RESNA
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3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
FAX: (408) 264-2435

LETTER REPORT
QUARTERLY GROUNDWATER MONITORING
First Quarter 1994
at
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

04/13/94

61035.12

ALCO
HAZMAT

94 APR 29 AM 11:00

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FAX: (408) 264-2435

TRANSMITTAL

TO: Ms. Susan Hugo
Alameda County Health
Care Services Agency
Oakland, California 94621

DATE: April 20, 1994
PROJECT NUMBER: 61035.12
SUBJECT: ARCO Station 6148

FROM: Erin D. Krueger

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COPIES	DATED	DESCRIPTION
1	04/19/94	Letter Report on Quarterly Groundwater Monitoring Fist Quarter 1994 at ARCO Station 6148, 5131 Shattuck Avenue, Oakland, California.

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REMARKS:
Copies: 1 to RESNA project file no. 61035.12

Erin D. Krueger, Staff Geologist

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

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3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
FAX: (408) 264-2435

April 19, 1994

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

Subject: Letter Report on Quarterly Groundwater Monitoring
First Quarter 1994
ARCO Station 6148
5131 Shattuck Avenue, Oakland, California.

Mr. Whelan:

As requested by ARCO Products Company (ARCO), RESNA Industries Inc. (RESNA) presents this letter report summarizing the results of First Quarter 1994 Groundwater Monitoring performed by Integrated Wastestream Management Inc. (IWM) of Milpitas, California at the above-referenced site (Plates 1 and 2). RESNA's scope of work was to interpret field and laboratory analytical data, which included evaluating trends in hydrocarbon concentrations in the local groundwater, the groundwater gradient, and direction of groundwater flow beneath the site. Evaluation and warrant of IWM's field procedures, field data, and field protocols, is beyond RESNA's scope of work. Previous environmental work at the site is summarized in RESNA reports cited in the Reference section.

GROUNDWATER MONITORING

Field Work

IWM field personnel were onsite February 2, 1994, to measure depth-to-water (DTW) levels, perform subjective analysis for the presence of product in groundwater, and perform quarterly sampling of wells MW-1 through MW-7.

Laboratory Analyses

Water samples were analyzed by Columbia Analytical Services, Inc., located in San Jose, California (Hazardous Waste Testing Laboratory Certification #1426) for benzene, toluene, ethylbenzene, and total xylenes (BTEX), and total petroleum hydrocarbons as gasoline (TPHg) using Environmental Protection Agency (EPA) Methods 5030/8020/DHS LUFT Method, and for halogenated volatile organic compounds (VOCs) using EPA Methods 5030/601. In addition, groundwater samples were collected from well MW-3 and analyzed for petroleum hydrocarbons using Standard Method 5520 F, total oil and grease (TOG) using Standard Method 5520C, and base neutral/acid semivolatile organic compounds (BNAs) using EPA Methods 3510/8270. The chain of custody records and laboratory analysis reports are included in Appendix A.

Results of Groundwater Monitoring

Groundwater elevations rose an average of approximately 0.91 foot in wells MW-1 through MW-7, since last quarter. No evidence of floating product or product sheen was noted in any of the wells during this quarter. Based on February 2, 1994, DTW data, groundwater is interpreted to flow toward the southwest with a gradient of approximately 0.02 ft/ft (Plate 3). Groundwater monitoring data from this and previous quarters is presented in Table 1. The results of IWM's field work on the site, are presented in Appendix A.

The following trends in hydrocarbon concentrations have been identified since last quarter: concentrations of TPHg and benzene generally decreased or remained within one order of magnitude in wells MW-3, MW-4, and MW-6; generally increased in wells MW-1 and MW-5; remained not detected in well MW-7; and, no trend could be evaluated for well MW-2 as it was not sampled during the last quarter (Plate 4). VOCs continue to be detected in well MW-1, located immediately adjacent to the former waste oil UST, and wells MW-2 and MW-4 through MW-7 located up and crossgradient of the former waste oil UST, however, they were not detected in well MW-3 located downgradient of the former waste oil UST. Based on this distribution, it appears that the VOCs may be coming from an offsite source. BNAs and TOG continue to be detected in well MW-3. Cumulative analytical results of water samples are presented in Table 2.

Floating Product Removal

RESNA field personnel visited the site on January 31, and March 25, 1994 to remove floating product from well MW-2. No floating product was present to be removed during these visits.

Previous and Future Work

First Quarter 1994

- Submitted Letter Report, Quarterly Groundwater Monitoring, Fourth Quarter 1993 to ARCO and regulatory agencies.
- Performed First Quarter 1994 Groundwater Monitoring.
- Monitored floating product in well MW-2.

Second Quarter 1994

- Submit Letter Report, Quarterly Groundwater Monitoring, First Quarter 1994 to ARCO and regulatory agencies.
- Perform Second Quarter 1994 Groundwater Monitoring.
- Remove floating product from well MW-2, if necessary.
- Submit a Report of Findings for the Air Sparge Pilot Test to ARCO and regulatory agencies.
- Initiate design of an interim soil and groundwater remediation system.

Reporting Requirements

It is recommended that copies of this report be forwarded to:

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

Mr. Richard Hiett
California Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, California 94612

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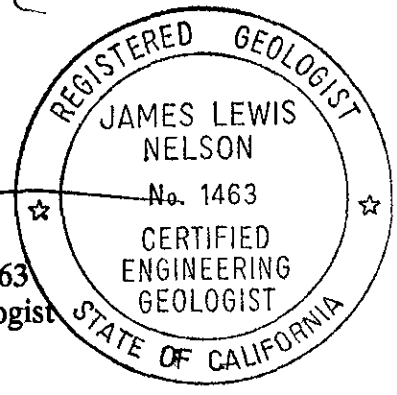
If you have any questions or comments, please call us at (408) 264-7723.

Sincerely,
RESNA Industries Inc.

Erin D. Krueger
Staff Geologist



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

Enclosures: References

Plate 1,	Site Vicinity Map
Plate 2,	Generalized Site Plan
Plate 3,	Groundwater Gradient Map, February 2, 1994
Plate 4,	Concentrations of TPHg/Benzene in Groundwater
Table 1,	Cumulative Groundwater Monitoring Data
Table 2,	Cumulative Results of Laboratory Analyses of Water Samples--TPHg, TPHd, BTEX, TOG, and Metals
Table 3,	Cumulative Results of Laboratory Analyses of Water Samples--VOCs AND BNAs
Appendix A:	IWM's Summary of Groundwater Sample Analyses, Field Report, Ground Water Sample Field Data Sheet, and Certified Analytical Reports with Chain-of-Custody Record

REFERENCES

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

RESNA Industries Inc. March 9, 1994. Letter Report, Quarterly Groundwater Monitoring Fourth Quarter 1993 at ARCO Station 6148, 5131 Shattuck Avenue in Oakland, California. RESNA Report 61035.06.

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

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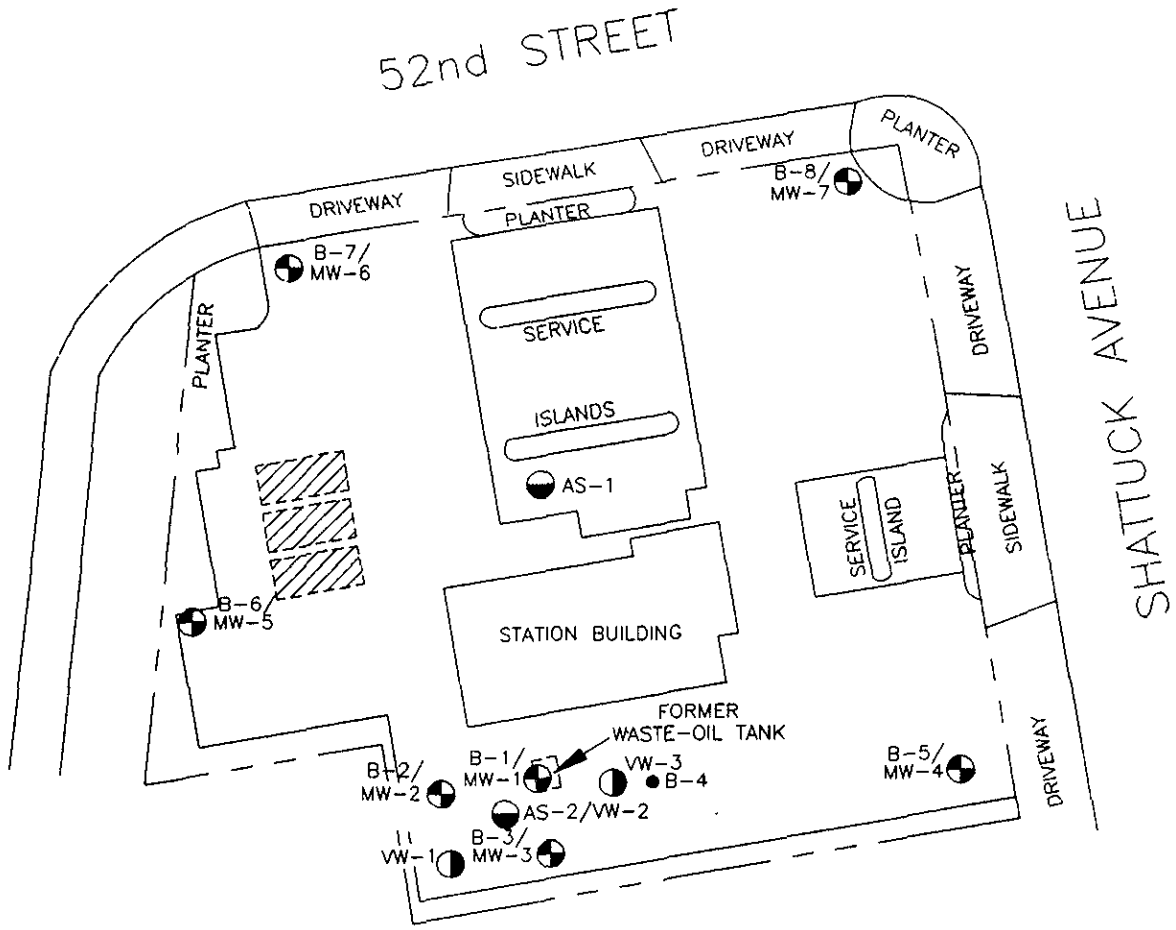
SITE VICINITY MAP
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE
1



