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09/09/93

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

61035.06

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93 SEP 15 PM 12:03

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TRANSMITTAL

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

DATE: September 9, 1993
PROJECT NUMBER: 61035.06
SUBJECT: ARCO Station No. 6148

FROM: Keith McVicker

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	9/9/93	Second Quarter 1993 Groundwater Monitoring Report for ARCO Station No. 6148, 5131 Shattuck Avenue, Oakland, California.

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REMARKS:

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Keith McVicker, Project Geologist

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

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September 9, 1993
61035.06

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

Subject: Second Quarter 1993 Groundwater Monitoring Report for ARCO Station 6148, 5131 Shattuck Avenue, Oakland, California.

Mr. Whelan:

As requested by ARCO Products Company (ARCO), RESNA Industries Inc. (RESNA) prepared this letter report summarizing the results of the second quarter 1993 groundwater monitoring performed by ARCO's contractor, EMCON Associates (EMCON) of San Jose, California, at the above-referenced site. The operating ARCO Station 6148 is located on the southwestern corner of the intersection of Shattuck Avenue and 52nd Street at 5131 Shattuck Avenue, in Oakland, California, as shown on Plate 1, Site Vicinity Map. The locations of the groundwater monitoring wells and pertinent site features are shown on Plate 2, Generalized Site Plan. Previous work is discussed in the previous subsurface investigations listed in the reference section of this report.

The purpose of quarterly groundwater monitoring is to evaluate changes in the groundwater flow direction and gradient, and changes in concentrations of petroleum hydrocarbons in the local groundwater associated with a former waste-oil tank and the existing underground gasoline-storage tanks (USTs) at the site. The field work and laboratory analyses of groundwater samples during this quarter were performed under the direction of EMCON and included measuring depths to groundwater, subjectively analyzing groundwater for the presence of petroleum product, collecting groundwater samples from the wells for laboratory analyses, and directing a State-certified laboratory to analyze the groundwater samples. Field procedures and acquisition of field data were performed under the direction of EMCON; evaluation and warrant of their field data and field protocols is beyond 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.

Groundwater Sampling and Gradient Evaluation

Depth to water levels (DTW) were measured on April 14, May 22, and June 17, 1993, and quarterly sampling was performed on April 14, 1993. Results of EMCON's field work on the site, including DTW levels and subjective analysis for the presence of product in the groundwater in MW-1 through MW-7 are presented on EMCON's Field Reports, Summary of Groundwater Monitoring Data, and Water Sample Field Data Sheets (Appendix A). Cumulative Groundwater Monitoring Data is summarized in Table 1.

During this quarter, floating product was only encountered in well MW-2 on April 14 and May 22, 1993, at thicknesses of 0.01 and 0.07 foot, respectively. Floating product or sheen was not observed in the other site wells during this quarter (see EMCON's Field Reports, Appendix A). On June 8, 1993, RESNA field personnel measured approximately 0.05 foot of floating product in well MW-2 (with Horner EZY Floating Product Skimmer). Approximately 0.3 gallon of product was bailed from well MW-2 by RESNA field personnel this quarter.

DTW levels from April 14, May 22, and June 17, 1993, were used to evaluate the groundwater gradients, shown on Plates 3 through 5, Groundwater Gradient Maps. The interpreted average groundwater gradient for April, May, and June 1993 was approximately 0.018 ft/ft with a flow direction to the southwest. This gradient and flow direction is generally consistent with those previously interpreted for the site.

Groundwater monitoring wells MW-1, and MW-3 through MW-7 were purged and sampled by EMCON field personnel on April 14, 1993. Monitoring well MW-2 was not sampled due to the presence of product. EMCON's Water Sample Field Data Sheets are included in Appendix A. According to ARCO, purge water generated during purging and sampling of the monitoring wells was transported to Gibson Environmental in Redwood City, California for recycling.

Laboratory Methods and Results

Under the direction of EMCON, water samples collected from the wells were analyzed by Columbia Analytical Services, Inc., located in San Jose, California (California Hazardous Waste Testing Laboratory Certification No. 1426). The water samples from MW-1, and MW-3 through MW-7 were analyzed for total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene, total xylenes (BTEX) using modified Environmental Protection Agency (EPA) Methods 5030/8020/DHS LUFT Method, and for halogenated volatile organic compounds (VOCs) using EPA Methods 5030/601. Additional groundwater

samples were collected from well MW-3 and analyzed for total petroleum hydrocarbons as diesel (TPHd) using EPA Method 3510/California LUFT Method, total oil and grease (TOG) using Standard Method 5520F, base neutral/acid semivolatile organic compounds (BNAs) using EPA Methods 3510/8270, and the metals cadmium (Cd), chromium (Cr), nickel (Ni), zinc (Zn) using EPA Method 6010, and lead (Pb) using EPA Method 7421. TPHg/Benzene Concentrations in Groundwater are shown on Plate 6. The Chain of Custody Records and Laboratory Analytical Reports are included in Appendix A. Results of these and previous water analyses are summarized in Tables 2 and 3, Cumulative Results of Laboratory Analyses of Water Samples.

Compared to the last quarter, concentrations of TPHg and BTEX have decreased in monitoring wells MW-1, MW-3 through MW-6. No TPHg or BTEX was detected in the water samples from well MW-7, which is consistent with the analytical results from the previous monitoring event.

TPHd was not detected in the groundwater sample from well MW-3. Although TPHd has been detected in this well, the chromatograph has not been typical of a diesel fingerprint. According to the laboratory, the TPHd detected falls in the range of weathered gasoline. The concentration of TOG in well MW-3 showed little change since the last quarter.

Compared to the previous sampling event, metals detected in wells MW-1 and MW-3 showed little change. The levels of metals detected have been below the respective MCL.

VOCs were detected in water samples collected from monitoring wells MW-1 and MW-3 through MW-7. Monitoring well MW-6, located upgradient from the USTs, former waste-oil tank, and service islands, contained the highest levels of tetrachloroethylene (PCE). BNAs were encountered in well MW-3; the concentrations have showed little change since the last quarter.

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

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

Sincerely,
RESNA Industries Inc.

Keith M. McVicker
Project Geologist

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

James L. Nelson
Certified Engineer
Geologist No. 1463

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Groundwater Gradient Map, April 14, 1993
Plate 4, Groundwater Gradient Map, May 22, 1993
Plate 5, Groundwater Gradient Map, June 17, 1993
Plate 6, Concentrations of TPHg/Benzene in Groundwater, April 14, 1993

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, and RESNA Field Report

REFERENCES

RESNA. August 30, 1991. Work Plan for Initial Subsurface Investigation Related to the Former Waste-Oil Tank at ARCO Station 6148, 5131 Shattuck Avenue, Oakland, California. RESNA Report 61035.01.

RESNA. November 7, 1991. Addendum to Work Plan at ARCO Station 6148, 5131 Shattuck Avenue, Oakland, California. RESNA Report 61035.02.

RESNA. June 6, 1992. Letter Report, Quarterly Groundwater Monitoring First Quarter 1992 at ARCO Station 6148, 5131 Shattuck Avenue, Oakland, California. RESNA Report 61035.03.

RESNA. September 28, 1992. Letter Report, Quarterly Groundwater Monitoring Second Quarter 1992 at ARCO Station 6148, 5131 Shattuck Avenue, Oakland, California. RESNA Report 61035.03.

RESNA. September 29, 1992. Initial Subsurface Investigation Related to the Former Waste-Oil Tank at ARCO Station 6148, 5131 Shattuck Avenue, Oakland, California. RESNA Report 61035.02.

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

RESNA. November 30, 1992. Letter Report, Quarterly Groundwater Monitoring Third Quarter 1992 at ARCO Station 6148, 5131 Shattuck Avenue in Oakland, California. RESNA Report 61035.03.

RESNA. February 23, 1993. Work Plan for Additional Subsurface Investigation and Evaluate Viable Interim Remediation Alternatives at ARCO Station 6148, 5131 Shattuck Avenue in Oakland, California. RESNA Report 61035.08.

RESNA. March 10, 1993. Letter Report, Quarterly Groundwater Monitoring Fourth Quarter 1992 at ARCO Station 6148, 5131 Shattuck Avenue in Oakland, California. RESNA Report 61035.03.

RESNA. June 8, 1993. Letter Report, Quarterly Groundwater Monitoring First Quarter 1992 at ARCO Station 6148, 5131 Shattuck Avenue in Oakland, California. RESNA Report 61035.06.

Source. U.S. Geological Survey
7 5-Minute Quadrangle
San Jose East/
San Jose West, California
Photorevised 1980

N

Approximate Scale

2000 1000 0 2000 4000

feet

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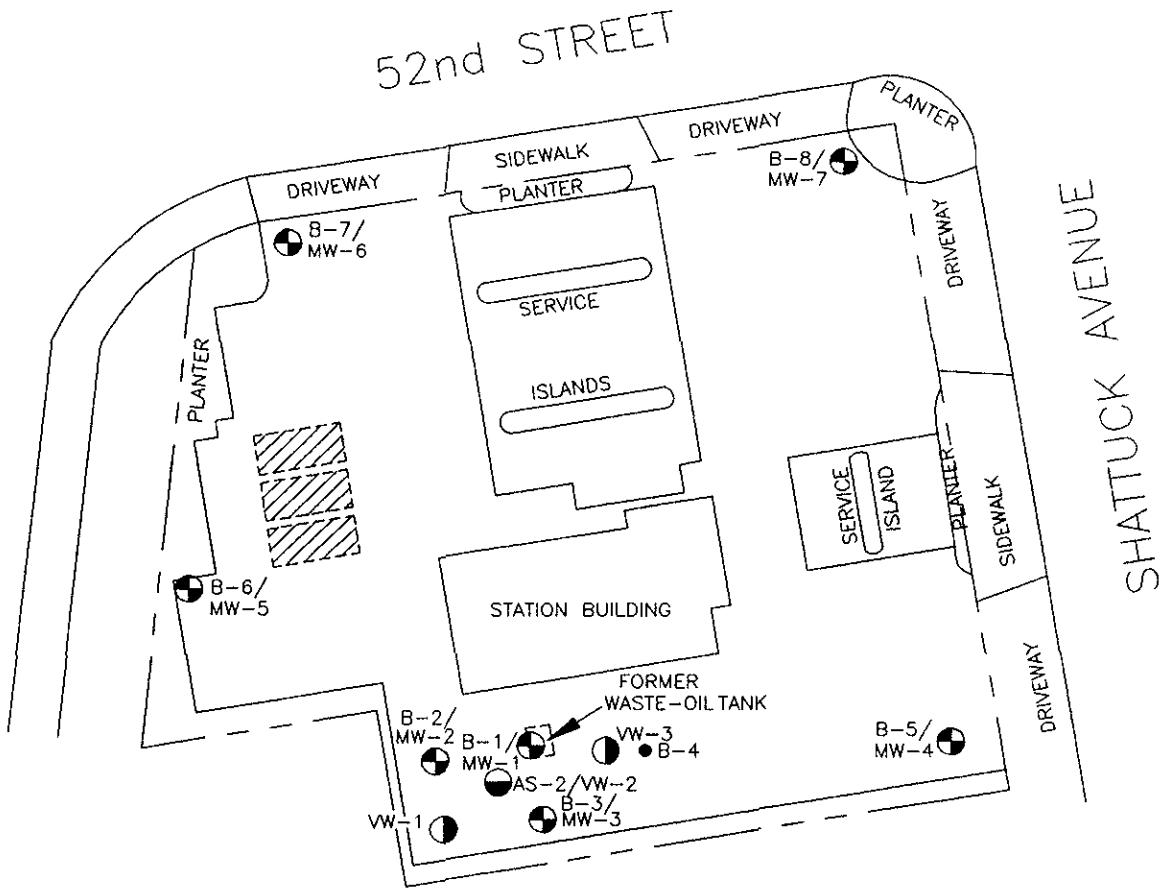
SITE VICINITY MAP
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE
1



