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LETTER REPORT
QUARTERLY GROUNDWATER MONITORING
Fourth Quarter 1993
at
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

03/07/94

61035.06

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March 7, 1994

Mr. Michael Whelan
ARCO Products Company
Post Office Box 5811
San Mateo, California 94402

Subject: Letter Report on Quarterly Groundwater Monitoring
Fourth Quarter 1993
ARCO Station 6148
5131 Shattuck Avenue, Oakland, California.

Mr. Whelan:

As requested by ARCO Products Company (ARCO), RESNA Industries Inc. (RESNA) presents this letter report summarizing the results of fourth quarter 1993 groundwater monitoring performed by EMCON Associates (EMCON) of San Jose, California at the above-referenced site (Plates 1 and 2). RESNA's scope of work was to interpret field and laboratory analytical data, which included evaluating trends in hydrocarbon concentrations in the local groundwater, the groundwater gradient, and direction of groundwater flow beneath the site. Evaluation and warrant of EMCON's field procedures, field data, and field protocols, is beyond RESNA's scope of work. Previous environmental work at the site is summarized in RESNA reports cited in the Reference section.

GROUNDWATER MONITORING

Field Work

EMCON field personnel were onsite November 16, 1993, to measure depth-to-water (DTW) levels, perform subjective analysis for the presence of product in groundwater, and perform quarterly sampling of wells MW-1 through MW-7.

Laboratory Analyses

Water samples were analyzed by Columbia Analytical Services, Inc., located in San Jose, California (Hazardous Waste Testing Laboratory Certification #1426) for benzene, toluene, ethylbenzene, and total xylenes (BTEX), and total petroleum hydrocarbons as gasoline (TPHg) using Environmental Protection Agency (EPA) Methods 5030/8020/California DHS LUFT Method, and for halogenated volatile organic compounds (VOCs) using EPA Methods 5030/8010. In addition, groundwater samples were collected from well MW-3 and analyzed for VOCs using EPA Method 624, total oil and grease (TOG) using Standard Method 5520F, and base neutral/acid semivolatile organic compounds (BNAs) using EPA Methods 3510/8270. The Chain of Custody Records and Laboratory Analysis Reports are included in Appendix A.

Results of Groundwater Monitoring

Groundwater elevations fell an average of about 0.09 foot in wells MW-3 through MW-7, and rose an average of 0.18 foot in wells MW-1 and MW-2 since last quarter. Floating product 0.03 foot thick was measured in well MW-2. Evidence of floating product or product sheen was not noted in any other wells during this quarter. Based on November 16, 1993, DTW data, groundwater is interpreted to flow toward the southwest with a gradient of approximately 0.02 ft/ft (Plate 3). Groundwater monitoring data from this and previous quarters is presented in Table 1. The results of EMCON's field work on the site, are presented in Appendix A.

The following trends in hydrocarbon concentrations have been identified since last quarter: concentrations of TPHg and BTEX generally decreased in wells MW-1, MW-3, and MW-5; generally increased in well MW-4; remained generally the same in well MW-6; continued to not be detected in well MW-7; and, floating product continued to be noted in well MW-2 (Plate 4). VOCs continued to be detected in wells MW-1 and MW-3 through MW-7. BNAs BNAs and TOG continue to be detected in well MW-3. Cumulative analytical results of water samples are presented in Table 2.

Floating Product Removal

RESNA field personnel visited the site on October 13, 26, and November 30, 1993, to remove floating product. During these visits, however, only a sheen was present and no floating product was removed.

Previous and Future Work

Fourth Quarter 1993

- Submitted Letter Report, Quarterly Groundwater Monitoring, Third Quarter 1993 to ARCO and regulatory agencies.
- Performed Fourth Quarter 1993 Groundwater Monitoring.
- Monitored floating product in well MW-2.

First Quarter 1994

- Submit Letter Report, Quarterly Groundwater Monitoring, Fourth Quarter 1993 to ARCO and regulatory agencies.
- Perform First Quarter 1994 Groundwater Monitoring.
- Perform monthly product removal from well MW-2.
- Perform an air sparge pilot test.

Reporting Requirements

It is recommended that copies of this 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. Richard Hiett
California Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, California 94612

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

Sincerely,
RESNA Industries Inc.

Erin D. Krueger
Staff Geologist

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

James L. Nelson, C.E.G. 1463
Certified Engineering Geologist

Enclosures: References

Plate 1,	Site Vicinity Map
Plate 2,	Generalized Site Plan
Plate 3,	Groundwater Gradient Map, November 16, 1993
Plate 4,	Concentrations of TPHg/Benzene in Groundwater
Table 1,	Cumulative Groundwater Monitoring Data
Table 2,	Cumulative Results of Laboratory Analyses of Water Samples--TPHg, TPHd, BTEX, TOG, and Metals
Table 3,	Cumulative Results of Laboratory Analyses of Water Samples--VOCs AND BNAs
Appendix A:	EMCON's Field Reports, Summary of Groundwater Monitoring Data, Certified Analytical Reports with Chain-of-Custody, Water Sample Field Data Sheets

REFERENCES

RESNA. September 29, 1992. Work Plan for Additional Subsurface Investigation at ARCO Station 6148, 5131 Shattuck Avenue, Oakland, California. RESNA Report 61035.04.

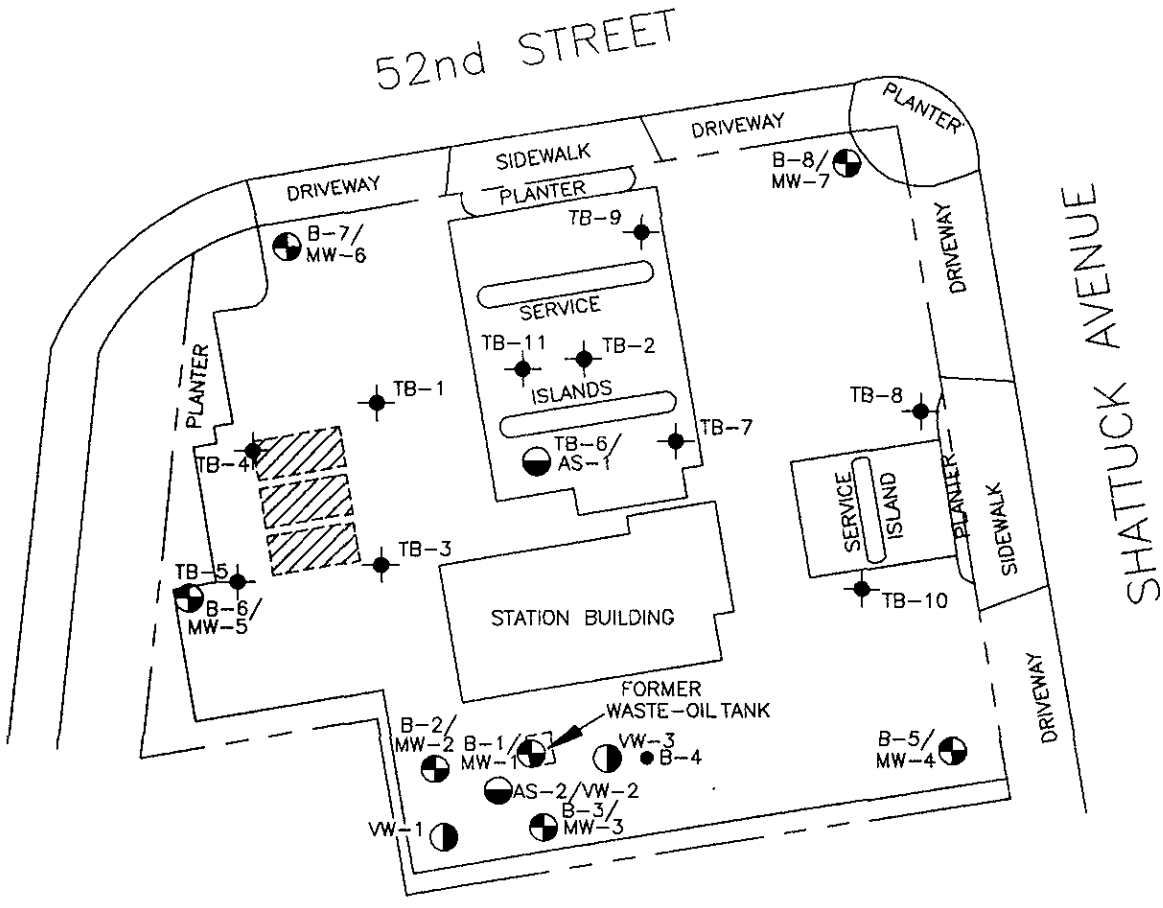
RESNA. December 29, 1993. Letter Report, Quarterly Groundwater Monitoring Third Quarter 1993 at ARCO Station 6148, 5131 Shattuck Avenue in Oakland, California. RESNA Report 61035.06.

Source U.S. Geological Survey
7 5–Minute Quadrangle
Oakland East/West, California
Photorevised 1980

N

Approximate Scale
2000 1000 0 2000
feet

RESNA Working to Restore Nature	SITE VICINITY MAP ARCO Station 6148 5131 Shattuck Avenue Oakland, California	PLATE 1
PROJECT 61035.06		



EXPLANATION

= Existing underground storage tanks

B-4 ● = Soil boring (*RESNA, December* 1991)

B-8/MW-7 = Monitoring well (RESNA, December 1991 and October 1992)

VW-3 = Vapor extraction well (RESNA, June 1993)

AS-2/VW-2 = Air-sparge/vapor extraction well (RESNA, June 1993)

TB-11 = Test boring (RESNA, April 1993)

TB-6/AS-1 = Test boring/Air-sparge well (RESNA, April 1993)

Approximate Scale

40 20 0 40 80

feet

Source: Based on data by John Koch, Land Surveyor, November 1992.

