Applied GeoSystems, Inc.
A RESNA Company

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Working To Restore Nature

TRANSMITTAL

3315 Almaden Expressway, Suite 34
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TO: MS. SUSAN HUGO
ACHCSA
80 SWAN WAY, ROOM 200
OAKLAND, CA 94621

DATE: 5/1/92
PROJECT NUMBER: 60000.05
SUBJECT: ARCO STATION 771, 899 RINCON AVENUE, LIVERMORE, CA.

FROM: LOU LEET
TITLE: STAFF GEOLOGIST

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THESE ARE TRANSMITTED as checked below:

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REMARKS:
AT THE REQUEST OF MR. MICHAEL WHELAN (ARCO PRODUCTS COMPANY) THIS REPORT HAS BEEN FORWARDED TO YOU FOR YOUR REVIEW.

Copies: 1 to project file no. 60000.05

*Revision Date: 11/21/91
*File Name: TRANSMT.PRJ

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LETTER REPORT
QUARTERLY GROUNDWATER MONITORING
First Quarter 1992
at
ARCO Station 771
899 Rincon Avenue
Livermore, California

60000.05

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May 1, 1992
0407MWHE
60000.05

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

Subject: First Quarter 1992 Groundwater Monitoring Report for ARCO Station 771, 899 Rincon Avenue, Livermore, California.

Mr. Whelan:

As requested by ARCO Products Company (ARCO), this letter report summarizes the results of first 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 the former gasoline-storage tanks and former waste-oil tank 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; evaluation and warrant of their field data and field protocols is beyond RESNA Industries' (RESNA's) scope of work. RESNA's scope of work was limited to interpretation of field and laboratory analyses 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 771 is located on the southwestern corner of the intersection of Rincon Avenue and Pine Street in Livermore, California, as shown on the Site Vicinity Map, Plate 1.

Prior to this quarterly monitoring period, RESNA (formerly Applied GeoSystems [AGS]) and Roux Associates of Concord, California, performed environmental assessments and investigations related to the removal and replacement of four underground gasoline-storage tanks (USTs) at the site. In February 1990, RESNA performed an environmental site assessment (AGS, June 1990), which included the drilling of three borings (B-1 through B-3). In December 1990, RESNA performed a supplemental subsurface investigation which included the drilling of three soil borings (B-4 through B-6) and installation of three monitoring wells, MW-1, MW-2, and MW-3 (AGS, April 1991). In January 1991, RESNA began quarterly monitoring of the onsite monitoring wells. In July 1991, RESNA performed an additional subsurface investigation which included the drilling of five soil borings (B-7 through B-11) and installation of four monitoring wells MW-4 through MW-7 (RESNA, October 1991). The results of these environmental assessments and investigations are presented in the reports listed in the References Cited section located at the end of this letter report. Underground gasoline-storage tank removal and replacement began in December 1991. In April 1992, RESNA initiated an additional onsite and initial offsite subsurface investigation. Results of this investigation will be discussed in a forthcoming report. RESNA is proceeding with design and permitting of a remediation system to be installed at the site. The locations of soil borings, groundwater monitoring wells, and other pertinent site features are shown on the Generalized Site Plan, Plate 2.

Groundwater Sampling and Gradient Evaluation

Depth to water measurements (DTW) were performed by EMCON field personnel on January 18, February 21, and March 31, 1992. Quarterly sampling was performed by EMCON field personnel on March 31, 1992. The results of EMCON's field work on the site, including DTW measurements and subjective analysis for the presence of product in the groundwater in MW-1 through MW-7, are presented on EMCON's field report sheets and EMCON's 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-7 for this quarter and previous quarterly groundwater monitoring at the site are summarized in Table 1, Cumulative Groundwater Monitoring Data. Some wells were not accessible during quarterly monitoring due to construction activities related to the removal and replacement of underground storage tanks and product lines. Some of the well heads on some of the monitoring wells were affected by construction activities so that the previously surveyed elevations of the well heads are no longer applicable; wellhead elevations will be resurveyed in April 1992. Groundwater elevations and gradients could not be calculated or evaluated. Groundwater elevations and gradients will be included in the second quarter 1992 quarterly groundwater

monitoring report. EMCON reported floating product in the skimmer in well MW-1 in January and March; no evidence of product or sheen was observed in the other wells by EMCON's field personnel during this quarterly monitoring (EMCON field report sheets, Appendix A).

Groundwater monitoring wells MW-2 through MW-7 were purged and sampled by EMCON field personnel on March 31, 1992; well MW-1 was not sampled because it contained floating product. The purge water was removed from the site by a licensed hazardous waste hauler.

Laboratory Methods and Analyses

Under the direction of EMCON, water samples collected from the wells were analyzed by Columbia Analytical Services, Inc., located in San Jose, California (Hazardous Waste Testing Laboratory Certification No. 1426). The water samples from MW-2 through MW-7 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. Concentrations of TPHg and benzene in the groundwater are shown on Plate 3, TPHg Concentrations in Groundwater and Plate 4, Benzene Concentrations in Groundwater. Well MW-6 was also analyzed for total petroleum hydrocarbons as diesel (TPHd) and total oil and grease (TOG) using EPA Methods 3510 and 5520C/5520F-IR, respectively. The Chain of Custody Records and Laboratory Analysis Reports are attached in Appendix A. Results of these and previous water analyses are summarized in Table 2, Cumulative Results of Laboratory Analyses of Groundwater--TPHg, TPHd, BTEX, and TOG.

Results of this quarter's groundwater monitoring indicate:

- TPHg was detected in groundwater samples from MW-2 through MW-7 at concentrations ranging from 670 parts per billion (ppb) to 270,000 ppb.
- Benzene was detected in groundwater samples from MW-2 through MW-7 at concentrations ranging from 12 ppb to 7,100 ppb.
- Toluene ethylbenzene, and total xylenes were detected in groundwater samples from MW-2 through MW-7 at concentrations ranging 1.1 ppb to 40,000 ppb.

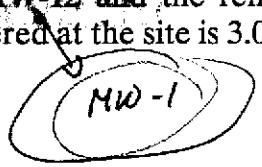
- TPHd was detected in the groundwater sample from MW-6 at a concentration of 2,400 ppb.

- TOG was detected in groundwater samples from MW-6 at slightly different concentrations depending on the analyses method; using EPA method 5520F-IR the concentration of TOG was 2.5 parts per million (ppm) and using EPA method 5520C the concentration was 4.0 ppm.

The following is a general summary of changes in the concentrations of hydrocarbon constituents in the groundwater from wells MW-2 through MW-7 since the last quarterly monitoring. Generally, except for the groundwater in MW-7, the petroleum hydrocarbon concentrations increased this quarter.

Product Recovery

Floating product is measured and removed on a monthly basis, as summarized in Table 3, Approximate Cumulative Product Removed. In January 1992, Horner EZY Skimmers were installed in wells MW-1, MW-2, and MW-5. The total year-to-date product recovered is 0.27 gallons, of which 93 percent was removed from well MW-12 and the remaining 7 percent from wells MW-2 and MW-5. The total product recovered at the site is 3.04 gallons for 1991 and 1992 combined.



Conclusions and Recommendations

The groundwater at the site has been impacted by petroleum hydrocarbons. The extent of the petroleum has not been defined.

RESNA recommends monthly groundwater monitoring and quarterly groundwater sampling at the site, including analyses of the groundwater for TPHg and BTEX. RESNA also recommends that groundwater from well MW-6 continue to be analyzed for TPHd and TOG.