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)

Approximate Scale

40 20 0 40 80

feet

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

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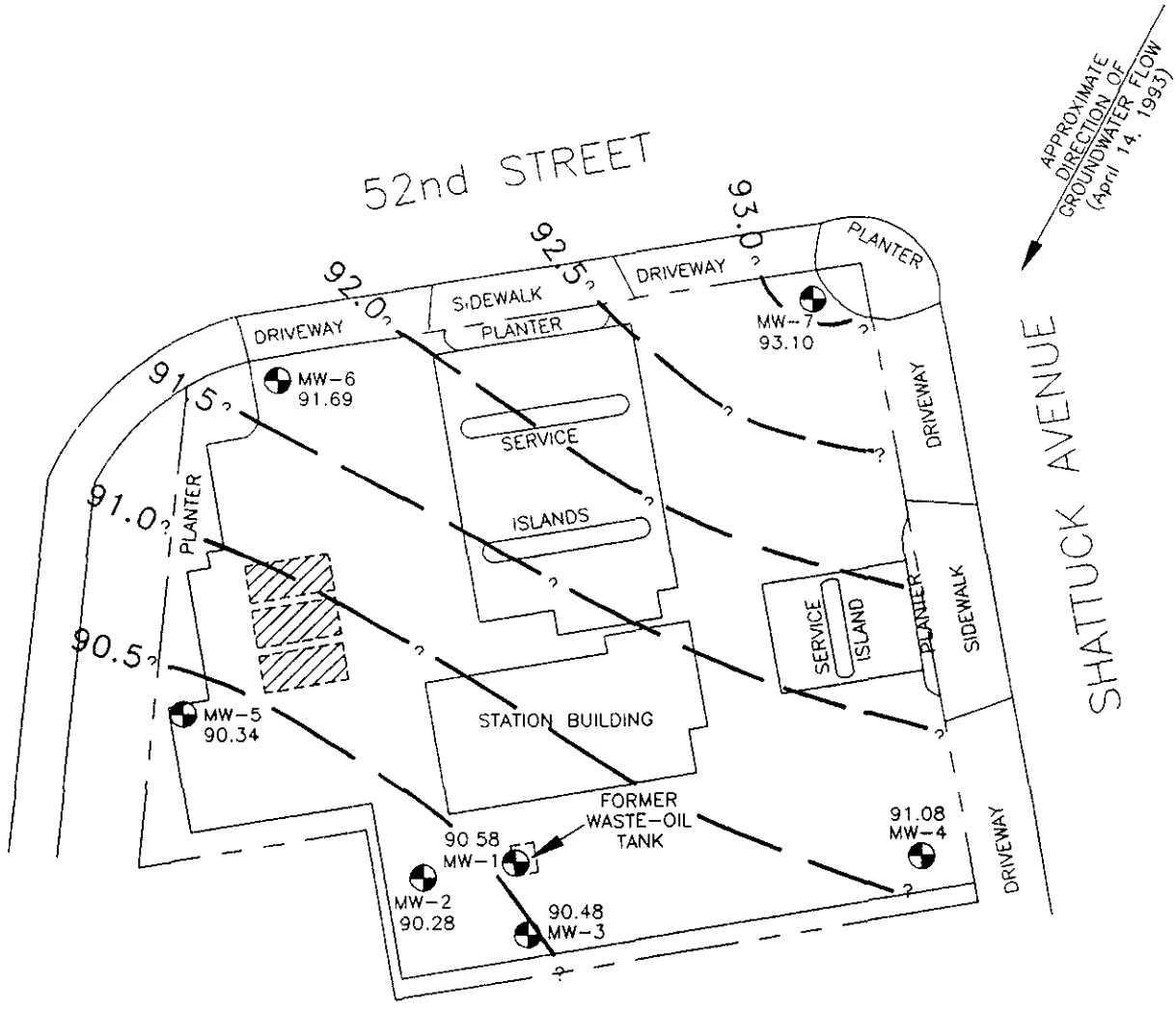
GENERALIZED SITE PLAN
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE
2



EXPLANATION

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

93 10 = Elevation of groundwater in feet above MSL, April 14, 1993

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

= Underground storage tanks

Approximate Scale

40 20 0 40 80

feet

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

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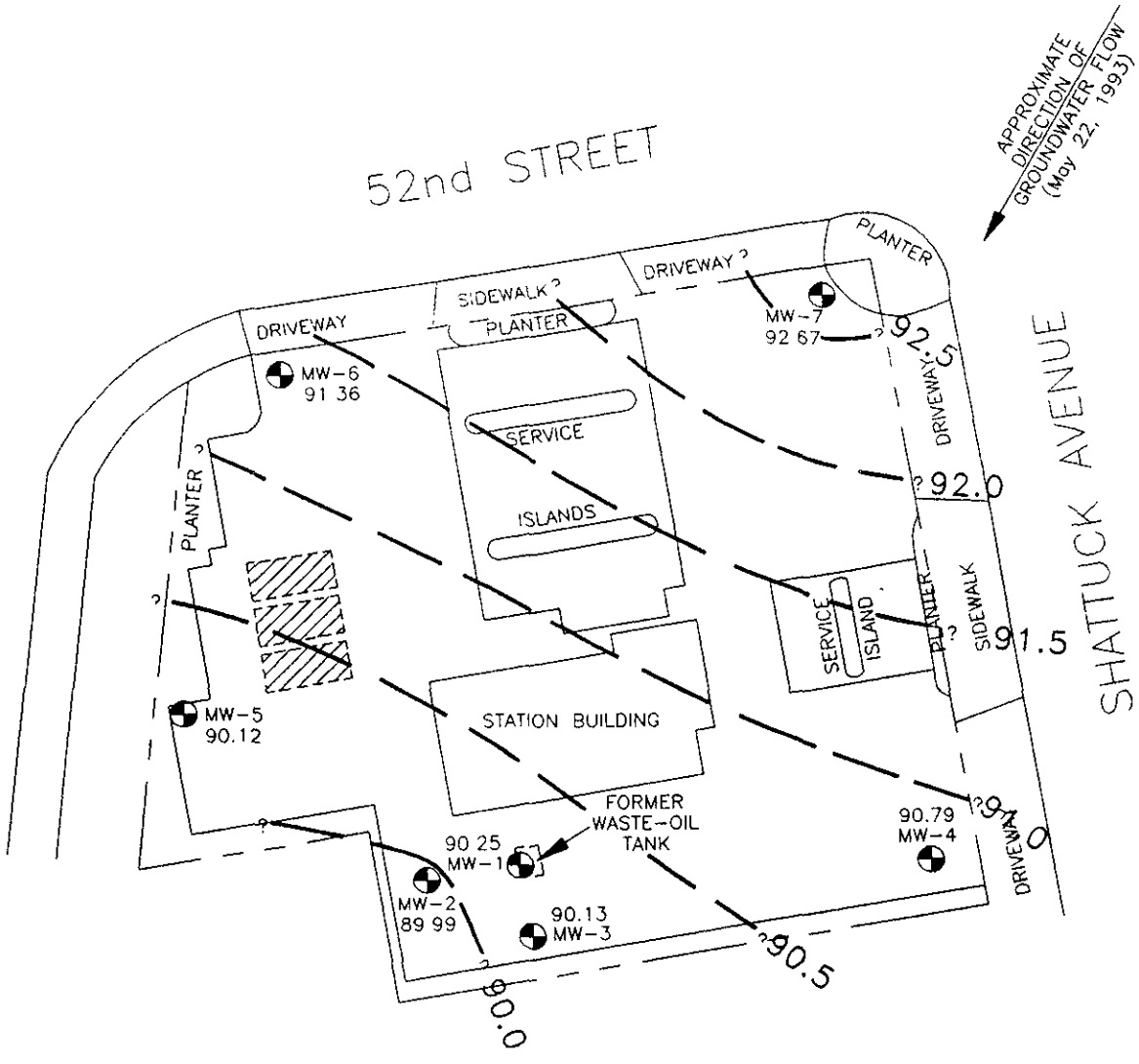
GROUNDWATER GRADIENT MAP
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE
3