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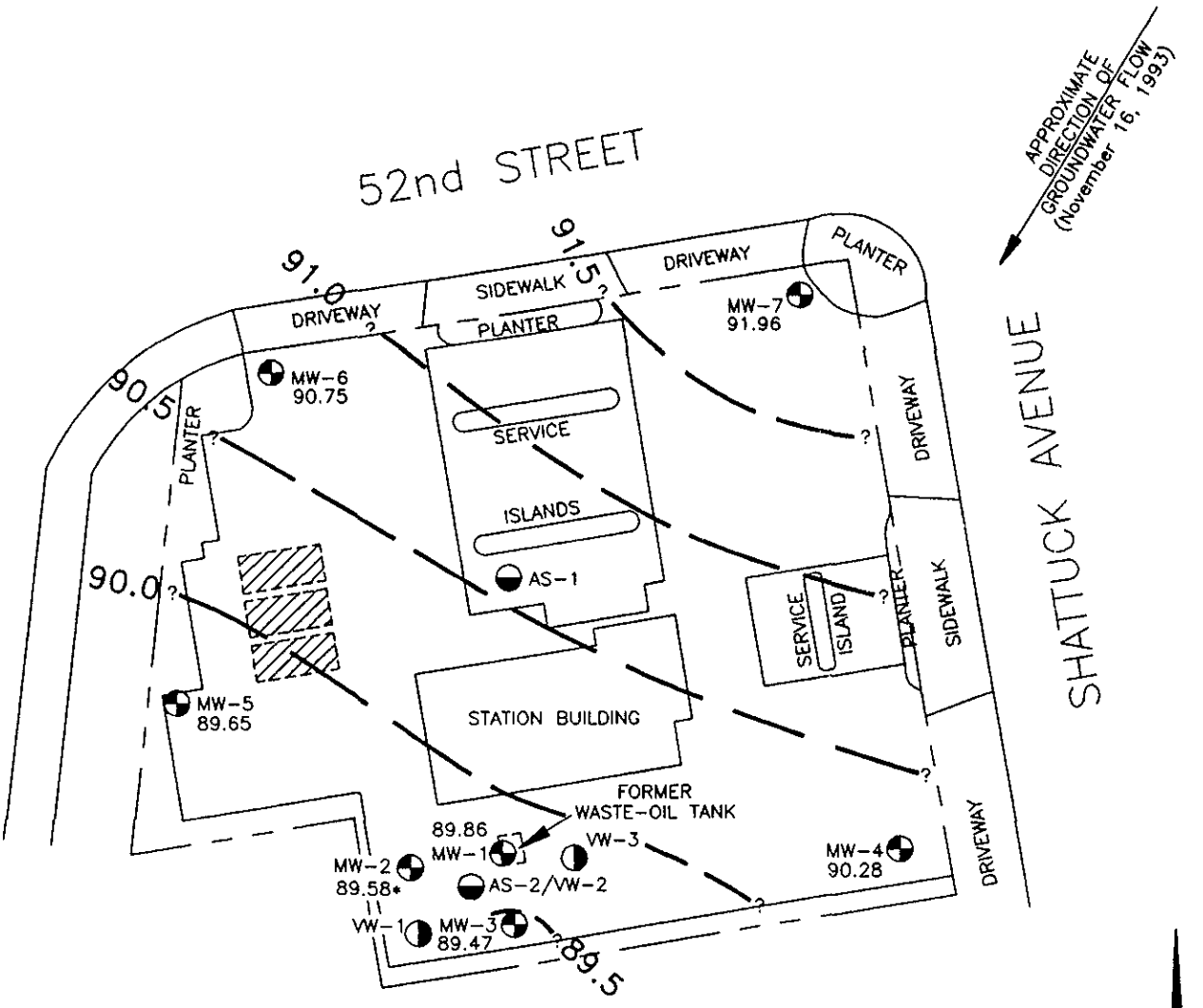
GENERALIZED SITE PLAN
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE 2



EXPLANATION

AS-2/VW-2 = Air-sparge/vapor extraction well (RESNA, June 1993)

MW-7 = Monitoring well (RESNA, December 1991 and October 1992)

VW-3 = Vapor extraction well (RESNA, June 1993)

= Underground storage tanks

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

91.96 = Elevation of groundwater in feet above MSL, November 16, 1993

* = Elevation corrected for presence of floating product

Approximate Scale

40 20 0 40 80

feet

Source: Based on data supplied by John Koch, Land Surveyor, November 1992.

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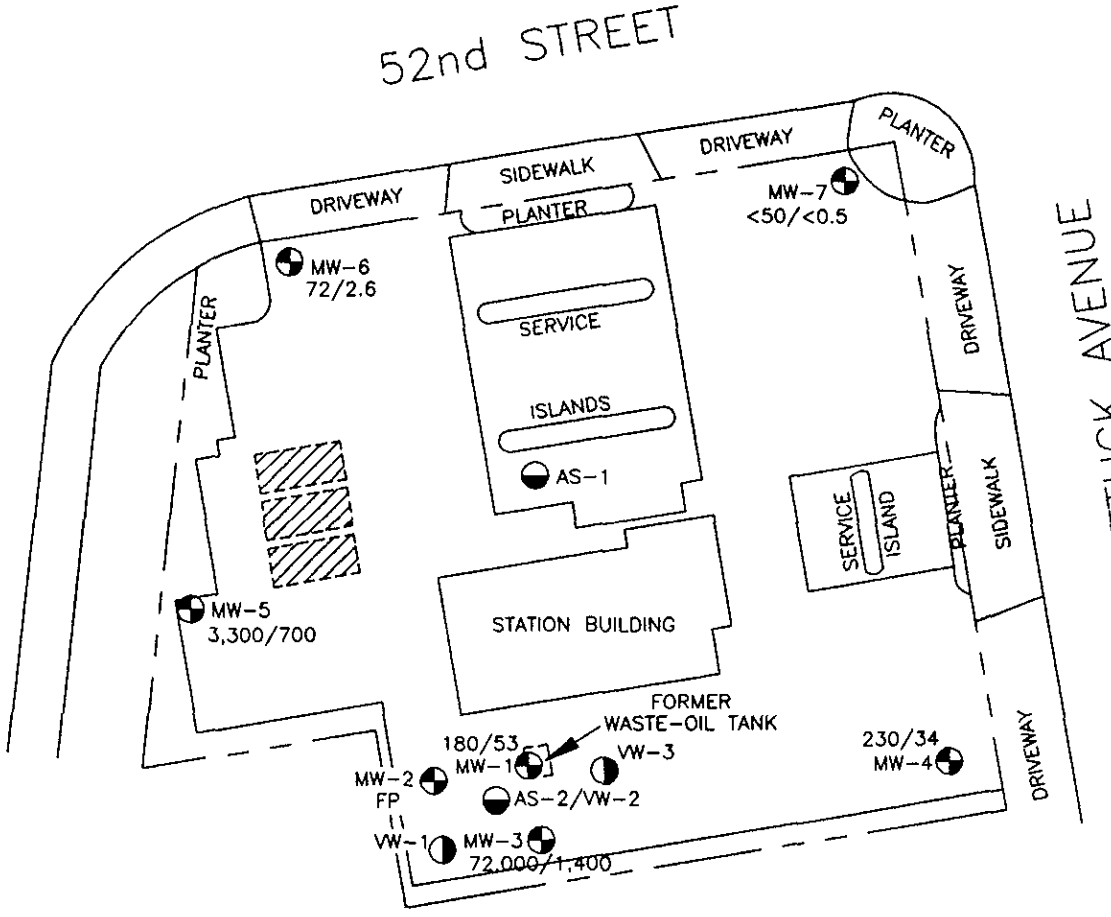
GROUNDWATER GRADIENT MAP

ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE 3



EXPLANATION

AS-2/VW-2 = Air-sparge/vapor extraction well (RESNA, June 1993)

MW-7 = Monitoring well (RESNA, December 1991 and October 1992)

VW-3 = Vapor extraction well (RESNA, June 1993)

= Underground storage tanks

72,000/1,400 = Concentrations of TPHg/Benzene in groundwater in parts per billion (ppb), November 16, 1993

FP = Floating product present in well, not sampled

N

Approximate Scale

40 20 0 40 80

feet

Source: Based on data supplied by John Koch, Land Surveyor, November 1992.

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CONCENTRATIONS OF TPHg/BENZENE IN GROUNDWATER
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE 4

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6148
Oakland, California
(Page 1 of 4)

Date Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-1				
12-23-91	108.03	18.26	89.77	Sheen
01-07-92		17.44	90.59	Sheen
01-19-92		17.17	90.86	None
02-19-92		16.52	91.51	None
03-18-92		16.81	91.22	None
04-20-92		17.56	90.47	None
05-15-92		17.96	90.07	None
06-12-92		18.16	89.87	None
07-15-92		18.32	89.71	None
08-07-92		18.34	89.69	None
09-14-92		18.46	89.57	None
10-07-92		18.52	89.51	None
11-12-92		18.11	89.92	None
12-09-92		17.10	90.93	None
01-21-93		15.44	92.59	None
02-22-93		16.54	91.49	None
03-25-93		17.05	90.98	None
04-14-93		17.45	90.58	None
05-22-93		17.78	90.25	None
06-17-93		17.90	90.13	None
07-27-93		18.10	89.93	None
08-29-93		18.31	89.72	None
09-30-93		18.24	89.79	None
11-16-93		18.17	89.86	None
MW-2				
12-23-91	107.43	17.98	89.45	Sheen
01-07-92		17.15	90.28	Sheen
01-19-92		17.47	89.96	None
02-19-92		16.28	91.15	None
03-18-92		16.52	90.91	None
04-20-92		17.27	90.16	None
05-15-92		17.62	89.81	None
06-12-92		17.63*	89.80*	0.05
07-15-92		17.65	89.78	None
08-07-92		17.80	89.63	None
09-14-92		18.09*	89.34*	0.55
10-07-92		18.55*	88.88*	0.31
11-12-92		17.95	89.48	Sheen
12-09-92		16.85*	90.58*	0.02
01-21-93		15.08*	92.35*	0.01
02-22-93		16.20*	91.23*	0.01
03-25-93	107.43	16.72*	90.71*	0.01
04-14-93		17.15*	90.28*	0.01

See notes on page 4 of 4.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6148
Oakland, California
(Page 2 of 4)

Date Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-2 (cont.)				
05-22-93		17.44*	89.99*	0.07
06-17-93		17.57	89.86	None
07-27-93		17.71*	89.72*	0.26
08-29-93		18.20*	89.23*	0.03
09-30-93		18.14*	89.29*	0.01
11-16-93		17.85*	89.58*	0.03
MW-3				
12-23-91	107.77	18.14	89.63	Sheen
01-07-92		17.26	90.51	Sheen
01-19-92		17.63	90.14	None
02-19-92		16.34	91.43	None
03-18-92		16.62	91.15	None
04-20-92		17.38	90.39	None
05-15-92		17.80	89.97	None
06-12-92		18.01	89.76	None
07-15-92		18.17	89.60	None
08-07-92		18.23	89.54	None
09-14-92		18.36	89.41	None
10-07-92		18.90	88.87	Sheen
11-12-92		18.00	89.77	Sheen
12-09-92		16.85	90.92	Droplets
01-21-93		15.24	92.53	None
02-22-93		16.36	91.41	None
03-25-93		16.89	90.88	None
04-14-93		17.29	90.48	None
05-22-93		17.64	90.13	None
06-17-93		17.75	90.02	None
07-27-93		17.98	89.79	None
08-29-93		18.14	89.63	None
09-30-93		18.14	89.63	None
11-16-93		18.30	89.47	None
MW-4				
11-12-92	106.58	16.08	90.50	None
12-09-92		15.00	91.58	None
01-21-93		13.35	93.23	None
02-22-93		14.48	92.10	None
03-25-93		15.06	91.52	None
04-14-93		15.50	91.08	None
05-22-93	106.58	15.79	90.79	None
06-17-93		14.90	91.68	None
07-27-93		16.11	90.47	None
08-29-93		16.21	90.37	None