Schedule

Additional work to further delineate the extent of the petroleum hydrocarbons was initiated on April 8, 1992 and will be discussed in a forthcoming report. Monthly groundwater monitoring and quarterly groundwater sampling will continue to be performed by ARCO's contracted sampler. At ARCO's request, RESNA will continue to analyze and report monthly and quarterly groundwater monitoring data from this site to evaluate trends in

petroleum hydrocarbons, and changes in groundwater gradient with time. The permitting process for installation of an interim remediation system at the site is continuing.

RESNA also recommends that copies of this letter report 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. Dannielle Stefani
Livermore Fire Department
4550 East Avenue
Livermore, California 94550

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

Sincerely,
RESNA Industries

Lou Leet
Staff Geologist

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

James L. Nelson
Certified Engineering
Geologist No. 1463

cc: W. C. Winsor, ARCO Product Company

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, TPHg Concentrations in Groundwater, March 31, 1992
Plate 4, Benzene Concentrations in Groundwater, March 31, 1992

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

Appendix A: EMCON's Depth to Water/Floating Product Survey Form (2), Certified Analytical Reports with Chain-of-Custody, and Water Sample Field Data Sheets.
Monitoring Well Purge Water Disposal Form

REFERENCES CITED

Applied GeoSystems, June 22, 1990. Limited Subsurface Environmental Assessment, ARCO Station No. 771, Livermore, California. AGS 60000-1.

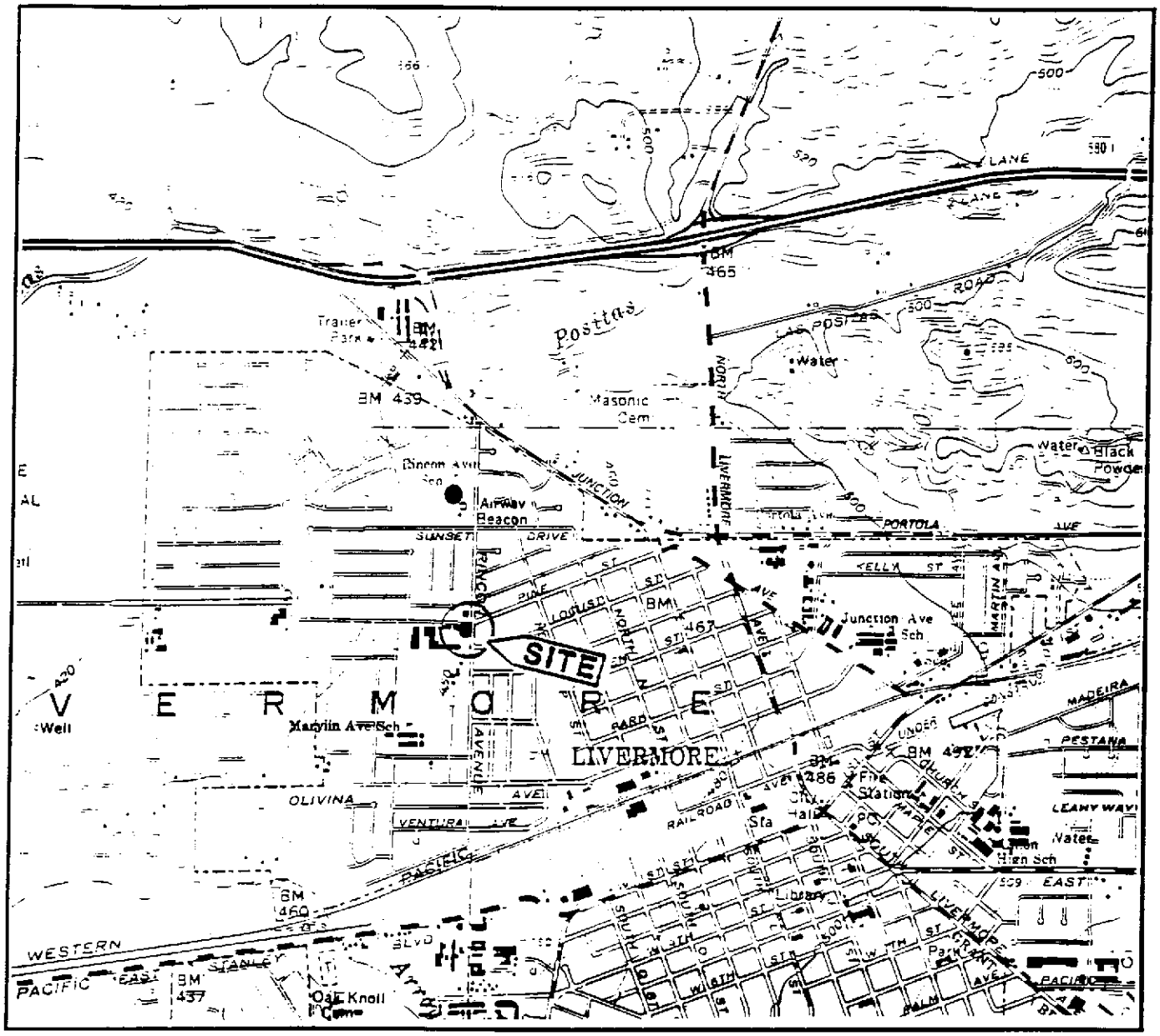
RESNA/Applied Geosystems, April 12, 1991. Supplemental Subsurface Investigation at ARCO Station No. 771, Livermore, California. AGS 60000.

RESNA/Applied GeoSystems, July 12, 1991. Letter Report Quarterly Ground-Water Monitoring Second Quarter 1991 at ARCO Station 771, 899 Rincon Avenue, Livermore, California. AGS 60000.05

RESNA, October 17, 1991. Report on Additional Subsurface Investigation at ARCO Station 771, 899 Rincon Avenue, Livermore, California. 60000.06

RESNA, November 21, 1991. Letter Report Quarterly Ground-Water Monitoring Third Quarter 1991 at ARCO Station 771, 899 Rincon Avenue, Livermore, California. 60000.05

RESNA, April 7, 1992. Letter Report Quarterly Groundwater Monitoring Fourth Quarter 1991 at ARCO Station 771, 899 Rincon Avenue, Livermore, California. 60000.05



