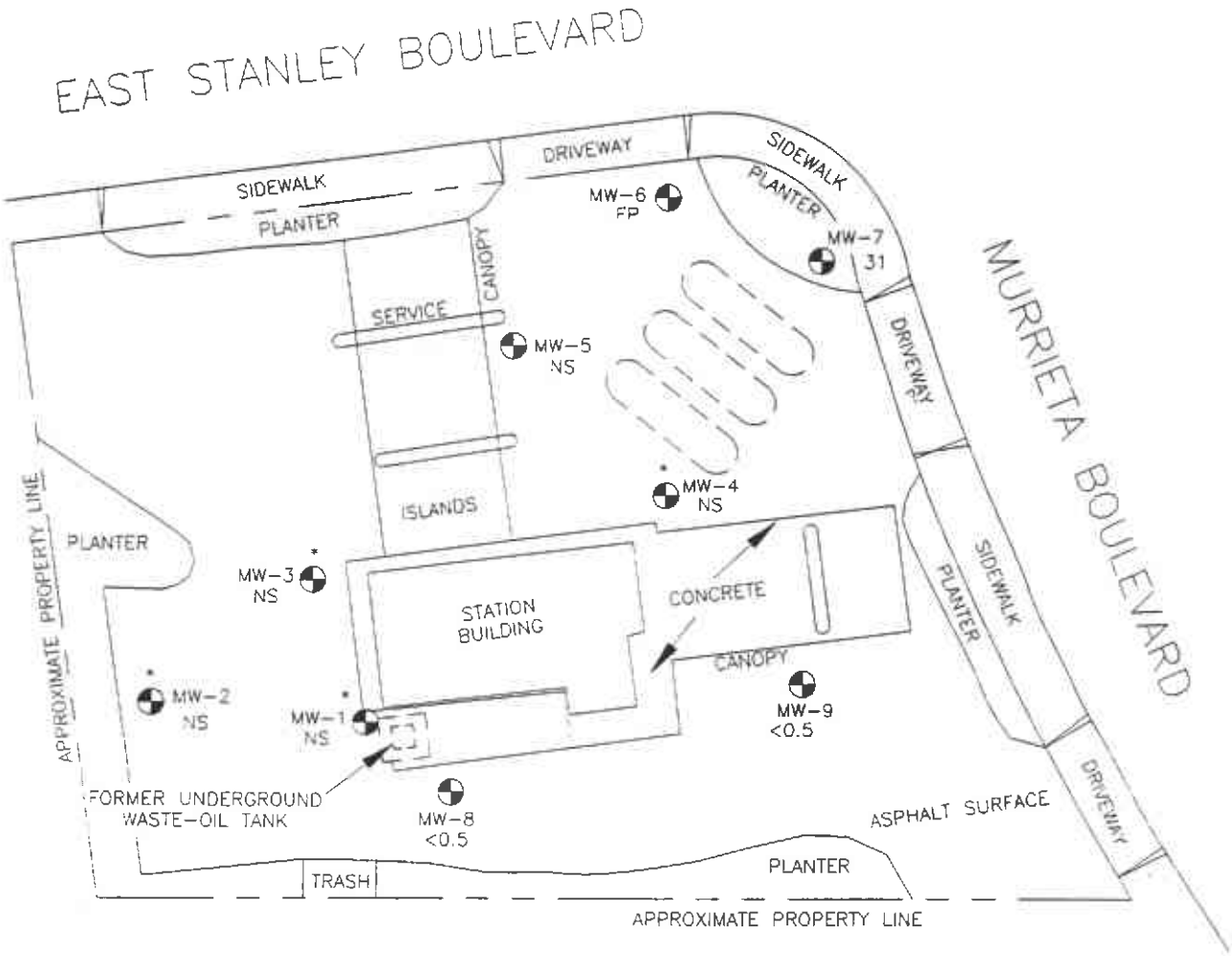
PROJECT: 69028.08

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

PLATE
5



EXPLANATION

31 = Concentration of benzene in groundwater in ppb, November 12, 1992

FP = Not sampled--floating product present

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

* = Well screened in upper perched zone

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

= Existing gasoline-storage tanks

N

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 Surveyor, June 1992

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PROJECT: 69028.08

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

PLATE
6

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

March 16, 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			
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
05/20/91		26.62	431.12	None
06/20/91		33.15	424.59	None
07/25/91		37.10	420.64	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-2cont.				
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			
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
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

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-3cont.				
07/28/92	456.97	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			
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			
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			

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-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			
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			
MW-8				
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
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			
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			

See notes on Page 5 of 5.