See notes on page 4 of 4.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6148
Oakland, California
(Page 3 of 4)

Date Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-4 (cont.)				
09-30-93		16.23	90.35	None
11-16-93		16.30	90.28	None
MW-5				
11-12-92	106.68	16.81	89.87	None
12-09-92		16.40	90.28	None
01-21-93		14.58	92.10	None
02-22-93		15.65	91.03	None
03-25-93		16.07	90.61	None
04-14-93		16.34	90.34	None
05-22-93		16.56	90.12	None
06-17-93		NA	—	—
07-27-93		16.80	89.88	None
08-29-93		16.93	89.75	None
09-30-93		16.97	89.71	None
11-16-93		17.03	89.65	None
MW-6				
11-12-92	105.16	14.05	91.11	None
12-09-92		13.37	91.79	None
01-21-93		11.76	93.40	None
02-22-93		12.62	92.54	None
03-25-93		13.04	92.12	None
04-14-93		13.47	91.69	None
05-22-93		13.80	91.36	None
06-17-93		13.88	91.28	None
07-27-93		14.13	91.03	None
08-29-93		14.19	90.97	None
09-30-93		14.34	90.82	None
11-16-93		14.41	90.75	None
MW-7				
11-12-92	107.08	14.75	92.33	None
12-09-92		12.55	94.53	None
01-21-93		11.52	95.56	None
02-22-93		12.82	94.26	None
03-25-93		13.43	93.65	None
04-14-93		13.98	93.10	None
05-22-93	107.08	14.41	92.67	None
06-17-93		14.50	92.58	None
07-27-93		14.82	92.26	None
08-29-93		15.05	92.03	None
09-30-93		15.04	92.04	None
11-16-93		15.12	91.96	None

See notes on page 4 of 4.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6148
Oakland, California
(Page 4 of 4)

Date Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
AS-2**				
09-30-93	---	18.31	---	None

Measurements in feet.
Well elevation = Top of casing elevations.
Wells surveyed on November 9, 1992, by John Koch. Datum is City of Oakland = (USGS) + 3.00
Elevations in feet above mean sea level.
* indicates that the depth to water (DTW) and water elevation were corrected for the presence of floating product by the following method. Measured product thickness (PT) is multiplied by a correction factor of 0.8 and subtracted from DTW to get adjusted DTW. (Adjusted DTW = DTW - [PT X 0.8]). The corrected DTW is then subtracted from the well elevation.
** = Well monitored as a one-time event following installation.

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TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES-
TPHg, TPHd, BTEX, TOG, and Metals
ARCO Station 6148
Oakland, California
(Page 1 of 2)

Well / Date	TPHg	TPHd	B	T	E	X	Cd	Cr	Pb	Ni	Zn	TOG
MW-1												
03-18-92	790	<50	310	26	12	44	<3	5	3	<20	31	<0.5 (1.4)
06-12-92	1,000	<50	290	15	10	30	NA	NA	NA	NA	NA	<0.5
09-14-92	1,000	<80*	370	6.5	6.5	17	NA	NA	NA	NA	NA	0.9
10-07-92	590	<50	200	19	6.7	19	NA	NA	NA	NA	NA	<0.5
01-22-93	1,200	NA	370	57	18	39	NA	NA	NA	NA	NA	NA
04-14-93	140	NA	46	<2.5	<2.5	<2.5	<3	<5	3	<20	25	NA
09-30-93	220	NA	64	0.9	2.2	4.0	NA	NA	NA	NA	NA	NA
11-16-93	180	NA	53	0.7	1.7	4.1	NA	NA	NA	NA	NA	NA
MW-2												
03-18-92	8,400	230**	1,400	1,000	220	870	<3	21	9	38	54	1.2 (3.0)
06-12-92	Not sampled--floating product											
09-14-92	Not sampled--floating product											
10-07-92	Not sampled--floating product											
01-22-93	Not sampled--floating product											
04-14-93	Not sampled--floating product											
09-30-93	Not sampled--floating product											
11-16-93	Not sampled--floating product											
MW-3												
03-18-92	20,000	2,800**	3,200	560	380	1,000	<3	67	27	113	156	7.8 (8.1)
06-12-92	46,000	1,600**	3,400	4,200	1,300	5,400	NA	NA	NA	NA	NA	16
09-14-92	53,000	40,000**	4,300	5,700	1,300	7,300	NA	NA	NA	NA	NA	5.5
10-07-92	Not sampled--floating product											
01-22-93	35,000	13,000**	2,100	1,400	1,200	4,400	<3	10	8	23	28	31
04-14-93	13,000	<50	1,800	390	990	3,500	<3	<5	3	<20	25	26
09-30-93	79,000	17,000**	2,400	3,400	1,900	8,100	<5	50	26	70	100	23
11-16-93	72,000	NA	1,400	2,100	1,900	8,300	NA	NA	NA	NA	NA	38
MW-4												
11-12-92	77	NA	32	<0.50	<0.50	<0.50	NA	NA	NA	NA	NA	NA
01-22-93	170	NA	66	0.8	<0.5	1.5	NA	NA	NA	NA	NA	NA
04-14-93	<50	NA	4.6	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
09-30-93	52	NA	13	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
11-16-93	230	NA	34	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
MW-5												
11-12-92	2,900	NA	1,300	12	67	18	NA	NA	NA	NA	NA	NA
01-22-93	17,000	NA	5,000	780	260	330	NA	NA	NA	NA	NA	NA
04-14-93	12,000	NA	4,600	<50	180	130	NA	NA	NA	NA	NA	NA
09-30-93	4,500	NA	1,100	<10***	39	16	NA	NA	NA	NA	NA	NA
11-16-93	3,300	NA	700	<10***	22	<10***	NA	NA	NA	NA	NA	NA

See Notes on Page 2 of 2.

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TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES-
TPHg, TPHd, BTEX, TOG, and Metals
ARCO Station 6148
Oakland, California
(Page 2 of 2)

Well Date	TPHg	TPHd	B	T	E	X	Cd	Cr	Pb	Ni	Zn	TOG
MW-6												
11-12-92	51	NA	2.6	<0.50	<0.50	<0.50	NA	NA	NA	NA	NA	NA
01-22-93	<50	NA	1.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
04-14-93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
09-30-93	74	NA	2.0	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
11-16-93	72	NA	2.6	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
MW-7												
11-12-92	<50	NA	1.8	<0.50	<0.50	<0.50	NA	NA	NA	NA	NA	NA
01-22-93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
04-14-93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
09-30-93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
11-16-93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
AS-2#												
09-30-93	<50	NA	1.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
MCL:	—	—	1	—	680	1,750	10	50	50	—	—	—
DWAL:	—	—	—	100	—	—	—	—	—	—	—	—

Results in parts per billion (ppb), except TOG which is in parts per million (ppm).

TPHg: Total petroleum hydrocarbons as gasoline using EPA method 5030/8015/8020.
TPHd: Total petroleum hydrocarbons as diesel using EPA method 3510/California DHS LUFT Method.
BTEX: Benzene, toluene, ethylbenzene, total xylenes isomers. Analyzed using EPA method 5030/8020/DHS LUFT Method.
TOG: Total oil and grease using Standard method 5520F-IR (on 09/14/92 by EPA Method 418.1)
Cd: Cadmium using EPA method 6010.
Cr: Chromium using EPA method 6010.
Pb: Lead using EPA method 7421.
Zn: Zinc using EPA method 6010.
Ni: Nickel using EPA method 6010.
( ): Concentrations in parentheses were results of Method 5520C.
*: Raised Method Reporting Limit (MRL) due to insufficient sample quantity.
#: Well sampled as a one-time event following installation.
<: Results reported below the listed laboratory detection limit.
**: Laboratory reported sample contains a lower boiling point hydrocarbon mixture quantified as diesel. The chromatogram does not match the typical diesel fingerprint, but appears to be weathered gasoline.
***: Raised MRL due to high analyte concentration requiring sample dilution.
MCL: Adopted Maximum Contaminant Levels in Drinking Water (DHS, October 1990).
DWAL: Recommended Drinking Water Action Level (DHS, October 1990).
NA: Not Analyzed

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TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF WATER SAMPLES-VOCs AND BNAs
ARCO Station 6148
Oakland, California
(Page 1 of 3)

Date/Well	Compound	VOCs (ppb)	Compound	BNAs (ppb)
MW-1				
03-18-92	Tetrachloroethene	13		NA
	Trichloroethene	1.2		
06-12-92	Tetrachloroethene	18		NA
	Trichloroethene	1.4		
09-14-92	Tetrachloroethene	15		NA
	Trichloroethene	1.5		
10-07-92	Tetrachloroethene	23		NA
	Trichloroethene	1.5		
	Chloroform	0.6		
01-22-93	Tetrachloroethene	11		<20
	Trichloroethene	0.9		
04-14-93	Tetrachloroethene	21		NA
	Trichloroethene	1.8		
	Chloroform	0.6		
09-30-93	Tetrachloroethene	19		NA
	Trichloroethene	1.1		
	Chloroform	0.7		
11-16-93	Tetrachloroethene	22		NA
	Trichloroethene	0.9		
MW-2				
03-18-92	Tetrachloroethene	19		NA
	Trichloroethene	2.22		
	cis-1,2-Dichloroethene	0.5		
06-12-92	Not sampled--floating product			NA
09-14-92	Not sampled--floating product			NA
10-07-92	Not sampled--floating product			NA
01-22-93	Not sampled--floating product			NA
04-14-93	Not sampled--floating product			NA
09-30-93	Not sampled--floating product			NA
11-16-93	Not sampled--floating product			NA
MW-3				
03-18-92	Tetrachloroethene	2.7	NA	
06-12-92	Tetrachloroethene	1.9	NA	
09-14-92	Tetrachloroethene	2.0	NA	
10-07-92	Not sampled--floating product		NA	
01-22-93	Tetrachloroethene	1.9	Naphthalene	440
			2-Methylnaphthalene	350
			Bis(2-ethylhexyl) Phthalate	280
			Di-n-octyl Phthalate	13
04-14-93	Tetrachloroethene	1.7	Naphthalene	130
			2-Methylnaphthalene	100

See Notes on Page 3 of 3.