EXPLANATION

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

92 67 = Elevation of groundwater in feet above MSL, May 22, 1993

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

= Underground storage tanks

Approximate Scale

40 20 0 40 80

feet

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

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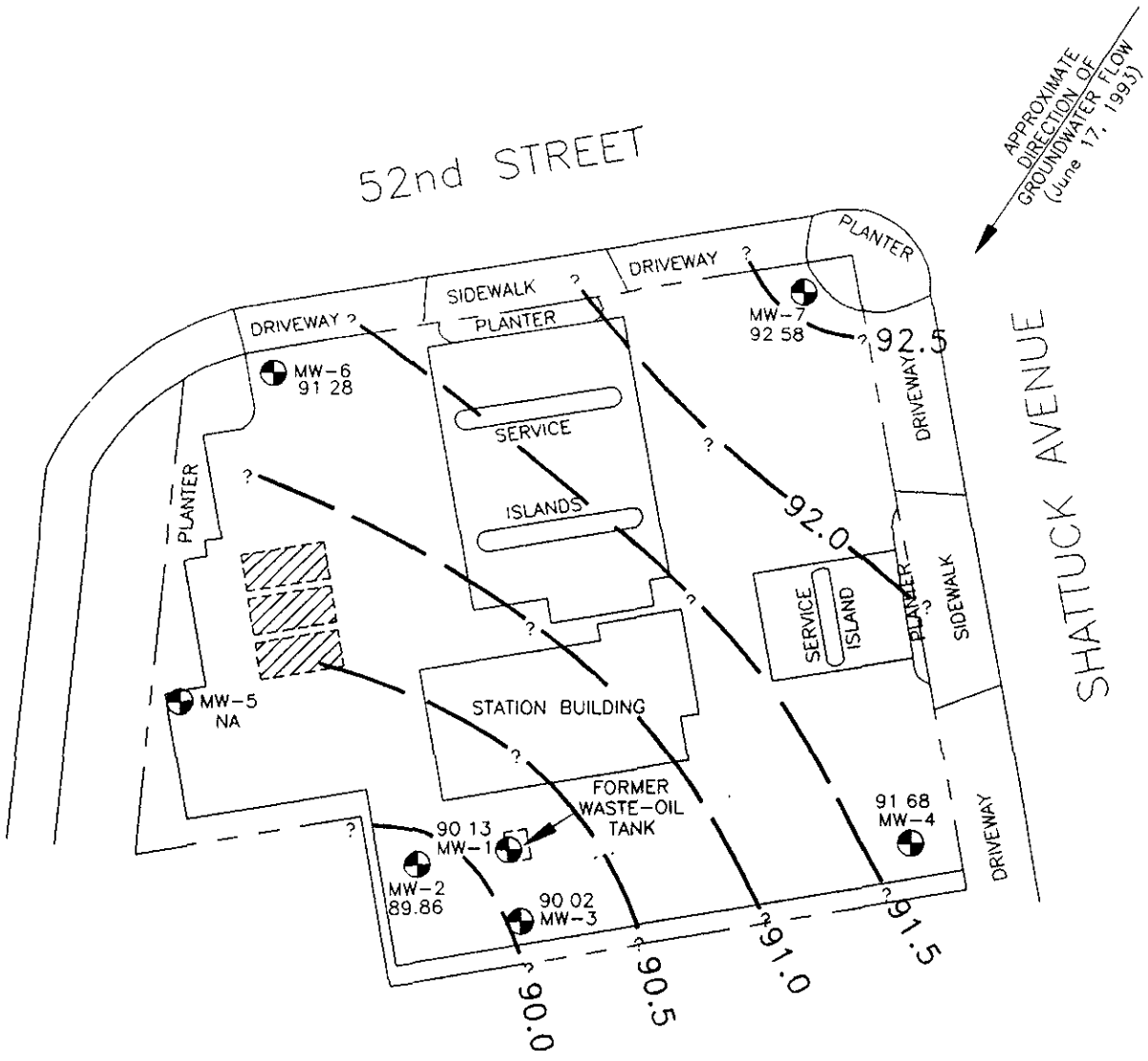
GROUNDWATER GRADIENT MAP
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE 4



EXPLANATION

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

93 65 = Elevation of groundwater in feet above MSL, June 17, 1993

NA = Not available

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

= Underground storage tanks

Approximate Scale

40 20 0 40 80

feet

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

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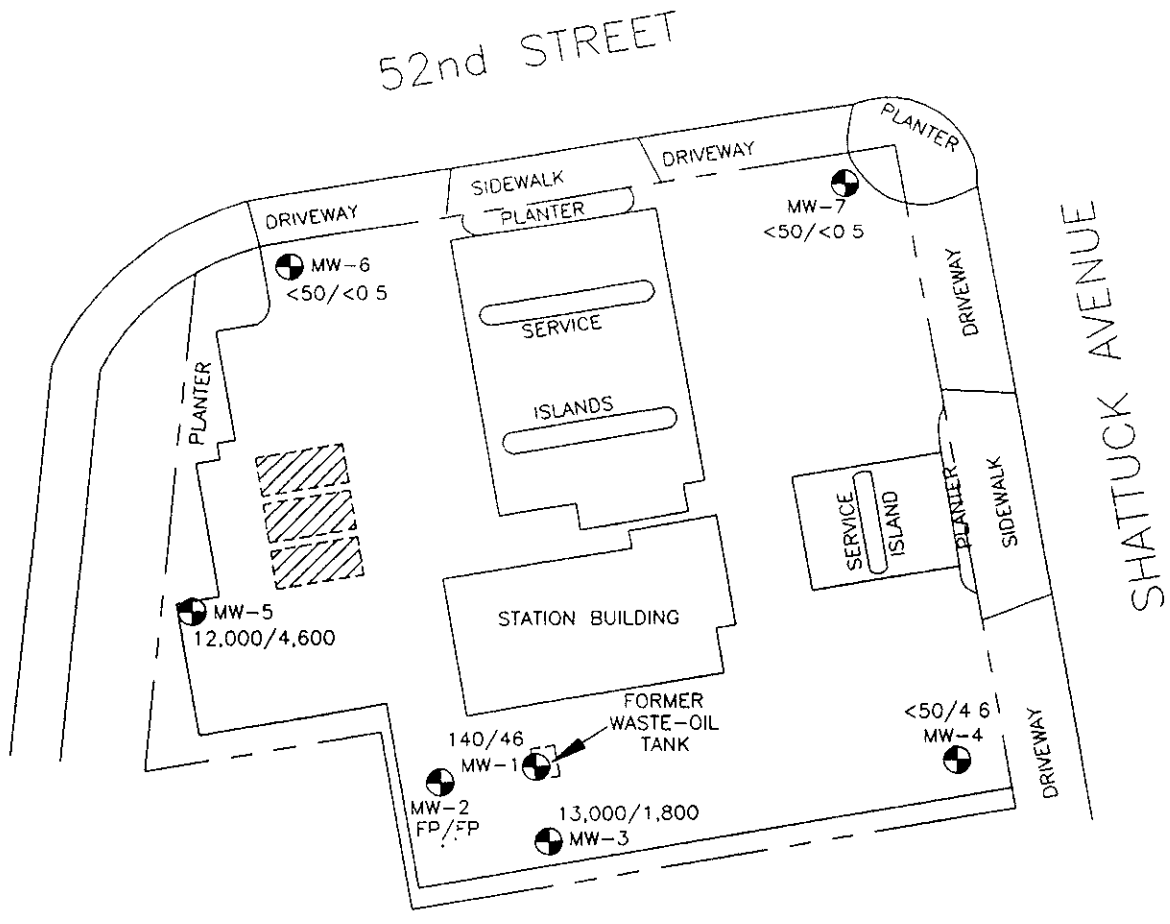
GROUNDWATER GRADIENT MAP
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE
5



EXPLANATION

13,000/1,800 = Concentration of total petroleum hydrocarbons as gasoline (TPHg) and benzene in groundwater in parts per billion (ppb), April 14, 1993

< = Less than laboratory detection limit

FP = Floating product present in well, not sampled

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

= Underground storage tanks

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
6

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Quarterly Groundwater Monitoring
ARCO Station 6148, Oakland, California

September 9, 1993
61035.06

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

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
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		16.72*	90.71*	0.01
04-14-93		17 15*	90.28*	0.01
05-22-93		17.44*	89.99*	0 07
06-17-93		17.57	89.86	None

See notes on page 3 of 3.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6148
Oakland, California
(Page 2 of 3)

Date Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
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
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		15.79	90.79	None
06-17-93		14.90	91 68	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	---	---

See notes on page 3 of 3.

Quarterly Groundwater Monitoring
ARCO Station 6148, Oakland, California

September 9, 1993
61035.06

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

Date Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
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
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		14 41	92.67	None
06-17-93		14.50	92.58	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.

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 SAMPLE 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
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											
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
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
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
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

See Notes on Page 2 of 2.

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 SAMPLE DATE	TPHg	TPHd	B	T	E	X	Cd	Cr	Pb	Ni	Zn	TOG
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
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 by EPA method 5030/8015/8020.

TPHd: Total petroleum hydrocarbons as diesel by EPA method 3510/California DHS LUFT Method

BTEX: Benzene, toluene, ethylbenzene, total xylenes isomers. Analyzed by EPA method 5030/8020/DHS LUFT Method.

TOG: Total oil and grease by Standard method 5520F-IR (on 09/14/92 by EPA Method 418.1)

( ): Concentrations in parentheses were results of Method 5520C.

*: Raised Method Reporting Limit (MRL) due to insufficient sample quantity

Metals: By EPA method 6010 and 7421.

<: 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.

MCL: Adopted Maximum Contaminant Levels in Drinking Water (DHS, October 1990).

DWAL: Recommended Drinking Water Action Level (DHS, October 1990).

NA: Not Analyzed

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF WATER SAMPLES-VOCs AND BNAs
ARCO Station 6148
Oakland, California
(Page 1 of 2)

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		
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		NA
09-14-92	Not sampled--floating product	NA		NA
10-07-92	Not sampled--floating product	NA		NA
01-22-93	Not sampled--floating product	NA		NA
04-14-93	Not sampled--floating product	NA		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	NA	
01-22-93	Tetrachloroethene	1.9	Naphthalene	440
			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
			Bis(2-ethylhexyl) Phthalate	250
			Di-n-octyl Phthalate	14

See Notes on Page 2 of 2.

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

Date/Well	Compound	VOCs (ppb)	Compound	BNAs (ppb)
MW-4				
01-22-93	Tetrachloroethene	1.4		<20
04-14-93	Tetrachloroethene	1.1		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		
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		
MW-7				
01-22-93	Tetrachloroethene	6.8		NA
04-14-93	Tetrachloroethene	4.3		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
Cd: Cadmium by EPA method 6010.
Cr: Chromium by EPA method 6010.
Pb: Lead by EPA method 7421.
Zn: Zinc by EPA method 6010.
Ni: Nickel by EPA method 6010.
MCLs: Maximum Contaminant Levels as reported by the California Department of Health Services 10/24/90
*: Proposed MCL.
NA: Not available

RESNA
Working to Restore Nature

APPENDIX A

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

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

Date May 12,1993
Project 0G70-039.01

To:
Mr. Robert Campbell
RESNA/ Applied Geosystems
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 second 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) 453-2266.