EXPLANATION

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

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

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

= Underground storage tanks

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

N

Approximate Scale

40 20 0 40 80

feet

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

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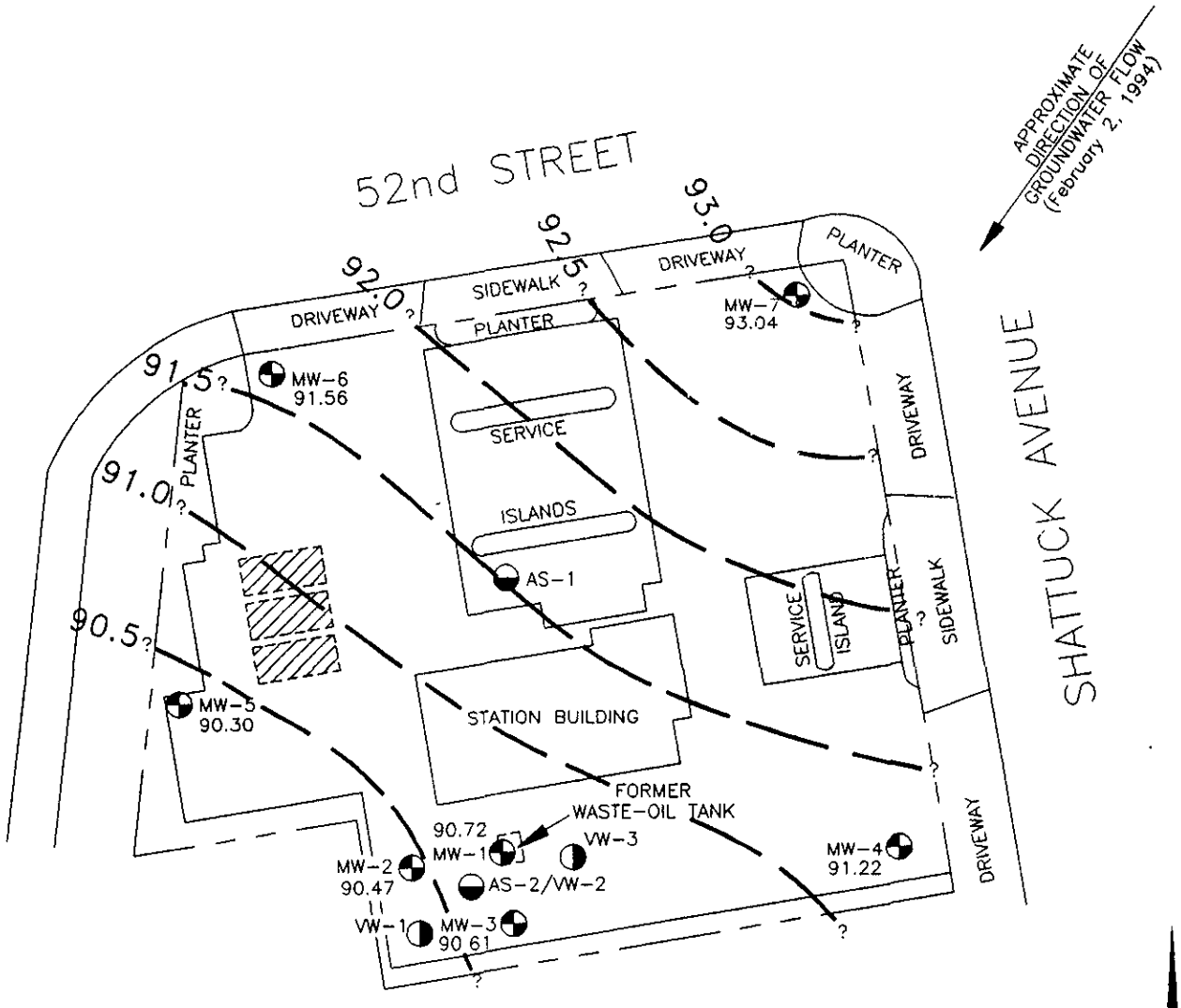
GENERALIZED SITE PLAN
ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE 2



EXPLANATION

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

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

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

= Underground storage tanks

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

93.04 = Elevation of groundwater in feet above MSL, February 2, 1994

* = Elevation corrected for presence of floating product

Approximate Scale

40 20 0 40 80

feet

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

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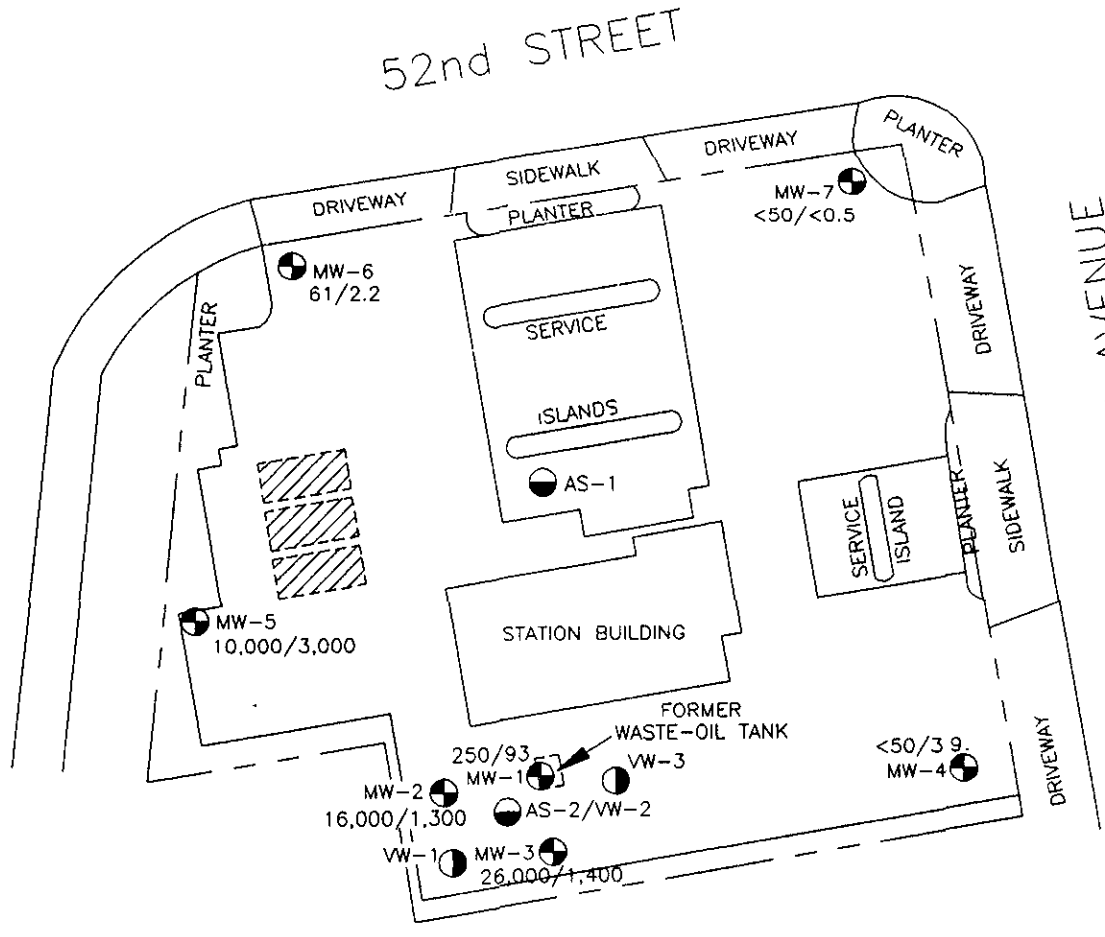
GROUNDWATER GRADIENT MAP

ARCO Station 6148
5131 Shattuck Avenue
Oakland, California

PLATE 3



EXPLANATION

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

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

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

= Underground storage tanks

26,000/1,400 = Concentrations of TPHg/Benzene in groundwater in parts per billion (ppb), February 2, 1994