RESNA
Working to Restore Nature

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF WATER SAMPLES-VOCs AND BNAs
ARCO Station 6148
Oakland, California
(Page 2 of 3)

Date/Well	Compound	VOCs (ppb)	Compound	BNAs (ppb)
MW-3 (cont.)				
			Bis(2-ethylhexyl) Phthalate	250
			Di-n-octyl Phthalate	14
09-30-93	Tetrachloroethene	1.2	Naphthalene	480
			2-Methylnaphthalene	320
11-16-93**	Tetrachloroethene	1.5	Naphthalene	590
			2-Methylnaphthalene	640
MW-4				
01-22-93	Tetrachloroethene	1.4		<20
04-14-93	Tetrachloroethene	1.1		NA
09-30-93	Tetrachloroethene	1.6		NA
11-16-93	Tetrachloroethene	1.9		NA
MW-5				
01-22-93	Tetrachloroethene	11		<20
	Trichloroethene	4.7		<20
	cis-1,2-Dichloroethene	1.8		<20
04-14-93	Tetrachloroethene	7.9		NA
	Trichloroethene	2.0		
	cis-1,2-Dichloroethene	1.5		
	Vinyl chloride	0.9		
09-30-93	Tetrachloroethene	17		NA
	Trichloroethene	2.8		
	cis-1,2-Dichloroethene	2.9		
	Vinyl chloride	0.8		
11-16-93	Tetrachloroethene	19		NA
	Trichloroethene	5.1		
	cis-1,2-Dichloroethene	4.0		
MW-6				
01-22-93	Tetrachloroethene	120		NA
	Trichloroethene	6.2		
	Chloroform	6.6		
	cis-1,2-Dichloroethene	1.8		
04-14-93	Tetrachloroethene	120		NA
	Trichloroethene	5.8		
	cis-1,2-Dichloroethene	1.1		
	1,1-Dichloroethane	6.3		
09-30-93	Tetrachloroethene	220		NA
	Trichloroethene	5.2		
	cis-1,2-Dichloroethene	2.7		

See Notes on Page 3 of 3.

RESNA
Working to Restore Nature

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF WATER SAMPLES-VOCs AND BNAs
ARCO Station 6148
Oakland, California
(Page 3 of 3)

Date/Well	Compound	VOCs (ppb)	Compound	BNAs (ppb)
MW-6 (cont.)				
11-16-93	Tetrachloroethene	160		NA
	Trichloroethene	8.5		
	cis-1,2-Dichloroethene	3.2		
	Chloroform	15		
MW-7				
01-22-93	Tetrachloroethene	6.8		NA
04-14-93	Tetrachloroethene	4.3		NA
09-30-93	Tetrachloroethene	2.5		NA
11-16-93	Tetrachloroethene	4.0		NA
AS-2***				
09-30-93	Tetrachloroethene	29		
	Trichloroethene	1.5		
	Chloroform	1.0		NA
MCL:	PCE 5	TCE 5	cis-1,2-DCE 6*	

Results in parts per billion (ppb).
VOCs: Volatile Organic Compounds by EPA method 5030/8010. Compounds not shown were not detected.
MCLs: Maximum Contaminant Levels as reported by the California Department of Health Services 10/24/90.
*: Proposed MCL.
**: VOCs using EPA 624 were not detected except BTEX
***: Well sampled as a one-time event following installation.
NA: Not analyzed

APPENDIX A

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

EMCON Associates
1921 Ringwood Avenue • San Jose, California 95131-1721 • **(408) 453-7300** • Fax (408) 437-9526

RECEIVED
DEC 10 1993
RESNA
SAN JOSE

Date December 7, 1993
Project 0G70-039.01

To:
Mr. John Young
RESNA
3315 Almaden 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 fourth quarter 1993 monitoring event at ARCO service station 6148, located at 5131 Shattuck Avenue, Oakland CA. Groundwater monitoring is conducted consistent with applicable regulatory guidelines. Please call if you have any questions. (408) 453-7300.

Reviewed by: Jim Butera

REGISTERED PROFESSIONAL ENGINEER No. 4034 Exp. 6/3/94 INDUSTRIAL STATE OF CALIFORNIA

Robert C Porter
Robert Porter, Senior Project Engineer.

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 0G70-039.01 STATION ADDRESS : 5131 Shattuck Ave., Oakland, CA DATE : 11-16-93

ARCO STATION # : 6148 FIELD TECHNICIAN : M. Gallegos 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-7**	Good	15/16	Good	3259	Good	15.12	15.12	ND	NA	27.0	—
2	**MW-6**	Good	15/16	Good	3259	Good	14.41	14.41	ND	NA	26.6	—
3	**MW-4**	Good	15/16	Good	3259	Good	16.30	16.30	ND	NA	26.0	—
4	**MW-1**	Good	15/16	Good	3259	Good	18.17	18.17	ND	NA	25.8	Strong odor
5	**MW-5**	Good	15/16	Good	3259	Good	17.03	17.03	ND	NA	25.0	—
6	**MW-3**	Good	15/16	Good	3259	Good	18.30	18.30	ND	NA	25.8	—
7	**MW-2**	Good	15/16	Good	3259	Good	17.87	17.87	17.84	.03	25.8	Strong Odor

SURVEY POINTS ARE TOP OF WELL CASINGS

Summa.y of Groundwater Monitoring Data
Fourth Quarter 1993
ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, 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)	Total Oil and Grease, 5520F (mg/l)
MW-1(25)	11/16/93	18.17	ND.[2]	180.	53.	0.7	1.7	4.1	NR.[3]
MW-2	11/16/93	17.87	0.01	FP.[4]	FP.	FP.	FP.	FP.	FP.
MW-3(25)	11/16/93	18.30	ND.	72,000.	1,400.	2,100.	1,900.	8,300.	38.
MW-4(26)	11/16/93	16.30	ND.	230.	34.	<0.5	<0.5	<0.5	NR.
MW-5(25)	11/16/93	17.03	ND.	3,300.	700.	<10.	22.	<10.	NR.
MW-6(26)	11/16/93	14.41	ND.	72.	2.6	<0.5	<0.5	<0.5	NR.
MW-7(27)	11/16/93	15.12	ND.	<50.	<0.5	<0.5	<0.5	<0.5	NR.
FB-1.[5]	11/16/93	NA.[6]	NA.	<50	<0.5	<0.5	<0.5	<0.5	NR.

1. TPH. = Total petroleum hydrocarbons
2. ND. = Not detected
3. NR. = Not reported; sample was not scheduled for analysis of the selected parameter
4. FP.= Floating product detected in well, no sample was taken
5. FB. = Field Blank
6. NA. = Not applicable

Summary of Analytical Results
Halogenated Volatile Organic Compounds by EPA[1] Methods 5030/601
Fourth Quarter 1993
ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California
micrograms per liter (µg/l) or parts per billion (ppb)

Well ID and Sample Depth	*cis* - 1,2-DCE[2] (ppb)	Chloroform (ppb)	TCE[3] (ppb)	Vinyl Chloride (ppb)	1,1-Dichloro-ethane (ppb)	PCE[4] (ppb)
MW-1(25)	<0.5	<0.5	0.9	<0.5	<0.5	22.
MW-2	FP.[5]	FP.	FP.	FP.	FP.	FP.
MW-3(25)	<0.5	<0.5	<0.5	<0.5	<0.5	1.5
MW-4(26)	<0.5	<0.5	<0.5	<0.5	<0.5	1.9
MW-5(25)	4.0	<0.5	5.1	<0.5	<0.5	19.
MW-6(26)	3.2	15.	8.5	<0.5	<0.5	160.
MW-7(27)	<0.5	<0.5	<0.5	<0.5	<0.5	4.0

1. EPA = United States Environmental Protection Agency.
2. *cis* - 1,2- DCE = *cis* - 1,2- Dichloroethene
3. TCE = Trichloroethene
4. PCE = Tetrachloroethene
5. FP.= Floating product detected, well not sampled

Summary of Analytical Results
Base Neutral / Acid Semivolatile Organic Compounds by EPA[1] Methods 3510/8270
Third Quarter 1993
ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California
micrograms per liter (µg/l) or parts per billion (ppb)

Well ID and Sample Depth	Naphthalene (ppb)	2-Methylnaphthalene (ppb)
MW-3(25)	590.	640.

1. EPA = United States Environmental Protection Agency.

Summary of Analytical Results
Volatile Organic Compounds by EPA[1] Method 624
Fourth Quarter 1993
ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California
micrograms per liter (µg/l) or parts per billion (ppb)

Well ID and Sample Depth	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Total Xylenes (ppb)
MW-3(25)	1,700.	2,700.	2,600.	11,000.

1. EPA = United States Environmental Protection Agency.

Columbia Analytical Services inc.

December 2, 1993 Service Request No. SJ93-1409

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

Re: **EMCON Project No. 0G70-039.01**
ARCO Facility No. 6148

Dear Mr. Butera:

Attached are the results of the water samples submitted to our lab on November 16, 1993. For your reference, these analyses have been assigned our service request number SJ93-1409.

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

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Carol J Klein
Keoni A. Murphy
Laboratory Manager

Annelise Jade Bazar
Annelise J. Bazar
Regional QA Coordinator

KAM/drf

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

Acronyms

ASTM	American Society for Testing and Materials
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NR	Not Requested
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
VPH	Volatile Petroleum Hydrocarbons

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	11/16/93
Project:	ARCO Project No. 0G70-039.01	**Service Request No.:**	SJ93-1409
	ARCO Facility No. 6148	**Sample Matrix:**	Water

Inorganic Parameters[1]
mg/L (ppm)

Sample Name:		MW-3 (25)	Method Blank
Date Sampled:		11/16/93	
Analyte	**Method**	**MRL**	
Hydrocarbons, IR	SM 5520F	0.5	38.	ND

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

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

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	11/16/93
Project:	EMCON Project No. 0G70-039.01	**Service Request No.:**	SJ93-1409
	ARCO Facility No. 6148	**Sample Matrix:**	Water

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

Sample Name:		MW-1 (25)	MW-3 (25)	MW-4 (26)
Date Analyzed:		11/23/93 *	11/23/93	11/24/93 **
Analyte	**MRL**			
Benzene	0.5	53.	1,400.	34.
Toluene	0.5	0.7	2,100.	ND
Ethylbenzene	0.5	1.7	1,900.	ND
Total Xylenes	0.5	4.1	8,300	ND
TPH as Gasoline	50	180.	72,000.	230.

Sample Name:		MW-5 (25)	MW-6 (26)	MW-7 (27)
Date Analyzed:		11/23/93	11/23/93 *	11/23/93 *
Analyte	**MRL**			
Benzene	0.5	700.	2.6	ND
Toluene	0.5	<10. ***	ND	ND
Ethylbenzene	0.5	22.	ND	ND
Total Xylenes	0.5	<10. ***	ND	ND
TPH as Gasoline	50	3,300.	72.	ND

* This sample was part of the analytical batch started on November 23, 1993. However, it was analyzed after midnight so the actual date analyzed is November 24, 1993.

** This sample was part of the analytical batch started on November 24, 1993. However, it was analyzed after midnight so the actual date analyzed is November 25, 1993.

*** Raised MRL due to high analyte concentration requiring sample dilution.

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	11/16/93
Project:	EMCON Project No. 0G70-039.01	**Service Request No.:**	SJ93-1409
	ARCO Facility No. 6148	**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	Method Blank
Date Analyzed:		11/23/93 *	11/23/93	11/24/93
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

* This sample was part of the analytical batch started on November 23, 1993. However, it was analyzed after midnight so the actual date analyzed is November 24, 1993.