Jim Butera JB

Reviewed by:

4/30/94

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 : 4/14/95

ARCO STATION # : 6148 FIELD TECHNICIAN : R. Stafford DAY : Wednesday

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket	Lock	Locking Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	MW-7	ok	yes	ok	3297	yes	13.78	[illegible]	ND	ND	27.0	—
2	MW-6	ok	yes	ok	[illegible]	yes	13.47	13.47	ND	ND	22.6	—
3	MW-4	ok	yes	ok	3291	yes	15.50	15.49	ND	ND	26.0	slight odor
4	MW-1	ok	yes	ok	3291	yes	17.42	17.44	ND	ND	25.7	—
5	MW-5	ok	yes	ok	3241	yes	16.34	16.34	ND	ND	25.0	—
6	MW-3	ok	yes	ok	3291	yes	17.29	17.30	ND	ND	25.8	mild odor
7	MW-2	ok	yes	ok	3291	yes	17.16	17.16	17.15	0.01'	25.8	skimmer [illegible] strong odor

SURVEY POINTS ARE TOP OF WELL CASINGS

Summary of Groundwater Monitoring Data
Second 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)	TPH as Diesel (µg/l)	Total Oil and Grease, 5520F (mg/l)
MW-1(24)	04/15/93	17.45	ND.[2]	140	46.	<2 5	<2 5	<2 5	NR[3]	NR
MW-2	04/15/93	17.16	0.01	FP[4]	FP	FP	FP	FP	FP	FP
MW-3(25)	04/15/93	17.29	ND	13,000	1,800.	390	990	3,500	<50	26
MW-4(25)	04/15/93	15.50	ND.	<50.	4.6	<0.5	<0 5	<0.5	NR	NR
MW-5(24)	04/15/93	16.34	ND.	12,000.	4,600.	<50.	180.	130	NR	NR
MW-6(25)	04/15/93	13.47	ND.	<50.	<0.5	<0.5	<0.5	<0 5	NR	NR
MW-7(26)	04/15/93	13.98	ND.	<50.	<0.5	<0.5	<0.5	<0 5	NR	NR
FB-1.[5]	04/15/93	NA.[6]	NA.	<50	<0.5	<0.5	<0.5	<0.5	NR	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
Second 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(24)	<0.5	0.6	1.8	<0.5	<0.5	21
MW-2	FP.[5]	FP.	FP	FP.	FP.	FP
MW-3(25)	<0.5	<0.5	<0.5	<0.5	<0.5	1.7
MW-4(25)	<0.5	<0.5	<0.5	<0.5	<0.5	1.1
MW-5(24)	1.5	<0.5	2.0	0.9	<0.5	7.9
MW-6(25)	1.1	<0.5	5.8	<0.5	6.3	120
MW-7(26)	<0.5	<0.5	<0.5	<0.5	<0.5	4.3

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
Second 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)	Bis(2-ethylhexyl) Phthalate (ppb)	Di-n-octyl Phathalate (ppb)
MW-3(25)	130.	100	250	14

1. EPA = United States Environmental Protection Agency.

Summary of Analytical Results
Total Metals by EPA[1] Method 6010 and 7421
Second 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	Cadmium (ppb)	Chromium (ppb)	Lead (ppb)	Nickel (ppb)	Zinc (ppb)
MW-3(24)	<3.	<5.	3	<20	25

1. EPA = United States Environmental Protection Agency

Summary of Analytical Results
Volatile Organic Compounds by EPA[1] Method 624
Second 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)	1,900.	380.	520	1,700.

1. EPA = United States Environmental Protection Agency.

RECEIVED

Columbia Analytical Services Inc.

May 3, 1993

Service Request No.: K932170C

Jim Butera
EMCON Associates
1921 Ringwood Avenue
San Jose, CA 95131-1721

Re: **ARCO 6148-Oakland/Task Order #EMC-93-5/SJ930513**

Dear Jim:

Enclosed are the results of the sample submitted to our laboratory on April 16, 1993. Preliminary results were transmitted via facsimile on April 28, 1993. For your reference, these analyses have been assigned our service request number K932170C.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (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.

Joe Wiegel
Project Chemist

JW/sam

Columbia Analytical Services, Inc.

for Kevin DeWhitt
Quality Assurance Coordinator

Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-10

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: ARCO 6148-Oakland/Task Order #EMC-93-5
Matrix: Water

Date Received: 4/16/93
Work Order No.: K932170C

Total Metals
µg/L (ppb)

		Sample Name:	MW-3	Method Blank
		Lab Code:	K217001	K2170MB
Analyte	EPA Method	MRL		
Cadmium	6010	3	ND	ND
Chromium	6010	5	ND	ND
Lead	7421	2	3	ND
Nickel	6010	20	ND	ND
Zinc	6010	10	25	ND

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

MET GW(1,2,3)03-13-92

Approved: _____ Date: 4/30/93

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: ARCO 6148-Oakland/Task Order #EMC-93-5
Sample Matrix: Water

Date Received: 04/16/93
Date Extracted: 04/19/93
Date Analyzed: 04/23/93
Work Order No.: K932170C

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

Sample Name: MW-3
Lab Code: K2170-1

Base Neutral Analyte	MRL	Result	Base Neutral Analyte	MRL	Result
N-Nitrosodimethylamine	25	ND	2,6-Dinitrotoluene	10	ND
Aniline	25	ND	Diethyl Phthalate	10	ND
Bis(2-chloroethyl) Ether	10	ND	4-Chlorophenyl Phenyl Ether	10	ND
1,2-Dichlorobenzene	10	ND	Fluorene	10	ND
1,3-Dichlorobenzene	10	ND	4-Nitroaniline	25	ND
1,4-Dichlorobenzene	10	ND	N-Nitrosodiphenylamine	10	ND
Bis(2-chloroisopropyl) Ether	10	ND	4-Bromophenyl Phenyl Ether	10	ND
N-Nitrosodi-n-propylamine	10	ND	Hexachlorobenzene	10	ND
Hexachloroethane	10	ND	Phenanthrene	10	ND
Nitrobenzene	10	ND	Anthracene	10	ND
Isophorone	10	ND	Di-n-butyl Phthalate	10	ND
Bis(2-chloroethoxy)methane	10	ND	Fluoranthene	10	ND
1,2,4-Trichlorobenzene	10	ND	Pyrene	10	ND
Naphthalene	10	130	Butylbenzyl Phthalate	10	ND
4-Chloroaniline	10	ND	3,3'-Dichlorobenzidine	25	ND
Hexachlorobutadiene	10	ND	Benz(a)anthracene	10	ND
2-Methylnaphthalene	10	100	Bis(2-ethylhexyl) Phthalate	10	[a]250
Hexachlorocyclopentadiene	10	ND	Chrysene	10	ND
2-Chloronaphthalene	10	ND	Di-n-octyl Phthalate	10	14
2-Nitroaniline	25	ND	Benzo(b)fluoranthene	10	ND
Dimethyl Phthalate	10	ND	Benzo(k)fluoranthene	10	ND
Acenaphthylene	10	ND	Benzo(a)pyrene	10	ND
3-Nitroaniline	25	ND	Indeno(1,2,3-c,d)pyrene	10	ND
Acenaphthene	10	ND	Dibenz(a,h)anthracene	10	ND
Dibenzofuran	10	ND	Benzo(g,h,i)perylene	10	ND
2,4-Dinitrotoluene	10	ND			

Acid Analyte	MRL	Result	Acid Analyte	MRL	Result
Phenol	10	ND	2,4-Dichlorophenol	10	ND
2-Chlorophenol	10	ND	4-Chloro-3-methylphenol	10	ND
Benzyl Alcohol	10	ND	2,4,6-Trichlorophenol	10	ND
2-Methylphenol	10	ND	2,4,5-Trichlorophenol	25	ND
3- and 4-Methylphenol[♦]	10	ND	2,4-Dinitrophenol	25	ND
2-Nitrophenol	10	ND	4-Nitrophenol	25	ND
2,4-Dimethylphenol	10	ND	2-Methyl-4,6-dinitrophenol	25	ND
Benzoic Acid	25	ND	Pentachlorophenol		

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
♦ Quantified as 4-methylphenol.
a Result is from the analysis of a diluted sample, performed on April 27, 1993.

Approved by _____ Date 4/30/93

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Extracted:**	04/09/93
Project:	ARCO 6148-Oakland/Task Order #EMC-93-5	**Date Analyzed:**	04/23/93
Sample Matrix:	Water	**Work Order No.:**	K932170C

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

Sample Name: Method Blank
Lab Code: K2170-MB

Base Neutral Analyte	MRL	Result	Base Neutral Analyte	MRL	Result
N-Nitrosodimethylamine	25	ND	2,6-Dinitrotoluene	10	ND
Aniline	25	ND	Diethyl Phthalate	10	ND
Bis(2-chloroethyl) Ether	10	ND	4-Chlorophenyl Phenyl Ether	10	ND
1,2-Dichlorobenzene	10	ND	Fluorene	10	ND
1,3-Dichlorobenzene	10	ND	4-Nitroaniline	25	ND
1,4-Dichlorobenzene	10	ND	N-Nitrosodiphenylamine	10	ND
Bis(2-chloroisopropyl) Ether	10	ND	4-Bromophenyl Phenyl Ether	10	ND
N-Nitrosodi-n-propylamine	10	ND	Hexachlorobenzene	10	ND
Hexachloroethane	10	ND	Phenanthrene	10	ND
Nitrobenzene	10	ND	Anthracene	10	ND
Isophorone	10	ND	Di-n-butyl Phthalate	10	ND
Bis(2-chloroethoxy)methane	10	ND	Fluoranthene	10	ND
1,2,4-Trichlorobenzene	10	ND	Pyrene	10	ND
Naphthalene	10	ND	Butylbenzyl Phthalate	10	ND
4-Chloroaniline	10	ND	3,3'-Dichlorobenzidine	25	ND
Hexachlorobutadiene	10	ND	Benz(a)anthracene	10	ND
2-Methylnaphthalene	10	ND	Bis(2-ethylhexyl) Phthalate	10	ND
Hexachlorocyclopentadiene	10	ND	Chrysene	10	ND
2-Chloronaphthalene	10	ND	Di-n-octyl Phthalate	10	ND
2-Nitroaniline	25	ND	Benzo(b)fluoranthene	10	ND
Dimethyl Phthalate	10	ND	Benzo(k)fluoranthene	10	ND
Acenaphthylene	10	ND	Benzo(a)pyrene	10	ND
3-Nitroaniline	25	ND	Indeno(1,2,3-c,d)pyrene	10	ND
Acenaphthene	10	ND	Dibenz(a,h)anthracene	10	ND
Dibenzofuran	10	ND	Benzo(g,h,i)perylene	10	ND
2,4-Dinitrotoluene	10	ND			