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

N

LEGEND

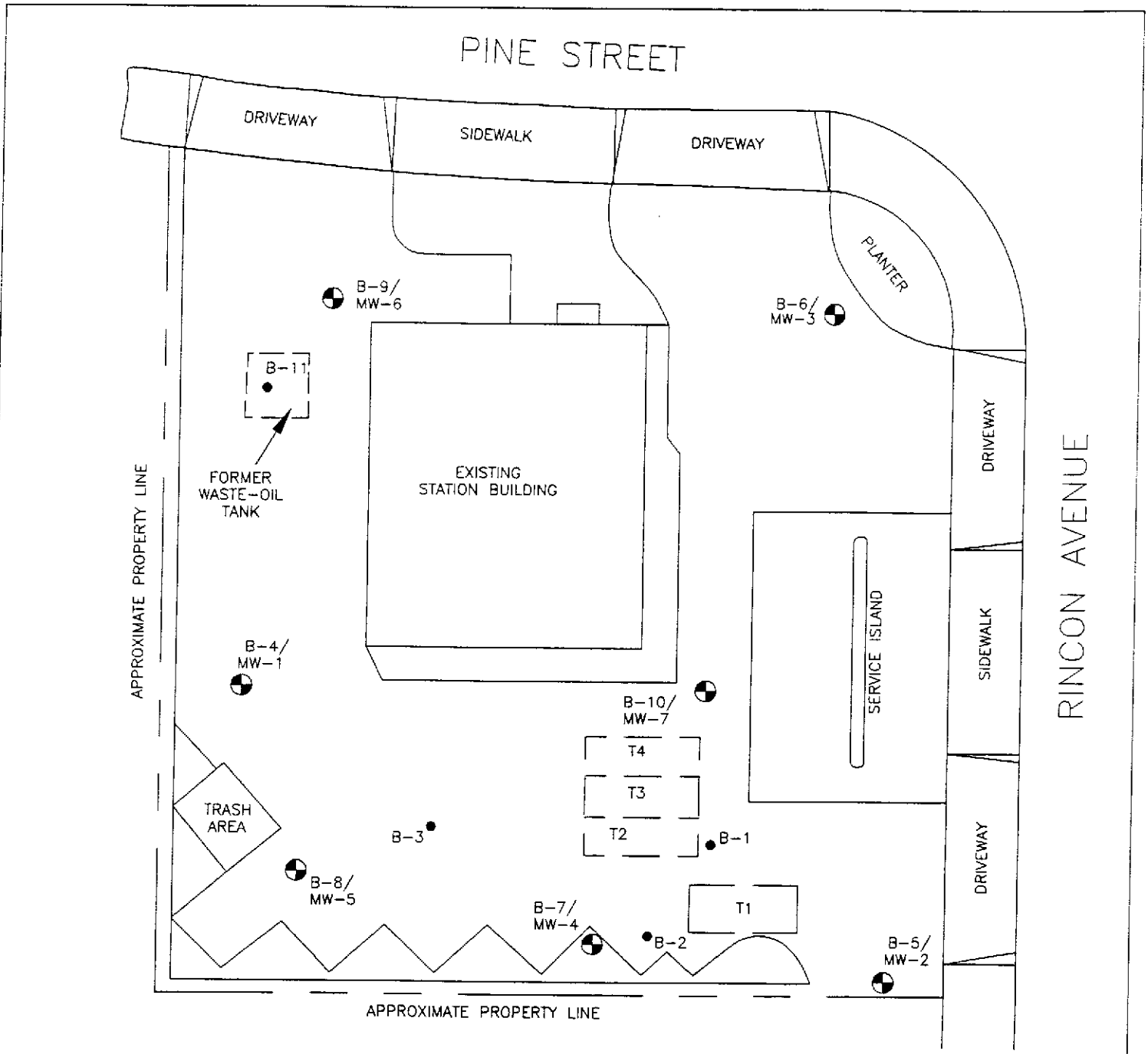
⊙ = Site Location

Approximate Scale

2000 1000 0 2000 4000

feet

RESNA	**SITE VICINITY MAP** **ARCO Station 771** **899 Rincon Avenue** **Livermore, California**	**PLATE** **1**
PROJECT 60000.05		



EXPLANATION

B-10/ MW-7 = Monitoring well (RESNA, December 1990, June and July 1991)

B-11 = Soil boring (RESNA, February 1990, July 1991)

T4 = Underground gasoline-storage tank

N

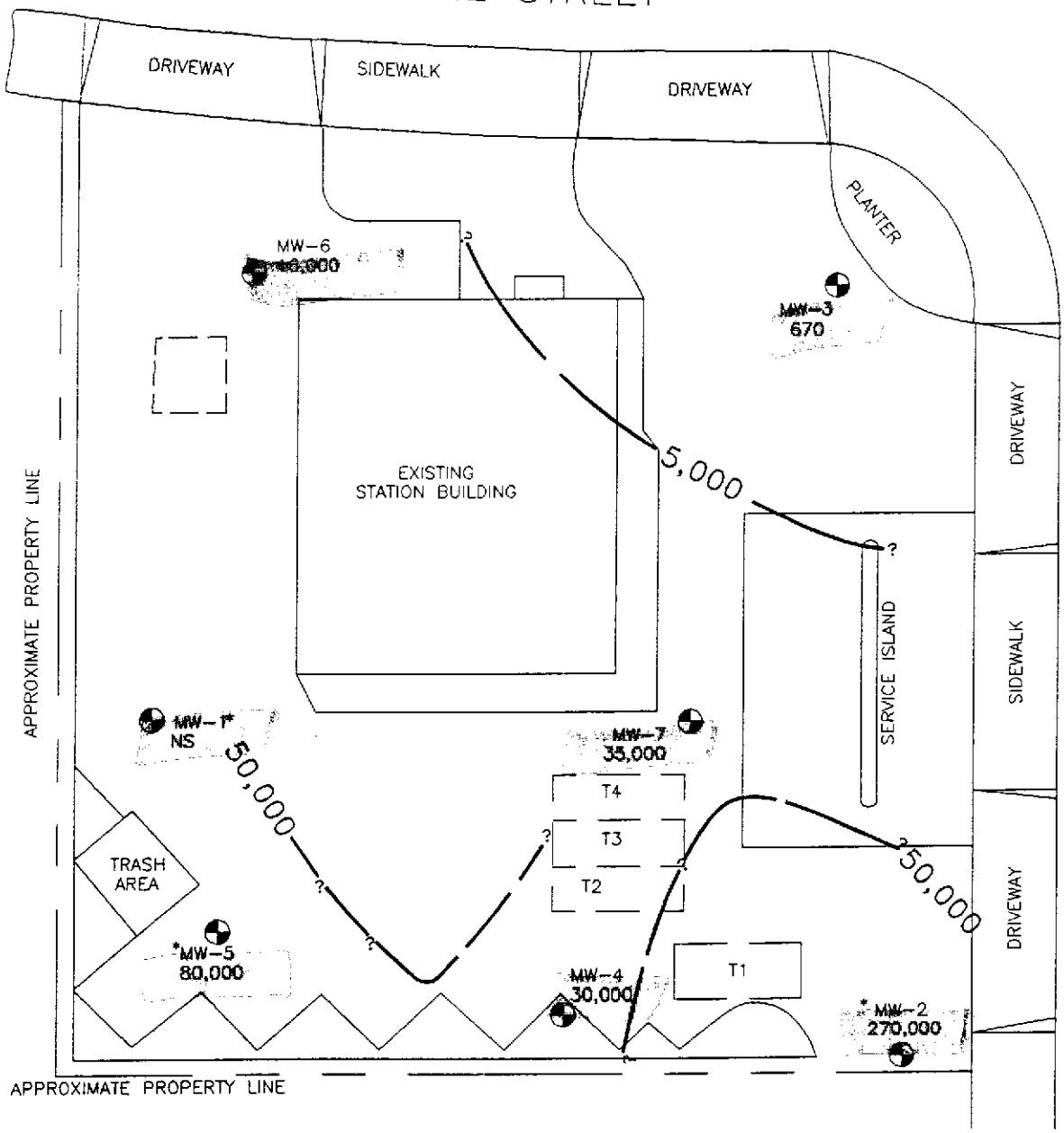
Approximate Scale

20 10 0 20 40

feet

Source: Surveyed by John Koch, Licensed Land Surveyor.

RESNA	**GENERALIZED SITE PLAN** **ARCO Station 771** **899 Rincon Avenue** **Livermore, California**	**PLATE** **2**
PROJECT 60000.05		



EXPLANATION

50,000 = Line of equal concentration of TPHg in groundwater, in ppb

270,000 = Concentration of TPHg in groundwater, in ppb, March 31, 1992

MW-7 = Monitoring well (RESNA, December 1990, June and July 1991)

T4 = Underground gasoline-storage tank

* = Product or product sheen

NS = Not sampled

N

Approximate Scale

20 10 0 20 40

feet

NOTE: Groundwater monitoring well MW-2 was not used to interpret this groundwater gradient (see text for explanation).