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	11/16/93
Project:	EMCON Project No. 0G70-039.01	**Service Request No.:**	SJ93-1409
	ARCO Facility No. 6148	**Sample Matrix:**	Water

Halogenated Volatile Organic Compounds
EPA Methods 5030/8010
µg/L (ppb)

Sample Name:		MW-1 (25)	MW-3 (25)	MW-4 (26)
Date Analyzed:		11/19/93	11/23/93	11/23/93
Analyte	MRL			
Dichlorodifluoromethane (Freon 12)	1	ND	ND	ND
Chloromethane	1	ND	ND	ND
Vinyl Chloride	0.5	ND	ND	ND
Bromomethane	0.5	ND	ND	ND
Chloroethane	0.5	ND	ND	ND
Trichlorofluoromethane (Freon 11)	0.5	ND	ND	ND
1,1-Dichloroethene	0.5	ND	ND	ND
Trichlorotrifluoroethane (Freon 113)	0.5	ND	ND	ND
Methylene Chloride	1	ND	ND	ND
trans-1,2-Dichloroethene	0.5	ND	ND	ND
cis-1,2-Dichloroethene	0.5	ND	ND	ND
1,1-Dichloroethane	0.5	ND	ND	ND
Chloroform	0.5	ND	ND	ND
1,1,1-Trichloroethane (TCA)	0.5	ND	ND	ND
Carbon Tetrachloride	0.5	ND	ND	ND
1,2-Dichloroethane	0.5	ND	ND	ND
Trichloroethene (TCE)	0.5	0.9	ND	ND
1,2-Dichloropropane	0.5	ND	ND	ND
Bromodichloromethane	0.5	ND	ND	ND
2-Chloroethyl Vinyl Ether	5	ND	ND	ND
trans-1,3-Dichloropropene	0.5	ND	ND	ND
cis-1,3-Dichloropropene	0.5	ND	ND	ND
1,1,2-Trichloroethane	0.5	ND	ND	ND
Tetrachloroethene (PCE)	0.5	22.	1.5	1.9
Dibromochloromethane	0.5	ND	ND	ND
Chlorobenzene	0.5	ND	ND	ND
Bromoform	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.5	ND	ND	ND
1,3-Dichlorobenzene	1	ND	ND	ND
1,4-Dichlorobenzene	1	ND	ND	ND
1,2-Dichlorobenzene	1	ND	ND	ND

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	11/16/93
Project:	EMCON Project No. 0G70-039.01	**Service Request No.:**	SJ93-1409
	ARCO Facility No. 6148	**Sample Matrix:**	Water

Halogenated Volatile Organic Compounds
EPA Methods 5030/8010
µg/L (ppb)

Sample Name:		MW-5 (25)	MW-6 (26)	MW-7 (27)
Date Analyzed:		11/19/93	11/19/93	11/19/93
Analyte	**MRL**			
Dichlorodifluoromethane (Freon 12)	1	ND	ND	ND
Chloromethane	1	ND	ND	ND
Vinyl Chloride	0.5	ND	ND	ND
Bromomethane	0.5	ND	ND	ND
Chloroethane	0.5	ND	ND	ND
Trichlorofluoromethane (Freon 11)	0.5	ND	ND	ND
1,1-Dichloroethene	0.5	ND	ND	ND
Trichlorotrifluoroethane (Freon 113)	0.5	ND	ND	ND
Methylene Chloride	1	ND	ND	ND
trans-1,2-Dichloroethene	0.5	ND	ND	ND
cis-1,2-Dichloroethene	0.5	4.0	3.2	ND
1,1-Dichloroethane	0.5	ND	ND	ND
Chloroform	0.5	ND	15.	ND
1,1,1-Trichloroethane (TCA)	0.5	ND	ND	ND
Carbon Tetrachloride	0.5	ND	ND	ND
1,2-Dichloroethane	0.5	ND	ND	ND
Trichloroethene (TCE)	0.5	5.1	8.5	ND
1,2-Dichloropropane	0.5	ND	ND	ND
Bromodichloromethane	0.5	ND	ND	ND
2-Chloroethyl Vinyl Ether	5	ND	ND	ND
trans-1,3-Dichloropropene	0.5	ND	ND	ND
cis-1,3-Dichloropropene	0.5	ND	ND	ND
1,1,2-Trichloroethane	0.5	ND	ND	ND
Tetrachloroethene (PCE)	0.5	19.	160.	4.0
Dibromochloromethane	0.5	ND	ND	ND
Chlorobenzene	0.5	ND	ND	ND
Bromoform	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.5	ND	ND	ND
1,3-Dichlorobenzene	1	ND	ND	ND
1,4-Dichlorobenzene	1	ND	ND	ND
1,2-Dichlorobenzene	1	ND	ND	ND

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	11/16/93
Project:	*EMCON Project No.* 0G70-039.01	**Service Request No.:**	SJ93-1409
	ARCO Facility No. 6148	**Sample Matrix:**	Water

Halogenated Volatile Organic Compounds
EPA Methods 5030/8010
µg/L (ppb)

Sample Name:		Method Blank	Method Blank
Date Analyzed:		11/19/93	11/23/93
Analyte	**MRL**		
Dichlorodifluoromethane (Freon 12)	1	ND	ND
Chloromethane	1	ND	ND
Vinyl Chloride	0.5	ND	ND
Bromomethane	0.5	ND	ND
Chloroethane	0.5	ND	ND
Trichlorofluoromethane (Freon 11)	0.5	ND	ND
1,1-Dichloroethene	0.5	ND	ND
Trichlorotrifluoroethane (Freon 113)	0.5	ND	ND
Methylene Chloride	1	ND	ND
trans-1,2-Dichloroethene	0.5	ND	ND
cis-1,2-Dichloroethene	0.5	ND	ND
1,1-Dichloroethane	0.5	ND	ND
Chloroform	0.5	ND	ND
1,1,1-Trichloroethane (TCA)	0.5	ND	ND
Carbon Tetrachloride	0.5	ND	ND
1,2-Dichloroethane	0.5	ND	ND
Trichloroethene (TCE)	0.5	ND	ND
1,2-Dichloropropane	0.5	ND	ND
Bromodichloromethane	0.5	ND	ND
2-Chloroethyl Vinyl Ether	5	ND	ND
trans-1,3-Dichloropropene	0.5	ND	ND
cis-1,3-Dichloropropene	0.5	ND	ND
1,1,2-Trichloroethane	0.5	ND	ND
Tetrachloroethene (PCE)	0.5	ND	ND
Dibromochloromethane	0.5	ND	ND
Chlorobenzene	0.5	ND	ND
Bromoform	0.5	ND	ND
1,1,2,2-Tetrachloroethane	0.5	ND	ND
1,3-Dichlorobenzene	1	ND	ND
1,4-Dichlorobenzene	1	ND	ND
1,2-Dichlorobenzene	1	ND	ND

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039.01
ARCO Facility No. 6148

Date Received: 11/16/93
Service Request No.: SJ93-1409
Sample Matrix: Water

Volatile Organic Compounds
EPA Method 624
µg/L (ppb)

Sample Name:		MW-3 (25) *	Method Blank
Date Analyzed:		11/30/93	11/30/93
Analyte	**MRL**		
Chloromethane	10	<500.	ND
Vinyl Chloride	10	<500.	ND
Bromomethane	10	<500.	ND
Chloroethane	10	<500.	ND
Trichlorofluoromethane (Freon 11)	1	<50.	ND
Trichlorotrifluoroethane (Freon 113)	10	<500.	ND
1,1-Dichloroethene	1	<50.	ND
Acetone	20	<1,000.	ND
Carbon Disulfide	1	<50.	ND
Methylene Chloride	10	<500.	ND
trans-1,2-Dichloroethene	1	<50.	ND
cis-1,2-Dichloroethene	1	<50.	ND
2-Butanone (MEK)	10	<500.	ND
1,1-Dichloroethane	1	<50.	ND
Chloroform	1	<50.	ND
1,1,1-Trichloroethane (TCA)	1	<50.	ND
Carbon Tetrachloride	1	<50.	ND
Benzene	1	1,700.	ND
1,2-Dichloroethane	1	<50.	ND
Vinyl Acetate	10	<500.	ND
Trichloroethene (TCE)	1	<50.	ND
1,2-Dichloropropane	1	<50.	ND
Bromodichloromethane	1	<50.	ND
2-Chloroethyl Vinyl Ether	10	<500.	ND
trans-1,3-Dichloropropene	1	<50.	ND
2-Hexanone	10	<500.	ND
4-Methyl-2-pentanone (MIBK)	10	<500.	ND
Toluene	1	2,700.	ND
cis-1,3-Dichloropropene	1	<50.	ND
1,1,2-Trichloroethane	1	<50.	ND
Tetrachloroethene (PCE)	1	<50.	ND
Dibromochloromethane	1	<50.	ND
Chlorobenzene	1	<50.	ND
Ethylbenzene	1	2,600.	ND
Styrene	1	<50.	ND
Total Xylenes	5	11,000.	ND
Bromoform	1	<50.	ND
1,1,2,2-Tetrachloroethane	1	<50.	ND
1,3-Dichlorobenzene	1	<50.	ND
1,4-Dichlorobenzene	1	<50.	ND
1,2-Dichlorobenzene	1	<50.	ND

* Raised MRL due to high analyte concentration requiring sample dilution.