Approximate Scale

40 20 0 40 80

feet

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

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

PLATE 4

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

Date Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-1				
12-23-91	108.03	18.26	89.77	Sheen
01-07-92		17.44	90.59	Sheen
01-19-92		17.17	90.86	None
02-19-92		16.52	91.51	None
03-18-92		16.81	91.22	None
04-20-92		17.56	90.47	None
05-15-92		17.96	90.07	None
06-12-92		18.16	89.87	None
07-15-92		18.32	89.71	None
08-07-92		18.34	89.69	None
09-14-92		18.46	89.57	None
10-07-92		18.52	89.51	None
11-12-92		18.11	89.92	None
12-09-92		17.10	90.93	None
01-21-93		15.44	92.59	None
02-22-93		16.54	91.49	None
03-25-93		17.05	90.98	None
04-14-93		17.45	90.58	None
05-22-93		17.78	90.25	None
06-17-93		17.90	90.13	None
07-27-93		18.10	89.93	None
08-29-93		18.31	89.72	None
09-30-93		18.24	89.79	None
11-16-93		18.17	89.86	None
02-02-94		17.31	90.72	None
MW-2				
12-23-91	107.43	17.98	89.45	Sheen
01-07-92		17.15	90.28	Sheen
01-19-92		17.47	89.96	None
02-19-92		16.28	91.15	None
03-18-92		16.52	90.91	None
04-20-92		17.27	90.16	None
05-15-92		17.62	89.81	None
06-12-92		17.63*	89.80*	0.05
07-15-92		17.65	89.78	None
08-07-92		17.80	89.63	None
09-14-92		18.09*	89.34*	0.55
10-07-92		18.55*	88.88*	0.31
11-12-92		17.95	89.48	Sheen
12-09-92		16.85*	90.58*	0.02
01-21-93		15.08*	92.35*	0.01
02-22-93		16.20*	91.23*	0.01
03-25-93	107.43	16.72*	90.71*	0.01

See notes on page 4 of 4.

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

Date Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-2 (cont.)				
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
07-27-93		17.71*	89.72*	0.26
08-29-93		18.20*	89.23*	0.03
09-30-93		18.14*	89.29*	0.01
11-16-93		17.85*	89.58*	0.03
02-02-94		16.96	90.47	None
MW-3				
12-23-91	107.77	18.14	89.63	Sheen
01-07-92		17.26	90.51	Sheen
01-19-92		17.63	90.14	None
02-19-92		16.34	91.43	None
03-18-92		16.62	91.15	None
04-20-92		17.38	90.39	None
05-15-92		17.80	89.97	None
06-12-92		18.01	89.76	None
07-15-92		18.17	89.60	None
08-07-92		18.23	89.54	None
09-14-92		18.36	89.41	None
10-07-92		18.90	88.87	Sheen
11-12-92		18.00	89.77	Sheen
12-09-92		16.85	90.92	Droplets
01-21-93		15.24	92.53	None
02-22-93		16.36	91.41	None
03-25-93		16.89	90.88	None
04-14-93		17.29	90.48	None
05-22-93		17.64	90.13	None
06-17-93		17.75	90.02	None
07-27-93		17.98	89.79	None
08-29-93		18.14	89.63	None
09-30-93		18.14	89.63	None
11-16-93		18.30	89.47	None
02-02-94		17.16	90.61	None
MW-4				
11-12-92	106.58	16.08	90.50	None
12-09-92		15.00	91.58	None
01-21-93		13.35	93.23	None
02-22-93		14.48	92.10	None
03-25-93		15.06	91.52	None
04-14-93		15.50	91.08	None
05-22-93	106.58	15.79	90.79	None

See notes on page 4 of 4.

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

Date Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-4 (cont.)				
06-17-93		14.90	91.68	None
07-27-93		16.11	90.47	None
08-29-93		16.21	90.37	None
09-30-93		16.23	90.35	None
11-16-93		16.30	90.28	None
02-02-94		15.36	91.22	None
MW-5				
11-12-92	106.68	16.81	89.87	None
12-09-92		16.40	90.28	None
01-21-93		14.58	92.10	None
02-22-93		15.65	91.03	None
03-25-93		16.07	90.61	None
04-14-93		16.34	90.34	None
05-22-93		16.56	90.12	None
06-17-93		NA	---	---
07-27-93		16.80	89.88	None
08-29-93		16.93	89.75	None
09-30-93		16.97	89.71	None
11-16-93		17.03	89.65	None
02-02-94		16.38	90.30	None
MW-6				
11-12-92	105.16	14.05	91.11	None
12-09-92		13.37	91.79	None
01-21-93		11.76	93.40	None
02-22-93		12.62	92.54	None
03-25-93		13.04	92.12	None
04-14-93		13.47	91.69	None
05-22-93		13.80	91.36	None
06-17-93		13.88	91.28	None
07-27-93		14.13	91.03	None
08-29-93		14.19	90.97	None
09-30-93		14.34	90.82	None
11-16-93		14.41	90.75	None
02-02-94		13.60	91.56	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

See notes on page 4 of 4.

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

Date Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-7 (cont.)				
05-22-93	107.08	14.41	92.67	None
06-17-93		14.50	92.58	None
07-27-93		14.82	92.26	None
08-29-93		15.05	92.03	None
09-30-93		15.04	92.04	None
11-16-93		15.12	91.96	None
02-02-94		14.04	93.04	None
AS-2**				
09-30-93	—	18.31	—	None

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

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

Well Date	TPHg	TPHd	B	T	E	X	Cd	Cr	Pb	Ni	Zn	TOG
MW-1												
03-18-92	790	<50	310	26	12	44	<3	5	3	<20	31	<0.5 (1.4)
06-12-92	1,000	<50	290	15	10	30	NA	NA	NA	NA	NA	<0.5
09-14-92	1,000	<80*	370	6.5	6.5	17	NA	NA	NA	NA	NA	0.9
10-07-92	590	<50	200	19	6.7	19	NA	NA	NA	NA	NA	<0.5
01-22-93	1,200	NA	370	57	18	39	NA	NA	NA	NA	NA	NA
04-14-93	140	NA	46	<2.5	<2.5	<2.5	<3	<5	3	<20	25	NA
09-30-93	220	NA	64	0.9	2.2	4.0	NA	NA	NA	NA	NA	NA
11-16-93	180	NA	53	0.7	1.7	4.1	NA	NA	NA	NA	NA	NA
02-02-94	250	NA	93	<0.5	1.9	1.0	NA	NA	NA	NA	NA	NA
MW-2												
03-18-92	8,400	230**	1,400	1,000	220	870	<3	21	9	38	54	1.2 (3.0)
06-12-92	Not sampled--floating product											
09-14-92	Not sampled--floating product											
10-07-92	Not sampled--floating product											
01-22-93	Not sampled--floating product											
04-14-93	Not sampled--floating product											
09-30-93	Not sampled--floating product											
11-16-93	Not sampled--floating product											
02-02-94	16,000	NA	1,300	2,500	540	2,700	NA	NA	NA	NA	NA	NA
MW-3												
03-18-92	20,000	2,800**	3,200	560	380	1,000	<3	67	27	113	156	7.8 (8.1)
06-12-92	46,000	1,600**	3,400	4,200	1,300	5,400	NA	NA	NA	NA	NA	16
09-14-92	53,000	40,000**	4,300	5,700	1,300	7,300	NA	NA	NA	NA	NA	5.5
10-07-92	Not sampled--floating product											
01-22-93	35,000	13,000**	2,100	1,400	1,200	4,400	<3	10	8	23	28	31
04-14-93	13,000	<50	1,800	390	990	3,500	<3	<5	3	<20	25	26
09-30-93	79,000	17,000**	2,400	3,400	1,900	8,100	<5	50	26	70	100	23
11-16-93	72,000	NA	1,400	2,100	1,900	8,300	NA	NA	NA	NA	NA	38
02-02-94	26,000	NA	1,400	1,200	1,200	4,400	NA	NA	NA	NA	NA	7.7 (7.8)
MW-4												
11-12-92	77	NA	32	<0.50	<0.50	<0.50	NA	NA	NA	NA	NA	NA
01-22-93	170	NA	66	0.8	<0.5	1.5	NA	NA	NA	NA	NA	NA
04-14-93	<50	NA	4.6	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
09-30-93	52	NA	13	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
11-16-93	230	NA	34	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
02-02-94	<50	NA	3.9	<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

See Notes on Page 2 of 2.