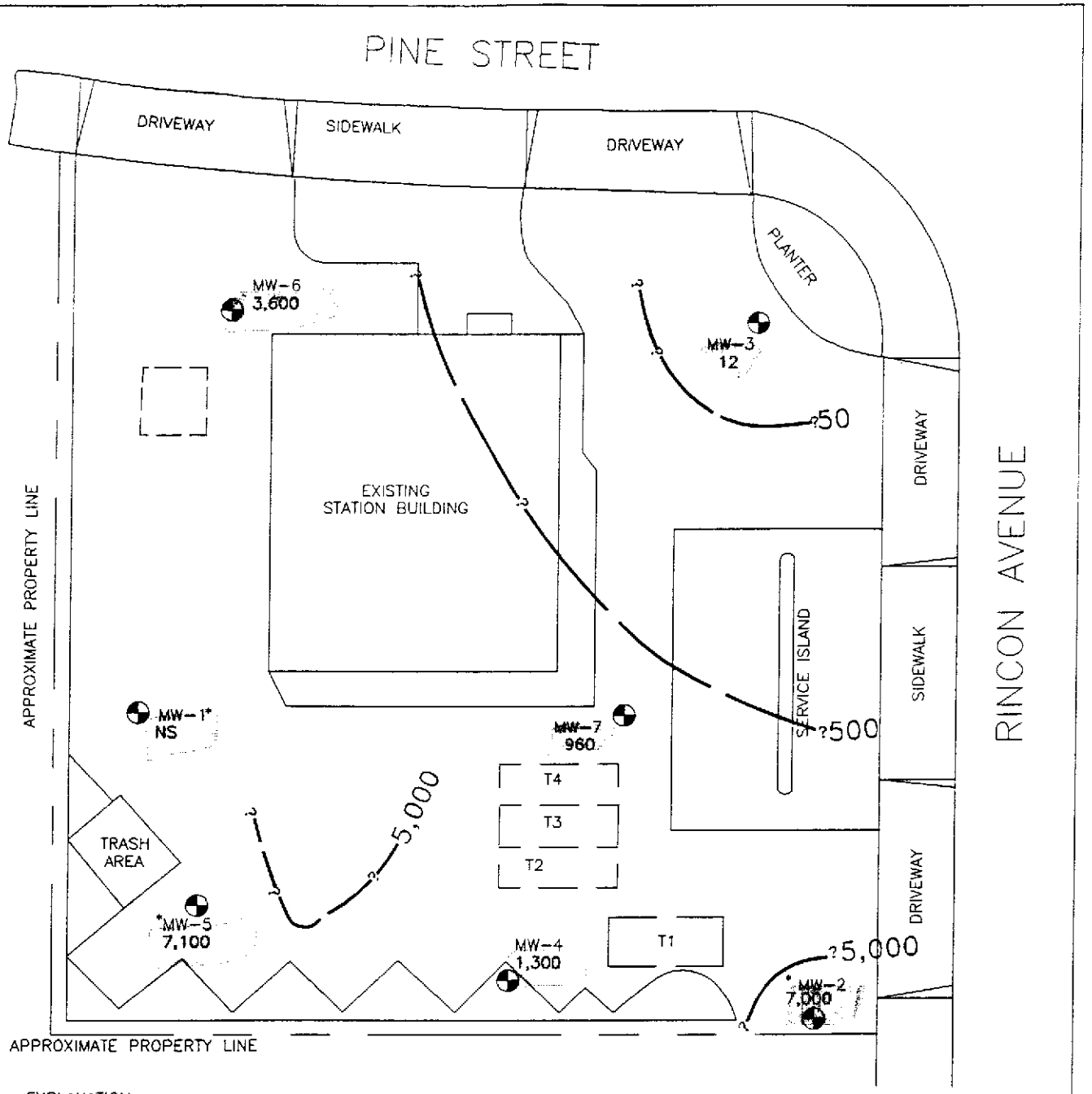
Source: Surveyed by John Koch, Licensed Land Surveyor.

RESNA

PROJECT 60000.05

TPHg CONCENTRATIONS IN GROUNDWATER
ARCO Station 771
899 Rincon Avenue
Livermore, California

PLATE 3



EXPLANATION

5,000 = Line of equal concentration of Benzene in groundwater, in ppb

7,000 = Concentration of Benzene in groundwater, in ppb, March 31, 1992

MW-7 = Monitoring well (RESNA, December 1990, June and July 1991)

T4 = Underground gasoline-storage tank

* = Product or product sheen

NS = Not Sampled

N

Approximate Scale

20 10 0 20 40

feet

NOTE: Groundwater monitoring well MW-2 was not used to interpret this groundwater gradient (see text for explanation).

Source: Surveyed by John Koch, Licensed Land Surveyor.

RESNA

PROJECT 60000.05

BENZENE CONCENTRATIONS IN GROUNDWATER
ARCO Station 771
899 Rincon Avenue
Livermore, California

PLATE 4

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 771
Livermore, California
(Page 1 of 3)

Well Date	Well Elevation	Depth-to- Water	Water Elevation	Floating Product
MW-1				
01-15-91	451.80**	32.77	419.03	Sheen
02-27-91		32.23	419.57	None
03-20-91		27.38	424.42	Sheen
04-10-91		26.49	425.31	None
05-20-91	451.80***	NM	NM	Sheen
06-20-91		33.95	417.85	Sheen
07-25-91		36.59*	415.21*	0.10
08-13-91		37.72*	414.08*	0.20
09-12-91		39.25*	412.55*	0.23
10-30-91		39.14*	412.66*	0.20
11-13-91		Dry	Dry	None
12-26-91		39.30*	412.50	0.01
01-18-92		37.81**	NC	Skimmer
02-21-92		Well inaccessible due to construction		
03-31-92		31.90**	NC	Skimmer
MW-2				
01-15-91	449.52**	30.89*	418.63*	0.16
02-27-91		29.11*	420.41*	0.02
03-20-91		24.57*	424.95*	0.02
04-10-91		22.85*	426.67*	0.05
05-20-91	449.51***	NM	NM	NM
06-20-91		31.42*	418.09*	0.15
07-25-91		33.69*	415.82*	0.49
08-13-91		34.80*	414.71*	0.47
09-12-91		36.39*	413.12*	0.45
10-30-91		Dry	Dry	None
11-13-91		Dry	Dry	None
12-26-91		36.45	413.06	Sheen
01-18-92		Well inaccessible due to construction		
02-21-92		26.27**	NC	Skimmer
03-31-92		28.85**	NC	Skimmer
MW-3				
01-15-91	450.29**	32.34	417.95	None
02-27-91		31.78	418.51	None
03-20-91		27.74	422.55	None
04-10-91		25.05	425.24	None
05-20-91	450.28***	27.06	423.22	None
06-20-91		32.35	417.93	None
07-25-91		35.02	415.26	None
08-13-91		36.50	413.78	None

See notes on Page 3 of 3.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 771
Livermore, California
(Page 2 of 3)