Approved by: Carol Klein Date: 12-2-93

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APPENDIX A

LABORATORY QC RESULTS

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039.01
Arco Facility No. 6148

Date Received: 11/16/93
Service Request No.: SJ93-1409
Sample Matrix: Water

Continuing Calibration Summary
Petroleum Hydrocarbons, IR
SM 5520-F

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Hydrocarbon Mix	40.	36.6	92	90-110

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

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039.01
ARCO Facility No. 6148

Date Received: 11/16/93
Service Request No.: SJ93-1409
Sample Matrix: Water

Matrix Spike/Duplicate Matrix Spike Summary
Petroleum Hydrocarbons, IR
SM 5520-F
mg/L (ppm)

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria
Hydrocarbon Mix	8.0	ND	7.74	8.70	97.	109.	56-151

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

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Date Received:**	11/16/93
Project:	EMCON Project No. 0G70-039.01	**Service Request No.:**	SJ93-1409
	ARCO Facility No. 6148	**Sample Matrix:**	Water

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

Sample Name	Date Analyzed	Percent Recovery *a,a,a*-Trifluorotoluene
MW-1 (25)	11/23/93	82.
MW-3 (25)	11/23/93	93.
MW-4 (26)	11/24/93	94.
MW-5 (25)	11/23/93	83.
MW-6 (26)	11/23/93	81.
MW-7 (27)	11/23/93	79.
FB-1	11/23/93	80.
MW-3 (25) MS	11/23/93	93.
MW-3 (25) DMS	11/23/93	91.
Method Blank	11/23/93	73.
Method Blank	11/24/93	88.
CAS Acceptance Criteria		70-130

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039.01
ARCO Facility No. 6148

Date Received: 11/16/93
Service Request No.: SJ93-1409

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

Date Analyzed: 11/23/93

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	25.	24.2	97.	85-115
Toluene	25.	23.6	94.	85-115
Ethylbenzene	25.	23.4	94.	85-115
Total Xylenes	75.	72.0	96.	85-115
TPH as Gasoline	250.	243.	97.	90-110

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Date Received:**	11/16/93
Project:	EMCON Project No. 0G70-039.01	**Service Request No.:**	SJ93-1409
	ARCO Facility No. 6148	**Sample Matrix:**	Water

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

Sample Name: MW-3 (25)
Date Analyzed: 11/23/93

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria
Benzene	2,500.	1,350.	3,500.	3,940.	86.	104.	76-122
Toluene	2,500.	2,130.	4,110.	4,660.	79.	101.	75-127
Ethylbenzene	2,500.	1,860.	3,760.	4,340.	73.	99.	70-135

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039.01
ARCO Facility No. 6148

Date Received: 11/16/93
Service Request No.: SJ93-1409
Sample Matrix: Water

Surrogate Recovery Summary
Halogenated Volatile Organic Compounds
EPA Methods 5030/8010

Sample Name	Date Analyzed	Percent Recovery 4-Bromofluorobenzene
MW-1 (25)	11/19/93	79.
MW-3 (25)	11/23/93	104.
MW-4 (26)	11/23/93	100.
MW-5 (25)	11/19/93	92.
MW-6 (26)	11/19/93	90.
MW-7 (27)	11/19/93	90.
MW-3 (25) MS	11/19/93	129.
MW-3 (25) DMS	11/19/93	128.
Method Blank	11/19/93	114.
Method Blank	11/23/93	93.
	CAS Acceptance Criteria	70-130

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Date Received:**	11/16/93
Project:	EMCON Project No. 0G70-039.01	**Service Request No.:**	SJ93-1409
	ARCO Facility No. 6148	**Sample Matrix:**	Water

Initial Calibration Verification
Halogenated Volatile Organic Compounds
EPA Methods 5030/8010
Nanograms

Date Analyzed: 11/19/93

Analyte	True Value	Result	Percent Recovery	EPA Percent Recovery Acceptance Criteria
Chloromethane	100	115.	115.	D-193
Vinyl Chloride	100	86.	86.	28-163
Bromomethane	100	39.	39.	D-144
Chloroethane	100	110.	110.	46-137
Trichlorofluoromethane (Freon 11)	100	110.	110.	21-156
1,1-Dichloroethene	100	125.	125.	28-167
Methylene Chloride	100	105.	105.	25-162
trans-1,2-Dichloroethene	100	126.	126.	38-155
1,1-Dichloroethane	100	119.	119.	47-132
Chloroform	100	127.	127.	49-133
1,1,1-Trichloroethane (TCA)	100	126.	126.	41-138
Carbon Tetrachloride	100	120.	120.	43-143
1,2-Dichloroethane	100	123.	123.	51-147
Trichloroethene (TCE)	100	127.	127.	35-146
1,2-Dichloropropane	100	126.	126.	44-156
Bromodichloromethane	100	115.	115.	42-172
trans-1,3-Dichloropropene	100	109.	109.	22-178
cis-1,3-Dichloropropene	100	128.	128.	22-178
1,1,2-Trichloroethane	100	124.	124.	39-136
Tetrachloroethene (PCE)	100	126.	126.	26-162
Dibromochloromethane	100	90.	90.	24-191
Chlorobenzene	100	127.	127.	38-150
Bromoform	100	94.	94.	13-159
1,1,2,2-Tetrachloroethane	100	94.	94.	8-184
1,3-Dichlorobenzene	100	140.	140.	7-187
1,4-Dichlorobenzene	100	124.	124.	42-143
1,2-Dichlorobenzene	100	123.	123.	D-208

D *Detected*

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039.01
ARCO Facility No. 6148

Date Received: 11/16/93
Service Request No.: SJ93-1409
Sample Matrix: Water

Matrix Spike/Duplicate Matrix Spike Summary
Halogenated Volatile Organic Compounds
EPA *Methods* 5030/8010
µg/L (ppb)

Sample Name: MW-3 (25)
Date Analyzed: 11/19/93

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria
1,1-Dichloroethene	10.	ND	10.9	10.9	109.	109.	59-145
Trichloroethene	10.	ND	12.6	12.7	126.	127.	66-156
Tetrachloroethene	10.	1.5	13.5	13.2	120.	118.	77-146

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039.01
ARCO Facility No. 6148

Date Received: 11/16/93
Service Request No.: SJ93-1409

Initial Calibration Verification
Volatile Organic Compounds
EPA Method 624
µg/L (ppb)

Date Analyzed: 10/21/93

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Chloromethane *	50	58.9	118.	70-130
Vinyl Chloride *	50	44.7	89.	70-130
Bromomethane *	50	39.3	79.	70-130
Chloroethane *	50	56.0	112.	70-130
Acetone *	50	68.0	136. **	70-130
1,1-Dichloroethene	50	48.0	96.	70-130
Carbon Disulfide	50	46.8	94.	70-130
Methylene Chloride	50	45.1	90.	70-130
trans-1,2-Dichloroethene	50	42.5	85.	70-130
cis-1,2-Dichloroethene	50	50.4	101.	70-130
1,1-Dichloroethane	50	46.3	93.	70-130
Vinyl Acetate *	50	34.0	68. **	70-130
2-Butanone *	50	53.9	108.	70-130
Chloroform	50	47.1	94.	70-130
1,1,1-Trichloroethane (TCA)	50	46.4	93.	70-130
Carbon Tetrachloride	50	48.0	96.	70-130
Benzene	50	45.9	92.	70-130
1,2-Dichloroethane	50	45.3	91.	70-130
Trichloroethene (TCE)	50	48.2	96.	70-130
1,2-Dichloropropane	50	44.1	88.	70-130
Bromodichloromethane	50	43.6	87.	70-130
2-Chloroethyl Vinyl Ether	50	40.6	81.	70-130
2-Hexanone *	50	53.4	107.	70-130
trans-1,3-Dichloropropene	50	46.7	93.	70-130
Toluene	50	46.3	93.	70-130
cis-1,3-Dichloropropene	50	44.6	89.	70-130
1,1,2-Trichloroethane	50	46.3	93.	70-130
Tetrachloroethene (PCE)	50	50.2	100.	70-130
Dibromochloromethane	50	45.4	91.	70-130
Chlorobenzene	50	48.0	96.	70-130
Ethylbenzene	50	48.7	97.	70-130
o Xylene	50	49.6	99.	70-130
Styrene	50	49.0	98.	70-130
Bromoform	50	45.5	91.	70-130
1,1,2,2-Tetrachloroethane	50	47.8	96.	70-130

* These recoveries are from an analysis on October 29, 1993.

** These two compounds were out of the CAS Acceptance Criteria. The data was accepted since the compounds were not present in any of the samples.

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039.01
ARCO Facility No. 6148

Date Received: 11/16/93
Service Request No.: SJ93-1409
Sample Matrix: Water

Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 624

Sample Name	Date Analyzed	Percent Recovery		
		1,2-Dichloroethane - D_4	Toluene - D_8	4-Bromofluorobenzene
MW-3 (25)	11/30/93	101.	95.	97.
MW-3 (25) MS	11/30/93	102.	94.	95.
MW-3 (25) DMS	11/30/93	99.	94.	94.
Method Blank	11/30/93	103.	95.	95.
	EPA Acceptance Criteria	76-114	88-110	86-115

Approved by: Carol Klein Date: 12-2-93

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039.01
ARCO Facility No. 6148

Date Received: 11/16/93
Service Request No.: SJ93-1409
Sample Matrix: Water

Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds
EPA Method 624
µg/L (ppb)

Sample Name: MW-3 (25)
Date Analyzed: 11/30/93

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	EPA Acceptance Criteria	Relative Percent Difference
1,1-Dichloroethene	2,500.	ND	2,480.	2,440.	99.	98.	61-145	2.
Trichloroethene	2,500.	ND	2,400.	2,430.	96.	97.	71-120	1.
Chlorobenzene	2,500.	ND	2,440.	2,510.	98.	100.	75-130	3.
Toluene	2,500.	2,720.	5,080.	5,020.	94.	92.	76-125	1.
Benzene	2,500.	1,660.	4,100.	4,080.	98.	97.	76-127	<1.

Approved by: Carol Klein Date: 12-2-93

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APPENDIX B

CHAIN OF CUSTODY

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ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. EMC-93-5

Chain of Custody

ARCO Facility no. 6148	City (Facility) OAKLAND	Project manager (Consultant) JIM Bulera	Laboratory name CAS
ARCO engineer Kyle Christie	Telephone no. (ARCO) 571-2434	Telephone no. (Consultant) 453-7300	Fax no (Consultant)
Consultant name EMCON Associates	Address (Consultant) 1921 Ringwood Avenue San Jose		Contract number 07077

Sample I.D.	Lab no	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	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 ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org/DHS ☐ Lead EPA 7420/7421 ☐		
MW-1(25')	1-4	4		X		X	HCl	11-16-93	1330		X				X							
MW-2( )		4		X		X	↓	—	no samples taken (product)													
MW-3(25')	5-13	8		X		X	↓	11-16-93	1444		X		X		X	X						
MW-4(26')	14-17	4		X		X	↓	↓	1254		X				X							
MW-5(25')	18-21	4		X		X	↓	↓	1400		X				X							
MW-6(26')	22-25	4		X		X	↓	↓	1220		X				X							
MW-7(27')	26-29	4		X		X	↓	↓	1445		X				X							
FB-1	30-31	2		X		X	HCl	↓	—		X											
MW-3(25')		2		X		X	NP	↓	1444		[illegible]						X					

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 2-40ml HCl
add:
2-40ml HCl
2-Liter HCl
2-Liter NP

Lab number: 5J93-1409

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 11-16-93	Time 1630	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory: [signature] Date 11/16/93 Time 1630

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

APPC 3292 (2-91)

68 3322 ; 8270

GOLDEN STATE/CAS
LABORATORIES INC

November 24, 1993

Jim Butera
EMCON Associates
1921 Ringwood Avenue
San Jose, CA 95161-0187

Re: **ARCO Facility #6148-Oakland/Project #0670-039-01/SJ93-1409**

Dear Jim:

Enclosed are the results of the sample submitted to our lab on November 18, 1993. For your reference, these analyses have been assigned our service request number LA933301.

All analyses were performed in accordance with our laboratory's quality assurance program. Golden State / CAS is certified for environmental analyses by the California Department of Health Services (Certificate # 1296).

Please call if you have any questions.

Respectfully Submitted,

Golden State / CAS Laboratories, Inc.