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

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.
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.

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

March 16, 1993
69028.08

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
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			
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			
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			
11/12/92		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
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			
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			
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			
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
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
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
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.

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

March 16, 1993
69028.08

TABLE 3
CUMULATIVE RESULTS OF GROUNDWATER LABORATORY ANALYSES – 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	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
11/12/92	NS	NS	NS	NS	NS	NS	NS	NS
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
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
11/12/92	NS	NS	NS	NS	NS	NS	NS	NS

See notes on Page 2 of 2.

TABLE 3
CUMULATIVE RESULTS OF GROUNDWATER LABORATORY ANALYSES – 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-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
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
MW-9								
11/12/92	NA	NA	NA	10	1,080	101	859	3,070
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
Consultants in Wastes Management and Environmental Control

RECEIVED
NOV 9 - 1992
RESNA
SAN JOSE

Date November 3, 1992
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
	October 1992 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 are attached. Please call if you have any questions: (408) 453-2266.

Reviewed by: Jim Butera JB

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

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 : 10-25-52

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

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	Dry	Dry	ND	ND	38.2	—
2	MW-3	ok	Yes	ok	3259	Yes	Dry	Dry	ND	ND	39.1	—
3	MW-8	ok	Yes	ok	3259	Yes	63.51	63.51	ND	ND	66.5	—
4	MW-1	ok	Yes	ok	3259	Yes	Dry	Dry	ND	ND	44.8	Water in C. Box.
5	MW-9	ok	Yes	ok	3259	Yes	63.17	63.17	ND	ND	68.0	—
6	MW-7	ok	Yes	ok	3259	Yes	62.23	62.23	ND	ND	67.7	—
7	MW-6	ok	Yes	ok	3259	Yes	62.14	62.14	ND	ND	67.3	Water in C. Box above (Strong odor L.W.C surface flow goes in to well box.
8	MW-5	ok	Yes	ok	3259	Yes	61.86	61.86	ND	ND	62.6	—
9	MW-4	ok	Yes	ok	3259	Yes	Dry	Dry	ND	ND	26.7	—

SURVEY POINTS ARE TOP OF WELL CASINGS

EMCON ASSOCIATES
Consultants in Wastes Management and Environmental Control

Date December 3, 1992
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
9	Water Sample Field Data Sheets

For your: X Information Sent by: X Mail

Comments:
Enclosed are the data from the fourth quarter 1992 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.

Jim Butera JB

Reviewed by:

Robert Porter, Senior Project Engineer.

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

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 0G70-038.01 STATION ADDRESS : 785 East Stanley Blvd. Livermore DATE : November 11, 1992

ARCO STATION # : 6113 FIELD TECHNICIAN : Steve Horton 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**	good	yes	na	3259	yes	Dry	Dry	ND	ND	38.7	—
2	**MW-3**	good	yes	na	3259	yes	Dry	Dry	ND	ND	39.2	Water in box
3	**MW-8**	good	yes	na	3259	yes	64.21	64.21	ND	ND	66.6	—
4	**MW-1**	good	yes	na	3259	yes	Dry	Dry	ND	ND	44.9	Water in box
5	**MW-9**	good	yes	na	3259	yes	63.68	63.69	ND	ND	68.2	—
6	**MW-7**	good	yes	na	3259	yes	62.69	62.69	ND	ND	68.8	Grout needed around casing
7	**MW-6**	good	yes	na	3259	yes	62.44	62.43	62.40	.03	68.0	—
8	**MW-5**	good	yes	na	3259	yes	62.53	62.53	ND	ND	62.6	Strong Odor
9	**MW-4**	good	yes	na	3259	yes	Dry	Dry	ND	ND	26.8	4" well not 6" as stated on request Water in box