Well / Date	Well Elevation	Depth-to-Water	Water Elevation	Floating Product
MW-3				
09-12-91		38.47	413.81	None
10-30-91		Dry	Dry	None
11-13-91		Dry	Dry	None
12-26-91		38.53	411.75	None
01-18-92		Well inaccessible due to construction		
02-21-92		Well inaccessible due to construction		
03-31-92		30.61	NC	None
MW-4				
07-25-91	451.56***	36.07	415.49	None
08-13-91		37.54	414.02	None
09-12-91		38.73	412.83	None
10-10-91		39.90	411.66	None
11-13-91		40.56	411.00	None
12-26-91		38.78	412.78	None
01-18-92		38.71	NC	None
02-21-92		31.91	NC	None
03-31-92		30.36	NC	None
MW-5				
07-25-91	451.41***	36.67	414.74	Sheen
08-13-91		37.98*	413.43*	0.01
09-12-91		39.01*	412.40*	0.05
10-30-91		38.28	412.13	Sheen
11-13-91		39.24	412.17	Sheen
12-26-91		39.11	412.30	Sheen
01-18-92		38.15**	NC	Skimmer
02-21-92		30.59**	NC	Skimmer
03-18-92		30.84**	NC	Skimmer
MW-6				
07-25-91	451.38***	37.68	413.70	None
08-13-91		39.17	412.21	None

See notes on Page 3 of 3.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 771
Livermore, California
(Page 3 of 3)

Well Date	Well Elevation	Depth-to- Water	Water Elevation	Floating Product
MW-6				
09-12-91		41.14	410.24	None
10-30-91		42.10	409.28	None
11-13-91		41.45	409.93	None
12-26-91		41.23	410.15	None
01-18-92		38.23	NC	None
02-21-92		35.21	NC	None
03-31-92		32.26	NC	None
MW-7				
07-25-91	450.65***	34.88	415.77	Sheen
08-13-91		36.17	414.48	None
09-12-91		37.81	412.84	None
10-30-91		38.50	412.15	None
11-13-91		38.31	412.34	None
12-26-91		37.90	412.75	None
01-18-92		Well inaccessible due to construction		
02-21-92		31.50	NC	None
03-31-92		29.40	NC	None

Measurements in feet.
* = Floating product present in well; calculated DTW when floating product is present is calculated using the attached protocol (Appendix A).
** = Surveyed by Ron Archer, Civil Engineer, in January 1991.
*** = Surveyed by John Koch, Licensed Land Surveyor, in July 1991.
NM = Not measured (instrument failure–interface probe).
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 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 is then subtracted from the measured depth to water to obtain a calculated depth to water. These calculated groundwater depths were subtracted from wellhead elevations to calculate the differences in groundwater elevations.
NC = Not calculated; wellhead elevations may no longer be correct due to construction activities related to the removal and replacement of underground storage tanks. Wellhead elevations will be resurveyed in April 1992.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER - TPHg, TPHd, BTEX, and TOG
ARCO Station 771
Livermore, California
(Page 1 of 2)

Sample	TPHg	B	T	E	X	TPHd	TOG
MW-1							
01-15-91	Not sampled--sheen						
04-10-91	98,000	11,000	18,000	2,800	20,000	NA	NA
07-25-91	Not sampled--floating product						
10-30-91	Not sampled--floating product						
03-31-92	Not sampled--floating product						
MW-2							
01-15-91	Not sampled--floating product						
04-10-91	Not sampled--floating product						
07-25-91	Not sampled--floating product						
10-30-91	Not sampled--sheen						
03-31-92	270,000	7,000	12,000	4,400	40,000	NA	NA
MW-3							
01-15-91	230	<0.5	<0.5	2.2	2.1	NA	NA
04-10-91	530	12	8.4	4.0	7.0	NA	NA
07-25-91	110	0.32	0.75	1.2	1.0	NA	NA
10-30-91	Not sampled--dry						
03-31-92	670	12	1.1	7.4	27	NA	NA
MW-4							
07-25-91	23,000	590	730	360	3,500	NA	NA
10-30-91	19,000	320	340	230	180	NA	NA
03-31-92	30,000	1,300	740	770	4,800	NA	NA
MW-5							
07-25-91	57,000	2,300	4,200	77	14,000	NA	NA
10-30-91	Not sampled--sheen						
03-31-92	80,000	7,100	9,100	2,000	16,000	NA	NA
MW-6							
07-25-91	10,000	3,000	200	340	1,000	NA	NA
10-30-91	970	150	4.4	4.9	6.6	NA	NA
03-31-92	16,000	3,600	1,500	660	1,700	[redacted]	25 (20)
MW-7							
07-25-91	45,000	1,500	2,700	1,200	9,200	NA	NA
10-30-91	93,000	1,800	770	780	6,700	NA	NA
03-31-92	35,000	960	350	300	5,900	NA	NA
MCLs	—	1	—	680	1,750		
Als	—	—	100	—	—		

See notes on Page 2 of 2.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER - TPHg, TPHd, BTEX, and TOG
ARCO Station 771
Livermore, California
(Page 2 of 2)

All results in parts per billion (ppb), except TOG, which is reported in parts per million (ppm).

TPHg:	Total petroleum hydrocarbons as gasoline (measured by EPA Method 5030/8015).
B: Benzene	T: toluene E: ethylbenzene X: total xylene isomers
BTEX:	Measured by EPA Method 5030/8020.
TPHd:	Total petroleum hydrocarbons as diesel (measured by EPA Method 3510).
NA:	Not analyzed.
<:	Less than the laboratory detection limit.
*:	Laboratory reported sample matrix contains low boiling point fuel mixture calculated as diesel.
MCL:	State Maximum Contaminant Level in ppb.
AL:	State Recommended Action Level in ppb.

TABLE 3
APPROXIMATE CUMULATIVE PRODUCT RECOVERED
ARCO Station 771
Livermore, California

Year	Floating Product Removed (gallons)
1991	TOTAL: 2.77 Gallons

Date	Floating Product Removed (gallons)
1992:	
MW-1	
01-15-92	Well inaccessible due to construction
02-28-92	Well inaccessible due to construction
03-26-92	0.25
MW-2	
01-15-92	Well inaccessible due to construction
02-28-92	None present
03-26-92	0.01
MW-5	
01-15-92	Well inaccessible due to construction
02-28-92	None present
03-26-92	0.01
	TOTAL: 0.27 Gallons

APPENDIX A
EMCON'S DEPTH TO WATER/FLOATING PRODUCT SURVEY FORMS (2), CERTIFIED ANALYTICAL REPORTS WITH CHAIN-OF-CUSTODY, AND WATER SAMPLE FIELD DATA SHEETS

EMCON ASSOCIATES
Consultants in Wastes Management and Environmental Control

Date February 25, 1992
Project G70-12.01

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 Form, February 1992 monthly water level survey, ARCO station 771, 899 Rincon Avenue, 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:

REG. NO. 4024
EXP. 6/30/92
REGISTERED GEOLOGIST
STATE OF CALIFORNIA

Mark Knuttel MK

Robert Porter, Senior Project Engineer.