Acid Analyte	MRL	Result	Acid Analyte	MRL	Result
Phenol	10	ND	2,4-Dichlorophenol	10	ND
2-Chlorophenol	10	ND	4-Chloro-3-methylphenol	10	ND
Benzyl Alcohol	10	ND	2,4,6-Trichlorophenol	10	ND
2-Methylphenol	10	ND	2,4,5-Trichlorophenol	25	ND
3- and 4-Methylphenol♦	10	ND	2,4-Dinitrophenol	25	ND
2-Nitrophenol	10	ND	4-Nitrophenol	25	ND
2,4-Dimethylphenol	10	ND	2-Methyl-4,6-dinitrophenol	25	ND
Benzoic Acid	25	ND	Pentachlorophenol		

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

Approved by _____ Date 4/30/93

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APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: ARCO 6148-Oakland/Task Order #EMC-93-5

Date Analyzed: 04/21,26/93
Work Order No.: K932170C

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

Analyte	EPA Method	True Value	Result	Percent Recovery
Cadmium	6010	1,250	1,270	102
Chromium	6010	500	508	102
Lead	7421	25	24.8	99
Nickel	6010	1,250	1,270	102
Zinc	6010	1,250	1,240	99

ICV Source: Inorganic Ventures

Approved by _____ Date 5/3/93

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Date Received:**	4/16/93
Project:	ARCO 6148-Oakland/Task Order #EMC-93-5	**Work Order No.:**	K932170C
Matrix:	Water		

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

Sample Name: MW-3
Lab Code: K217001

Analyte	MRL	Spike Level	Sample Result	Percent Recovery: Spiked Sample Result	Percent Recovery: Duplicate Spiked Sample Result	Percent Recovery: Spiked Sample	Percent Recovery: Duplicate Spiked Sample	CAS Acceptance Criteria	Relative Percent Difference
Cadmium	3	50	ND	46	46	92	92	75-125	<1
Chromium	5	200	ND	193	195	96	98	75-125	1
Lead	2	20	3	22	22	95	95	75-125	<1
Nickel	20	500	ND	491	496	98	99	75-125	1
Zinc	10	500	25	491	490	93	93	75-125	<1

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

0006

METDMS W1/03-13-91

Approved: _____ Date: 4/30/95

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Date Analyzed:**	04/21,26/93
Project:	ARCO 6148-Oakland/Task Order #EMC-93-5	**Work Order No.:**	K932170C
LCS Matrix:	Water		

Laboratory Control Sample Summary
Total Metals
µg/L (ppb)

Source: CAS Spiking Solution

Analyte	EPA Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Cadmium	6010	50	46	92	80-120
Chromium	6010	200	199	100	80-120
Lead	7421	20	19	95	80-120
Nickel	6010	500	514	103	80-120
Zinc	6010	500	486	97	80-120

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Approved by _____ Date 4/30/93

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Date Received:**	04/16/93
Project:	ARCO 6148-Oakland/Task Order #EMC-93-5	**Date Extracted:**	04/19/93
Sample Matrix:	Water	**Date Analyzed:**	04/23/93
		Work Order No.:	K932170C

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
MW-3	K2170-1	51	31	82	75	86	84
MW-3	K2170-1MS	46	34	77	82	89	87
MW-3	K2170-1DMS	58	40	84	84	87	84
Laboratory Control Sample	K2170-LCS	59	38	85	85	81	89
Method Blank	K2170-MB	56	38	80	85	71	83
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}

Approved by _____ Date 4/30/93

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: ARCO 6148-Oakland/Task Order #EMC-93-5
Sample Matrix: Water

Date Received: 04/16/93
Date Extracted: 04/19/93
Date Analyzed: 04/23/93
Work Order No.: K932170C

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

Sample Name: MW-3
Lab Code: K2170-1

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	380	380	ND	120	140	32	37	12-89	14
2-Chlorophenol	380	380	ND	210	240	55	63	27-123	14
1,4-Dichlorobenzene	190	190	ND	160	160	84	84	36-97	<1
N-Nitrosodi-n-propylamine	190	190	ND	150	170	79	89	41-116	12
1,2,4-Trichlorobenzene	190	190	ND	140	150	74	79	39-98	7
4-Chloro-3-methylphenol	380	380	ND	190	230	50	61	23-97	20
Acenaphthene	190	190	ND	150	150	79	79	46-118	<1
4-Nitrophenol	380	380	ND	290	270	76	71	10-80	7
2,4-Dinitrotoluene	190	190	ND	150	160	79	84	24-96	6
Pentachlorophenol	380	380	ND	260	240	68	63	9-103	8
Pyrene	190	190	ND	170	160	89	84	26-127	6

ND None Detected at or above the method reporting limit

Approved by _____ Date 4/30/93

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	**Date Extracted:**	04/19/93
Project:	ARCO 6148-Oakland/Task Order #EMC-93-5	**Date Analyzed:**	04/23/93
LCS Matrix:	Water	**Work Order No.:**	K932170C

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	100	37	37	5-112
2-Chlorophenol	100	86	86	23-134
1,4-Dichlorobenzene	100	81	81	20-124
N-Nitrosodi-n-propylamine	100	85	85	D-230
1,2,4-Trichlorobenzene	100	72	72	44-142
4-Chloro-3-methylphenol	100	79	79	22-147
Acenaphthene	100	76	76	47-145
4-Nitrophenol	100	43	43	D-132
2,4-Dinitrotoluene	100	76	76	39-139
Pentachlorophenol	100	63	63	14-176
Pyrene	100	92	92	52-115

D Detected; result must be greater than zero.

Approved by _____ Date 4/30/93

APPENDIX B

CHAIN OF CUSTODY INFORMATION

K2170C

ARCO Products Company Division of AtlanticRichfieldCompany

Task Order No. ~~EMCCC-92-1~~ EMC-93-5 (rev J. B-ka 4-14-93)

Chain of Custody

ARCO Facility no: 6148	City (Facility): OAKLAND	Project manager (Consultant): Jim Butera	Laboratory name: CAS
ARCO engineer: Kyle Christie	Telephone no (ARCO): 571-2434	Telephone no (Consultant): 453-0719 / Fax no (Consultant): 453-0452	Contract number: 07077
Consultant name: EMCON ASSOCIATES		Address (Consultant): 1938 Junction Avenue San Jose	

Sample I.D.	Lab no	Container no	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH GAS EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐ (SS20 F/IR)	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org/DHS ☐ Lead EPA 7420/7421 ☐	METALS Cd, Cr, Pb, Zn, Ni	
mw-1(24)	1-4	4		X		X	HCL	4-14-93	1352		X				X							
~~mw-2( )~~		~~4~~	No	sample.		0.01'	Product in	well			~~X~~				~~X~~							
mw-3(25)	5-12	8					HCl	4-14-93	1520		X		X		X	X						
mw-4(25)	13-16	4						4-14-93	1213		X				X							
mw-5(24)	17-20	4						4-14-93	1442		X				X							
mw-6(2)	21-24	4						4-14-93	1323		X				X							
mw-7(26)	25-28	4						4-14-93	1145		X				X							
FB-1	29-30	~~4~~ 2						4-14-93	1315		X											
mw-3(25)		1					HNO3	4-14-93	1520												X	
mw-3(25)	31-32	4					NP	4-14-93	1520			X	E				X					

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest possible

Special QA/QC: AS Normal

Remarks: 4-40ml VOA's
mw 3 add
2-40ml VOA's HCl
2-Liter HCl (Glass)
4 Liter NP (Glass)
1-500 ml HNO3 (plastic)
0670-039.01

Lab number: SJ93-0513

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

Condition of sample: OK		Temperature received: cool	
Relinquished by sampler: [signature]	Date 4/15/93 Time 07:31	Received by: [signature]	4-15-93 9:35
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory: Ruth Allison	Date 4-16-93 Time 0930

Laboratory: Canary copy — ARCO Environmental Engineering, Pink copy — Consultant

TSK 2413 0670, well, n CIS

Columbia Analytical Services, Inc.

April 29, 1993

Service Request No. SJ93-0513

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 April 15, 1993. For your reference, these analyses have been assigned our service request number SJ93-0513.

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

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Keoni A. Murphy
Laboratory Manager

Annelise J. Bazar
Regional QA Coordinator

KAM/kt

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
ARCO Facility No. 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

Inorganic Parameters[1]
mg/L (ppm)

Sample Name:			MW-3 (25)	Method Blank
Date Sampled:			04/14/93	
Analyte	**Method**	**MRL**		
Hydrocarbons, IR	SM 5520F	0.5	26.	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
[1] Unless otherwise noted, all analyses were performed within EPA recommended maximum holding times specified in *Test Methods for Evaluating Solid Waste*, (SW-846, 3rd Edition) and *Methods for Chemical Analysis of Water and Waste* (EPA-600/4-79-020, Revised March 1983).

Approved by: Kevin Murphy Date: Apr. 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	Date Received:	04/15/93
Project:	EMCON Project No. 0G70-039.01	Date Extracted:	04/19/93
	ARCO Facility No. 6148	Date Analyzed:	04/19/93
Sample Matrix:	Water	Service Request No.:	SJ93-0513

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

Sample Name	MRL	TPH as Diesel
MW-3 (25)	50	ND
Method Blank	50	ND

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

Approved by: Kenneth Smith Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	Date Received:	04/15/93
Project:	EMCON Project No. 0G70-039.01	Service Request No.:	SJ93-0513
	ARCO Facility No. 6148	Sample Matrix:	Water

BTEX and TPH as Gasoline
EPA Methods 5030/8240 Mod./California DHS LUFT Method
µg/L (ppb)

Sample Name:		MW-1 (24)	MW-3 (25)	MW-4 (25)
Date Analyzed:		04/22/93 *	04/22/93	04/23/93
Analyte	**MRL**			
Benzene	0.5	46.	1,800.	4.6
Toluene	0.5	<2.5 **	390.	ND
Ethylbenzene	0.5	<2.5 **	990.	ND
Total Xylenes	0.5	<2.5 **	3,500.	ND
TPH as Gasoline	50	140.	13,000.	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* This sample was part of the analytical batch started on April 22, 1993. However, it was analyzed after midnight so the actual date analyzed is April 23, 1993.
** Raised MRL due to high analyte concentration requiring sample dilution.