SURVEY POINTS ARE TOP OF WELL CASINGS

Summary of Groundwater Monitoring Data
Fourth Quarter 1992
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)	TPH as Diesel (mg/l	Total Oil and Grease, 5520C (mg/l
MW-1	11/11/92	Dry	NA.[2]	NS.[3]	NS.	NS.	NS.	NS.	NS.	NS.
MW-2	11/11/92	Dry	ND.	NS.	NS.	NS.	NS.	NS.	NS.	NS.
MW-3	11/11/92	Dry	ND.	NS.	NS.	NS.	NS.	NS.	NS.	NS.
MW-4	11/11/92	Dry	ND.	NS.	NS.	NS.	NS.	NS.	NS.	NS.
MW-5	11/11/92	62.53	ND.[4]	NS.	NS.	NS.	NS.	NS.	NS.	NS.
MW-6	11/11/92	62.43	0.03	FP.[5]	FP.	FP.	FP.	FP.	FP.	FP.
MW-7(68)	11/11/92	62.69	ND.	470.	31.	1.0	<0.5	0.8	NR.[6]	NR.
MW-8(66)	11/11/92	64.21	ND.	<50	<0.5	<0.5	<0.5	<0.5	NR.	NR.
MW-9(68)	11/11/92	63.68	ND.	<50	<0.5	<0.5	<0.5	<0.5	NR.	NR.
FB-1.[7]	11/11/92	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. FP. = Floating product detected in well, no samples taken
6. NR. = Not reported; sample was not scheduled for analysis of the selected parameter
7. FB. = Field Blank

Summary of Groundwater Monitoring Data
Fourth Quarter 1992
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	Cadmium (µg/l) (ppb)	Chromium (µg/l) (ppb)	Lead (µg/l) (ppb)	Nickel (µg/l) (ppb)	Zinc (µg/l) (ppb)
MW-8(66)	11/11/92	28	3,440.	221.	9,840.	2,550.
MW-9(68)	11/11/92	10.	1,080.	101.	3,070.	859.

Columbia Analytical Services inc.

December 1, 1992

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:

Enclosed are the results of the water samples submitted to our lab on November 13, 1992. For your reference, our service request number for this work is SJ92-1438.

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

KAM/kt

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	11/13/92
Project:	EMCON Project No. 0G70-038.01	**Work Order No.:**	SJ92-1438
	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-7 (68)	MW-8 (66)	MW-9 (68)
Date Analyzed:		11/24/92	11/24/92	11/24/92
Analyte	**MRL**			
Benzene	0.5	31.	ND	ND
Toluene	0.5	1.0	ND	ND
Ethylbenzene	0.5	ND	ND	ND
Total Xylenes	0.5	0.8	ND	ND
TPH as Gasoline	50	470.	ND	ND

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

Approved by: Keenan Murphy Date: December 1, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	11/13/92
Project:	EMCON Project No. 0G70-038.01	**Work Order No.:**	SJ92-1438
	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:		FB-1	Method Blank
Date Analyzed:		11/24/92	11/24/92
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: Kevin Murphy Date: December 1, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

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

Date Received: 11/13/92
Work Order No.: SJ92-1438

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

Date Analyzed: 11/24/92

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	250.	273.	109.	85-115
Toluene	250.	279.	111.	85-115
Ethylbenzene	250.	260.	104.	85-115
Total Xylenes	750.	737.	98.	85-115
TPH as Gasoline	2,500.	2,591.	104.	90-110

TPH Total Petroleum Hydrocarbons

Approved by: Keith Murphy Date: December 1, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Date Received:**	11/13/92
Project:	EMCON Project No. 0G70-038.01	**Work Order No.:**	SJ92-1438
	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 α,α,α-Trifluorotoluene
MW-7 (68)	11/24/92	108. *
MW-8 (66)	11/24/92	106.
MW-9 (68)	11/24/92	110.
FB-1	11/24/92	108.
MW-8 (66) MS	11/24/92	114.
MW-8 (66) DMS	11/24/92	110.
Method Blank	11/24/92	97.
CAS Acceptance Criteria		70-130

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

Approved by: Kelly Murphy Date: December 1, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

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

Date Received: 11/13/92
Work Order No.: SJ92-1438
Sample Matrix: Water

Matrix Spike/Duplicate Matrix Spike Summary
BTE
EPA Methods 5030/8020
µg/L (ppb)

Sample Name: MW-8 (66)
Date Analyzed: 11/24/92

			Spike Result		Percent Recovery		CAS Acceptance
Analyte	Spike Level	Sample Result	MS	DMS	MS	DMS	Criteria
Benzene	25.	ND	25.1	25.0	100.	100.	39-150
Toluene	25.	ND	24.8	24.8	99.	99.	46-148
Ethylbenzene	25.	ND	24.1	23.9	96.	96.	32-160