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

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : G70-12.01 STATION ADDRESS : 899 Rincon Avenue, Livermore, CA DATE : 2-21-92

ARCO STATION # : 771 FIELD TECHNICIAN : Vince Barlock 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-6	OK	YES	OK	YES	YES	31.21	31.22	ND	ND	43.25	Petrol. odor.
2	MW-4	NO	NO	NO	YES	YES	31.91	31.91	ND	ND	41.45	—
3	MW-7	YES	YES	YES	YES	YES	31.50	31.50	ND	ND	40.00	—
4	MW-3	—	—	—	—	BURRIED	—	—	—	—	—	BURRIED
5	MW-5	NO	NO	NO	YES	YES	30.60	30.59	ND	ND	40.46	Dedicated Pump
6	MW-2	YES	YES	OK	YES	YES	26.27	26.27	ND	ND	37.85	Dedicated Pump
7	MW-1	—	—	—	—	BURRIED	—	—	—	—	—	BURRIED

EMCON
ASSOCIATES
Consultants in Wastes
Management and
Environmental Control

Date January 29, 1992
Project G70-12.01

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

We are enclosing:

Copies	Description
1	DTW/FP Survey Form, January 1992 monthly water level survey, ARCO station 771, 899 Rincon Avenue, 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:

REGISTERED PROFESSIONAL ENGINEER ROBERT CHARLES PORTER No: 4094 Exp. 6/30/92 INDUSTRIAL STATE OF CALIFORNIA

Mark Knuttel MK

Robert C Porter

Robert Porter, Senior P.E. #4094

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : G70-12.01 STATION ADDRESS : 899 Rincon Avenue, Livermore, CA DATE : 1-18-92

ARCO STATION # : 771 FIELD TECHNICIAN : M Knerfel / J Watoha DAY : Saturday

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-6	ok	yes	ok	yes	yes	38.23	38.23	ND	ND	43.20	—
2	MW-4	NO	NO	NO	yes	yes	38.71	38.71	ND	ND	41.50	G5 casing loose. Can lift it over well casing. Damage from heavy equip
3	MW-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Well is Buried
4	MW-3	"	"	"	"	"	"	"	"	"	"	well is buried
5	MW-5	ok	yes	ok	yes	yes	38.15	38.15	ND	ND	40.5	Skimmer in well - no water in it. No product detected in bailer
6	MW-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Heavy equipment parked on well.
7	MW-1	ok	yes	ok	yes	yes	37.81	37.81	ND	ND	40.60	Skimmer in well. Has .8 ft of black water in it. Looks like it might be product. Dropped down bailer pulled up clear water with no product.
												* Station is closed and has its tanks pulled with a open pit remaining. Station is fenced off. We were able to get inside fence and get WL and TD's for several wells.

EMCON ASSOCIATES
Consultants in Wastes Management and Environmental Control

RECEIVED
APR 21 1992
RESNA
SAN JOSE

Date April 16, 1992
Project G70-12.01

To:
Mr. Joel Coffman
RESNA/ Applied Geosystems
3315 Alamden Expressway, Suite 34
San Jose, California 95050

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
7	Water Sample Field Data Sheets

For your: X Information Sent by: X Mail

Comments:

Enclosed are the data from the first quarter 1992 monitoring event at ARCO service station 771, 899 Rincon Avenue, Livermore, California. Please call if you have any questions:.(408) 453-2266.

Mark Knuttel MK

Reviewed by:

REGISTERED PROFESSIONAL ENGINEER
ROBERT CURTIS PORTER
No. 4884
EXP. 6/30/92
INDUSTRIAL
STATE OF CALIFORNIA

Robert Porter, Senior Project Engineer.

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : G70-12.01 STATION ADDRESS : 899 Rincon Avenue, Livermore, CA DATE : 3-31-92

ARCO STATION # : 771 FIELD TECHNICIAN : M. Kaufhold / J. Batera 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-6	OK	YES	✓	3259	YES	32.26	32.26	ND	ND	43.2	- 15/16" SOCKET WRENCH TO OPEN
2	MW-4	OK	yes	✓	3259	YES	30.36	30.36	ND	ND	41.0	3x3 foot outer lid covering well
3	MW-7	OK	yes	✓	3259	yes	29.40	29.40	ND	ND	39.5	3x3 foot outer lid covering wells
4	MW-3	OK	YES	✓	3259	YES	30.61	30.61	ND	ND	39.7	— 15/16" SOCKET WRENCH TO OPEN
5	MW-5	OK	yes	✓	3259	yes	30.84	30.84	ND	ND	40.5	SKIMMER IN WELL 3x3 OUTER LID
6	MW-2	OK	yes	✓	3259	YES	28.85	29.85	ND	ND	37.9	SKIMMER IN WELL 3x3 outer lid covering well
7	MW-1	OK	yes	✓	3259	yes	31.90	31.90	NA	NA	40.17	PRODUCT IN SKIMMER
												≈ 3x3 CIRCULAR OUTER COVER
												LID and locking mechanism differ
												most wells
												Need 3/4" SOCKET WRENCH
												to open

Summary of Groundwater Monitoring Data
First Quarter 1992
ARCO Service Station 771
899 Rincon Avenue, 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 (ug/l)	Total Oil and Grease, 5520C (mg/l	Hydrocarbons 5520F-IR (mg/l)
MW-1	NS.[2]	31.90	NM.[3]	NS.	NS.	NS.	NS.	NS.	NS.	NS.	NS.
MW-2(34)	03/31/92	28.85	ND.[4]	270,000	7,000.	12,000.	4,400.	40,000.	NR.[5]	NR.	NR.
MW-3(36)	03/31/92	30.61	ND.	670.	12.	1.1	7.4	27.	NR.	NR.	NR.
MW-4(38)	03/31/92	30.36	ND.	30,000.	1,300.	740.	770.	4,800.	NR.	NR.	NR.
MW-5(39)	03/31/92	30.84	ND.	80,000.	7,100.	9,100.	2,000.	16,000.	NR.	NR.	NR.
MW-6(41)	03/31/92	32.26	ND.	16,000.	3,600.	1,500.	660.	1,700.	2,400.*	4.0	2.5
MW-7(38)	03/31/92	29.40	ND.	35,000.	960.	350.	300.	5,900.	NR.	NR.	NR.
FB-1.[6]	03/31/92	NA.[7]	NA.	<50	<0.5	<0.5	<0.5	<0.5	NR.	NR.	NR.

1. TPH. = Total petroleum hydrocarbons
2. NS. = Not sampled; well was not sampled due to detection of floating product
3. NM. = Not measured; Floating product observed in dedictated skimmer
4. ND. = Not detected
5. NR. = Not reported; sample was not scheduled for analysis of the selected parameter
6. FB. = Field blank
7. NA. = Not applicable

*. = Sample matrix contains low boiling point fuel mixture calculated as diesel

Columbia Analytical Services inc.

April 7, 1992

Mark Knuttel
EMCON Associates
1921 Ringwood Avenue
San Jose, CA 95131

Re: **EMCON Project No. G70-12.01**
Arco Facility No. 771

Dear Mr. Knuttel:

Enclosed are the results of the water samples submitted to our lab on March 31, 1992. For your reference, our service request number for this work is SJ92-0343.

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

Please call if you have any questions.

Respectfully submitted:

Keoni A. Murphy
COLUMBIA ANALYTICAL SERVICES, INC.

le/KAM

1904 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	03/31/92
Project:	EMCON Project No. G70-12.01	**Work Order #:**	SJ92-0343
	Arco Facility No. 771	**Sample Matrix:**	Water

Inorganic Parameters[1]
mg/L (ppm)

Sample Name:	MW-6 (41)	Method Blank
Date Sampled:	03/31/92	

Analyte	Method	MRL		
Total Oil and Grease	5520C	0.5	4.0	ND
Hydrocarbons	5520F-IR	0.5	2.5	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
[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 Kevin A Murphy Date April 7, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	03/31/92
Project:	EMCON Project No. G70-12.01	**Date Extracted:**	04/02/92
	Arco Facility No. 771	**Date Analyzed:**	04/03/92
Sample Matrix:	Water	**Work Order #:**	SJ92-0343

Total Petroleum Hydrocarbons as Diesel
EPA Methods 3510/California DHS LUFT Method
µg/L (ppb)

Sample Name	MRL	TPH as Diesel
MW-6 (41)	50	2,400.*
Method Blank	50	ND

MRL Method Reporting Limit
TPH Total Petroleum Hydrocarbons
ND None Detected at or above the method reporting limit
* Sample matrix contains low boiling point fuel mixture calculated as diesel.