Approved by: _____ Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
ARCO Facility No. 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

BTEX and TPH as Gasoline
EPA Methods 5030/8240 Mod., California DHS LUFT Method
µg/L (ppb)

Sample Name:		MW-5 (24)	MW-6 (25)	MW-7 (26)
Date Analyzed:		04/22/93	04/23/93	04/23/93
Analyte	**MRL**			
Benzene	0.5	4,600.	ND	ND
Toluene	0.5	<50. *	ND	ND
Ethylbenzene	0.5	180.	ND	ND
Total Xylenes	0.5	130.	ND	ND
TPH as Gasoline	50	12,000.	ND	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Raised MRL due to high analyte concentration requiring sample dilution.

Approved by: _____ Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	04/15/93
Project:	EMCON Project No. 0G70-039 01	**Service Request No.:**	SJ93-0513
	ARCO Facility No. 6148	**Sample Matrix:**	Water

BTEX and TPH as Gasoline
EPA Methods 5030/8240 Mod./California DHS LUFT Method
µg/L (ppb)

Sample Name:		FB-1	Method Blank	Method Blank
Date Analyzed:		04/23/93	04/22/93	04/23/93
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

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

Approved by: Kenneth Murphy Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
ARCO Facility No 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

Halogenated Volatile Organic Compounds
EPA Methods 5030/601
µg/L (ppb)

Sample Name:		MW-1 (24)	MW-3 (25)	MW-4 (25)
Date Analyzed:		04/20/93	04/20/93	04/20/93
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	0.6	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	1.8	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	21.	1.7	1.1
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

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

Approved by: _____ Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
ARCO Facility No. 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

Halogenated Volatile Organic Compounds
EPA Methods 5030/601
µg/L (ppb)

Sample Name:		MW-5 (24)	MW-6 (25)	MW-7 (26)
Date Analyzed:		04/20/93	04/20/93	04/20/93
Analyte	**MRL**			
Dichlorodifluoromethane (Freon 12)	1	ND	ND	ND
Chloromethane	1	ND	ND	ND
Vinyl Chloride	0.5	0.9	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	1.5	1.1	ND
1,1-Dichloroethane	0.5	ND	6.3	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	2.0	5.8	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	7.9	120.	4.3
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

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

Approved by: Kenneth Minglin Date: 4/29/1993

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
ARCO Facility No. 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

Halogenated Volatile Organic Compounds
EPA Methods 5030/601
µg/L (ppb)

Sample Name:	Method Blank
Date Analyzed:	04/20/93

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

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

Approved by: [signature] Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
ARCO Facility No. 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

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

Sample Name:		MW-3 (25) *	Method Blank
Date Analyzed:		04/16/93	04/16/93
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	1,900.	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	380.	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	520.	ND
Styrene	1	<50.	ND
Total Xylenes	5	1,700.	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

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Raised MRL due to high analyte concentration requiring sample dilution.

Approved by: _____ Date: April 29 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
Arco Facility No. 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

Continuing Calibration Summary
Inorganics
SM5520F
mg/L

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Hydrocarbons, IR	100.	109.	109.	90-110

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

Approved by: _____ Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

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

Date Received: 04/15/93
Service Request No.: SJ93-0513
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: 04/16/93

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	2,610.	2,470.	104.	98.	61-145	6.
Trichloroethene	2,500.	ND	2,500.	2,390.	100.	96.	71-120	4.
Chlorobenzene	2,500.	ND	2,290.	2,150.	92.	86.	75-130	6.
Toluene	2,500.	385.	2,880.	2,810.	100.	97.	76-125	3.
Benzene	2,500.	1,930.	4,410.	4,370.	99.	98.	76-127	1.

ND None Detected at or above the method reporting limit

Approved by: _____ Date: April 29, 1993

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
Arco Facility No. 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

Matrix Spike Summary
Inorganic Parameters
SM5520F
mg/L (ppm)

Date Sampled: 04/14/93

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria
Hydrocarbons, IR	8.0	ND	6.9	6.9	86.	86.	56-151

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
ND None Detected at or above the method reporting limit

Approved by: _____ Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

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

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

Initial Calibration Verification
Total Petroleum Hydrocarbons as Diesel
EPA Methods 3510/DHS LUFT Method
mg/L (ppm)

Date Analyzed: 04/19/93

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
TPH as Diesel	500.	484.	97.	90-110

TPH Total Petroleum Hydrocarbons

Approved by: _____ Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
ARCO Facility No. 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

Surrogate Recovery Summary
Total Petroleum Hydrocarbons as Diesel
EPA Methods 3510/California DHS LUFT Method

Sample Name	Date Analyzed	Percent Recovery *p*-Terphenyl
MW-3 (25)	04/19/93	99.
MS	04/19/93	93.
DMS	04/19/93	101.
Method Blank	04/19/93	93.
CAS Acceptance Criteria		46-133

Approved by: Kevin McGuire Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

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

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

Matrix Spike Duplicate Matrix Spike Summary
Total Petroleum Hydrocarbons as Diesel
EPA Method 3510/DHS LUFT Method
µg/L (ppb)

Date Analyzed: 04/19/93

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	Acceptance Criteria
Diesel	4,000.	ND	3,890.	4,190.	97.	105.	61-121

ND None Detected at or above the method reporting limit

Approved by: Kevin Murphy Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
ARCO Facility No. 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513

Initial Calibration Verification
BTEX and TPH as Gasoline
EPA Methods 5030/8240 Mod./DHS LUFT Method
µg/L (ppb)

Date Analyzed: 04/22/93

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	25.	22.8	91.	85-115
Toluene	25.	22.4	90.	85-115
Ethylbenzene	25.	23.3	93.	85-115
Total Xylenes	75.	70.5	94.	85-115
TPH as Gasoline	250.	245.	98.	90-110

TPH Total Petroleum Hydrocarbons

Approved by: _____ Date: April 27, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	Date Received:	04/15/93
Project:	EMCON Project No. 0G70-039.01	Service Request No.:	SJ93-0513
	ARCO Facility No. 6148	Sample Matrix:	Water

Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8240 Mod./California DHS LUFT Method

Sample Name	Date Analyzed	Percent Recovery *a,a,a*-Trifluorotoluene
MW-1 (24)	04/22/93	92.
MW-3 (25)	04/22/93	92.
MW-4 (25)	04/23/93	86.
MW-5 (24)	04/22/93	91.
MW-6 (25)	04/23/93	92.
MW-7 (26)	04/23/93	85.
FB-1	04/23/93	92.
MW-5 (24) MS	04/22/93	100.
MW-5 (24) DMS	04/22/93	101.
Method Blank	04/22/93	90.
Method Blank	04/23/93	87.
CAS Acceptance Criteria		70-130

TPH Total Petroleum Hydrocarbons

Approved by: _____ Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Associates	Date Received:	04/15/93
Project:	EMCON Project No. 0G70-039 01	Service Request No.:	SJ93-0513
	ARCO Facility No. 6148	Sample Matrix:	Water

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

Sample Name: MW-5 (24)
Date Analyzed: 04/22/93

			Spike Result		Percent Recovery		CAS Acceptance
Analyte	Spike Level	Sample Result	MS	DMS	MS	DMS	Criteria
TPH as Gasoline	25,000.	12,400.	36,200.	36,800.	95.	98.	76-130

TPH Total Petroleum Hydrocarbons

Approved by: _____ Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

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

Date Received: 04/15/93
Service Request No.: SJ93-0513

Initial Calibration Verification
Halogenated Volatile Organic Compounds
EPA Methods 5030/601
Nanograms

Date Analyzed: 04/20/93

Analyte	True Value	Result	Percent Recovery	EPA Percent Recovery Acceptance Criteria
Chloromethane	50	49.7	99.	D-193
Vinyl Chloride	50	55.8	112.	28-163
Bromomethane	50	55.1	110.	D-144
Chloroethane	50	61.6	123.	46-137
Trichlorofluoromethane (Freon 11)	50	45.6	91.	21-156
1,1-Dichloroethene	50	55.5	111.	28-167
Methylene Chloride	50	44.1	88.	25-162
trans-1,2-Dichloroethene	50	47.2	94.	38-155
1,1-Dichloroethane	50	48.7	97.	47-132
Chloroform	50	45.7	91.	49-133
1,1,1-Trichloroethane (TCA)	50	48.6	97.	41-138
Carbon Tetrachloride	50	53.6	107.	43-143
1,2-Dichloroethane	50	38.1	76.	51-147
Trichloroethene (TCE)	50	47.9	96.	35-146
1,2-Dichloropropane	50	48.4	97.	44-156
Bromodichloromethane	50	49.8	100.	42-172
trans-1,3-Dichloropropene	50	60.8	122.	22-178
cis-1,3-Dichloropropene	50	49.0	98.	22-178
1,1,2-Trichloroethane	50	42.2	84.	39-136
Tetrachloroethene (PCE)	50	49.5	99.	26-162
Dibromochloromethane	50	47.0	94.	24-191
Chlorobenzene	50	51.4	103.	38-150
Bromoform	50	47.3	95.	13-159
1,1,2,2-Tetrachloroethane	50	45.1	90.	8-184
1,3-Dichlorobenzene	50	53.5	107.	7-187
1,4-Dichlorobenzene	50	54.9	110.	42-143
1,2-Dichlorobenzene	50	53.8	108.	D-208

D Detected

Approved by: _____ Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
ARCO Facility No. 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

Surrogate Recovery Summary
Halogenated Volatile Organic Compounds
EPA Methods 5030/601

Sample Name	Date Analyzed	Percent Recovery 4-Bromofluorobenzene
MW-1 (24)	04/20/93	112.
MW-3 (25)	04/20/93	96.
MW-4 (25)	04/20/93	89.
MW-5 (24)	04/20/93	101.
MW-6 (25)	04/20/93	99.
MW-7 (26)	04/20/93	97.
MW-1 (24) MS	04/20/93	105.
MW-1 (24) DMS	04/20/93	110.
Method Blank	04/20/93	95.
	CAS Acceptance Criteria	70-130

Approved by: Kevin A Mcglin Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
ARCO Facility No. 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513
Sample Matrix: Water

Matrix Spike/Duplicate Matrix Spike Summary
Halogenated Volatile Organic Compounds
EPA Methods 5030/601
µg/L (ppb)