Dr. B. Gene Bennett
Laboratory Director

Gary Pechter
Quality Assurance Coordinator

GB/ib

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

GOLDEN STATE / CAS LABORATORIES, INC.

Analytical Report

Client:	EMCON Associates	**Date Collected:**	11/16/93
Project:	ARCO Products Company/#0670-039-01	**Date Received:**	11/18/93
Sample Matrix:	Water	**Date Extracted:**	11/23/93
		Date Analyzed:	11/23/93
		Service Request No.:	LA933301

Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3510/8270
µg/L (ppb)

Sample Name: MW3 (25')
Lab Code: LA3301-1

Base Neutral Analyte	MRL*	Result	Base Neutral Analyte	MRL*	Result
N-Nitrosodimethylamine	50	ND	2,6-Dinitrotoluene	50	ND
Bis(2-chloroethyl) Ether	50	ND	Diethyl Phthalate	50	ND
1,2-Dichlorobenzene	50	ND	4-Chlorophenyl Phenyl Ether	50	ND
1,3-Dichlorobenzene	50	ND	Fluorene	50	ND
1,4-Dichlorobenzene	50	ND	4-Nitroaniline	200	ND
Bis(2-chloroisopropyl) Ether	50	ND	N-Nitrosodiphenylamine	50	ND
N-Nitrosodi-n-propylamine	50	ND	4-Bromophenyl Phenyl Ether	50	ND
Hexachloroethane	50	ND	Hexachlorobenzene	50	ND
Nitrobenzene	50	ND	Phenanthrene	50	ND
Isophorone	50	ND	Anthracene	50	ND
Bis(2-chloroethoxy) methane	50	ND	Di-n-butyl Phthalate	50	ND
1,2,4-Trichlorobenzene	50	ND	Fluoranthene	50	ND
Naphthalene	50	590	Pyrene	50	ND
4-Chloroaniline	50	ND	Butylbenzyl Phthalate	50	ND
Hexachlorobutadiene	50	ND	3,3'-Dichlorobenzidine	200	ND
2-Methylnaphthalene	50	640	Benz(a)anthracene	50	ND
Hexachlorocyclopentadiene	100	ND	Bis(2-ethylhexyl) Phthalate	50	ND
2-Chloronaphthalene	50	ND	Chrysene	50	ND
2-Nitroaniline	200	ND	Di-n-octyl Phthalate	50	ND
Dimethyl Phthalate	50	ND	Benzo(b)fluoranthene	50	ND
Acenaphthylene	50	ND	Benzo(k)fluoranthene	50	ND
3-Nitroaniline	200	ND	Benzo(a)pyrene	50	ND
Acenaphthene	50	ND	Indeno(1,2,3-c,d)pyrene	50	ND
Dibenzofuran	50	ND	Dibenz(a,h)anthracene	50	ND
2,4-Dinitrotoluene	50	ND	Benzo(g,h,i)perylene	50	ND
Aniline	50	ND			

Acid Analyte	MRL*	Result	Acid Analyte	MRL*	Result
Phenol	50	ND	2,4-Dichlorophenol	50	ND
2-Chlorophenol	50	ND	4-Chloro-3-methylphenol	50	ND
Benzyl Alcohol	100	ND	2,4,6-Trichlorophenol	50	ND
2-Methylphenol	50	ND	2,4,5-Trichlorophenol	50	ND
3- and 4-Methylphenol♦	50	ND	2,4-Dinitrophenol	500	ND
2-Nitrophenol	50	ND	4-Nitrophenol	500	ND
2,4-Dimethylphenol	50	ND	2-Methyl-4,6-dinitrophenol	200	ND
Benzoic Acid	500	ND	Pentachlorophenol	300	ND

MRL Method Reporting Limit
* MRLs are elevated because of matrix interferences and because the sample required diluting.
ND None Detected at or above the method reporting limit
♦ Quantified as 4-methylphenol.

0000

Approved by _____ Date 11-24-93

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

GOLDEN STATE / CAS LABORATORIES, INC.

Analytical Report

Client:	EMCON Associates	**Date Extracted:**	11/23/93
Project:	ARCO Products Company/#0670-039-01	**Date Analyzed:**	11/23/93
Sample Matrix:	Water	**Service Request No.:**	LA933301

Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3510/8270
µg/L (ppb)

Sample Name: Method Blank
Lab Code: LA3301-MB

Base Neutral Analyte	MRL	Result	Base Neutral Analyte	MRL	Result
N-Nitrosodimethylamine	5	ND	2,6-Dinitrotoluene	5	ND
Bis(2-chloroethyl) Ether	5	ND	Diethyl Phthalate	5	ND
1,2-Dichlorobenzene	5	ND	4-Chlorophenyl Phenyl Ether	5	ND
1,3-Dichlorobenzene	5	ND	Fluorene	5	ND
1,4-Dichlorobenzene	5	ND	4-Nitroaniline	20	ND
Bis(2-chloroisopropyl) Ether	5	ND	N-Nitrosodiphenylamine	5	ND
N-Nitrosodi-n-propylamine	5	ND	4-Bromophenyl Phenyl Ether	5	ND
Hexachloroethane	5	ND	Hexachlorobenzene	5	ND
Nitrobenzene	5	ND	Phenanthrene	5	ND
Isophorone	5	ND	Anthracene	5	ND
Bis(2-chloroethoxy) methane	5	ND	Di-n-butyl Phthalate	5	ND
1,2,4-Trichlorobenzene	5	ND	Fluoranthene	5	ND
Naphthalene	5	ND	Pyrene	5	ND
4-Chloroaniline	5	ND	Butylbenzyl Phthalate	5	ND
Hexachlorobutadiene	5	ND	3,3'-Dichlorobenzidine	20	ND
2-Methylnaphthalene	5	ND	Benz(a)anthracene	5	ND
Hexachlorocyclopentadiene	10	ND	Bis(2-ethylhexyl) Phthalate	5	ND
2-Chloronaphthalene	5	ND	Chrysene	5	ND
2-Nitroaniline	20	ND	Di-n-octyl Phthalate	5	ND
Dimethyl Phthalate	5	ND	Benzo(b)fluoranthene	5	ND
Acenaphthylene	5	ND	Benzo(k)fluoranthene	5	ND
3-Nitroaniline	20	ND	Benzo(a)pyrene	5	ND
Acenaphthene	5	ND	Indeno(1,2,3-c,d)pyrene	5	ND
Dibenzofuran	5	ND	Dibenz(a,h)anthracene	5	ND
2,4-Dinitrotoluene	5	ND	Benzo(g,h,i)perylene	5	ND
Aniline	5	ND			

Acid Analyte	MRL	Result	Acid Analyte	MRL	Result
Phenol	5	ND	2,4-Dichlorophenol	5	ND
2-Chlorophenol	5	ND	4-Chloro-3-methylphenol	5	ND
Benzyl Alcohol	10	ND	2,4,6-Trichlorophenol	5	ND
2-Methylphenol	5	ND	2,4,5-Trichlorophenol	5	ND
3- and 4-Methylphenol♦	5	ND	2,4-Dinitrophenol	50	ND
2-Nitrophenol	5	ND	4-Nitrophenol	50	ND
2,4-Dimethylphenol	5	ND	2-Methyl-4,6-dinitrophenol	20	ND
Benzoic Acid	50	ND	Pentachlorophenol	30	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
♦ Quantified as 4-methylphenol.

3090

Approved by _____ Date 11-24-93

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

GOLDEN STATE / CAS LABORATORIES, INC.

QA/QC Report

Client: EMCON Associates
Project: ARCO Products Company/#0670-039-01
Sample Matrix: Water

Service Request No.: LA933301

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3510/8270

Sample Name	Lab Code	Percent Recovery					
		2FP	PHL	TBP	NBZ	FBP	TPH
MW3 (25')	LA3301-1	26	33	63	79	84	116
Method Blank	LA3301-MB	57	31	64	84	76	118
EPA Acceptance Criteria		21-100	10-94	10-123	35-114	43-116	33-141

2FP 2-Fluorophenol
PHL *Phenol*-D_6
TBP 2,4,6-Tribromophenol
NBZ Nitrobenzene-D_5
FBP 2-Fluorobiphenyl
TPH Terphenyl-D_{14}

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Approved by _____ Date 11-24-93

GOLDEN STATE / CAS LABORATORIES, INC.

QA/QC Report

Client:	EMCON Associates	**Date Extracted:**	11/23/93
Project:	ARCO Products Company/#0670-039-01	**Date Analyzed:**	11/23/93
LCS Matrix:	*Water*	**Service Request No.:**	LA933301

Laboratory Control Sample Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3510/8270
µg/L (ppb)

Analyte	True Value	Result	Percent Recovery	EPA Percent Recovery Acceptance Criteria
Phenol	50.0	20.2	40	5-112
2-Chlorophenol	50.0	40.4	81	23-134
1,4-Dichlorobenzene	50.0	36.6	73	20-124
N-Nitrosodi-n-propylamine	50.0	43.8	88	D-230
1,2,4-Trichlorobenzene	50.0	37.2	74	44-142
4-Chloro-3-methylphenol	50.0	40.9	82	22-147
Acenaphthene	50.0	46.0	92	47-145
4-Nitrophenol	50.0	14.8	30	D-132
2,4-Dinitrotoluene	50.0	42.8	86	39-139
Pentachlorophenol	50.0	30.4	61	14-176
Pyrene	50.0	56.8	114	52-115

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Approved by _____ Date 11-24-93

GOLDEN STATE / CAS LABORATORIES, INC.

QA/QC Report

Client: EMCON Associates
Project: ARCO Products Company/#0670-039-01
Sample Matrix: Water

Date Extracted: 11/23/93
Date Analyzed: 11/23/93
Service Request No.: LA933301

Laboratory Control Spike/Duplicate Laboratory Control Spike Summary*
Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3510/8270
µg/L (ppb)

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	EPA Acceptance Criteria	Relative Percent Difference
Phenol	50.0	50.0	ND	20.2	18.8	40	38	12-89	7
2-Chlorophenol	50.0	50.0	ND	40.4	39.5	81	79	27-123	2
1,4-Dichlorobenzene	50.0	50.0	ND	36.6	36.4	73	73	36-97	1
N-Nitrosodi-n-propylamine	50.0	50.0	ND	43.8	40.6	88	81	41-116	8
1,2,4-Trichlorobenzene	50.0	50.0	ND	37.2	36.2	74	72	39-98	3
4-Chloro-3-methylphenol	50.0	50.0	ND	40.9	39.3	82	79	23-97	4
Acenaphthene	50.0	50.0	ND	46.0	44.9	92	90	46-118	2
4-Nitrophenol	50.0	50.0	ND	14.8	11.9	30	24	10-80	22
2,4-Dinitrotoluene	50.0	50.0	ND	42.8	40.7	86	81	24-96	5
Pentachlorophenol	50.0	50.0	ND	30.4	27.5	61	55	9-103	10
Pyrene	50.0	50.0	ND	56.8	55.7	114	111	26-127	2

ND None Detected at or above the method reporting limit
* Two laboratory control samples were extracted in lieu of matrix QC because it appeared that the sample would require dilution.