Approved by Kevin A Murphy Date April 7, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	03/31/92
Project:	EMCON Project No. G70-12.01	**Work Order #:**	SJ92-0343
	Arco Facility No. 771	**Sample Matrix:**	Water

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

Sample Name:		MW-6 (41)	MW-4 (38)	MW-7 (38)
Date Analyzed:		04/02/92	04/03/92	04/03/92
Analyte	MRL			
Benzene	0.5	3,600.	1,300.	960.
Toluene	0.5	1,500.	740.	350.
Ethylbenzene	0.5	660.	770.	300.
Total Xylenes	0.5	1,700.	4,800.	5,900.
TPH as Gasoline	50	16,000.	30,000.	35,000.

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

Approved by Kenneth Murphy Date April 7, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	03/31/92
Project:	EMCON Project No. G70-12.01	**Work Order #:**	SJ92-0343
	Arco Facility No. 771	**Sample Matrix:**	Water

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

Sample Name:		MW-3 (36)	MW-5 (39)	MW-2 (34)
Date Analyzed:		04/03/92	04/02/92	04/02/92
Analyte	**MRL**			
Benzene	0.5	12.	7,100.	7,000.
Toluene	0.5	1.1	9,100.	12,000.
Ethylbenzene	0.5	7.4	2,000.	4,400.
Total Xylenes	0.5	27.	16,000.	40,000.
TPH as Gasoline	50	670.	80,000.	270,000.

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

Approved by Kevin P. Murphy Date April 7, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	03/31/92
Project:	EMCON Project No. G70-12.01	**Work Order #:**	SJ92-0343
	Arco Facility No. 771	**Sample Matrix:**	Water

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

Sample Name:		FB-1	Method Blank	Method Blank
Date Analyzed:		04/03/92	04/02/92	04/03/92
Analyte	**MRL**			
Benzene	0.5	ND	ND	ND
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	ND	ND
Total Xylenes	0.5	ND	ND	ND
TPH as Gasoline	50	ND	ND	ND

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

Approved by Kevin Murphy Date April 7, 1992

Client: EMCON Associates
Project: EMCON Project No. G70-12.01
Arco Facility No. 771

Date Received: 03/31/92
Work Order #: SJ92-0343
Sample Matrix: Water

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

Sample Name	Date Analyzed	Percent Recovery P-Terphenyl
MW-6 (41)	04/03/92	78.
Method Blank	04/03/92	76.
	CAS Acceptance Criteria	55-145

TPH Total Petroleum Hydrocarbons

Approved by Kevin Murphy Date April 7, 1992

Client: EMCON Associates
Project: EMCON Project No. G70-12.01
Arco Facility No. 771

Date Received: 03/31/92
Work Order #: SJ92-0343
Sample Matrix: Water

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

Sample Name	Date Analyzed	Percent Recovery α,α,α-Trifluorotoluene
MW-6 (41)	04/02/92	85.
MW-4 (38)	04/03/92	96.
MW-7 (38)	04/03/92	99.
MW-3 (36)	04/03/92	106.
MW-5 (39)	04/02/92	90.
MW-2 (34)	04/02/92	92.
FB-1	04/03/92	93.
Method Blank	04/02/92	93.
Method Blank	04/03/92	96.
	CAS Acceptance Criteria	70-130

TPH Total Petroleum Hydrocarbons

Approved by Kevin Murphy Date April 7, 1992

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. EMCGC-92-1

Chain of Custody

ARCO Facility no. 771 | City (Facility) Livermore | Project manager (Consultant) Mark Kmetkap

ARCO engineer Kyle Christie | Telephone no. (ARCO) 415-571-2434 | Telephone no. (Consultant) 408-453-0719 | Fax no. (Consultant) 408-453-0452

Consultant name EMCON Associates | Address (Consultant) 1938 Junction Ave, SAN JOSE, CA

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 ☑	Oil and Grease 413.1 ☐ 413.2 ☑	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐
MW-6(41)	1-2	2		X		X	HCl	3-31-92	1045		X									
MW-4(38)	3-4	2		X		X	HCl	3-31-92	1110		X									
MW-7(38)	5-6	2		X		X	HCl	3-31-92	1135		X									
MW-3(36)	7-8	2		X		X	HCl	3-31-92	1215		X									
MW-5(39)	9-10	2		X		X	HCl	3-31-92	1236		X									
MW-2(34)	11-12	2		X		X	HCl	3-31-92	1300		X									
MW-1( )		2		X		X	HCl	NO SAMPLE			X									
FB-1	13-14	2		X		X	HCl	3-31-92	1140		X									
MW-6(41)	15-16	2		X		X	NP	3-31-92	1045			X								
MW-6(41)	17-18	2		X		X	HCl	3-31-92	1045				X							
MW-2(34)		1		X		X	HNO_3	3-31-92	1300											X

Condition of sample: OK — MW-4 + MW-2 + MW-5 had product

Temperature received: COOL

Relinquished by sampler: Mark Kmetkap	Date: 3-31-92	Time: 1455	Received by: [signature]
Relinquished by	Date	Time	Received by: 3-31-92 2:55
Relinquished by	Date	Time	Received by laboratory: Date: Time:

Laboratory name: ICAS

Contract number: 07077

Method of shipment: Sampler will Deliver

Special detection Limit/reporting: lowest Possible

Special QA/QC: Normal

Remarks: G70-12.01
TPH-G/BTXE
2-40 ml HCl VOA
TPH-d
2-liter glass ~~HCl~~ NP
TOG
2-liter glass HCl
Total lead
1-500 ml LPE HNO_3
- NOT FILTERED -

Lab number: 5192-0343

Turnaround time

Priority Rush 1 Business Day	☐
Rush 2 Business Days	per P. Lacy 4-2-92 ☒
Expedited 5 Business Days	☐
Standard 10 Business Days	$ ☒

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

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 670-12.01 | SAMPLE ID: MW-1
PURGED BY: MK | CLIENT NAME: ARCO 771
SAMPLED BY: MK | LOCATION: Livermore

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.): NR
DEPTH TO WATER (feet): 31.90 | CALCULATED PURGE (gal.): ↓
DEPTH OF WELL (feet): 40.12 | ACTUAL PURGE VOL. (gal.): ___

DATE PURGED: NR | Start (2400 Hr) NR | End (2400 Hr) NR
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)
		PRODUCT IN WELL				

D. O. (ppm): NR | ODOR: NR | 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	___ 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: NR		Other: NR	

WELL INTEGRITY: Good | LOCK #: 3259

REMARKS: PRODUCT DETECTED IN SKIMMER. NO SAMPLE COLLECTED 3-31-92

Meter Calibration: Date: ___ Time: ___ Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: MW-6

Signature: Mark Kmetko | Reviewed By: MK | Page 1 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 670-12.01 SAMPLE ID: MW-2 (34)

PURGED BY: M. Knuttel / J. Butera CLIENT NAME: ARCO 771

SAMPLED BY: " " LOCATION: Livermore

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.):	5.94
DEPTH TO WATER (feet):	28.85	CALCULATED PURGE (gal.):	29.68
DEPTH OF WELL (feet):	37.9	ACTUAL PURGE VOL. (gal.):	13.0

DATE PURGED: 3-31-92 Start (2400 Hr) 1238 End (2400 Hr) 1249

DATE SAMPLED: 3-31-92 Start (2400 Hr) 1255 End (2400 Hr) 1300

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1243	6.0	7.09	1162	69.2	cloudy	lt wt
1247	12.0	7.02	1148	68.2	cloudy	heavy
	18.0	—	DRY —			
		~~7.24~~				
1302	after recharge	7.21	1162	69.5	cloudy	Mod.