ND None Detected at or above the method reporting limit

Approved by: Kevin A Murphy Date: December 1, 1992

[redacted]O [redacted]duc[redacted]om[redacted]y [redacted]
Division of AtlanticRichfieldCompany

Task Order No. EMCGC-92-1

Ch[redacted]n of [redacted]stody

ARCO Facility no. 6113 | City (Facility) LIVERMORE | Project manager (Consultant) Jim Butera | Laboratory name CAS

ARCO engineer Kyle Christie | Telephone no. (ARCO) 571-2434 | Telephone no. (Consultant) 453-0719 | Fax no. (Consultant) 453-0452 | Contract number 07077

Consultant name EMCON Associates | Address (Consultant) 1938 Junction Ave San Jose

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 GAS EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	5520 C+F Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	METALS 200.7	TOTAL LEAD
~~MW-1( )~~		~~2~~		~~X~~		~~X~~	~~HCl~~				X	no sample, dry well										
~~MW-2( )~~		~~2~~		~~X~~		~~X~~	~~HCl~~				X	no sample, dry well										
~~MW-3( )~~		~~2~~		~~X~~		~~X~~	~~HCl~~				X	no sample, dry well										
~~MW-4( )~~		~~2~~		~~X~~		~~X~~	~~HCl~~				X	no sample, dry well										
~~MW-5( )~~		~~2~~		~~X~~		~~X~~	~~HCl~~				X	no sample, dry well										
~~MW-6( )~~		~~2~~		~~X~~		~~X~~	~~HCl~~				X	~~no sample, well contained product~~										
MW-7(68)	1-2	2		X		X	HCl	11/12/92	15:30		X											
MW-8(66)	3-8	~~4~~6		X		X	HCl	↓	13:45		X		X									
MW-9(68)	9-10	2		X		X	HCl	↓	14:40		X											
FB-1	11-12	2		X		X	HCl	↓	14:40		X											
MW-8(66)	13-14	2		X		X	NP	↓	13:45			X										
MW-8(66)		1		X		X	HNO_3	↓	13:45												X	X
MW-9(68)		1		X		X	HNO_3	↓	14:40												X	

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 2-40 ml HCl VOA's
4-Liter HCl
2-Liter NP
1-500 ml HNO_3
All 5520 F&C and diesel analyses cancelled 11-16-92 by J Butera [illegible]

Lab number: SJ92-1438

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

Condition of sample: OKAY | Temperature received: COOL

Relinquished by sampler: [signature] | Date 11/13/92 | Time 15:20 | Received by: [signature] CAS/SJ 11/13/92 1520

Relinquished by | Date | Time | Received by

Relinquished by | Date | Time | Received by laboratory | Date | Time

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)

Columbia Analytical Services, Inc.

November 25, 1992

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

Re: **ARCO #6113 - Livermore/#OG70-038.01/SJ921438**

Dear Jon:

Enclosed are the results of the samples submitted to our laboratory on November 14, 1992. For your reference, these analyses have been assigned our work order number K927232C.

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.

Dave Elliott
for Colin B. Elliott
Senior Project Chemist

CBE/sam

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest, Inc.	**Date Received:**	11/14/92
Project:	ARCO #6113 - Livermore	**Work Order No.:**	K927232C
Sample Matrix:	Water		

Total Metals
µg/L (ppb)

	Sample Name:		MW-8	MW-9	Method Blank
	Lab Code:		K7232-1	K7232-2	K7232-MB
Analyte	**EPA Method**	**MRL**			
Cadmium	6010	3	28	10	ND
Chromium	6010	5	3,440	1,080	ND
Lead	7421	2	221	101	ND
Nickel	6010	20	9,840	3,070	ND
Zinc	6010	10	2,550	859	ND

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

00001

Approved by Dave Edwards Date 11/25/92

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest, Inc.	**Date Received:**	11/14/92
Project:	ARCO #6113 - Livermore	**Work Order No.:**	K927232C
Sample Matrix:	Water		

Duplicate Summary
Total Metals
µg/L (ppb)

Sample Name: MW-8
Lab Code: K7232-1

Analyte	EPA Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Cadmium	6010	3	28	27	28	4
Chromium	6010	5	3,440	3,390	3,420	1
Lead	7421	2	221	188	204	16
Nickel	6010	20	9,840	9,720	9,780	1
Zinc	6010	10	2,550	2,530	2,540	<1

MRL Method Reporting Limit

Approved by Dave Shaw/ Date 11/25/92

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Northwest, Inc.
Project: ARCO #6113 - Livermore
Sample Matrix: Water

Date Received: 11/14/92
Work Order No.: K927232C

Matrix Spike Summary
Total Metals
µg/L (ppb)

Sample Name: MW-8
Lab Code: K7232-1

Analyte	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Cadmium	3	50	28	78	100	75-125
Chromium	5	200	3,440	3,560	NA	75-125
Lead	2	20	221	234	NA	75-125
Nickel	20	500	9,840	10,200	NA	75-125
Zinc	10	500	2,550	2,970	NA	75-125

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 times the amount spiked.