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Approved by _____ Date 11-24-93

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

ARCO Products Company Division of AtlanticRichfieldCompany

Task Order No. EMC-93-5

Chain of Custody

LA 3301

ARCO Facility no	6148
City (Facility)	OAKLAND
Project manager (Consultant)	JIM Bulera
Laboratory name	CAS
ARCO engineer	Kyle Christie
Telephone no. (ARCO)	571-2434
Telephone no. (Consultant)	453 7300
Fax no. (Consultant)	
Contract number	07077
Consultant name	EMCON Associates
Address (Consultant)	1921 Ringwood Avenue San Jose
Method of shipment	Sampler will deliver

Sample I.D.	Lab no.	Container no	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	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 ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org/DHS ☐ Lead EPA 7420/7421 ☐		
mw-1(25')	1-4	4		X		X	HCl	11-16-93	1330		X				X							
mw-2(		4		X		X	↓	—	no	Samples taken (product)												
mw-3(25')	5-13	8		X		X	↓	11-16-93	1444		X		X		X	X						
mw-4(26')	14-17	4		X		X	↓	↓	1254		X				X							
mw-5(25')	18-21	4		X		X	↓	↓	1400		X				X							
mw-6(26')	22-25	4		X		X	↓	↓	1220		X				X							
mw 7(27')	26-29	4		X		X	↓	↓	1345		X				X							
FB-1	30-31	2		X		X	HCl	↓	—		X											
mw-3(25')		2		X		X	NP	↓	1444		[illegible]						X					

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 2-40ml HCl
add: 2-40ml HCl
2-Liter HCl
2-Liter NP

Lab number: 9J93-1409

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: 11-16-93	Time: 1630	Received by
Relinquished by: [signature] CAS/SJ	Date: 11/17/93	Time: 1600	Received by
Relinquished by	Date	Time	Received by laboratory: [signature] Date: 11/16/93 Time: 1630

[signature] GS/CAS 11/18/93 0900 Via FedEx 65 3322 ; 8270

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: 0670-039.01 SAMPLE ID: MW-1

PURGED BY: M. Gallegos CLIENT NAME: Exxon 6148

SAMPLED BY: M. Gallegos LOCATION: Oakland, CA

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

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

CASING ELEVATION (feet/MSL):	NR	VOLUME IN CASING (gal.):	4.97
DEPTH TO WATER (feet):	18.18	CALCULATED PURGE (gal.):	14.93
DEPTH OF WELL (feet):	25.8	ACTUAL PURGE VOL. (gal.):	12.5

DATE PURGED: 11/16/93 Start (2400 Hr) 1316 End (2400 Hr) 1321

DATE SAMPLED: 11-16-93 Start (2400 Hr) 1330 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1318	5.0	7.21	451	73.2	Cloudy	Light
1320	10.0	6.67	449	72.2	"	"
—	~~15.0~~	~~6.~~	449	69.9	—	—
1330	recharge	6.70	449	69.6	"	"

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	✓ 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: Well Dried at 12.5 gallons.

All Samples Taken

Meter Calibration: Date: 11-16-93 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-7

Signature: M. J. Gallegos Reviewed By: JB Page 1 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

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

PURGED BY: M. Gallegos CLIENT NAME: ARCO # 6148

SAMPLED BY: " LOCATION: Oakland, 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): NK VOLUME IN CASING (gal.): NA

DEPTH TO WATER (feet): 17.87 CALCULATED PURGE (gal.): ___

DEPTH OF WELL (feet): 25.8 ACTUAL PURGE VOL. (gal.): ___

DATE PURGED: 11-16-93 Start (2400 Hr) NA End (2400 Hr) NA

DATE SAMPLED: ___ Start (2400 Hr) ___ End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
	no sample taken			Product in well		
		0.03				

D. O. (ppm): NA 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): NK

PURGING EQUIPMENT

___ 2" Bladder Pump ___ Bailer (Teflon®)

___ Centrifugal Pump ___ Bailer (PVC)

___ Submersible Pump ___ Bailer (Stainless Steel)

___ Well Wizard™ ___ Dedicated

Other: NA

SAMPLING EQUIPMENT

___ 2" Bladder Pump ___ Bailer (Teflon®)

___ DDL Sampler ___ Bailer (Stainless Steel)

___ Dipper ___ Submersible Pump

___ Well Wizard™ ___ Dedicated

Other: NA

WELL INTEGRITY: NK. LOCK #: 3259

REMARKS: no sample taken Product in well.

11-16-93.

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

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

Location of previous calibration: ___

Signature: [signature] Reviewed By: [signature] Page 2 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 0670-039.01 SAMPLE ID: MW-3

PURGED BY: M. Gallegos CLIENT NAME: ARCO # 6148

SAMPLED BY: M. Gallegos LOCATION: Oakland

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.): 41.9

DEPTH TO WATER (feet): 18.30 CALCULATED PURGE (gal.): 14.7

DEPTH OF WELL (feet): 25.8 ACTUAL PURGE VOL. (gal.): 11.5

DATE PURGED: 11-16-93 Start (2400 Hr) 1420 End (2400 Hr) 1426

DATE SAMPLED: 11-16-93 Start (2400 Hr) 1444 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1422	5.0	7.05	559	70.8	Clear	Light
1425	10.0	6.66	546	70.5	Grey	heavy
1444	recharge	6.62	547	70.8	Grey	heavy

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): FB-1

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

WELL INTEGRITY: Good LOCK #: 3259

REMARKS: Sheen on top of purge water

Well dried at 11.5 gallons

Meter Calibration: Date: 11-16-93 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-7

Signature: [signature] Reviewed By: JB Page 3 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

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

PURGED BY: M. Gallegos CLIENT NAME: ARCO# 6148

SAMPLED BY: M. Gallegos LOCATION: OAKland, 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.): 6.32

DEPTH TO WATER (feet): 16.32 CALCULATED PURGE (gal.): 18.97

DEPTH OF WELL (feet): 26.0 ACTUAL PURGE VOL. (gal.): 19.0

DATE PURGED: 11/16/93 Start (2400 Hr) 1239 End (2400 Hr) 1246

DATE SAMPLED: 11-16-93 Start (2400 Hr) 1254 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1242	6.5	6.74	479	75.3	Lt-Brown	Hi-Turb
1244	13.0	6.63	502	73.6	"	"
1246	19.0	6.68	494	73.0	"	"

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

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	X Bailer (Teflon®)
___ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
X 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: 11-16-93 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-7

Signature: M. Gallegos Reviewed By: JS Page 4 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 0670-039.01 SAMPLE ID: MW-5

PURGED BY: M. Gallagher CLIENT NAME: ARCO Hobbs

SAMPLED BY: M. Gallagher LOCATION: Jackson, 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.): 5.20

DEPTH TO WATER (feet): 17.03 CALCULATED PURGE (gal.): 15.62

DEPTH OF WELL (feet): 25.0 ACTUAL PURGE VOL. (gal.): 8.5

DATE PURGED: 11-16-93 Start (2400 Hr) 1347 End (2400 Hr) 1351

DATE SAMPLED: 11-16-93 Start (2400 Hr) 1400 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1350	5.5	6.99	505	73.5	Cloudy	Light
	~~11.0~~					
	16.0					
1400	recharge	6.96	513	69.9	Brn	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	~~___ Bailer (PVC)~~	___ DDL Sampler	___ Bailer (Stainless Steel)
X Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: Good LOCK #: 3259

REMARKS: Well dried at 8.5 gallons

all Samples taken

Meter Calibration: Date: 11-16-93 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-7

Signature: M. Gallagher Reviewed By: JB Page 5 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 0670-039.01 SAMPLE ID: MW-6

PURGED BY: M. Gallegos CLIENT NAME: ARCO #6148

SAMPLED BY: " LOCATION: Oakland, 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.): 7.95

DEPTH TO WATER (feet): 14.43 CALCULATED PURGE (gal.): 23.85

DEPTH OF WELL (feet): 26.6 ACTUAL PURGE VOL. (gal.): 24.0

DATE PURGED: 11-16-93 Start (2400 Hr) 1203 End (2400 Hr) 1210

DATE SAMPLED: 11-16-93 Start (2400 Hr) 1220 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1206	8.0	7.15	423	72.4	Lt-Brn	Heavy
1208	16.0	6.85	425	71.3	"	"
1210	24.0	6.86	422	70.8	"	"

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): NR

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

WELL INTEGRITY: Good LOCK #: 3259

REMARKS: all samples taken

Meter Calibration: Date: 11-16-93 Time: ___ Meter Serial #: 9204 Temperature °F: ___

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

Location of previous calibration: MW-7

Signature: [signature] Reviewed By: [signature] Page 6 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 0670-039.01 SAMPLE ID: MW-7

PURGED BY: M. Gallegos CLIENT NAME: ARCO # 6147

SAMPLED BY: M. Gallegos LOCATION: Oakland, 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.):	7.74
DEPTH TO WATER (feet):	15.14	CALCULATED PURGE (gal.):	23.24
DEPTH OF WELL (feet):	27.0	ACTUAL PURGE VOL. (gal.):	23.5

DATE PURGED: 11-16-93 Start (2400 Hr) 1127 End (2400 Hr) 1135

DATE SAMPLED: 11-16-93 Start (2400 Hr) 1145 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1131	8.0	7.10	372	71.8	Cloudy	moderate
1133	16.0	6.84	387	73.1	Light Brown	heavy
1135	23.5	6.78	394	73.0	"	"

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

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	X Bailer (Teflon®)
___ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
X Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: Good LOCK #: 3259

REMARKS: All Samples taken

Meter Calibration: Date: 11/16/93 Time: 1122 Meter Serial #: 9204 Temperature °F: 68.1

(EC 1000 1010 / 1000) (DI ___) (pH 7 701 / 701) (pH 10 1000 / 1000) (pH 4 400 / 4000)

Location of previous calibration: ___

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

ALCO
HAZMAT

94 MAR 10 AM 10: 48

RESNA
Working To Restore Nature

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TRANSMITTAL

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

DATE: March 7, 1994
PROJECT NUMBER: 61035.06
SUBJECT: ARCO Station 6148

FROM: Erin D. Krueger

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	03/03/94	Letter Report on Quarterly Groundwater Monitoring Fourth Quarter 1993 at ARCO Station 6148, 5131 Shattuck Avenue, Oakland, California.

THESE ARE TRANSMITTED as checked below:

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[X] For your files	[ ] Regular Mail	[X] Certified Mail

REMARKS:
Copies: 1 to RESNA project file no. 61035.06

Erin D. Krueger, Staff Geologist

cc: Mr. Richard Hiett, RWQCB
Mr. Michael Whelan, ARCO