Sample Name: MW-1 (24)
Date Analyzed: 04/20/93

			Percent Recovery				
	Spike	Sample	Spike Result				EPA Acceptance
Analyte	Level	Result	MS	DMS	MS	DMS	Criteria
1,1-Dichloroethene	10.	ND	8.51	8.10	85.	81.	28-167
Trichloroethene	10.	1.76	11.3	12.0	95.	102.	35-146
Tetrachloroethene	10.	21.4	29.6	29.6	82.	82.	26-162

ND None Detected at or above the method reporting limit

Approved by: _____ Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-039 01
ARCO Facility No. 6148

Date Received: 04/15/93
Service Request No.: SJ93-0513

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

Date Analyzed: 04/16/93

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Chloromethane	50	51.2	102.	70-130
Vinyl Chloride	50	52.9	106.	70-130
Bromomethane	50	50.6	101.	70-130
Chloroethane	50	51.0	102.	70-130
Acetone	50	65.1	130.	70-130
1,1-Dichloroethene	50	51.6	103.	70-130
Carbon Disulfide	50	50.5	101.	70-130
Methylene Chloride	50	50.3	101.	70-130
trans-1,2-Dichloroethene	50	49.0	98.	70-130
cis-1,2-Dichloroethene	50	49.0	98.	70-130
1,1-Dichloroethane	50	48.8	98.	70-130
Vinyl Acetate	50	43.1	86.	70-130
2-Butanone	50	53.4	107.	70-130
Chloroform	50	49.6	99.	70-130
1,1,1-Trichloroethane (TCA)	50	47.3	95.	70-130
Carbon Tetrachloride	50	50.3	101.	70-130
Benzene	50	50.7	101.	70-130
1,2-Dichloroethane	50	51.0	102.	70-130
Trichloroethene (TCE)	50	51.0	102.	70-130
1,2-Dichloropropane	50	51.0	102.	70-130
Bromodichloromethane	50	51.4	103.	70-130
2-Chloroethyl Vinyl Ether	50	52.7	105.	70-130
2-Hexanone	50	60.6	121.	70-130
trans-1,3-Dichloropropene	50	51.7	103.	70-130
Toluene	50	54.6	109.	70-130
cis-1,3-Dichloropropene	50	51.8	104.	70-130
1,1,2-Trichloroethane	50	52.7	105.	70-130
Tetrachloroethene (PCE)	50	49.5	99.	70-130
Dibromochloromethane	50	50.9	102.	70-130
Chlorobenzene	50	50.7	101.	70-130
Ethylbenzene	50	50.1	100.	70-130
o Xylene	50	49.5	99.	70-130
Styrene	50	50.2	100.	70-130
Bromoform	50	55.0	110.	70-130
1,1,2,2-Tetrachloroethane	50	56.1	112.	70-130

Approved by: [signature] Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

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

Date Received: 04/15/93
Service Request No.: SJ93-0513
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)	04/16/93	102.	100.	100.
MW-3 (25) MS	04/16/93	102.	102.	99.
MW-3 (25) DMS	04/16/93	101.	102.	101.
Method Blank	04/16/93	102.	99.	99.
	EPA Acceptance Criteria	76-114	88-110	86-115

Approved by: Kevin McLaughlin Date: April 29, 1993

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

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

Date Received: 04/15/93
Service Request No.: SJ93-0513
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)	04/16/93	102.	100.	100.
MW-3 (25) MS	04/16/93	102.	102.	99.
MW-3 (25) DMS	04/16/93	101.	102.	101.
Method Blank	04/16/93	102.	99.	99.
	EPA Acceptance Criteria	76-114	88-110	86-115

Approved by: Kevin A. Macaulay Date: April 29, 1993

APPENDIX B

CHAIN OF CUSTODY

• Telephone 408/437-2400 • Fax 408/437-9356

ARCO Products Company
Division of AtlanticRichfieldCompany

Chain of Custody

Task Order No. ~~EMCC-92-1~~ EMC-93-5

ARCO Facility no	6148	City (Facility)	OAKLAND
ARCO engineer	Kyle Christie	Telephone no (ARCO)	571-2434
Consultant name	EMCON ASSOCIATES	Address (Consultant)	1938 Junction Avenue San Jose
Project manager (Consultant)	Jim Butera		
Telephone no (Consultant)	453-0719	Fax no (Consultant)	453-0452

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 / SVOA	CAM Metals EPA 6010/7000 TTLC / STLC	Lead Org./DHS / Lead EPA 7420/7421	METALS Cd, Cr, Pb, Zn	
MW-1(24)	1-4	4		X		X	HCL	4-14-93	1352		X				X							
MW-2( )		~~4~~	No	Sample.		Oil Product in well					X				X			→				
MW-3(25)	5-12	8					HCl	4-14-93	1320		X		X		X	X						
MW-4(25)	13-16	4						4-14-93	1213		X				X							
MW-5(21)	17-20	4						4-14-93	1442		X				X							
MW-6(25)	21-24	4						4-14-93	1323		X				X							
MW-7(26)	25-28	4						4-14-93	1145		X				X							
FB 1	29-30	~~3~~ 2					↓	4-14-93	1315		X											
		6																				
MW-1(25)		1					HNO_3	4-14-93	1520												X	
MW-3(25)	31-32	4		↓		↓	NP	4-14-93	1520			X	X				X					

Condition of sample: OF

Relinquished by sampler: [signature] Date 4/15/93 Time 09:31

Relinquished by: Date Time

Relinquished by: Date Time

Temperature received: COO

Received by: [signature] Date 4-15-93 Time 9:35

Received by:

Received by laboratory: Date Time

Laboratory name: CAS

Contract number: (illegible)

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest possible

Special QA/QC: MS Normal

Remarks:
4-40ml VOA's
MW-3 added
~~BTEX~~
2-40ml VOA's HCL
2-Liter HCl (Glass)
4 Liter NP (Glass)
1-500ml HNO_3 (plastic)
0670-0591

Lab number: SJ93-0513

Turnaround time

- Priority Rush 1 Business Day [ ]
- Rush 2 Business Days [ ]
- Expedited 5 Business Days [ ]
- Standard 10 Business Days [X]

White copy — Laboratory Canary copy — ARCO Environmental Engineering, Pink copy — Consultant

WATER SAMPLE FIELD DATA SHEET

Rev 2, 5/9

EMCON ASSOCIATES

PROJECT NO: OG70-0391 | SAMPLE ID: MW-1 (24)
PURGED BY: K. Stafford | CLIENT NAME: Arco 6148
SAMPLED BY: K. Stafford | LOCATION: 5131 Shattuck Ave, 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) WK | VOLUME IN CASING (gal.): 5.37
DEPTH TO WATER (feet): 12.05 | CALCULATED PURGE (gal.): 16.2
DEPTH OF WELL (feet): 20.7 | ACTUAL PURGE VOL. (gal.): 16.5

DATE PURGED: 4-14-93 | Start (2400 Hr) 1341 | End (2400 Hr) 1352
DATE SAMPLED: 4-14-93 | Start (2400 Hr) 1352 | End (2400 Hr) 1354

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1344	5.5	6.50	442	69.9	Clear	low
1346	11	6.57	463	67.9	↓	↓
1348	16.5	6.57	464	69.5	↓	↓

D. O. (ppm): Nil | ODOR: Slight | Nil (COLOR: COBALT 0 - 100) | Nil (TURBIDITY: NTU 0 - 200)

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

PURGING EQUIPMENT

___ 2" Bladder Pump | ___ Bailer (Teflon®)
___ Centrifugal Pump | ___ Bailer (PVC)
___ Submersible Pump | ___ Bailer (Stainless Steel)
___ Well Wizard™ | ___ Dedicated
Other ___

SAMPLING EQUIPMENT

___ 2" Bladder Pump | X Bailer (Teflon®)
___ DDL Sampler | ___ Bailer (Stainless Steel)
___ Dipper | ___ Submersible Pump
___ Well Wizard™ | ___ Dedicated
Other: ___

WELL INTEGRITY: OK | LOCK #: 3257

REMARKS ___

Meter Calibration: Date: 4-14-93 Time: 1115 | Meter Serial #: 9264 | Temperature °F ___
(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ ___
Location of previous calibration: 1111-7

Signature [signature] | Reviewed By: [signature] | Page 1 of 7

Rev. 2, 5/91

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 0G70-039 C1 SAMPLE ID: MW-2 (24)
PURGED BY: R. Stafford CLIENT NAME: Arco 6148
SAMPLED BY: R. Stafford LOCATION: 5131 Shattuck Ave 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.): NA
DEPTH TO WATER (feet): 17.16 CALCULATED PURGE (gal.): NA
DEPTH OF WELL (feet): 25.8 ACTUAL PURGE VOL. (gal.): NA

DATE PURGED: 4-14-93 Start (2400 Hr) NA End (2400 Hr) NA
DATE SAMPLED: 4-14-93 Start (2400 Hr) NA End (2400 Hr) NA

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmnos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
No Readings		no Sample	0.01' product	in Bailer		

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

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

PURGING EQUIPMENT

___ 2" Bladder Pump ___ Bailer (Teflon®)
___ Centrifugal Pump NA ___ Bailer (PVC)
___ Submersible Pump ___ Bailer (Stainless Steel)
___ Well Wizard™ ___ Dedicated
Other ___

SAMPLING EQUIPMENT

___ 2" Bladder Pump ___ Bailer (Teflon®)
___ DDL Sampler NA ___ Bailer (Stainless Steel)
___ Dipper ___ Submersible Pump
___ Well Wizard™ ___ Dedicated
Other: ___

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: No Sample 0.01' Product in well

Meter Calibration: Date: 4-14-93 Time: 918 Meter Serial #: 9204 Temperature °C ___
(EC 1000 ___ ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___
Location of previous calibration: MW-7

Signature: R. Stafford Reviewed By: JB Page 7 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-039.01 | SAMPLE ID: MW-3 (23)

PURGED BY: K. Stafford | CLIENT NAME: Arco 6148

SAMPLED BY: K. Stafford | LOCATION: 5131 Shattuck Ave 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): U'K | VOLUME IN CASING (gal.): 5.5

DEPTH TO WATER (feet): 17.32 | CALCULATED PURGE (gal.): 16.64

DEPTH OF WELL (feet): 25.3 | ACTUAL PURGE VOL. (gal.): 16.5

DATE PURGED: 4-14-93 | Start (2400 Hr): 1500 | End (2400 Hr): 1517

DATE SAMPLED: 4-14-93 | Start (2400 Hr): 1520 | End (2400 Hr): 1532

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1516	5.5	6.62	502.	71.9	Clear	Low
1510	11	6.47	533.	70.8	↓	↓
515	16.5	6.45	1.CC.	69.8	↓	↓