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

Well / Date	TPHg	TPHd	B	T	E	X	Cd	Cr	Pb	Ni	Zn	TOG
MW-5 (cont.)												
09-30-93	4,500	NA	1,100	<10***	39	16	NA	NA	NA	NA	NA	NA
11-16-93	3,300	NA	700	<10***	22	<10***	NA	NA	NA	NA	NA	NA
02-02-94	10,000	NA	3,000	65	240	78	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
09-30-93	74	NA	2.0	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
11-16-93	72	NA	2.6	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
02-02-94	61	NA	2.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
MW-7												
11-12-92	<50	NA	1.8	<0.50	<0.50	<0.50	NA	NA	NA	NA	NA	NA
01-22-93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
04-14-93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
09-30-93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
11-16-93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
02-02-94	<50	NA	<0.5	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
AS-2#												
09-30-93	<50	NA	1.2	<0.5	<0.5	<0.5	NA	NA	NA	NA	NA	NA
MCL:	—	—	1	—	680	1,750	10	50	50	—	—	—
DWAL:	—	—	—	100	—	—	—	—	—	—	—	—

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

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

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

Date/Well	Compound	VOCs (ppb)	Compound	BNAs (ppb)
MW-1				
03-18-92	Tetrachloroethene	13		NA
	Trichloroethene	1.2		
06-12-92	Tetrachloroethene	18		NA
	Trichloroethene	1.4		
09-14-92	Tetrachloroethene	15		NA
	Trichloroethene	1.5		
10-07-92	Tetrachloroethene	23		NA
	Trichloroethene	1.5		
	Chloroform	0.6		
01-22-93	Tetrachloroethene	11		<20
	Trichloroethene	0.9		
04-14-93	Tetrachloroethene	21		NA
	Trichloroethene	1.8		
	Chloroform	0.6		
09-30-93	Tetrachloroethene	19		NA
	Trichloroethene	1.1		
	Chloroform	0.7		
11-16-93	Tetrachloroethene	22		NA
	Trichloroethene	0.9		
02-02-94	Trichloroethene	1.1		NA
	Tetrachloroethene	11		
MW-2				
03-18-92	Tetrachloroethene	19		NA
	Trichloroethene	2.22		
	cis-1,2-Dichloroethene	0.5		
06-12-92	Not sampled--floating product			NA
09-14-92	Not sampled--floating product			NA
10-07-92	Not sampled--floating product			NA
01-22-93	Not sampled--floating product			NA
04-14-93	Not sampled--floating product			NA
09-30-93	Not sampled--floating product			NA
11-16-93	Not sampled--floating product			NA
02-02-94	Tetrachloroethene	13		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

See Notes on Page 3 of 3.

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

Date/Well	Compound	VOCs (ppb)	Compound	BNAs (ppb)
MW-3(cont.)				
01-22-93	Tetrachloroethene	1.9	Naphthalene	440
			2-Methylnaphthalene	350
			Bis(2-ethylhexyl) Phthalate	280
			Di-n-octyl Phthalate	13
04-14-93	Tetrachloroethene	1.7	Naphthalene	130
			2-Methylnaphthalene	100
			Bis(2-ethylhexyl) Phthalate	250
			Di-n-octyl Phthalate	14
09-30-93	Tetrachloroethene	1.2	Naphthalene	480
			2-Methylnaphthalene	320
11-16-93**	Tetrachloroethene	1.5	Naphthalene	590
			2-Methylnaphthalene	640
02-02-94	ND		Naphthalene	160
			2-Methylnaphthalene	91
			Bis(2-ethylhexyl) Phthalate	9
MW-4				
01-22-93	Tetrachloroethene	1.4		<20
04-14-93	Tetrachloroethene	1.1		NA
09-30-93	Tetrachloroethene	1.6		NA
11-16-93	Tetrachloroethene	1.9		NA
02-02-94	Tetrachloroethene	1.4		
MW-5				
01-22-93	Tetrachloroethene	11		<20
	Trichloroethene	4.7		<20
	cis-1,2-Dichloroethene	1.8		<20
04-14-93	Tetrachloroethene	7.9		NA
	Trichloroethene	2.0		
	cis-1,2-Dichloroethene	1.5		
	Vinyl chloride	0.9		
09-30-93	Tetrachloroethene	17		NA
	Trichloroethene	2.8		
	cis-1,2-Dichloroethene	2.9		
	Vinyl chloride	0.8		
11-16-93	Tetrachloroethene	19		NA
	Trichloroethene	5.1		
	cis-1,2-Dichloroethene	4.0		
02-02-94	Tetrachloroethene	2.7		NA

See Notes on Page 3 of 3.

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

Date/Well	Compound	VOCs (ppb)	Compound	BNAs (ppb)
MW-6				
01-22-93	Tetrachloroethene	120		NA
	Trichloroethene	6.2		
	Chloroform	6.6		
	cis-1,2-Dichloroethene	1.8		
04-14-93	Tetrachloroethene	120		NA
	Trichloroethene	5.8		
	cis-1,2-Dichloroethene	1.1		
	1,1-Dichloroethane	6.3		
09-30-93	Tetrachloroethene	220		NA
	Trichloroethene	5.2		
	cis-1,2-Dichloroethene	2.7		
11-16-93	Tetrachloroethene	160		NA
	Trichloroethene	8.5		
	cis-1,2-Dichloroethene	3.2		
	Chloroform	15		
02-02-94	Chloroform	6.7		NA
	Tetrachloroethene	100		
MW-7				
01-22-93	Tetrachloroethene	6.8		NA
04-14-93	Tetrachloroethene	4.3		NA
09-30-93	Tetrachloroethene	2.5		NA
11-16-93	Tetrachloroethene	4.0		NA
02-02-94	Chloroform	0.8		NA
	Tetrachloroethene	3.4		
AS-2***				
09-30-93	Tetrachloroethene	29		
	Trichloroethene	1.5		
	Chloroform	1.0		NA

MCL:	PCE	TCE	cis-1,2-DCE
	5	5	6*

Results in parts per billion (ppb).
VOCs: Volatile Organic Compounds by EPA methods 5030/601. Compounds not shown were not detected.
MCLs: Maximum Contaminant Levels as reported by the California Department of Health Services 10/24/90. *:Proposed MCL.
**: VOCs using EPA 624 were not detected except BTEX
***: Well sampled as a one-time event following installation.
NA: Not analyzed
ND: None Detected

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APPENDIX A

IWM'S SUMMARY OF GROUNDWATER SAMPLE ANALYSES, FIELD REPORT, GROUNDWATER SAMPLE FIELD DATA SHEETS, AND CERTIFIED ANALYTICAL REPORTS WITH CHAIN-OF-CUSTODY RECORD

I NTEGRATED
W ASTESTREAM
M ANAGEMENT, INC.

February 22, 1994

Mr. John Young
RESNA Industries
3315 Almaden Expressway
Suite 34
San Jose, CA. 95118

Dear Mr. John Young:

Attached are the field data sheets and analytical results for quarterly ground water sampling at ARCO Facility No. A-6148 in Oakland, California. Integrated Wastestream Management measured the depth to water and collected samples from wells at this site on February 2, 1994.

Sampling was carried out in accordance with the protocols described in the "Request for Bid for Quarterly Sampling at ARCO Facilities in Northern California".

Please call us if you have any questions.

Sincerely,
Integrated Wastestream Management

Tom DeLon
Project Manager

Walter H. Howe
Registered Geologist

950 AMES AVENUE MILPITAS, CA. 95035 (408) 942-8955

I NTEGRATED
W ASTESTREAM
M ANAGEMENT

A6148QA4.XLS

Summary of Ground Water Sample Analyses ARCO Facility No. A-6148, Oakland, California

WELL NUMBER	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
DATE SAMPLED	2/2/94	2/2/94	2/2/94	2/2/94	2/2/94	2/2/94	2/2/94
DEPTH TO WATER	17.31	16.96	17.16	15.36	16.38	13.60	14.04
SHEEN	NONE	NONE	NONE	NONE	NONE	NONE	NONE
PRODUCT THICKNESS	NA	NA	NA	NA	NA	NA	NA
TPHg	250	16,000	26,000	N.D.	10,000	61	N.D.
BTEX							
BENZENE	93	1,300	1,400	3.9	3,000	2.2	N.D.
TOLUENE	N.D.	2,500	1,200	N.D.	65	N.D.	N.D.
ETHLYBENZENE	1.9	540	1,200	N.D.	240	N.D.	N.D.
XYLENES	1.0	2,700	4,400	N.D.	78	N.D.	N.D.
EPA 5030							
CHLOROFORM	N.D.	<5	<5	N.D.	<2.5	6.7	0.8
TCE	1.1	<5	<5	N.D.	<2.5	<5	N.D.
PCE	11	13	<5	1.4	2.7	100	3.4
SM 5520 C							
OIL & GREASE	NA	NA	7.8	NA	NA	NA	NA
SM 5520 F							
HYDROCARBONS	NA	NA	7.7	NA	NA	NA	NA
EPA 3510/8270							
NAPHTHALENE	NA	NA	160	NA	NA	NA	NA
2-METHYLNAPHTHALENE	NA	NA	91	NA	NA	NA	NA
BIS(2-ETHYLHEXYL) PHTHALATE	NA	NA	9	NA	NA	NA	NA

FOOTNOTES:

Concentrations reported in ug/L (ppb).
TPHg = Total Purgeable Petroleum Hydrocarbons (USEPA Method 3015 Modified)
BTEX Distinction (USEPA Method 8020)
PCE = Tetrachloroethene (USEPA Method 8010)
DCE = cis-1, 2-Dichloroethene (USEPA Method 8010)
TCE = Trichloroethene (USEAP Method 8010)
N.D. = Not Detected.
NA = Not applicable

950 AMES AVENUE MILPITAS, CA 95035 (408) 942-8955

FIELD REPORT

DEPTH TO WATER / FLOATING PRODUCT SURVEY

SITE ARRIVAL TIME: 815

SITE DEPARTURE TIME: 1230

WEATHER CONDITIONS: Sunny/cool

PROJECT NO.: _____ LOCATION: 5131 Shattuck Ave. Oak. DATE: 2-2-94

CLIENT/STATION #: Arco 6148 FIELD TECHNICIAN: Vince / Francesca DAY OF WEEK: Wednesday