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

COLOR: NR (COBALT 0 - 100) TURBIDITY: 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	✓ 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 SKIMMER IN WELL LOCK #: 3259

REMARKS: TOXICITY TEST SAMPLE & LEAD SAMPLE TAKEN HERE
sheen noticed in purge water
Dried well at ≈ 13.0 gallons at 1249
WL at 34.1 at 1255 - all samples taken

Meter Calibration: Date: ___ Time: ___ Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: MW-6

Signature: Mark Knuttel Reviewed By: MK Page 2 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: G70-12.01 SAMPLE ID: MW-3 (36)

PURGED BY: M. Knuttal / J. Butera CLIENT NAME: Arco 771

SAMPLED BY: " " LOCATION: Livermore

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.): 5.96

DEPTH TO WATER (feet): 30.61 CALCULATED PURGE (gal.): 29.82

DEPTH OF WELL (feet): 39.70 ACTUAL PURGE VOL. (gal.): 13.0

DATE PURGED: 3-31-92 Start (2400 Hr) 1154 End (2400 Hr) 1205

DATE SAMPLED: 3-31-92 Start (2400 Hr) 1210 End (2400 Hr) 1215

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1159	6.6	7.65	973	66.4	Cloudy	light
1204	12.0	7.41	1037	66.9	"	Heavy
	18.0		— Dry —			
	24.0		1			
1216	30.5 recharge	7.48	1046	66.8	cloudy	Heavy

D. O. (ppm): NR ODOR: Moderate COLOR: NR (COBALT 0 - 100) TURBIDITY: 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	✓ 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: Dried well at = 13 gallons at 1205
wl at 35.86 at 1210 all samples collected

Meter Calibration: Date: ___ Time: ___ Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: MW-6

Signature: Mark Knuttal Reviewed By: MK Page 3 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 670-12.01 SAMPLE ID: MW-4 (38)

PURGED BY: J. Butera / M. Knuttel CLIENT NAME: ARCO 771

SAMPLED BY: " " LOCATION: Livermore

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.):	6.97
DEPTH TO WATER (feet):	30.36	CALCULATED PURGE (gal.):	34.89
DEPTH OF WELL (feet):	41.0	ACTUAL PURGE VOL (gal.):	17.0

DATE PURGED: 3-31-92 Start (2400 Hr) 1048 End (2400 Hr) 1059

DATE SAMPLED: 3-31-92 Start (2400 Hr) 1106 End (2400 Hr) 1110

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1052	7.0	7.12	1334	65.4	cloudy	mod
1055	14.0	6.97	1339	66.6	"	"
	21.0	—	DRY —			
	28.0		1			
1111	35. Backwash	7.08	1295	66.6	Cloudy	Mud

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

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: Sheen of F/P screen in bucket and bailer while purging
Dried well at ≈ 17.0 gallons at 1059
WL at 38.0 at 1105. All samples collected.

Meter Calibration: Date: ___ Time: ___ Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: MW-6

Signature: Mark Knuttel Reviewed By: MK Page 4 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 670-12.01 | SAMPLE ID: MW-5(39)

PURGED BY: M. Knuttel / J. Butera | CLIENT NAME: ARCO 771

SAMPLED BY: " " | LOCATION: Livermore

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.):	6.34
DEPTH TO WATER (feet):	30.84	CALCULATED PURGE (gal.):	31.68
DEPTH OF WELL (feet):	40.5	ACTUAL PURGE VOL (gal.):	15.0

DATE PURGED: 3-31-92 Start (2400 Hr) 1214 End (2400 Hr) 1225

DATE SAMPLED: 3-31-92 Start (2400 Hr) 1232 End (2400 Hr) 1236

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1218	6.5	7.03	1344	67.4	cloudy	light
1223	13.0	7.10	1281	66.5	"	"
	19.5		DRY			
	26.0					
1288	32.0 (recharge)	7.31	1305	66.8	cloudy	light

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

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 SKIMMER IN WELL LOCK #: 3259

REMARKS: Sheen noticed in purge water
Dried well at approx. 15 gallons at 1225. WL at 38.35 at 1231. All samples taken

Meter Calibration: Date: ___ Time: ___ Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: MW-6

Signature: Mark Knuttel Reviewed By: MK Page 5 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: G70-12.01 | SAMPLE ID: MW-6 (41)

PURGED BY: M. Knuthal / J. Rivera | CLIENT NAME: ARCO 771

SAMPLED BY: " " | LOCATION: Livermore

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.): 7.18

DEPTH TO WATER (feet): 32.26 | CALCULATED PURGE (gal.): 35.88

DEPTH OF WELL (feet): 43.20 | ACTUAL PURGE VOL. (gal.): 16

DATE PURGED: 3-31-92 | Start (2400 Hr) 1019 | End (2400 Hr) 1035

DATE SAMPLED: 3-31-92 | Start (2400 Hr) 1038 | End (2400 Hr) 1045

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1024	7.5	6.76	1329	65.6	grey	heavy
1029	15.0	7.02	1242	65.7	"	"
	22.5		- DRY -			
	30.0					
1046	36.0 recharge	7.16	1242	64.1	Grey	heavy

D. O. (ppm): NR | ODOR: MODERATE | 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	✓ 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: Dried well at 16.0 gallons at 1030
WL at 46.65 at 1035. All samples collected
TPH-d and TOC samples also taken here

Meter Calibration: Date: 3-31-92 Time: 1010 Meter Serial #: M6973 Temperature °F: 69.5

EC 1000 980 / 1000) (DI 6.85) (pH 7 7.03 / 7.0) (pH 10 10.05 / 10.0) (pH 4 4.02 / —)

Location of previous calibration: ___

Signature: Mark Knuthal | Reviewed By: MLL | Page 6 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 670-12.01 | SAMPLE ID: MW-7(38)

PURGED BY: M. Knuttel / J. Estrada | CLIENT NAME: ARCO 771

SAMPLED BY: " " | LOCATION: Livermore

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.):	6.82
DEPTH TO WATER (feet):	29.40	CALCULATED PURGE (gal.):	34.11
DEPTH OF WELL (feet):	39.80	ACTUAL PURGE VOL. (gal.):	16.0

DATE PURGED: 3-31-92 | Start (2400 Hr) 1117 | End (2400 Hr) 1126

DATE SAMPLED: ___ | Start (2400 Hr) 1132 | End (2400 Hr) 1135

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1120	7.0	7.34	1324	66.1	grey	heavy
1125	14.0	7.17	1304	67.4	Brown	"
___	21.0	—	DRY	___	___	___
___	28.0	___	/	___	___	___
1137	~~35.0~~ overhang	7.37	1321	68.2	Grey	heavy

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

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

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: Sheen noted in purge water. Dried well at ≈ 16.0 gallons at 1126. Wi at 37.0 at 1132

Meter Calibration: Date: ___ Time: ___ Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: MW-6

Signature: Mark Knuttel | Reviewed By: MB | Page 7 of 7