Approved by Dawn Eble./ Date 11/25/92

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Northwest, Inc.
Project: ARCO #6113 - Livermore

Date Analyzed: 11/19/92
Work Order No.: K927232C

Initial Calibration Verification (ICV) Summary
µg/L (ppb)

Analyte	EPA Method	True Value	Result	Percent Recovery
Cadmium	6010	1,250	1,340	107
Chromium	6010	500	522	104
Lead	7421	98.4	108	110
Nickel	6010	1,250	1,330	106
Zinc	6010	1,250	1,270	102

ICV Source: EPA ICV

Approved by Dave Elel./ Date 4/25/92

ARCO Products Company Division of Atlantic Richfield Company — Task Order No. [redacted]GC-72-7 — Chain of Custody

ARCO Facility no. 6113	City (Facility) LIVERMORE	Project manager (Consultant) Jim Butera	Laboratory name CAS
ARCO engineer Kyle Christie	Telephone no. (ARCO) 371-2434	Telephone no. (Consultant) 453-0719	Fax no. (Consultant) 453-0452	Contract number 07077
Consultant name EMCON Associates	Address (Consultant) 1938 Junction Ave San Jose		Method of shipment Sampler will deliver

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Water	Other	Preservation: Ice	Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015 (CAS / SAC-CST)	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 ☐	METALS 200.7	TOTAL LEAD
MW-1( )		2		X		X	HCl				X			no sample, dry well								
MW-2( )		2		X		X	HCl				X			no sample, dry well								
MW-3( )		2		X		X	HCl				X			no sample, dry well								
MW-4( )		2		X		X	HCl				X			no sample, dry well								
MW-5( )		2		X		X	HCl				X			no sample, dry well								
MW-6( )		2		X		X	HCl				X			no sample, well contained product								
MW-7(68)	1-2	2		X		X	HCl	11/12/92	15:30		X											
MW-8(66)	3-8	#6		X		X	HCl		13:45		X		X									
MW-9(68)	9-10	2		X		X	HCl		14:40		X											
FB-1	11-12	2		X		X	HCl		14:40		X											
MW-8(66)	13-14	2		X		X	NP		13:45			X										
MW-8(66)		1		X		X	HNO_3		13:45												X	X
MW-9(68)		1		X		X	HNO_3	↓	14:40												X	

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 2-40 ml HCl VOA's
4-Liter HCl
2-Liter NP
1-500 ml HNO_3

Lab number: 5592-1438

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

Condition of sample: OKAY

Temperature received: COOL

	Date	Time			
Relinquished by sampler	11/13/92	15:20	Received by	CAS/ST	11/13/92 1520
Relinquished by	11/13/92	1600	Received by		
Relinquished by	Date	Time	Received by laboratory	Date 11/14/92	Time 0900

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-C38.01 SAMPLE ID: MW-1

PURGED BY: S. Horton CLIENT NAME: ARCO #613

SAMPLED BY: S. Horton LOCATION: 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): Dry CALCULATED PURGE (gal.): NA

DEPTH OF WELL (feet): 44.9 ACTUAL PURGE VOL. (gal.): NA

DATE PURGED: NA 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)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		No Sample, Dry Well				

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

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

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: Good LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 11/12/92 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-8

Signature: Steve Horton Reviewed By: JB Page 1 of 9

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 0670-039.01 SAMPLE ID: MW-2

PURGED BY: S. Horton CLIENT NAME: ARCO #6113

SAMPLED BY: S. Horton LOCATION: 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): Dry CALCULATED PURGE (gal.): NA

DEPTH OF WELL (feet): 39.7 ACTUAL PURGE VOL. (gal.): NA

DATE PURGED: NA 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)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
NC Sample, Dry Well						

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

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

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: Good LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 11/12/92 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-8