DTW ORDER	WELL ID	SURFACE SEAL	LID SECURE	GASKET	LOCK	EXPANDING CAP	TOTAL DEPTH (Feet)	FIRST DEPTH TO WATER (Feet)	SECOND DEPTH TO WATER (Feet)	DEPTH TO FLOATING PRODUCT (Feet)	FLOATING PRODUCT THICKNESS (Feet)	SHEEN (Y = YES, N = NO)	COMMENTS	MATERIALS
3	MW-1	OK	YES	OK	OK	OK	25.82	17.31	17.31	N/A	N/A	N	4"	
7	MW-2	OK	YES	OK	OK	OK	25.80	16.96	16.96			?	4"	
6	MW-3	OK	YES	OK	OK	OK	25.85	17.16	17.16				4"	
4	MW-4	OK	YES	OK	OK	OK	26.0	15.36	15.36				4"	
5	MW-5	OK	YES	OK	OK	OK	25.0	16.38	16.38				4"	
2	MW-6	OK	YES	OK	OK	OK	26.00	13.60	13.60				4"	
1	MW-7	OK	YES	OK	OK	OK	27.0	14.14	14.04				4"	

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-7

CLIENT/STATION #: ARCO 6148 ADDRESS: 5131 SHATTUCK AVE OAK

CASING DIAMETER (inches): 2 3 4 6 8 12 Other _____

GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____

TD 27.0 - DTW 14.04 X GALLON (LINEAR FT.) 0.66 X CASING VOLUME 3 = CALCULATED PURGE 25.66 ACTUAL PURGE _____

DATE PURGED: 2-2-94 START (2400 HR) 900 END (2400 HR) 906

DATE SAMPLED: 2-2-94 START (2400 HR) 910 END (2400 HR) 910

TIME (2400 HR)	VOLUME (GAL.)	pH (UNITS)	E.C. (UMHOS/ CM@25 C)	TEMP. (F)	COLOR (VISUAL)	TURBIDITY (VISUAL)
901	3	7.71	0.74	66.8	cloudy	____
902	5	7.95	0.43	66.5	clear	____
904	14	7.58	0.35	66.3	clear	____
905	21	7.29	0.35	66.1	clear	____
906	26	7.16	0.35	66.0	clear	____

FIELD QC SAMPLES COLLECTED AT THIS WELL (I.E., FB-1, XDUP-1): _____

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
___ Dedicated		✓ Bailer Disposable	___ Dedicated
Other: _____		Other: _____	

REMARKS: _____

PRINT NAME: Vince Vasquez

SIGNATURE: Vince Vasquez

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-6

CLIENT/STATION #: ARCO 6148 ADDRESS: 2131 SHATTUCK AV OAK

CASING DIAMETER (inches): 2 3 4 6 8 12 Other _____

GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____

TD 26.60 DTW 13.60 X GALLON LINEAR FT. 0.66 X CASING VOLUME 3 = CALCULATED PURGE 25.74 ACTUAL PURGE 26.0

DATE PURGED: 2-2-94 START (2400 HR) 916 END (2400 HR) 922
DATE SAMPLED: 2-2-94 START (2400 HR) 926 END (2400 HR) 926

TIME (2400 HR)	VOLUME (GAL.)	pH (UNITS)	E.C. (UMHOS/ CM@25 C)	TEMP. (F)	COLOR (VISUAL)	TURBIDITY (VISUAL)
917	3	6.72	0.36	67.3	cloudy	_____
918	9	6.73	0.37	67.5	clear	_____
919	15	6.71	0.35	67.1	clear	_____
921	20	6.72	0.38	67.0	clear	_____
922	26	6.68	0.36	66.2	clear	_____

FIELD QC SAMPLES COLLECTED AT THIS WELL (I.E., FB-1, XDUP-1): _____

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
___ Dedicated		✓ Bailer Disposable	___ Dedicated
Other: _____		Other: _____	

REMARKS: _____

PRINT NAME: Vince Vasquez

SIGNATURE: Vince Vasquez

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-1

CLIENT/STATION #: ARCO 6143 ADDRESS: 5131 SHATTUCK AV OAK

CASING DIAMETER (inches): 2 3 4 6 8 12 Other _____

GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____

TD 25.82 - DTW 17.31 X GALLON LINEAR FT. 0.66 X CASING VOLUME 3 = CALCULATED PURGE 16.84 ACTUAL PURGE 16.0

DATE PURGED: 2-2-94 START (2400 HR) 939 END (2400 HR) 946
DATE SAMPLED: 2-2-94 START (2400 HR) 951 END (2400 HR) 951

TIME (2400 HR)	VOLUME (GAL.)	pH (UNITS)	E.C. (UMHOS/ CM@25 C)	TEMP. (F)	COLOR (VISUAL)	TURBIDITY (VISUAL)
940	2	6.80	0.40	68.6	clear	
942	5	6.72	0.40	68.7	clear	
943	8	6.64	0.44	68.5	clear	
946	10	6.63	0.43	68.4	clear	

FIELD QC SAMPLES COLLECTED AT THIS WELL (I.E., FB-1, XDUP-1): _____

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
___ Dedicated		✓ Bailer Disposable	___ Dedicated
Other: _____		Other: _____	

REMARKS: well pumped dry at 10 gallons

PRINT NAME: Vince Vasquez

SIGNATURE: Vince Vasquez

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-4

CLIENT/STATION #: ARCO 6143 ADDRESS: 5131 SHATTUCK AV OAK

CASING DIAMETER (inches): 2 3 4 6 8 12 Other _____

GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____

TD 26.0 - DTW 15.36 X GALLON/LINEAR FT. 0.66 X CASING VOLUME 3 = CALCULATED PURGE 21.06 ACTUAL PURGE 22

DATE PURGED: 2-2-94 START (2400 HR) 1010 END (2400 HR) 1017

DATE SAMPLED: 2-2-94 START (2400 HR) 1024 END (2400 HR) 1024

TIME (2400 HR)	VOLUME (GAL.)	pH (UNITS)	E.C. (UMHOS/ CM@25 C)	TEMP. (F)	COLOR (VISUAL)	TURBIDITY (VISUAL)
1012	2	6.77	0.46	67.4	cloudy	
1013	6	6.68	0.43	67.9	clear	
1014	12	6.65	0.43	67.8	clear	
1016	18	6.61	0.42	67.6	clear	
1017	22	6.59	0.43	67.2	clear	

FIELD QC SAMPLES COLLECTED AT THIS WELL (I.E., FB-1, XDUP-1): _____

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
___ Dedicated		✓ Bailer Disposable	___ Dedicated
Other: _____		Other: _____	

REMARKS: _____

PRINT NAME: Vince [illegible]

SIGNATURE: [signature]

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-5

CLIENT/STATION #: ARCO 6148 ADDRESS: 5131 SHATTUCK AV

CASING DIAMETER (inches): 2 3 4 6 8 12 Other _____

GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____

TD 25.0 - DTW 16.38 X GALLON/LINEAR FT. 0.66 X CASING VOLUME 3 = CALCULATED PURGE 17.06 ACTUAL PURGE 17

DATE PURGED: 2-2-94 START (2400 HR) 1037 END (2400 HR) 1042
DATE SAMPLED: 2-2-94 START (2400 HR) 1051 END (2400 HR) 1051

TIME (2400 HR)	VOLUME (GAL.)	pH (UNITS)	E.C. (UMHOS/ CM@25 C)	TEMP. (F)	COLOR (VISUAL)	TURBIDITY (VISUAL)
1038	3	6.71	0.40	67.5	clear	
1039	7	6.70	0.46	67.2	clear	
1042	10	6.68	0.47	66.8	clear	

FIELD QC SAMPLES COLLECTED AT THIS WELL (I.E., FB-1, XDUP-1): _____

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
___ Dedicated		✓ Bailer Disposable	___ Dedicated
Other: _____		Other: _____	

REMARKS: Well pumped dry at 10 gallons

PRINT NAME: VINCE [illegible]

SIGNATURE: [signature]

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-3

CLIENT/STATION #: ARCO 6148 ADDRESS: 5131 SHATTUCK AV OAK

CASING DIAMETER (inches): 2 3 4 6 8 12 Other _____

GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____

TD 25.85 - DTW 17.16 X GALLON/LINEAR FT. 0.66 X CASING VOLUME 3 = CALCULATED PURGE 17.20 ACTUAL PURGE _____

DATE PURGED: 2-2-94 START (2400 HR) 1102 END (2400 HR) 1107
DATE SAMPLED: 2-2-94 START (2400 HR) 1112 END (2400 HR) 1112

TIME (2400 HR)	VOLUME (GAL.)	pH (UNITS)	E.C. (UMHOS/ CM@25 C)	TEMP. (F)	COLOR (VISUAL)	TURBIDITY (VISUAL)
1103	3	6.70	0.77	67.2	clear	
1104	8	6.64	0.51	67.0	cloudy	
1107	12	12.02	0.48	66.9	cloudy	