D. O. (ppm): N/A | ODOR: Strong | (COBALT 0 - 100): N/A | (NTU 0 - 200): N/A

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

PURGING EQUIPMENT

___ 2" Bladder Pump | ___ Bailer (Teflon ®)
___ Centrifugal Pump | ___ Bailer (PVC)
7 Submersible Pump | ___ Bailer (Stainless Steel)
___ Well Wizard™ | ___ Dedicated
Other ___

SAMPLING EQUIPMENT

___ 2" Bladder Pump | X Bailer (Teflon ®)
___ DDL Sampler | ___ Bailer (Stainless Steel)
___ Dipper | ___ Submersible Pump
___ Well Wizard™ | ___ Dedicated
Other: ___

WELL INTEGRITY: OK | LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 4-14-93 Time: 1118 | Meter Serial #: 9204 | Temperature °C ___

(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

EMCON ASSOCIATES

PROJECT NO: 0670-039.01 SAMPLE ID: MW-~~4~~ (25)

PURGED BY: R. Stafford CLIENT NAME: Arco 6148

SAMPLED BY: R. Stafford LOCATION: 5131 Shattuck Ave Oakland, CA

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

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

CASING ELEVATION (feet/MSL)	UK	VOLUME IN CASING (gal.)	~~7.6~~ 6.85
DEPTH TO WATER (feet)	~~15.47~~ 15.50	CALCULATED PURGE (gal.)	~~27.6~~ 20.55
DEPTH OF WELL (feet)	~~26.6~~ 26.0	ACTUAL PURGE VOL. (gal.)	25.5

DATE PURGED: 4-14-93 Start (2400 Hr) 12:03 End (2400 Hr) 1212

DATE SAMPLED: 4-14-93 Start (2400 Hr) 1213 End (2400 Hr) 1216

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1205	8.5	6.32	475	68.6	Clear	low
1207	17.0	6.37	487	67.6	↓	↓
1210	25.5	6.40	490	67.6	↓	↓

D. O. (ppm): NA ODOR: none NA (COBALT 0 - 100) NA (NTU 0 - 200)

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

PURGING EQUIPMENT

___ 2" Bladder Pump
___ Centrifugal Pump
✓ Submersible Pump
___ Well Wizard™
___ Bailer (Teflon®)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
___ Dedicated
Other ___

SAMPLING EQUIPMENT

___ 2" Bladder Pump
___ DDL Sampler
___ Dipper
___ Well Wizard™
✓ Bailer (Teflon®)
___ Bailer (Stainless Steel)
___ Submersible Pump
___ Dedicated
Other: ___

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 4-14-93 Time: 1118 Meter Serial #: 9204 Temperature °F ___

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

Location of previous calibration: MW-7

Signature: R. Stafford Reviewed By: JB Page 4 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2. 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-0391 | SAMPLE ID: MW-5 (24)

PURGED BY: R. Stafford | CLIENT NAME: Arco 6148

SAMPLED BY: R. Stafford | LOCATION: 5131 Shattuck Ave. 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)	N/R	VOLUME IN CASING (gal.)	5.45
DEPTH TO WATER (feet)	6.34	CALCULATED PURGE (gal.)	16.35
DEPTH OF WELL (feet)	25.0	ACTUAL PURGE VOL. (gal.)	17.0

DATE PURGED: 4-14-93 | Start (2400 Hr) 1430 | End (2400 Hr) 1437

DATE SAMPLED: 4-14-93 | Start (2400 Hr) 1442 | End (2400 Hr) 1445

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1430	5.5C	6.43	570.	70.8	Clear - Red	low
1435	11 C	6.52	620.	70.5	Cloudy Red	low
1438	17.0	6.60	588.	69.6	↓	↓

D. O. (ppm): NM | ODOR: X Slight | NM (COBALT 0 - 100) | NM (NTU 0 - 200)

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

PURGING EQUIPMENT

___ 2" Bladder Pump | ___ Bailer (Teflon®)
___ Centrifugal Pump | ___ Bailer (PVC)
2" Submersible Pump | ___ Bailer (Stainless Steel)
___ Well Wizard™ | ___ Dedicated
Other ___

SAMPLING EQUIPMENT

___ 2" Bladder Pump | X Bailer (Teflon®)
___ DDL Sampler | ___ Bailer (Stainless Steel)
___ Dipper | ___ Submersible Pump
___ Well Wizard™ | ___ Dedicated
Other: ___

WELL INTEGRITY: OK | LOCK #: 3257

REMARKS: ___

Meter Calibration: Date: 4-14-93 Time: 1118 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 5 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: OG70-039 C1 | SAMPLE ID: MW-7 (26)

PURGED BY: K. Stafford | CLIENT NAME: Arco 6145

SAMPLED BY: K. Stafford | LOCATION: 5131 Shattuck Ave. 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)	N/R	VOLUME IN CASING (gal.)	8.49
DEPTH TO WATER (feet)	13.98	CALCULATED PURGE (gal.)	25.5
DEPTH OF WELL (feet)	27.0	ACTUAL PURGE VOL. (gal.)	25.5

DATE PURGED: 4-14-93 | Start (2400 Hr) 1125 | End (2400 Hr) 1143

DATE SAMPLED: 4-14-93 | Start (2400 Hr) 1145 | End (2400 Hr) 1150

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1132	8.5	6.66	455	68.2	Clear - Yellow	low
1136	17.0	6.22	459	69.0	Clear	↓
1142	25.5	6.28	454	69.5	↓	↓

D. O. (ppm): N/A | ODOR: None | N/A (COBALT 0 - 100) | N/A (NTU 0 - 200)

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

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

WELL INTEGRITY: OK | LOCK #: 3257

REMARKS ___

Meter Calibration: Date: 4-14-93 Time: 1118 Meter Serial #: 9224 Temperature °F: 68.0

(EC 1000 1010 / 1000) (DI 3.94) (pH 7 7.04 / 7.00) (pH 10 9.68 / 10.02) (pH 4 3.93 / ___)

Location of previous calibration: N/A

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

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

Date June 3, 1993
Project 0G70-039.01

To:
Mr. John Young
RESNA
3315 Almaden Expressway, Suite 34
San Jose, California 95118

We are enclosing:

Copies	Description
1	Depth To Water/Floating Product Survey Results
	March 1993 monthly water level survey, ARCO
	station 6148, 5131 Shattuck Avenue, Oakland, CA

For your: X Information Sent by: X Mail

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

Reviewed by: Jim Butera JB

6/30/93

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 : 5-22-93

ARCO STATION # : 6148 FIELD TECHNICIAN : K REICHELDERFER 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-7	OK	YES	OK	3259	OK	14.41	14.41	ND	NA	27.0	WATER IN BOX, BELOW LID
2	MW-6	OK	YES	OK	3259	OK	13.80	13.80	ND	NA	26.6	—
3	MW-4	OK	YES	OK	3259	OK	15.79	15.79	ND	NA	26.0	—
4	MW-1	OK	YES	OK	3259	OK	16.56	16.56	ND	NA	25.0	—
5	MW-5	OK	YES	OK	3259	OK	17.78	17.78	ND	NA	25.7	—
6	MW-3	OK	YES	OK	3259	OK	17.64	17.64	ND	NA	25.8	STRONG ODOR
7	MW-2	OK	YES	OK	3259	OK	17.50	17.50	17.43	0.07	25.8	0.03' OF PRODUCT IN BAILER

SURVEY POINTS ARE TOP OF WELL CASINGS

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

Date June 21, 1993
Project 0G70-039.01

To:
Mr. John Young
RESNA
3315 Almaden Expressway, Suite 34
San Jose, California 95118

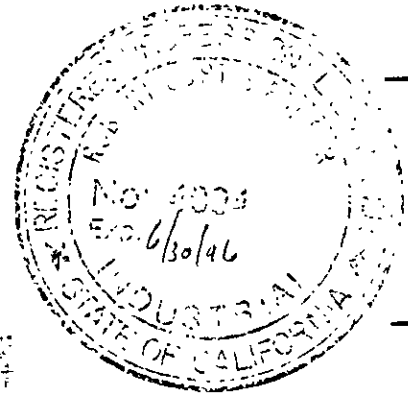
We are enclosing:

Copies	Description
1	Depth To Water/Floating Product Survey Results
	June 1993 monthly water level survey, ARCO
	station 6148, 5131 Shattuck Avenue, Oakland, CA

For your: X Information Sent by: X Mail

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

Reviewed by: Jim Butera



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 : 6 17 93

ARCO STATION # : 6148 FIELD TECHNICIAN : REICHELDERFER / GALLEGOS DAY : THURSDAY

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket	Lock	Locking Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	MW-7	OK	15/16	OK	3259	OK	14.50	14.50	ND	NA	26.9	—
2	MW-6	OK	15/16	OK	3259	OK	13.88	13.88	ND	NA	26.6	—
3	MW-4	OK	15/16	OK	3259	OK	14.90	14.90	ND	NA	25.9	—
4	MW-1	OK	15/16	OK	3259	OK	17.90	17.90	ND	NA	25.6	—
5	MW-5	—	—	—	3259	—	~~17.75~~	—	—	—	~~25.8~~	STATION MANAGER WOULD NOT MOVE HIS CAR THAT WAS ON THE
6	MW-3	OK	15/16	OK	3259	OK	17.75	17.75	ND	NA	25.8	—
7	MW-2	OK	15/16	OK	3259	OK	17.57	17.57	ND	NA	25.8	—

"TOO BUSY

SURVEY POINTS ARE TOP OF WELL CASINGS

FIELD REPORT
SKIMMER INSPECTION/FLOATING PRODUCT REMOVAL

DATE: 6-8-93

SITE: Arco 6148

ADDRESS: Oakland

JOB #: 610356

FIELD TECHNICIAN: [illegible]

WELL NO/ TIME	ODOR (OBS)	SHEEN (H,M,S-EMUL., COLOR)	PROD(FRESH (TRANSCLU-SCENT), DEGRADED(DK.BR.), ASPHALTINE(DK,VISCOUS)	WELL ELEV	DTP	DTW	TOT. DET.	WAT. EL.
MW-1		Slight Odor				17.78		
MW-3		"	"			17.62		
MW-2		Floating	Product.		17.40	17.45		

PRODUCT REMOVED: Baled 1 liter
3 Liter H_2O

3 Full Drums H_2O from Drilling dated 4/27/93

Notes: