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3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
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LETTER REPORT
QUARTERLY GROUNDWATER MONITORING
Fourth Quarter 1992
at
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

03/10/93

61035.03

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3315 Almaden Expressway, Suite 34
San Jose, CA 95118
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TRANSMITTAL

TO: Ms. Susan Hugo
ACHCSA
Dept. of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

DATE: November 30, 1992
PROJECT NUMBER: 61035.03
SUBJECT: ARCO Station 6148, 5131 Shattuck Avenue, Oakland, California

FROM: Robert Campbell
TITLE: Staff Geologist

WE ARE SENDING YOU:

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REMARKS:
Per ARCO's request (Mr. Michael Whelan) this report has been forwarded to you for your files.

Copies: 1 to RESNA project file no. 61035.03

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March 10, 1993
0308MWHE
61035.03

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

Subject: Fourth Quarter 1992 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, which summarizes the results of fourth quarter 1992 groundwater monitoring performed by ARCO's contractor, EMCON Associates (EMCON) of San Jose, California, and RESNA at the above-referenced site. The objectives of this quarterly groundwater monitoring are to evaluate changes in the groundwater flow direction and gradient, and changes in concentrations of petroleum hydrocarbons in the local groundwater associated with a former waste-oil tank and existing underground gasoline-storage tanks (USTs) at the site.

The field work and laboratory analyses of groundwater samples collected from well MW-1 on October 7, 1992 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 well 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.

As part of an additional subsurface investigation at the site, RESNA installed groundwater monitoring wells MW-4 through MW-7 this quarter. During November 1992, RESNA measured depths to water in wells MW-1 through MW-7, subjectively analyzed groundwater for the presence of petroleum product in wells MW-1 through MW-7, collected samples

from wells MW-4 through MW-7 for laboratory analysis, and directed a State-certified laboratory to analyze the groundwater samples. During October and December 1992, RESNA's scope of work was limited to interpretation of EMCON's field and Columbia Analytical's analyses data, which included evaluating trends in reported hydrocarbon concentrations in the local groundwater, the groundwater gradient, and direction of groundwater flow beneath the site.

The operating ARCO Station 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 the Site Vicinity Map, Plate 1.

Previous environmental work at the site is summarized in reports listed in the References section. The location of the groundwater monitoring wells, borings, and pertinent site features are shown on the Generalized Site Plan, Plate 2.

Groundwater Sampling and Gradient Evaluation

Depth to water levels (DTW) were measured in wells MW-1 through MW-3 by EMCON field personnel on October 7 and in wells MW-1 through MW-7 on December 9, 1992. DTW levels were measured in wells MW-1 through MW-7 by RESNA field personnel on November 12, 1992. Quarterly sampling of well MW-1 was performed by EMCON field personnel on October 7, 1992, and sampling of wells MW-4 through MW-7 was performed by RESNA field personnel on November 12, 1992. The 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 and EMCON's Summary of Groundwater Monitoring Data and RESNA's Field Reports. These data are included in Appendix A.

The DTW levels, wellhead elevations, groundwater elevations, and subjective observations of petroleum product in the groundwater from MW-1 through MW-7 for this and previous monitorings at the site are summarized in Table 1, Cumulative Groundwater Monitoring Data. EMCON's DTW levels from October 7 and December 9, 1992 and RESNA's DTW levels from November 12, 1992, were used to evaluate groundwater gradients. Floating product was observed in MW-2 by EMCON (0.31 feet thick on October 7 and 0.02 feet thick on December 9) and petroleum product sheen and product droplets were observed in MW-3 by EMCON on October 7 and December 9, 1992. Product sheen was observed in wells MW-2 and MW-3 by RESNA's field personnel on November 12, 1992 (see EMCON's and RESNA's Field Reports, Appendix A). The groundwater gradients and flow directions interpreted for this quarter are shown on Plates 3 through 5, Groundwater Gradient Maps. The interpreted groundwater gradients varied between 0.02 ft/ft and 0.08 ft/ft and the

groundwater flow directions were toward the southwest. These gradients and flow directions are generally consistent with those previously interpreted.

Groundwater monitoring well MW-1 was purged and sampled by EMCON field personnel on October 7, 1992. EMCON's Water Sample Field Data Sheets are included in Appendix A. Approximately five well volumes were purged from MW-1 and five well volumes were purged from MW-3 prior to collecting groundwater samples on October 7, 1992. No groundwater samples were collected from MW-3, due to the presence of 0.02 feet of floating product after purging the well. Monitoring wells MW-4 through MW-7 were purged and sampled by RESNA field personnel on November 12, 1992. RESNA's Water Sample Field Data Sheets are included in Appendix A. Approximately 5 well volumes were purged from wells MW-4 through MW-7 prior to collecting groundwater samples on November 12, 1992. Purge water was removed from the site by a licensed hazardous waste hauler. The Monitoring Well Purge Water Transport Forms are included in Appendix A.

Laboratory Methods and Results

Under the direction of EMCON, water samples collected from well MW-1 were analyzed by Columbia Analytical Services, Inc., located in San Jose, California (California Hazardous Waste Testing Laboratory Certification No. 1426) for total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using modified Environmental Protection Agency (EPA) Methods 5030/8020/DHS LUFT Method. Groundwater from well MW-1 was also analyzed for total petroleum hydrocarbons as diesel (TPHd) using EPA Method 3510/California DHS LUFT Method, total recoverable petroleum hydrocarbons (TRPH) using Standard Method (SM) 5520F, and volatile organic compounds (VOCs) using EPA Method 5030/601. Under the direction of RESNA, water samples collected from wells MW-4 through MW-7 were analyzed by Sequoia Analytical, located in Redwood City, California (California Waste Testing Laboratory Certification No. 1210) for TPHg and BTEX using EPA Methods 5030/8015/8020. 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.

In MW-1, concentrations of TPHg and benzene have decreased; toluene, ethylbenzene, and total xylenes have slightly increased; tetrachloroethene (PCE) has increased, trichloroethene (TCE) has remained the same; chloroform was detected at a concentration of 0.6 parts per billion for the first time since third quarter 1992. Monitoring wells MW-4 through MW-7 were installed this quarter, therefore general trends have not been established. Cumulative analytical results of groundwater samples are shown on Tables 2, Cumulative Results of

Quarterly Groundwater Monitoring
ARCO Station 6148, Oakland, California

March 10, 1993
61035.03

Laboratory Analyses of Water Samples-TPHg, TPHd, BTEX, TOG, and Metals, and on Table 3, Cumulative Results of Laboratory Analyses of Water Samples-VOCs.

Conclusions

The highest concentrations of gasoline hydrocarbons and VOCs in groundwater is in the southwestern portion of the site. Groundwater monitoring wells MW-4 through MW-7 were installed this quarter, and general trends in gasoline hydrocarbons in groundwater have not been established.

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.

Robert D. Campbell
Staff Geologist

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

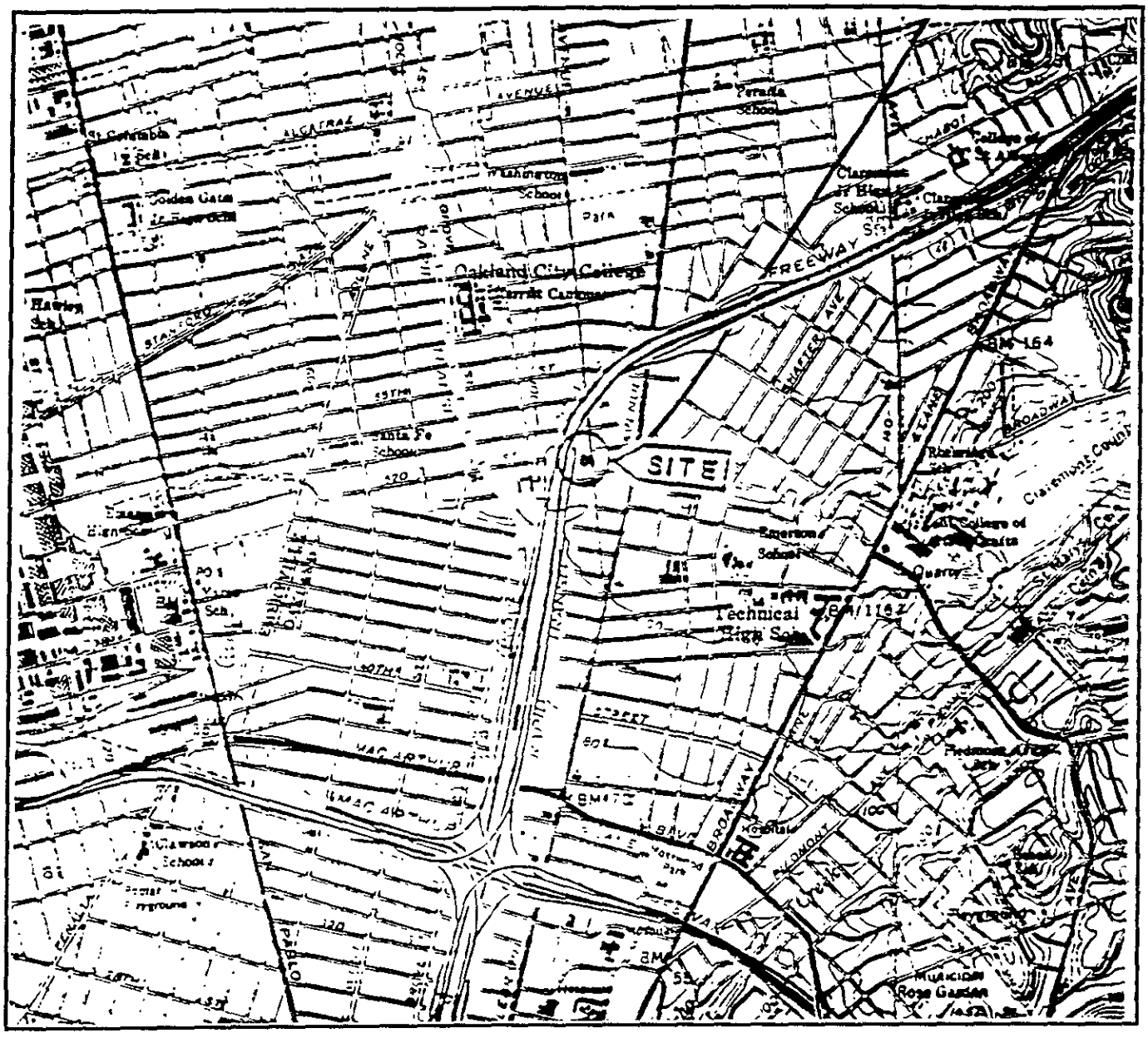
James L. Nelson
Certified Engineering Geologist No. 1463

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Groundwater Gradient Map, October 7, 1992
Plate 4, Groundwater Gradient Map, November 12, 1992
Plate 5, Groundwater Gradient Map, December 9, 1992
Plate 6, Concentrations of TPHg/Benzene in Groundwater, November 12, 1992

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

Appendix A: EMCON's Field Reports, RESNA's Field Report Summary of Groundwater Monitoring Data, Certified Analytical Reports with Chain-of-Custody, Water Sample Field Data Sheets, and Monitoring Well Purge Water Transport Form



Base U S Geological Survey
7.5-Minute Quadrangles
Oakland East/West, California.
Photorevised 1980

LEGEND

⊙ = Site Location

N

Approximate Scale

2000 1000 0 2000 4000

feet

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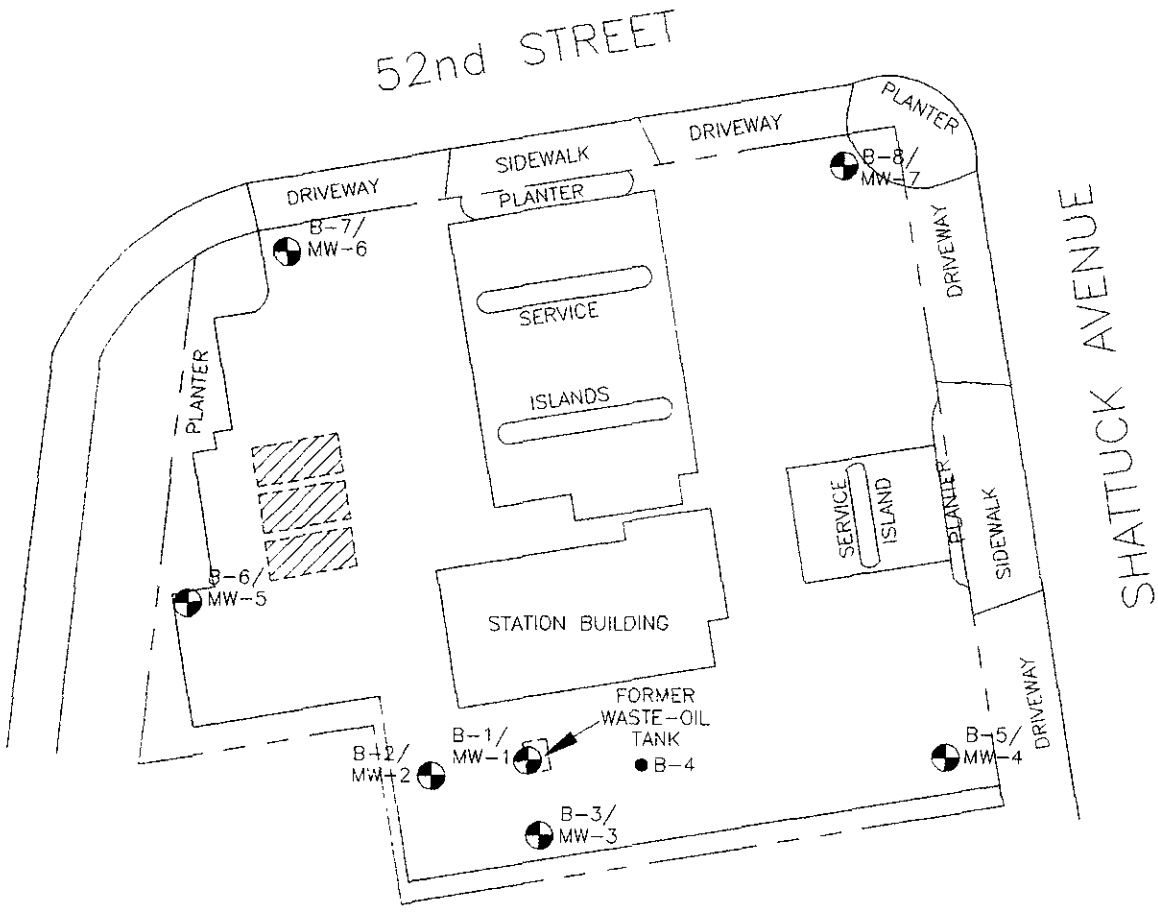
SITE VICINITY MAP
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

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)

N

Approximate Scale

40 20 0 40 80

feet

Source: Based on ARCO site plan dated 1980

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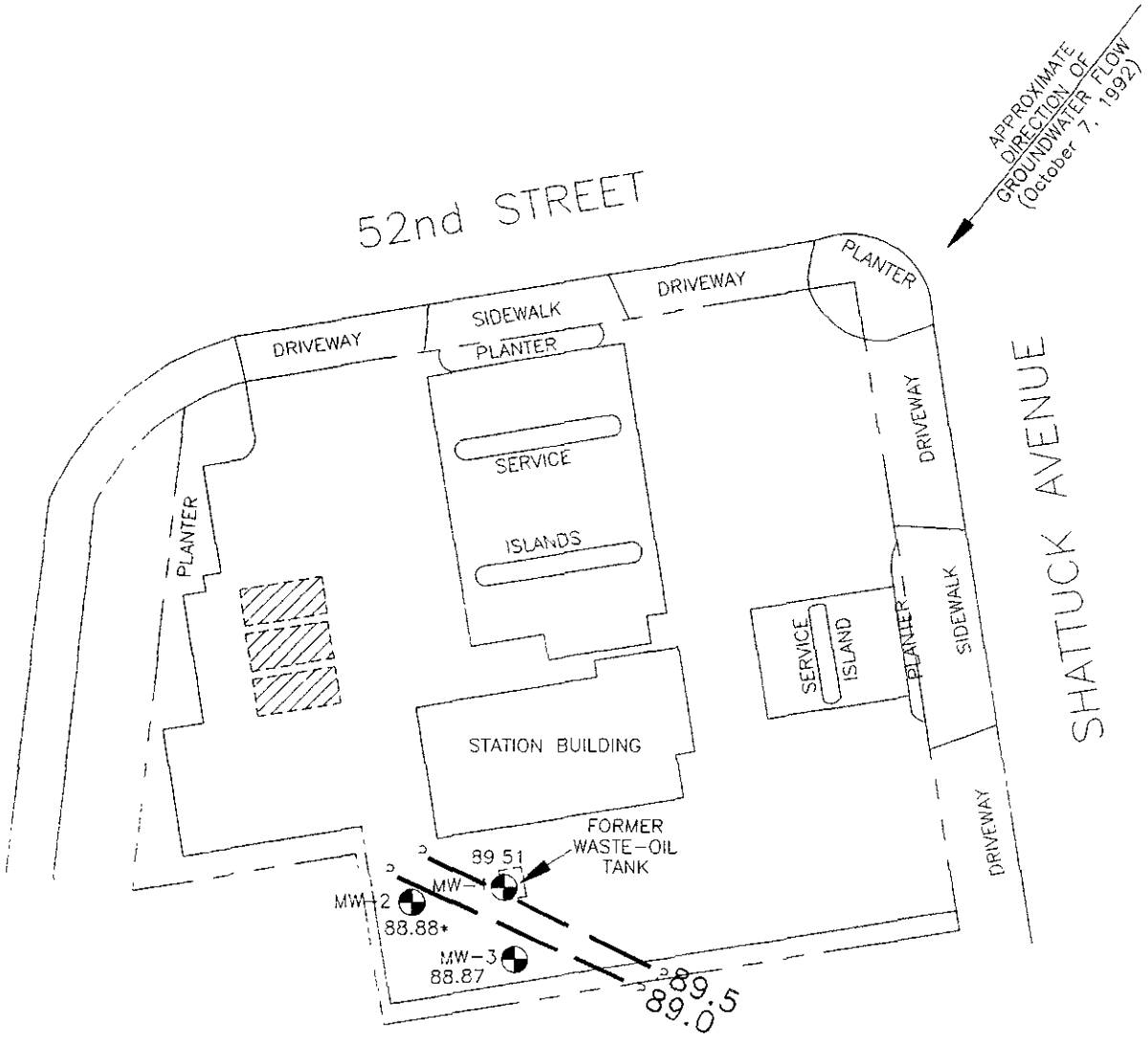
GENERALIZED SITE PLAN
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE
2



EXPLANATION

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

89.51 = Elevation of groundwater in feet above MSL, October 7, 1992

* = Groundwater elevation corrected for the presence of floating product

MW-3 = Monitoring well (RESNA, December 1991)

= Underground storage tanks

Approximate Scale

40 20 0 40 80

feet

Source: Based on John Koch survey of December 1991

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

PLATE
3

EXPLANATION

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

92.33 = Elevation of groundwater in feet above MSL, November 12, 1992

MW-3 = Monitoring well (RESNA, December 1991)

= Underground storage tanks

Approximate Scale

40 20 0 40 80

feet

Source Based on data supplied by John Koch, Surveyor, 11/09/92

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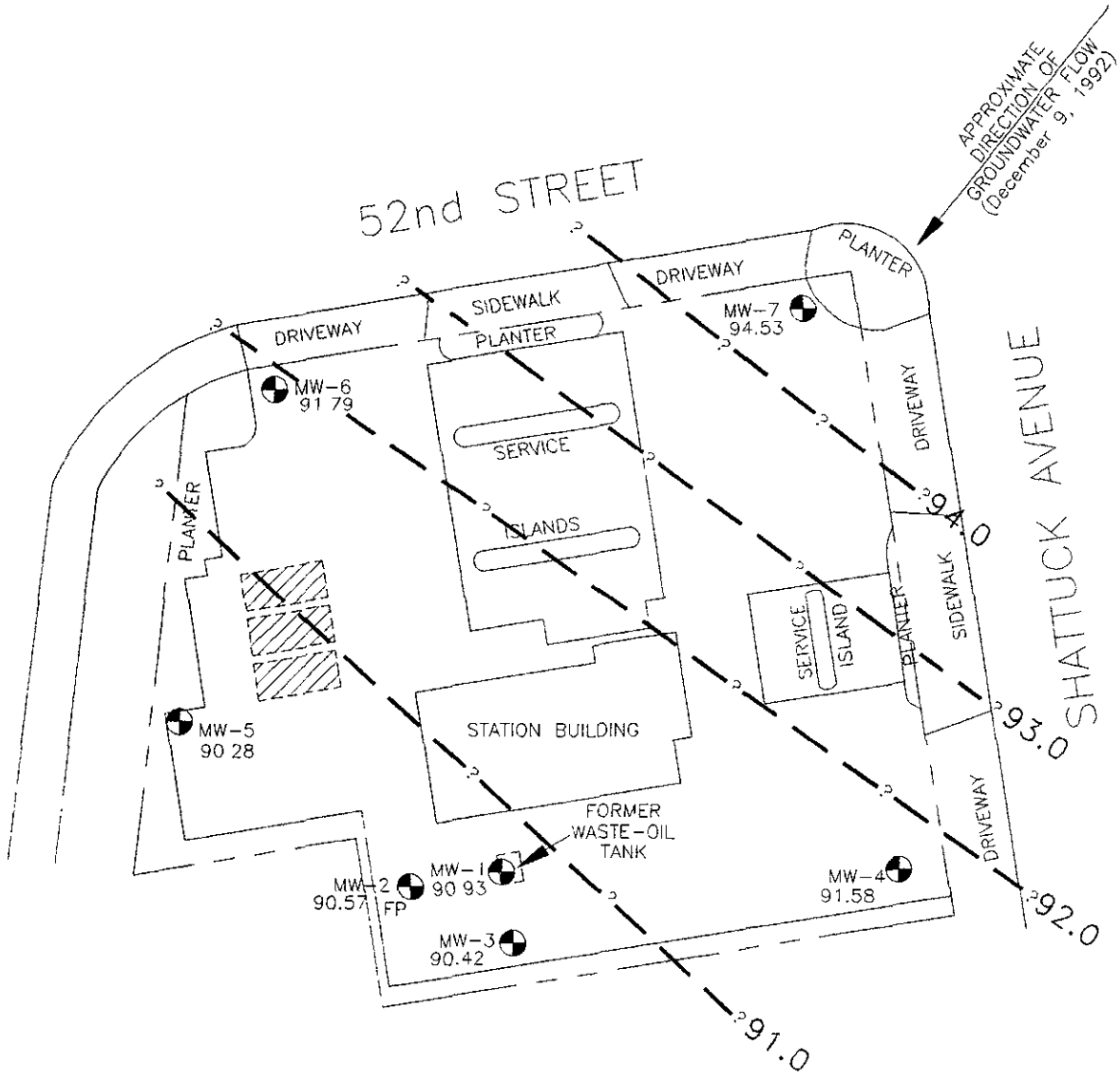
GROUNDWATER GRADIENT MAP
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE
4



EXPLANATION

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

94.53 = Elevation of groundwater in feet above MSL, December 9, 1992

FP = Floating Product

MW-3 = Monitoring well (RESNA, December 1991)

= Underground storage tanks

Approximate Scale

40 20 0 40 80

feet

Source: Based on data supplied by John Koch, Surveyor, 11/09/92

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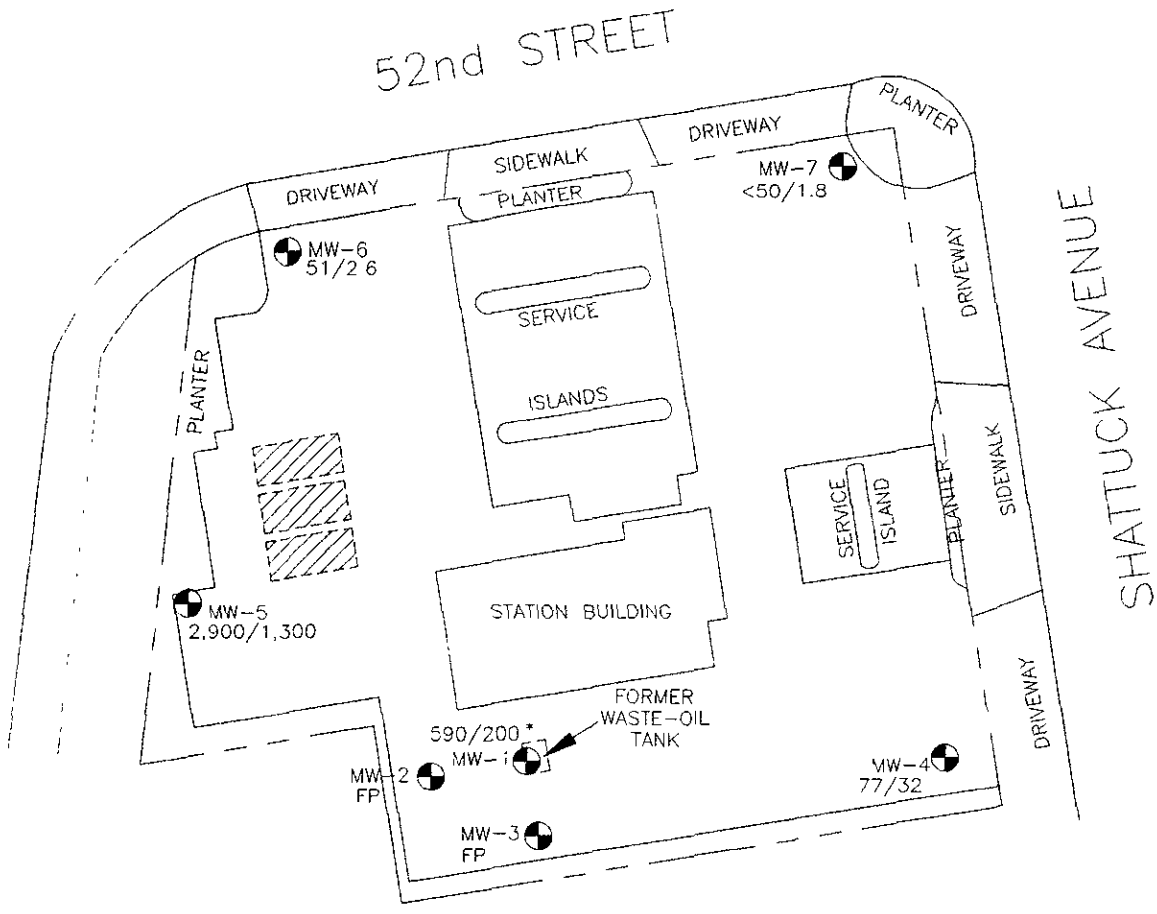
GROUNDWATER GRADIENT MAP
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE 5



EXPLANATION

- • = Well was sampled on October 7, 1992
- 2,900/1,300 = Concentration of TPHg/Benzene in groundwater November 12, 1992
- FP = Floating Product
- MW-3 = Monitoring well (RESNA, December 1991)
- = Underground storage tanks

Approximate Scale

40 20 0 40 80

feet

Source: Based on data supplied by John Koch, Surveyor, 11/09/92.

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

PLATE 6

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

Date Well 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
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
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

See notes on Page 2 of 2.

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

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-3 Cont.				
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
MW-4				
11-12-92	106.58	16.08	90.50	None
12-09-92		15.00	91.58	None
MW-5				
11-12-92	106.68	16.81	89.87	None
12-09-92		16.40	90.28	None
MW-6				
11-12-92	105.16	14.05	91.11	None
12-09-92		13.37	91.79	None
MW-7				
11-12-92	107.08	14.75	92.33	None
12-09-92		12.55	94.53	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. (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 DATE	TPHg	TPHd	B	T	E	X	Cd	Cr	Pb	Ni	Zn	TRPH
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
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											
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											
MW-4												
11/12/92	77	NA	32	<0.50	<0.50	<0.50	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
MW-6												
11/12/92	51	NA	2.6	<0.50	<0.50	<0.50	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
MCL:	—	—	1	—	680	1,750	10	50	50	—	—	—
DWAL:	—	—	—	100	—	—	—	—	—	—	—	—

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)

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.
B: benzene, T: toluene, E: ethylbenzene, X: total xylenes isomers

BTEX:	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 MRL due to insufficient sample quantity.
Metals:	By EPA method 6010 and 7421.
<:	Results reported below the 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).

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES-VOCs
ARCO Station 6148
Oakland, California

Date/Well	Compound	VOCs (ppb)
MW-1		
03/18/21	Tetrachloroethene	13
	Trichloroethene	1.2
06/12/92	Tetrachloroethene	18
	Trichloroethene	1.4
09/14/92	Tetrachloroethene	15
	Trichloroethene	1.5
10/07/92	Tetrachloroethene	23
	Trichloroethene	1.5
	Chloroform	0.6
MW-2		
03/18/92	Tetrachloroethene	19
	Trichloroethene	2.22
	cis-1,2-Dichloroethene	0.5
06/12/92	Not sampled--floating product	
09/14/92	Not sampled--floating product	
10/07/92	Not sampled--floating product	
MW-3		
03/18/92	Tetrachloroethene	2.7
06/12/92	Tetrachloroethene	1.9
09/14/92	Tetrachloroethene	2.0
10/07/92	Not sampled--floating product	

MCL:	PCE	TCE	cis-1,2-DCE
	5	5	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.

APPENDIX A

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

EMCON ASSOCIATES
Consultants in Wastes Management and Environmental Control

RECEIVED
NOV 9 - 1992
RESNA SAN JOSE

Date October 29, 1992
Project 0G70-039.01

To:
Mr. Joel Coffman
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
3	Water Sample Field Data Sheets

For your: X Information Sent by: X Mail

Comments:
Enclosed are the data from the fourth quarter 1992 monitoring event at ARCO service station 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.

Reviewed by:

Jim Butera JB

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 : 10-07-92

ARCO STATION # : 6148 FIELD TECHNICIAN : S. Williams DAY : WED

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Lock Gasket	~~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-1	OK	YES	3259	NA	OK	18.52	18.52	ND	ND	25.7	—
2	MW-2	OK	YES	3259	NA	OK	18.80	18.80	19.11	.31	25.8	@ .31 Teflon Bailer
3	MW-3	OK	YES	3259	NA	OK	18.90	18.90	ND	ND*	25.80	* .02 After purge

SURVEY POINTS ARE TOP OF WELL CASINGS

Summary of Groundwater Monitoring Data
Fourth Quarter 1992
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(25)	10/07/92	18.52	ND.[2]	590.	200.	19.	6.7	19.	<50.	<0.5
MW-2	10/07/92	18.80	0.31	FP.[3]	FP.	FP.	FP.	FP.	FP.	FP.
MW-3	10/07/92	18.90	0.02*	FP.	FP.	FP.	FP.	FP.	FP.	FP.
FB-1.[4]	10/07/92	NA.[5]	NA.	<50	<0.5	<0.5	<0.5	<0.5	NR.[6]	NR.

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

* = Floating product came into the well after the purge was completed

Summary of Analytical Results
Halogenated Volatile Organic Compounds by EPA[1] Methods 5030/601
Fourth Quarter 1992
ARCO Service Station 6148
5131 Shattuck Avenue, Oakland, California
micrograms per liter (µg/l) or parts per billion (ppb)

Well ID and Sample Depth	Sampling Date	Chloroform (ppb)	TCE[2] (ppb)	PCE[3] (ppb)
MW-1(25)	06/12/92	0.6	1.5	23.
MW-2	FP.[4]	FP.	FP.	FP.
MW-3	FP.	FP.	FP.	FP.

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

Columbia Analytical Services, Inc.

October 20, 1992

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:

Enclosed are the results of the water samples submitted to our lab on October 7, 1992. For your reference, our service request number for this work is SJ92-1244.

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

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Keoni A. Murphy
Laboratory Manager

Annelise J. Bazar
Regional QA Coordinator

KAM/ajb

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	10/07/92
Project:	EMCON Project No. 0G70-039.01	**Work Order #:**	SJ92-1244
	Arco Facility No. 6148	**Sample Matrix:**	Water

Inorganic Parameters
mg/L (ppm)

Sample Name:	MW-1 (25)	Method Blank
Date Sampled:	10/07/92	

Analyte	Method	MRL		
Hydrocarbons by IR	SM 5520F	0.5	ND	ND

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

Approved by Karen A Murphy Date October 20, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	10/07/92
Project:	EMCON Project No. 0G70-039.01	**Date Extracted:**	10/12/92
	Arco Facility No. 6148	**Date Analyzed:**	10/15/92
Sample Matrix:	Water	**Work Order #:**	SJ92-1244

TPH as Diesel
EPA Method 3510/California DHS LUFT Method
µg/L (ppb)

Sample Name	MRL	TPH as Diesel
MW-1 (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 Kevin Murphy Date October 20, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

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

Date Received: 10/07/92
Work Order #: SJ92-1244
Sample Matrix: Water

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

Sample Name:	MW-1 (25)	Method Blank
Date Analyzed:	10/09/92	10/09/92

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	0.5	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	0.6	ND
1,1,1-Trichloroethane (TCA)	0.5	ND	ND
Carbon Tetrachloride	0.5	ND	ND
Benzene	0.5	ND	ND
1,2-Dichloroethane	0.5	ND	ND
Trichloroethene (TCE)	0.5	1.5	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
Toluene	1	ND	ND
cis-1,3-Dichloropropene	0.5	ND	ND
1,1,2-Trichloroethane	0.5	ND	ND
Tetrachloroethene (PCE)	0.5	23.	ND
Dibromochloromethane	0.5	ND	ND
Chlorobenzene	0.5	ND	ND
Ethylbenzene	1	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
Total Xylenes	1	ND	ND

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

Approved by _____ Date October 20, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	10/07/92
Project:	EMCON Project No. 0G70-039.01	**Work Order #:**	SJ92-1244
	Arco Facility No. 6148	**Sample Matrix:**	Water

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

Sample Name:		MW-1 (25)	FB-1	Method Blank
Date Analyzed:		10/12/92	10/12/92	10/12/92
Analyte	**MRL**			
Benzene	0.5	200.	ND	ND
Toluene	0.5	19.	ND	ND
Ethylbenzene	0.5	6.7	ND	ND
Total Xylenes	0.5	19.	ND	ND
TPH as Gasoline	50	590.	ND	ND

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

Approved by Kathy Murphy Date October 20, 1992

APPENDIX A

LABORATORY QC RESULTS

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

Date Received: 10/07/92
Work Order #: SJ92-1244
Sample Matrix: Water

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

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Hydrocarbons by IR	100.	106.	106.	90-110

Approved by Kevin Murphy Date October 20, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

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

Date Received: 10/07/92
Work Order #: SJ92-1244
Sample Matrix: Water

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

Sample Name: MW-1 (25)
Date Sampled: 10/07/92

Parameter	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	Recovery Acceptance Criteria
Hydrocarbons by IR	5.71	ND	5.72	5.72	100.	100.	56-106

ND None Detected at or above the method reporting limit

Approved by Keenan Murphy Date October 20, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

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

Date Received: 10/07/92
Work Order #: SJ92-1244
Sample Matrix: Water

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

Date Analyzed: 10/15/92

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
TPH as Diesel	1,000.	1,100.	110.	90-110

TPH Total Petroleum Hydrocarbons

Approved by Kevin Murphy Date October 20, 1992

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

Date Received: 10/07/92
Work Order #: SJ92-1244
Sample Matrix: Water

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

Sample Name	Date Analyzed	Percent Recovery P-Terphenyl
MW-1 (25)	10/15/92	94.
MS	10/15/92	81.
DMS	10/15/92	77.
Method Blank	10/15/92	106.
	CAS Acceptance Criteria	61-121

TPH Total Petroleum Hydrocarbons

Approved by Kevin Murphy Date October 20, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

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

Date Received: 10/07/92
Work Order #: SJ92-1244
Sample Matrix: Water

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

Date Analyzed: 10/15/92

Parameter	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	Acceptance Criteria
Diesel	4,000.	ND	3,770.	3,340.	93.	84.	46-133

ND None Detected at or above the method reporting limit

Approved by Kevin Murphy Date October 20, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

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

Date Received: 10/07/92
Work Order #: SJ92-1244

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

Analyte	True Value	Result	Percent Recovery	EPA Percent Recovery Acceptance Criteria
Chloromethane	50	43.5	87.	D-193
Vinyl Chloride	50	48.4	97.	28-163
Bromomethane	50	48.0	96.	D-144
Chloroethane	50	50.1	100.	46-137
Trichlorofluoromethane (Freon 11)	50	47.8	96.	21-156
1,1-Dichloroethene	50	44.8	90.	28-167
Methylene Chloride	50	48.5	97.	25-162
trans-1,2-Dichloroethene	50	51.3	103.	38-155
1,1-Dichloroethane	50	52.1	104.	47-132
Chloroform	50	50.6	101.	49-133
1,1,1-Trichloroethane (TCA)	50	53.0	106.	41-138
Carbon Tetrachloride	50	54.4	109.	43-143
1,2-Dichloroethane	50	58.4	117.	51-147
Trichloroethene (TCE)	50	53.3	107.	35-146
1,2-Dichloropropane	50	56.0	112.	44-156
Bromodichloromethane	50	54.8	110.	42-172
trans-1,3-Dichloropropene	50	74.3	149.	22-178
cis-1,3-Dichloropropene	50	59.2	118.	22-178
1,1,2-Trichloroethane	50	55.6	111.	39-136
Tetrachloroethene (PCE)	50	54.6	109.	26-162
Dibromochloromethane	50	54.6	109.	24-191
Chlorobenzene	50	54.4	109.	38-150
Bromoform	50	55.6	111.	13-159
1,1,2,2-Tetrachloroethane	50	54.9	110.	8-184
1,3-Dichlorobenzene	50	53.6	107.	7-187
1,4-Dichlorobenzene	50	57.9	116.	42-143
1,2-Dichlorobenzene	50	57.3	115.	D-208

D Detected

Approved by Kevin Murphy Date October 20, 1992

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

Date Received: 10/07/92
Work Order #: SJ92-1244
Sample Matrix: Water

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

Sample Name	Date Analyzed	Percent Recovery 4-Bromofluorobenzene
MW-1 (25)	10/09/92	89.
MS	10/09/92	105.
DMS	10/09/92	106.
Method Blank	10/09/92	76.
	CAS Acceptance Criteria	70-130

Approved by Kathleen Murphy Date October 20, 1992

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

Date Received: 10/07/92
Work Order #: SJ92-1244
Sample Matrix: Water

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

Date Analyzed: 10/09/92

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	EPA Acceptance Criteria
1,1-Dichloroethene	10.	ND	10.4	10.8	104.	108.	28-167
Trichloroethene	10.	ND	10.4	11.0	104.	110.	35-146
Tetrachloroethene	10.	ND	10.7	11.3	107.	113.	26-162

ND None Detected at or above the method reporting limit

Approved by Kevin Murphy Date October 20, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

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

Date Received: 10/07/92
Work Order #: SJ92-1244

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

Date Analyzed: 10/12/92

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	250.	261.	104.	85-115
Toluene	250.	266.	107.	85-115
Ethylbenzene	250.	253.	101.	85-115
Total Xylenes	750.	709.	95.	85-115
TPH as Gasoline	2,500.	2,431.	97.	90-110

TPH Total Petroleum Hydrocarbons

Approved by Kevin Murphy Date October 20, 1992

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

Date Received: 10/07/92
Work Order #: SJ92-1244
Sample Matrix: Water

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

Sample Name	Date Analyzed	Percent Recovery α,α,α-Trifluorotoluene
MW-1 (25)	10/12/92	109.
FB-1	10/12/92	107.
MS	10/12/92	110. *
DMS	10/12/92	106. *
Method Blank	10/12/92	108.

CAS Acceptance Criteria 70-130

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

Approved by Kevin Murphy Date October 20, 1992

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

Date Received: 10/07/92
Work Order #: SJ92-1244
Sample Matrix: Water

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

Date Analyzed: 10/12/92

Analytes	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	Acceptance Criteria
Benzene	25.	5.8	28.2	28.6	90.	91.	39-150
Toluene	25.	ND	23.6	24.0	94.	96.	46-148
Ethylbenzene	25.	ND	23.5	24.1	94.	96.	32-160

ND None Detected at or above the method reporting limit

Approved by Kevin Murphy Date October 20, 1992

APPENDIX B

CHAIN OF CUSTODY

[redacted]CO [redacted]duc[redacted]Com[redacted]ny
Division of AtlanticRichfieldCompany

Task Order No. EMCGC-92-01

Chain of Custody

ARCO Facility no. 6148	City (Facility) OAKLAND	Project manager (Consultant) JIM BUTLER	Laboratory name CAS
ARCO engineer Kyle Christie	Telephone no. (ARCO) 415 571 7434	Telephone no. (Consultant) 408 453-0719	Fax no. (Consultant) 408 453-0452
Consultant name EMCON ASSOCIATES	Address (Consultant) 1938 Junction Ave San Jose		Contract number 07077

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 GAS	TPH Modified 8015 Gas ☐ Diesel ☑	Oil and Grease 413.1 ☐ 413.2 ☐ SAME	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
MW-1(25)	1-6	6		X		X	HCl	10-7-92	1146		X		X		X							
MW-2( )		6		X		X	HCl	NO SAMPLE			X		X		X							
MW-3( )		6		X		X	HCl	NO SAMPLE			X		X		X							
MW-1(25-30)	7-8	2		X		X	NP	10-7-92	1146			X										
MW-2( )		2		X		X	NP	NO SAMPLE				X										
MW-3( )		2		X		X	NP	NO SAMPLE				X										
FB-1	9-10	2		X		X	HCl	10-7-92	1222		X											

Special detection Limit/reporting: Lowest possible

Special QA/QC: AS Normal

Remarks: 3-40ml HCl; 2-Liter HCl; 2-Liter NP; 0670-039.01

Lab number: 5592-1244

Condition of sample: OK		Temperature received: Room	
Relinquished by sampler: Joe Williams	Date: 10-7-92 Time: 1410	Received by	
Relinquished by	Date Time	Received by	
Relinquished by	Date Time	Received by laboratory	Date: 10-7-92 Time: 14:10

Turnaround time

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

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: 0470-039-01 SAMPLE ID: MW-1

PURGED BY: J. Williams CLIENT NAME: ARCO 6148

SAMPLED BY: J. Williams 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): NR VOLUME IN CASING (gal.): 4.71

DEPTH TO WATER (feet): 18.52 CALCULATED PURGE (gal.): 23.55

DEPTH OF WELL (feet): 25.7 (3.75) ACTUAL PURGE VOL. (gal.): 24

DATE PURGED: 10-07-92 Start (2400 Hr) 1103 End (2400 Hr) 1139

DATE SAMPLED: 10-07-92 Start (2400 Hr) 1141 End (2400 Hr) 1146

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1105	5	6.09	465	78.6	CLEAR	CLEAR
1118	10	6.33	471	72.9	"	"
1124	15	6.27	498	73.1	"	"
1134	20	6.35	466	72.2	"	"
1139	24	6.32	466	73.3	"	"

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

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

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: OK LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 10-07-92 Time: 1055 Meter Serial #: 9111 Temperature °F: 79.0

(EC 1000 1073 / 1000) (DI ___) (pH 7 7.00 / 7.00) (pH 10 10.00 / 10.01) (pH 4 3.95 / ___)

Location of previous calibration: MW-1

Signature: [signature] Reviewed By: JB Page 1 of 3

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 0670-039-01 SAMPLE ID: MW-2

PURGED BY: J Williams CLIENT NAME: ARCO 6148

SAMPLED BY: J Williams 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): NR VOLUME IN CASING (gal.): NR

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

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

DATE PURGED: NR Start (2400 Hr) ___ End (2400 Hr) ___

DATE SAMPLED: NR 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)

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

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

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

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: Product Thickness .31

Meter Calibration: Date: 10-02-91 Time: 1155 Meter Serial #: 9111 Temperature °F: ___

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

Location of previous calibration: MW-1

Signature: [signature] Reviewed By: JB

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 0670-039-01 SAMPLE ID: MW-3

PURGED BY: J Williams CLIENT NAME: ARCO 6148

SAMPLED BY: J Williams 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): NR VOLUME IN CASING (gal.): 4.52

DEPTH TO WATER (feet): 18.90 CALCULATED PURGE (gal.): 22.

DEPTH OF WELL (feet): 25.80 ACTUAL PURGE VOL. (gal.): ___

DATE PURGED: 10-07-92 Start (2400 Hr) 1220 End (2400 Hr) 1247

DATE SAMPLED: 10-07-92 Start (2400 Hr) 1250 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1228	5	6.33	473	75.8	GREY	HEAVY
1233	10	6.41	525	73.7	GREY	HEAVY
1239	15	6.41	560	72.2	CLEAR	CLEAR
1244	20	6.45	567	71.9	CLEAR	CLEAR
1247	24	6.41	568	72.1	CLEAR	CLEAR

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 (12:22)

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: OK LOCK #: 3259

REMARKS: NO SAMPLE TAKEN AFTER PURGING AFTER purging Product came in 02 Teflon bailer

Meter Calibration: Date: 10-07-92 Time: 1055 Meter Serial #: 9171 Temperature °F: ___

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

Location of previous calibration: MW-1

Signature: Joe Williams Reviewed By: JB Page 3 of 3

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 6148-92-25

Chain of Custody

ARCO Facility no. 6148	City (Facility) Oakland	Project manager (Consultant) Joel Coffman	Laboratory name Sequoia
ARCO engineer Michael Whelan	Telephone no. (ARCO) (415) 574-2435	Telephone no. (Consultant) (408) 284-7723	Fax no. (Consultant) (408) 264-2735
Consultant name RESNA Industries Inc.	Address (Consultant) 3315 Almaden Expressway, Suite 34, San Jose, CA 95118		Contract number 07-073

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 ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
16-MW4		3		X		X	X	11/12/92	1610		X											
16-MW5		3		X		X	X		1200		X											
14-MW6		3		X		X	X		1330		X											
14-MW7		3		X		X	X		1420		X											

Special detection Limit/reporting

Special QA/QC

Remarks

Lab number

Turnaround time

- Priority Rush 1 Business Day ☐
- Rush 2 Business Days ☐
- Expedited 5 Business Days ☐
- Standard 10 Business Days ☒

Method of shipment

Condition of sample: good		Temperature received: cool	
Relinquished by sampler	Date 11/13/92	Time 1000	Received by Robert D. Campbell
Relinquished by Robert D. Campbell	Date 11/13/92	Time 1135	Received by 11-13-92 1125
Relinquished by	Date 11/13/92	Time 1220	Received by laboratory	Date 11-13-92	Time 1220pm

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

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Project: ARCO 6148, Oakland

Enclosed are the results from 4 water samples received at Sequoia Analytical on November 13,1992. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
2112545	Water, W-16-MW4	11/12/92	EPA 5030/8015/8020
2112546	Water, W-16-MW5	11/12/92	EPA 5030/8015/8020
2112547	Water, W-14-MW6	11/12/92	EPA 5030/8015/8020
2112548	Water, W-14-MW7	11/12/92	EPA 5030/8015/8020

Please contact me if you have any questions. In the meantime, thank you for the opportunity to work with you on this project.

Very truly yours,

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID:	ARCO 6148, Oakland	Sampled:	Nov 12, 1992
3315 Almaden Expwy., Suite 34	Sample Matrix:	Water	Received:	Nov 13, 1992
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Reported:	Nov 25, 1992
Attention: Joel Coffman	First Sample #:	211-2545		

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 211-2545 W-16-MW4	Sample I.D. 211-2546 W-16-MW5	Sample I.D. 211-2547 W-14-MW6	Sample I.D. 211-2548 W-14-MW7
Purgeable Hydrocarbons	50	77	2,900	51	N.D.
Benzene	0.50	32	1,300	2.6	1.8
Toluene	0.50	N.D.	12	N.D.	N.D.
Ethyl Benzene	0.50	N.D.	67	N.D.	N.D.
Total Xylenes	0.50	N.D.	18	N.D.	N.D.
Chromatogram Pattern:		Gas & Discrete Peaks	Gas & Discrete Peaks	Gas & Discrete Peaks	--

Quality Control Data

Report Limit Multiplication Factor:	1.0	20	1.0	1.0
Date Analyzed:	11/20/92	11/20/92	11/20/92	q
Instrument Identification:	GCHP-2	GCHP-2	GCHP-2	GCHP-2
Surrogate Recovery, %: (QC Limits = 70-130%)	97	92	93	97

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 6148, Oakland

QC Sample Group: 2112545-8

Reported: Nov 25, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	M. Nipp	M. Nipp	M. Nipp	M. Nipp
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Nov 20, 1992	Nov 20, 1992	Nov 20, 1992	Nov 20, 1992
QC Sample #:	GBLK112092 MS/MSD	GBLK112092 MS/MSD	GBLK112092 MS/MSD	GBLK112092 MS/MSD
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	11	11	11	32
Matrix Spike % Recovery:	110	110	110	107
Conc. Matrix Spike Dup.:	11	11	10	32
Matrix Spike Duplicate % Recovery:	110	110	100	107
Relative % Difference:	0.0	0.0	9.5	0.0

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

% Recovery:	Conc. of M.S. - Conc. of Sample / Spike Conc. Added	x 100
Relative % Difference:	Conc. of M.S. - Conc. of M.S.D. / (Conc. of M.S. + Conc. of M.S.D.) / 2	x 100

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 0G70-039.01 STATION ADDRESS : 5131 Shattuck Ave., Oakland, CA DATE : 12-9-92

ARCO STATION # : 6148 FIELD TECHNICIAN : Joe Williams 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-1	OK	YES	OK	3254	OK	17.10	17.10	ND	ND	25.7	
2	MW-4	OK	YES	OK	3269	BROKEN	15.00	15.00	ND	ND	26.0	
3	MW-5	OK	YES	OK	3259	OK	16.40	16.41	ND	ND	25.0	
4	MW-6	OK	YES	OK	3257	OK	13.37	13.38	ND	ND	26.6	
5	MW-7	OK	YES	OK	3254	OK	12.55	12.55	ND	ND	27.0	
6	MW-2	OK	YES	OK	3259	OK	16.87	16.87	16.85	.02	25.8	
7	MW-3	OK	YES	OK	3254	OK	16.85	16.85	16.85	Sheets of product	25.8	FLOATING PRODUCT WAS present but COULD NOT MEASURE THICKNESS IT WAS IN DROPLETS FLOATING IN WATER.

SURVEY POINTS ARE TOP OF WELL CASINGS

RESNA
Working To Restore Nature

WELL PURGE DATA SHEET

Project Name: 6148

Job No. 61035.05

Date: 11-12-92

Page 1 of 1

Well No. 4

Time Started 14:30

TIME (hr)	GALLONS (cum.)	TEMP. (F)	pH	CONDUCT. (micromho)	TURBIDITY (NTU)
14:30	Start purging MW- 4				
14:30	0	67.6	~~7~~.31	8.04	61.2
14:37	~~7~~	67.1	7.35	5.37	101.7
14:43	14	67.2	7.24	5.37	35.6
14:49	21	64.1	7.58	5.39	20.3
14:55	28	65.6	7.44	5.44	13.8
15:01	35	64.9	7.49	5.39	6.9
	Stop purging MW- 4				

Notes:

Well Diameter (inches) : 2"
Depth to Bottom (feet) : ~~25~~.83
Depth to Water - initial (feet) : 16.08
Depth to Water - final (feet) : 16.10
% recovery : 100%
Time Sampled : 15:10
Gallons per Well Casing Volume : 6.4
Gallons Purged : 35
Well Casing Volume Purged : 5.5
Approximate Pumping Rate (gpm) : 1.1

RESNA
Working To Restore Nature

WELL PURGE DATA SHEET

Project Name: 6148

Job No. 61035.05

Date: 11-12-92

Page 1 of 1

Well No. 5

Time Started 11:30

TIME (hr)	GALLONS (cum.)	TEMP. (F)	pH	CONDUCT. (micromho)	TURBIDITY (NTU)
11:30	Start purging MW- 5				
11:30	0	67.5	8.53	9.73	>200
11:36	6	65.2	7.39	7.55	>200
11:42	12	64.1	7.52	7.32	>200
11:48	18	64.0	7.34	7.43	>200
11:54	24	64.1	7.31	7.45	>200
12:00	30	63.9	7.33	7.49	>200
	Stop purging MW- 5				

Notes:

Well Diameter (inches) : 4"
Depth to Bottom (feet) : 24.81
Depth to Water - initial (feet) : 16.81
Depth to Water - final (feet) : 16.82
% recovery : 100%
Time Sampled : 12:30
Gallons per Well Casing Volume : 5.28
Gallons Purged : 30
Well Casing Volume Purged : 5.68
Approximate Pumping Rate (gpm) : 10

RESNA
Working To Restore Nature

WELL PURGE DATA SHEET

Project Name: 6148

Job No. 61035.05

Date: 11-12-92

Page 1 of 1

Well No. 6

Time Started 12:40

TIME (hr)	GALLONS (cum.)	TEMP. (F)	pH	CONDUCT. (micromho)	TURBIDITY (NTU)
12:40	Start purging MW- 6				
12:40	0	63.7	8.06	5.32	36.3
12:50	10	66.1	7.75	5.40	50.9
13:00	20	67.0	7.65	5.47	92.4
13:10	30	66.4	7.60	5.46	172.1
13:20	40	65.8	7.68	5.42	7200
	Stop purging MW-6				

Notes:

Well Diameter (inches) : 4"
Depth to Bottom (feet) : 26.4
Depth to Water - initial (feet) : 14.05
Depth to Water - final (feet) : 14.20
% recovery : 99%
Time Sampled : 13:30
Gallons per Well Casing Volume : 8.15
Gallons Purged : 40.0
Well Casing Volume Purged : 4.9
Approximate Pumping Rate (gpm) : 1.0

RESNA
Working To Restore Nature

WELL PURGE DATA SHEET

Project Name: 6148 Job No. 61035.05

Date: 11-12-92 Page 1 of 1

Well No. 7 Time Started 13:41

TIME (hr)	GALLONS (cum.)	TEMP. (F)	pH	CONDUCT. (micromho)	TURBIDITY (NTU)
13:41	Start purging MW- 7				
13:41	0	66.9	7.96	5.94	17-9
13:48	10	70.3	7.41	5.47	7200
13:56	20	69.0	7.56	5.19	7200
14:04	30	67.5	7.29	5.17	>200
14:17	40	67.8	7.35	5.36	>200
	Stop purging MW- 7				

Notes:

Well Diameter (inches) : 4"
Depth to Bottom (feet) : 26.82
Depth to Water - initial (feet) : 14.75
Depth to Water - final (feet) : 14.77
% recovery : 100%
Time Sampled : 14:20
Gallons per Well Casing Volume : 8.0
Gallons Purged : 40.0
Well Casing Volume Purged : 5.0
Approximate Pumping Rate (gpm) : 1.3

{TF1086-1}

TF NUMBER: 1086-1 GIB-92-084

MONITORING WELL PURGE WATER TRANSPORT FORM

GENERATOR INFORMATION

NAME: ARCO PRODUCTS

ADDRESS: P.O. BOX 5811

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

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

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

KYLE CHRISTIE Kyle Don Deffan 11/30/92
(Typed or printed full name & signature) (Date)

SITE INFORMATION

	STA #	JOB #	ADDRESS	GALS
1	A-6148	21314-DW	5131 SHATTUCK AVE., OAKLAND, CA	377
2	A-5387	21344-PW	20200 HESPERIAN BLVD., SAN LORENZO, CA	318
3	A-2096	21275-PW	2460 FLORIN RD., SACRAMENTO, CA	109
4	A-601	21333-PW	712 LEWELLING BLVD., SAN LEANDRO, CA	35
5	A-551	21276-PW	1391 FLORIN RD., SACRAMENTO, CA	40
6	A-707	21336-PW	988 SAN ANTONIO RD., LOS ALTOS, CA	158
7	A-2153	21282-DW	2800 HOMESTEAD RD., SANTA CLARA, CA	45
8	A-6001	21277-PW	886 COLUSA AVE., YUBA CITY, CA	192
9	A-1321	21236-PW	903 5TH AVE., MODESTO, CA	147
10	A-2143	21279-PW	5TH & "E" ST., WILLIAMS, CA	132
11	A-6044	21338-PW	3174 SENTER RD., SAN JOSE, CA	16
				1,569

TRANSPORTER INFORMATION

NAME: BALCH PETROLEUM

ADDRESS: 930 AMES AVE.

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

TRUCK ID #: 99 [signature] 11-30-92
(Typed or printed full name & signature) (Date)

TSD FACILITY INFORMATION

NAME: GIBSON ENVIRONMENTAL

ADDRESS: 475 SEAPORT BLVD

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

RELEASE #: 11320 BILL LEDIN Bill Ledin 11-30-92
(Typed or printed full name & signature) (Date)