FIELD QC SAMPLES COLLECTED AT THIS WELL (I.E., FB-1, XDUP-1): _____

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
___ Dedicated		✓ Bailer Disposable	___ Dedicated
Other: _____		Other: _____	

REMARKS: Well pumped dry at 12 gallons

PRINT NAME: Vince [illegible]

SIGNATURE: [illegible]

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-2

CLIENT/STATION #: ARCO 6148 ADDRESS: 6131 SHATTUCK AVE OAK

CASING DIAMETER (inches): 2 | 3 | 4 | 6 | 8 | 12 | Other _____

GALLON/LINEAR FOOT: 0.17 | 0.38 | 0.66 | 1.5 | 2.6 | 5.8 | Other _____

TD 25'30 - DTW 10'96 X GALLON/LINEAR FT. 0.66 X CASING VOLUME 3 = CALCULATED PURGE 17.50

ACTUAL PURGE 17.0

DATE PURGED: 2-2-94 START (2400 Hr) 1119 END (2400 Hr) 1128

DATE SAMPLED: 2-2-94 START (2400 Hr) 1136 END (2400 Hr) 1136

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1120	2	6.62	0.35	66.1	cloudy	
1123	5	6.59	0.40	6058	clear	
1126	10	6.47	0.46	6057	clear	
1128	12	6.46	0.45	6056	clear	

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

PURGING EQUIPMENT

- ___ 2" Bladder Pump
- ✓ Centrifugal Pump
- ___ Submersible Pump
- ___ Dedicated
- ___ Bailer (Teflon®)
- ___ Bailer (PVC)
- ___ Bailer (Stainless Steel)

Other: _____

SAMPLING EQUIPMENT

- ___ 2" Bladder Pump
- ___ DDL Sampler
- ___ Dipper
- ✓ Bailer Disposable
- ___ Bailer (Teflon®)
- ___ Bailer (Stainless Steel)
- ___ Submersible Pump
- ___ Dedicated

Other: _____

REMARKS: Well has a slow recharge rate. Was pumped dry at 12 gallons

PRINT NAME: Vince Valdez

SIGNATURE: Vince Valdez

PAGE 8 OF 8

Columbia Analytical Services, Inc.

February 16, 1994

Service Request No. SJ94-0165

Gina Austin
Tom DeLon
IWM
950 Ames Avenue
Milpitas, CA 95035

Re: **ARCO Facility No. A6148**

Dear Ms. Austin/Mr. DeLon:

Attached are the results of the water samples submitted to our lab on February 7, 1994. For your reference, these analyses have been assigned our service request number SJ94-0165.

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/kmh

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

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

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	IWM	**Dates Collected:**	02/02/94
Project:	ARCO Facility No. A6148	**Date Received:**	02/07/94
Sample Matrix:	Water	**Date Extracted:**	N/A
		Date Analyzed:	N/A
		Service Request:	SJ94-0165

Oil and Grease, IR SM 5520 C
Petroleum Hydrocarbons, IR SM 5520 F
Units. mg/L (ppm)

Sample Name	Oil and Grease, IR	Hydrocarbons, IR
MW-3	7 8	7.7
Method Blank	ND	ND
MRL	0 5	0 5

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

Approved By: Kevin A Murphy Date. February 17, 1994

[940165 \LW]O&Gww 2/16/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. A6148
Sample Matrix: Water

Dates Collected: 02/02/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: 02/09/94
Service Request: SJ94-0165

BTEX and TPH as Gasoline
EPA Methods 5030/8020/DHS LUFT Method

Analyte:	**Benzene**	**Toluene**	**Ethyl-benzene**	**Total Xylenes**	**TPH as Gasoline**
Units:	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)
Method Reporting Limit:	0.5	0.5	0.5	0.5	50
Sample Name					
MW-1	93.	ND	1.9	1.0	250.
MW-2	1,300.	2,500.	540.	2,700.	16,000
MW-3	1,400.	1,200.	1,200.	4,400.	26,000
MW-4	3.9	ND	ND	ND	ND
MW-5	3,000.	65	240.	78.	10,000
MW-6	2.2	ND	ND	ND	61
MW-7	ND	ND	ND	ND	ND
Method Blank	ND	ND	ND	ND	ND

Approved By: Kevin Murphy Date: February 17, 1994

[940165 XLW]8020w1/2/16/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. A6148
Sample Matrix: Water

Dates Collected: 02/02/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: 02/09, 10/94
Service Request: SJ94-0165

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

Sample Name:	MW-1	MW-2 (a)	MW-3 (a)
Date Analyzed:	02/09/94	02/10/94	02/10/94
Analyte	**MRL**		
Dichlorodifluoromethane (Freon 12)	1	ND	<10.	<10
Chloromethane	1	ND	<10.	<10
Vinyl Chloride	0.5	ND	<5.	<5
Bromomethane	0.5	ND	<5.	<5
Chloroethane	0.5	ND	<5.	<5.
Trichlorofluoromethane (Freon 11)	0 5	ND	<5.	<5.
1,1-Dichloroethene	0.5	ND	<5.	<5
Trichlorotrifluoroethane (Freon 113)	0.5	ND	<5	<5.
Methylene Chloride	2	ND	<20	<20.
trans-1,2-Dichloroethene	0.5	ND	<5.	<5
cis-1,2-Dichloroethene	0.5	ND	<5	<5
1,1-Dichloroethane	0.5	ND	<5	<5
Chloroform	0.5	ND	<5	<5
1,1,1-Trichloroethane (TCA)	0 5	ND	<5.	<5
Carbon Tetrachloride	0.5	ND	<5.	<5
1,2-Dichloroethane	0 5	ND	<5	<5
Trichloroethene (TCE)	0.5	1 1	<5	<5
1,2-Dichloropropane	0 5	ND	<5.	<5
Bromodichloromethane	0.5	ND	<5.	<5
2-Chloroethyl Vinyl Ether	5	ND	<50.	<50
trans-1,3-Dichloropropene	0.5	ND	<5.	<5
cis-1,3-Dichloropropene	0 5	ND	<5.	<5
1,1,2-Trichloroethane	0.5	ND	<5.	<5
Tetrachloroethene (PCE)	0 5	11.	13.	<5
Dibromochloromethane	0.5	ND	<5.	<5
Chlorobenzene	0 5	ND	<5.	<5
Bromoform	0 5	ND	<5	<5
1,1,2,2-Tetrachloroethane	0.5	ND	<5.	<5
1,3-Dichlorobenzene	1	ND	<10	<10
1,4-Dichlorobenzene	1	ND	<10	<10
1,2-Dichlorobenzene	1	ND	<10	<10

(a) Raised MRL due to matrix interference.

Approved By: Lee M. A. Murphy Date: February 17, 1994

[9410to5 XLW]Ar601W4/2/10/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. A6148
Sample Matrix: Water

Dates Collected: 02/02/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: 02/09, 10/94
Service Request: SJ94-0165

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

Sample Name:	MW-4	MW-5 (a)	MW-6 (b)
Date Analyzed:	02/09/94	02/09/94	02/10/94
Analyte	**MRL**		
Dichlorodifluoromethane (Freon 12)	1	ND	<5.	<10
Chloromethane	1	ND	<5.	<10
Vinyl Chloride	0.5	ND	<2.5	<5
Bromomethane	0.5	ND	<2.5	<5
Chloroethane	0.5	ND	<2.5	<5
Trichlorofluoromethane (Freon 11)	0.5	ND	<2.5	<5
1,1-Dichloroethene	0.5	ND	<2.5	<5
Trichlorotrifluoroethane (Freon 113)	0.5	ND	<2.5	<5
Methylene Chloride	2	ND	<10.	<20
trans-1,2-Dichloroethene	0.5	ND	<2.5	<5
cis-1,2-Dichloroethene	0.5	ND	<2.5	<5
1,1-Dichloroethane	0.5	ND	<2.5	<5
Chloroform	0.5	ND	<2.5	6.7
1,1,1-Trichloroethane (TCA)	0.5	ND	<2.5	<5
Carbon Tetrachloride	0.5	ND	<2.5	<5
1,2-Dichloroethane	0.5	ND	<2.5	<5
Trichloroethene (TCE)	0.5	ND	<2.5	<5
1,2-Dichloropropane	0.5	ND	<2.5	<5
Bromodichloromethane	0.5	ND	<2.5	<5
2-Chloroethyl Vinyl Ether	5	ND	<25	<50
trans-1,3-Dichloropropene	0.5	ND	<2.5	<5
cis-1,3-Dichloropropene	0.5	ND	<2.5	<5
1,1,2-Trichloroethane	0.5	ND	<2.5	<5
Tetrachloroethene (PCE)	0.5	1.4	2.7	100
Dibromochloromethane	0.5	ND	<2.5	<5
Chlorobenzene	0.5	ND	<2.5	<5
Bromoform	0.5	ND	<2.5	<5
1,1,2,2-Tetrachloroethane	0.5	ND	<2.5	<5
1,3-Dichlorobenzene	1	ND	<5	<10
1,4-Dichlorobenzene	1	ND	<5.	<10
1,2-Dichlorobenzene	1	ND	<5.	<10

(a) Raised MRL due to matrix interference
(b) Raised MRL due to high analyte concentration requiring sample dilution.

Approved By: Kevin Murphy Date: February 17, 1994

[940165 XLW]Aro01W8/2/16-94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. A6148
Sample Matrix: Water

Dates Collected: 02/02/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: 02/09, 10/94
Service Request: SJ94-0165

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

Sample Name:	MW-7	Method Blank	Method Blank
Date Analyzed:	02/09/94	02/09/94	02/10/94
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	2	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	0.8	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	ND	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	3.4	ND	ND
Dibromochloromethane	0.5	ND	ND	ND
Chlorobenzene	0.5	ND	ND	ND
Bromoform	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.5	ND	ND	ND
1,3-Dichlorobenzene	1	ND	ND	ND
1,4-Dichlorobenzene	1	ND	ND	ND
1,2-Dichlorobenzene	1	ND	ND	ND

Approved By: _____ Date: February 17, 1994

[940165 XLW]Aro01W9 2/16/94

APPENDIX A

LABORATORY QC RESULTS

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Dates Collected:**	02/02/94
Project:	ARCO Facility No. A6148	**Date Received:**	02/07/94
Sample Matrix:	Water	**Date Extracted:**	N/A
		Date Analyzed:	02/10/94
		Service Request:	SJ94-0165

Initial Calibration Verification
Petroleum Hydrocarbons, IR
EPA Method SM 5520 F
Units: mg/L (ppm)

Analyte	True Value	Result	Percent Recovery	CAS Acceptance Criteria
Hydrocarbon Mix	40.	39.	90.	90-110

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

Approved By: Kenneth Murphy Date: February 17, 1994

[940165 XLW]O&Gccsw5/2/10/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. A6148
Sample Matrix: Water

Dates Collected: 02/02/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: 02/10/94
Service Request: SJ94-0165

Matrix Spike/Duplicate Matrix Spike Summary
Petroleum Hydrocarbons, IR
EPA Method SM 5520 F
Units: mg/L (ppm)

		Spike Result		Percent Recovery		CAS Acceptance
Analyte	Spike Level	LCS	LCSD	LCS	LCSD	Criteria
Hydrocarbon Mix	4.	3.5	3.8	88.	96.	60-121

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

Approved By: Kevin Murphy Date: February 17, 1994

[940165.XLW]O&Gcsw7/2/1o/94

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Dates Collected:**	02/02/94
Project:	ARCO Facility No. A6148	**Date Received:**	02/07/94
Sample Matrix:	Water	**Date Extracted:**	N/A
		Date Analyzed:	02/09/94
		Service Request:	SJ94-0165

Surrogate Recovery Summary
BTEX and Total Petroleum Hydrocarbons (TPH) as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method

Sample Name	Percent Recovery a,a,a-Trifluorotoluene
MW-1	88
MW-2	82.
MW-3	88
MW-4	84
MW-5	96
MW-6	83
MW-7	87.
MW-6 (MS)	82.
MW-6 (DMS)	87
Method Blank	89.

CAS Acceptance Limits: 62-112

Approved By: Keon A Murphy Date: February 17, 1994

[940165 XLW]8020sr1/2/16/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. A6148
Sample Matrix: Water

Dates Collected: 02/02/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: 02/09/94
Service Request: SJ94-0165

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

Analyte	True Value	Result	Percent Recovery	CAS Acceptance Criteria
Benzene	25	27.7	111	85-115
Toluene	25	27.2	109.	85-115
Ethylbenzene	25	27.2	109	85-115
Total Xylenes	75.	82.7	110.	85-115
TPH as Gasoline	250	249.	100.	90-110

Approved By: Kee M. Murphy Date: February 17, 1994

[940165.XLW]8020ccs/2/16/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Dates Collected:**	02/02/94
Project:	ARCO Facility No. A6148	**Date Received:**	02/07/94
Sample Matrix:	Water	**Date Extracted:**	N/A
		Date Analyzed:	02/09/94
		Service Request:	SJ94-0165

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

Sample Name: MW-6

					Percent Recovery		
		Sample	Spike Result				CAS Acceptance
Analyte	**Spike Level**	**Result**	**MS**	**DMS**	**MS**	**DMS**	**Criteria**
TPH as Gasoline	250.	61.0	305.	303.	98.	97.	67-121

Approved By: Kevin A Murphy Date: February 17, 1994

[940165 XLW]8020tphms/2/16/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. A6148
Sample Matrix: Water

Dates Collected: 02/02/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: 02/09, 10/94
Service Request: SJ94-0165

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

Sample Name	Date Analyzed	Percent Recovery 4- Bromofluorobenzene
MW-1	02/09/94	87.
MW-2	02/10/94	86
MW-3	02/10/94	86
MW-4	02/09/94	81.
MW-5	02/09/94	89.
MW-6	02/10/94	91.
MW-7	02/09/94	78
MW-7 (MS)	02/09/94	84
MW-7 (DMS)	02/09/94	89.
Method Blank	02/09/94	85.
Method Blank	02/10/94	88.

CAS Acceptance Limits: 76-138

Approved By: Kevin Murphy Date: February 17, 1994

I940165 XLW|o01Srw3/2/1o/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. A6148
Sample Matrix: Water

Dates Collected: 02/02/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: 01/06/94
Service Request: SJ94-0165

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

Analyte	True Value	Result	Percent Recovery	CAS Acceptance Criteria
Chloromethane	100	94.2	94.	D-193
Vinyl Chloride	100	106.	106	28-163
Bromomethane	100	85.7	86.	D-144
Chloroethane	100	89.2	89.	46-137
Trichlorofluoromethane (Freon 11)	100	95.6	96	21-156
1, 1-Dichloroethene	100	129.	129.	28-167
Methylene Chloride	100	108.	108.	25-162
trans-1,2-Dichloroehtene	100	89.8	90	38-155
1,1-Dichloroethane	100	93 1	93.	47-132
Chloroform	100	106.	106	49-133
1,1,1-Trichloroethane (TCA)	100	100.	100	41-138
Carbon Tetrachloride	100	114.	114.	43-143
1,2-Dichloroethane	100	108.	108	51-147
Trichloroehtene (TCE)	100	99.8	100	35-146
1,2-Dichloropropane	100	102	102.	44-156
Bromodichloromethane	100	99 8	100.	42-172
trans-1,3-Dichloropropene	100	119.	119	22-178
cis-1,3-Dichloropropene	100	96.3	96.	22-178
1,1,2-Trichloroethane	100	102.	102.	39-136
Tetrachloroethene (PCE)	100	94.8	95.	26-162
Dibromochloromethane	100	102	102.	24-191
Chlorobenzene	100	97 9	98.	38-150
Bromoform	100	99.1	99.	13-159
1,1,2,2-Tetrachloroethane	100	114.	114	8-184
1,3-Dichlorobenzene	100	98.3	98.	7-187
1,4-Dichlorobenzene	100	101	101.	42-143
1,2-Dichlorobenzene	100	99.0	99.	D-208

D Detected.

Approved By: Kevin A Murphy Date: February 17, 1994

[940165 XLW]601Ccsl/2/16/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. A6148
Sample Matrix: Water

Dates Collected: 02/02/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: 02/09/94
Service Request: SJ94-0165

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

Sample Name: MW-7

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria
1,1-Dichloroethene	10.	ND	8 52	8 86	85	89	69-142
Trichloroethene	10	ND	9.09	8 79	91	88	42-148
Tetrachloroethene	10	3.44	13 4	13 2	100.	98	80-136

Approved By: Keenan Murphy Date: February 17, 1994

[940165 XLW]601Msw2/2/10/94

APPENDIX B

CHAIN OF CUSTODY

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. EWM-94-5CC

Chain of Custody

ARCO Facility no: A 0148	City (Facility): OAKLAND	Project manager (Consultant): TOM DeFazio	Laboratory name: Columbia
ARCO engineer: Kyle Christie	Telephone no (ARCO):	Telephone no. (Consultant): 408/942 3955	Fax no (Consultant): 408/942 1499
Consultant name: EWM	Address (Consultant): 950 Amestown Mtn Ca 95035		Contract number: 07077

Method of shipment: CAS COURIER

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid HCL	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 5520 E&F 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 ☐	BTEX 8020
TB FB	1-2	2		✓		✓	✓	2-2-94	820		✓	✓			✓						
MW-1	3-6	4		✓		✓	✓		951		✓	✓			✓						
MW-2	7-10	4		✓		✓	✓		1136		✓	✓			✓						
MW-3	11-15	7		✓		✓	✓		1112		✓	✓		✓	✓						✓
MW-4	16-19	4		✓		✓	✓		1024		✓	✓			✓						
MW-5	20-23	4		✓		✓	✓		1051		✓	✓			✓						
MW-6	24-27	4		✓		✓	✓		926		✓	✓			✓						
MW-7	28-31	4		✓		✓	✓		910		✓	✓			✓						

Special detection Limit/reporting:

Special QA/QC:

Remarks: Hold on TB-FB 5520 C&F per AARON @ KENA 2/5/94 (408) 264-7723

Lab number: SJ94-0165

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

Condition of sample: OK		Temperature received: cool	
Relinquished by sampler: [signature]	Date: 2-7-94	Time: 9:03 AM	Received by: [signature]
Relinquished by: [signature]	Date: 2/7/94	Time:	Received by: [signature] 2-7-94 11:10
Relinquished by:	Date:	Time:	Received by laboratory:	Date:	Time:

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APPC 3292 (2 91)

GB 3501, 8270

GOLDEN STATE/CAS
LABORATORIES INC

February 14, 1994

Tom De Lon
IWM
950 Ames Ave.
Milpitas, CA 95035

Re: **ARCO Facility #6148-Oakland/Project #SJ94-0165**

Dear Tom:

Enclosed are the results of the samples submitted to our lab on February 8, 1994. For your reference, these analyses have been assigned our service request number LA941199.

All analyses were performed in accordance with our laboratory's quality assurance program. Golden State / CAS is certified for environmental analyses by the California Department of Health Services (Certificate # 1296/Expiration - August 1994).

Please call if you have any questions.

Respectfully submitted,

Golden State / CAS Laboratories, Inc.

Dr. B. Gene Bennett
Laboratory Director

Thomas X. Robinson
Quality Assurance Coordinator

GB/iz

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GOLDEN STATE / CAS LABORATORIES, INC.

Analytical Report

Client:	IWM	**Date Collected:**	02/02/94
Project:	ARCO Products Company/#6148	**Date Received:**	02/08/94
Sample Matrix:	Water	**Date Extracted:**	02/08/94
		Date Analyzed:	02/10/94
		Service Request No.:	LA941199

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

Sample Name: MW-3
Lab Code: LA1199-1

Base Neutral Analyte	MRL	Result	Base Neutral Analyte	MRL	Result
N-Nitrosodimethylamine	5	ND	2,6-Dinitrotoluene	5	ND
Bis(2-chloroethyl) Ether	5	ND	Diethyl Phthalate	5	ND
1,2-Dichlorobenzene	5	ND	4-Chlorophenyl Phenyl Ether	5	ND
1,3-Dichlorobenzene	5	ND	Fluorene	5	ND
1,4-Dichlorobenzene	5	ND	4-Nitroaniline	20	ND
Bis(2-chloroisopropyl) Ether	5	ND	N-Nitrosodiphenylamine	5	ND
N-Nitrosodi-n-propylamine	5	ND	4-Bromophenyl Phenyl Ether	5	ND
Hexachloroethane	5	ND	Hexachlorobenzene	5	ND
Nitrobenzene	5	ND	Phenanthrene	5	ND
Isophorone	5	ND	Anthracene	5	ND
Bis(2-chloroethoxy) methane	5	ND	Di-n-butyl Phthalate	5	ND
1,2,4-Trichlorobenzene	5	ND	Fluoranthene	5	ND
Naphthalene	5	160	Pyrene	5	ND
4-Chloroaniline	5	ND	Butylbenzyl Phthalate	5	ND
Hexachlorobutadiene	5	ND	3,3'-Dichlorobenzidine	20	ND
2-Methylnaphthalene	5	91	Benz(a)anthracene	5	ND
Hexachlorocyclopentadiene	10	ND	Bis(2-ethylhexyl) Phthalate	5	9
2-Chloronaphthalene	5	ND	Chrysene	5	ND
2-Nitroaniline	20	ND	Di-n-octyl Phthalate	5	ND
Dimethyl Phthalate	5	ND	Benzo(b)fluoranthene	5	ND
Acenaphthylene	5	ND	Benzo(k)fluoranthene	5	ND
3-Nitroaniline	20	ND	Benzo(a)pyrene	5	ND
Acenaphthene	5	ND	Indeno(1,2,3-c,d)pyrene	5	ND
Dibenzofuran	5	ND	Dibenz(a,h)anthracene	5	ND
2,4-Dinitrotoluene	5	ND	Benzo(g,h,i)perylene	5	ND
Aniline	5	ND	Pyridine	10	ND

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

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

Approved by _____ Date 2-14-94

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GOLDEN STATE / CAS LABORATORIES, INC.

Analytical Report

Client: IWM
Project: ARCO Products Company/#6148
Sample Matrix: Water

Date Extracted: 02/08/94
Date Analyzed: 02/09/94
Service Request No.: LA941199

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

Sample Name: Method Blank
Lab Code: LA1199-MB

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

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

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

Approved by _____ Date 2-14-94

GOLDEN STATE / CAS LABORATORIES, INC.

QA/QC Report

Client: IWM
Project: ARCO Products Company/#6148
Sample Matrix: Water

Service Request No.: LA941199

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	LA1199-1	23	20	81	65	88	96
Method Blank	LA1199-MB	57	36	86	79	81	101
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 [signature] Date 2-14-94

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GOLDEN STATE / CAS LABORATORIES, INC.

QA/QC Report

Client:	IWM	**Date Extracted:**	02/08/94
Project:	ARCO Products Company/#6148	**Date Analyzed:**	02/09/94
LCS Matrix:	Water	**Service Request No.:**	LA941199

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

Analyte	True Value	Result	Percent Recovery	EPA Percent Recovery Acceptance Criteria
Phenol	50.0	18.7	37	5-112
2-Chlorophenol	50.0	36.8	74	23-134
1,4-Dichlorobenzene	50.0	41.2	82	20-124
N-Nitrosodi-n-propylamine	50.0	48.0	96	D-230
1,2,4-Trichlorobenzene	50.0	34.8	70	44-142
4-Chloro-3-methylphenol	50.0	39.2	78	22-147
Acenaphthene	50.0	45.8	92	47-145
4-Nitrophenol	50.0	12.3	25	D-132
2,4-Dinitrotoluene	50.0	45.8	92	39-139
Pentachlorophenol	50.0	36.7	73	14-176
Pyrene	50.0	49.5	99	52-115

D Detected; result must be greater than zero.

Approved by _____ Date 2-14-94

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GOLDEN STATE / CAS LABORATORIES, INC.

QA/QC Report

Client: IWM
Project: ARCO Products Company/#6148
Sample Matrix: Water

Date Extracted: 02/08/94
Date Analyzed: 02/11/94
Service Request No.: LA941199

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

Lab Code: LA1199-1

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	50.0	50.0	ND	21.6	20.9	43	42	12-89	3
2-Chlorophenol	50.0	50.0	ND	40.2	40.7	80	81	27-123	1
1,4-Dichlorobenzene	50.0	50.0	ND	39.5	38.3	79	77	36-97	3
N-Nitrosodi-n-propylamine	50.0	50.0	ND	50.2	51.2	100	102	41-116	2
1,2,4-Trichlorobenzene	50.0	50.0	ND	35.4	34.0	71	68	39-98	4
4-Chloro-3-methylphenol	50.0	50.0	ND	40.1	40.4	80	81	23-97	<1
Acenaphthene	50.0	50.0	ND	44.4	44.2	89	88	46-118	<1
4-Nitrophenol	50.0	50.0	ND	13.6	14.3	27	29	10-80	5
2,4-Dinitrotoluene	50.0	50.0	ND	46.0	46.6	92	93	24-96	1
Pentachlorophenol	50.0	50.0	ND	33.8	34.7	68	69	9-103	3
Pyrene	50.0	50.0	ND	50.6	47.4	101	95	26-127	7

ND None Detected at or above the method reporting limit

Approved by [signature] Date 2-14-94

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ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. IWM-94-5CC

Chain of Custody

ARCO Facility no. A 6148	City (Facility) OAKLAND	Project manager (Consultant) TOM DeTOW	Laboratory name Columbia
ARCO engineer Kyle Christie	Telephone no. (ARCO)	Telephone no. (Consultant) 408/942 8955	Fax no. (Consultant) 408/942 1099
Consultant name IWM	Address (Consultant) 950 Ames Av Milp CA 95035		Contract number 07077

Method of shipment: CAS COURIER

Sample I.D	Lab no. CA1199	Container no.	Matrix: Soil	Water	Other	Preservation: Ice	Acid HCL	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 5520 E/F EPA 418.1/SM503E	EPA 601/8010 + 8240 VOC's	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 ☐	BUA's 35,1C/8270
TB-FB		2		✓		✓	✓	2-2-94	820		✓	✓			✓						
MW-1		4		✓		✓	✓		951		✓	✓			✓						
MW-2		4		✓		✓	✓		1136		✓	✓			✓						
MW-3	1	7		✓		✓	✓		1112		✓	✓		✓	✓						✓
MW-4		4		✓		✓	✓		1024		✓	✓			✓						
MW-5		4		✓		✓	✓		1051		✓	✓			✓						
MW-6		4		✓		✓	✓		926		✓	✓			✓						
MW-7		4		✓		✓	✓		910		✓	✓			✓						

Special detection Limit/reporting:

Special QA/QC:

Remarks: Hold on TB-FB

GS 418* CA1199

Lab number: SJ94-0165

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

Condition of sample: OK		Temperature received: cool	
Relinquished by sampler: [signature]	Date 2-7-94	Time 9:03AM	Received by: [signature]
Relinquished by: [signature]	Date 2/7/94	Time	Received by: [signature] CAS 2-7-94 11:10
Relinquished by: [signature] CAS/SJ	Date 2/7/94	Time 1600	Received by laboratory: [signature] Date 2-8-94 Time 1000

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APPC-3292 (2-91)

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