Signature: Steven Horton Reviewed By: JB Page 2 of 9

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 SAMPLE ID: MW-3

PURGED BY: S. Horton CLIENT NAME: ARCO #6113

SAMPLED BY: S. Horton LOCATION: 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): Dry CALCULATED PURGE (gal.): NA

DEPTH OF WELL (feet): 39.7 ACTUAL PURGE VOL. (gal.): NA

DATE PURGED: NA 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)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		No Sample, Dry Well				

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

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

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: Good LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 11/12/92 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-9

Signature: Steve Horton Reviewed By: JB Page 3 of 9

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 0670-039.01 SAMPLE ID: MW-4

PURGED BY: S. Horton CLIENT NAME: ARCO #6113

SAMPLED BY: S. Horton LOCATION: 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.): NA

DEPTH TO WATER (feet): Dry CALCULATED PURGE (gal.): NA

DEPTH OF WELL (feet): 26.9 ACTUAL PURGE VOL. (gal.): NA

DATE PURGED: NA 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)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		No Sample, Dry Well				

D. O. (ppm): NR ODOR: NA

COLOR (COBALT 0 - 100): NR TURBIDITY (NTU 0 - 200): NR

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

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: Good LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 11/12/92 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-9

Signature: Steve Horton Reviewed By: JB Page 4 of 9

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 SAMPLE ID: MW-5

PURGED BY: S. Horton CLIENT NAME: ARCO #6113

SAMPLED BY: S. Horton LOCATION: 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.): NA

DEPTH TO WATER (feet): 62.53 CALCULATED PURGE (gal.): NA

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

DATE PURGED: NA 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)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
No Sample, Dry Well						

D. O. (ppm): NR ODOR: NA

COLOR (COBALT 0 - 100): NA TURBIDITY (NTU 0 - 200): NA

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

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: Good LOCK #: 3259

REMARKS: * Insufficient volume of water to sample.

Meter Calibration: Date: 11/12/92 Time: ___ Meter Serial #: 9704 Temperature °F: ___

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

Location of previous calibration: MW-8

Signature: Steve Horton Reviewed By: JB Page 5 of 9

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: OG7C-038.01 SAMPLE ID: MW-6

PURGED BY: S. Horton CLIENT NAME: ARCC #6113

SAMPLED BY: S. Horton LOCATION: 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.): NA

DEPTH TO WATER (feet): 62.43 CALCULATED PURGE (gal.): NA

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

DATE PURGED: NA 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)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
~~	~~~		No Sample		~~~	~~~
		Well	Contained Product			

D. O. (ppm): NR ODOR: NA

NA (COBALT 0 - 100) NA (NTU 0 - 200)

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

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: Good LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 11/12/92 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-8

Signature: Steve Horton Reviewed By: JB Page 6 of 9

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: CG70-C39.01 SAMPLE ID: MW-7 (68)

PURGED BY: S. Horton CLIENT NAME: ARCO #6113

SAMPLED BY: S. Horton LOCATION: 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.): 4.00

DEPTH TO WATER (feet): 62.69 CALCULATED PURGE (gal.): 20.04

DEPTH OF WELL (feet): 68.8 ACTUAL PURGE VOL. (gal.): 7.0

DATE PURGED: 11/12/92 Start (2400 Hr) 14:54 End (2400 Hr) 15:14

DATE SAMPLED: 11/12/92 Start (2400 Hr) 15:29 End (2400 Hr) 15:30

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
15:04	4.00	7.40	791	62.7	brown	heavy
15:14	___	Well Dried At 7.0 Gallons			___	___
15:30	recharge	7.14	777	62.3	brown	heavy
___	___	___	___	___	___	___
___	___	___	___	___	___	___

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

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

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: Good LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 11/12/92 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-8

Signature: Steve Horton Reviewed By: JB Page 7 of 9

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-038.01 SAMPLE ID: MW-8(66)

PURGED BY: S. Horton CLIENT NAME: ARCO #6113

SAMPLED BY: S. Horton LOCATION: 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.): 1.56

DEPTH TO WATER (feet): 64.21 CALCULATED PURGE (gal.): 7.83

DEPTH OF WELL (feet): 66.6 ACTUAL PURGE VOL. (gal.): ≈1.75

DATE PURGED: 11/12/92 Start (2400 Hr) 12:30 End (2400 Hr) 12:50

DATE SAMPLED: 11/12/92 Start (2400 Hr) 13:44 End (2400 Hr) 13:45

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
12:43	1.5	6.87	729	62.5	brown	heavy
12:50		Well Dried At ≈ 1.75 Gallons				
13:45	recharge	7.46	735	61.2	brown	heavy

D. O. (ppm): NR ODOR: none

COLOR (visual): NR (COBALT 0 - 100) TURBIDITY (visual): NR (NTU 0 - 200)

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

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: Good LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 11/12/92 Time: 12:20 Meter Serial #: 9204 Temperature °F: 63.7

(EC 1000 1049 / 1000) (DI ___) (pH 7 6.94 / 7.00) (pH 10 9.97 / 10.00) (pH 4 4.00 / ___)

Location of previous calibration: ___

Signature: Steve Horton Reviewed By: JB Page 8 of 9

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 0670-038.01 SAMPLE ID: MW-9(68)

PURGED BY: S. Horton CLIENT NAME: ARCO # 6113

SAMPLED BY: S. Horton LOCATION: 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.): 2.96

DEPTH TO WATER (feet): 63.68 CALCULATED PURGE (gal.): 14.82

DEPTH OF WELL (feet): 68.2 ACTUAL PURGE VOL. (gal.): 5.5

DATE PURGED: 11/12/92 Start (2400 Hr) 14:05 End (2400 Hr) 14:20

DATE SAMPLED: 11/12/92 Start (2400 Hr) 14:39 End (2400 Hr) 14:46

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
14:13	3.0	7.63	809	61.4	brown	heavy
		Well Dried At 5.5 Gallons				
14:20	recharge	7.51	794	62.3	brown	heavy

D. O. (ppm): NR ODOR: none

NR (COBALT 0 - 100) NR (NTU 0 - 200)

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	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: Good LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 11/12/92 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-8

Signature: S. Horton Reviewed By: VB Page 9 of 9

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 0G70-038.01 STATION ADDRESS : 785 East Stanley Blvd. Livermore DATE : 12-14-92

ARCO STATION # : 6113 FIELD TECHNICIAN : MAdler DAY : Monday

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											
2	MW-3											
3	MW-8											
4	MW-1											
5	MW-9											
6	MW-7											
7	MW-5											
8	MW-4											
9	MW-6											
							Unable to perform water level survey due to construction					
							going on and equipment in the way.					

SURVEY POINTS ARE TOP OF WELL CASINGS

TF1087-1}

TF NUMBER: 1087-1 GIB-92-085

MONITORING WELL PURGE WATER TRANSPORT FORM

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 Jon De Lor 12-7-92
(Typed or printed full name & signature) (Date)

SITE INFORMATION

	STA #	JOB #	ADDRESS	GALS
1	A-230	21401-PW	2190 CARROLL ST., SAN FRANCISCO, CA	60
2	A-444	21400-PW	1798 MISSION ST., SAN FRANCISCO, CA	102
3	A-763	21403-PW	376 CASTRO ST., SAN FRANCISCO, CA	20
4	A-6113	21341-PW	785 E. STANLEY BLVD., LIVERMORE, CA	30
5	A-6185	21399-PW	5898 MISSION ST., SAN FRANCISCO, CA	84
6	A-589	21343-PW	1963 EL CAMINO REAL, PALO ALTO, CA	164
7	A-2153	21339-PW	2800 HOMESTEAD RD., SANTA CLARA, CA	303
8	A-674	21332-PW	1143 N. CAPITOL AVE., SAN JOSE, CA	155
9	A-6041	21273-DW	7249 VILLAGE PRKWY., DUBLIN, CA	31
10	A-2082	21340-PW	1995 WARBURTON AVE., SAN JOSE, CA	177
11	A-2121	21337-PW	43 SO. ABBOTT ST., MILPITAS, CA	281
				1,407

TRANSPORTER INFORMATION

NAME: BALCH PETROLEUM

ADDRESS: 930 AMES AVE.

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

TRUCK ID #: 99-ALLIED JERRY DRAKE [signature] 12-7-92
(Typed or printed full name & signature) (Date)

TSD FACILITY INFORMATION

NAME: GIBSON ENVIRONMENTAL

ADDRESS: 475 SEAPORT BLVD

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

RELEASE #: 11320 JOHN DEN PERALTA [signature] 7DEC92
(Typed or printed full name & signature) (Date)

Gor# 1940