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LETTER REPORT
QUARTERLY GROUNDWATER AND
REMEDATION SYSTEM MONITORING
Fourth Quarter 1993
at
ARCO Station 374
6407 Telegraph Avenue
Oakland, California

60025.12

03/08/94

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
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TO: Ms. Susan Hugo
Alameda County Health
Care Services Agency
80 Swan Way, Room 200
Oakland, California 94621

DATE: March 8, 1994
PROJECT NUMBER: 60025.12
SUBJECT: ARCO Station 374

FROM: Zbigniew L. Ignatowicz

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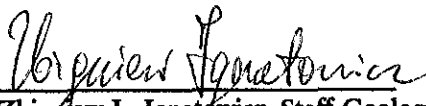
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1 03/08/94	Letter Report, Quarterly Groundwater and Remediation System Monitoring, Fourth Quarter 1993 at ARCO Station 374, 6407 Telegraph Avenue, Oakland, California.

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REMARKS:

Copies: 1 to RESNA project file no. 60025.12


Zbigniew L. Ignatowicz, Staff Geologist

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

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

March 8, 1994

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

Subject: Letter Report, Quarterly Groundwater and Remediation System Monitoring
Fourth Quarter 1993
ARCO Station 374
6407 Telegraph Avenue, Oakland, California

Mr. Whelan:

As requested by ARCO Products Company (ARCO), RESNA Industries Inc. (RESNA) presents this letter report summarizing the results of Fourth Quarter 1993 Groundwater Monitoring and Remediation System Monitoring at the above-referenced site. The location of the site is shown on Plate 1, and site features such as groundwater monitoring wells, vapor extraction wells, and the remediation compound are shown on Plate 2.

Field work associated with groundwater monitoring was performed by EMCON Associates (EMCON) of San Jose, California. RESNA's scope of work for groundwater monitoring was to interpret field and laboratory analytical data, which included evaluating trends in hydrocarbon concentrations in the local groundwater, the groundwater gradient, and direction of groundwater flow beneath the site. Evaluation and warrant of EMCON's groundwater monitoring field procedures and protocols is beyond RESNA's scope of work.

Field work associated with remediation system monitoring was performed by RESNA and consists of; collection of field data, treatment unit influent and effluent sampling, and system adjustment to optimize system performance. Evaluation of remediation system operation was performed by RESNA using laboratory results of samples and collected field data. Previous environmental work at the site is summarized in RESNA reports cited in the Reference section.

GROUNDWATER MONITORING

Field Work

EMCON field personnel was on site on October 13 and 14, 1993 to measure depth-to-water (DTW) level, to perform subjective analysis for the presence of product in groundwater in wells MW-1 through MW-7 and to perform quarterly sampling.

Laboratory Analyses

Water samples were analyzed by Columbia Analytical Services, Inc., located in San Jose, California (Hazardous Waste Testing Laboratory Certification #1426) for benzene, toluene, ethylbenzene, and total xylenes (BTEX), and total petroleum hydrocarbons as gasoline (TPHg) using Environmental Protection Agency (EPA) Methods 5030/8020/California DHS LUFT Method. The groundwater sample from monitoring well MW-4 was also analyzed for total petroleum hydrocarbons as diesel (TPHd) using EPA Method 3510/California DHS LUFT Method. The Chain of Custody Records and Laboratory Analysis Reports are included in Appendix A.

Results of Groundwater Monitoring

Groundwater elevations fell an average of about 0.86 foot in wells MW-1 through MW-6 since last quarter. Evidence of floating product or product sheen was not noted in any of the wells during this quarter. Based on October 13, 1993, DTW data, groundwater is interpreted to flow toward the southwest with a gradient of approximately 0.03 ft/ft (Plate 3). Groundwater monitoring data from this and previous quarters are presented in Table 1. The results of EMCON's field work on the site are presented in Appendix A.

The following trends in hydrocarbon concentrations have been identified since last quarter: TPHg and BTEX have remained nondetectable in onsite well MW-1, and in offsite wells MW-5 and MW-6. Concentrations of TPHg and BTEX have decreased in onsite well MW-4, and increased in offsite well MW-3. Except for an increase in benzene concentrations in onsite well MW-2, TPHg and the other gasoline constituents in MW-2 remained nondetectable. Cumulative analytical results of water samples are presented in Table 2.

GROUNDWATER REMEDIATION SYSTEM

Startup and Description of Groundwater Remediation System

Installation of a Groundwater Remediation System (GRS) was conducted between October 1993 and December 1993. GRS construction was completed on November 23, 1993 and its operation was initiated on December 21, 1993, after RESNA notified the East Bay

Municipal Utility District (EBMUD) in a letter one week prior to system startup (RESNA, December 16, 1993).

The onsite GRS utilizes a submersible pneumatic pump installed in an existing tank pit monitoring well (W-2) to recover dissolved phase gasoline hydrocarbon bearing groundwater from the site (Plate 5). A subgrade discharge hose, enclosed with a 4-inch diameter Schedule (Sch) 40 polyvinyl chloride (PVC) pipe, directs the extracted groundwater to the remediation compound for above ground treatment. The hydrocarbon bearing groundwater is filtered through a bag filter, and then directed into a surge tank for temporary storage. A transfer pump then pumps extracted groundwater stored in the surge tank through a second bag filter, prior to treatment through three 400-pound liquid-phase activated carbon canisters in series. Treated groundwater is subsequently discharged to an onsite sewer lateral under permit #502-85611 from the EBMUD. The GRS data presented in this report covers the period from December 21, 1993 through December 29, 1993.

Groundwater Sampling and System Monitoring

Groundwater samples were collected from the influent and effluent sample ports of the 400-pound liquid-phase activated carbon canisters as indicated in the site specific EBMUD permit. The location of the sample ports are shown on Plate 5, Vapor & Groundwater P&ID. The first groundwater sample was collected from sample port SP-102, influent to the surge tank. As required by the EBMUD permit, groundwater samples were collected from each of the following three sample ports: SP-105 "A", influent to carbon canister #1, SP-106 "B", influent to carbon canister #2, and SP-108 "D", effluent from the system (discharge to the sewer). Samples were collected twice a week, on December 21, 23, 27, and 29, 1993. In addition to the sampling schedule, the GRS was monitored twice a week for the following parameters: groundwater extraction rates from W-2; flow totalizer readings and groundwater discharged to the sewer in gallons; compressor air pressure to W-2; and pressure to the three 400-pound liquid-phase activated carbon canisters and filters.

Laboratory Methods and Analytical Results

All collected water samples were analyzed by Sequoia Analytical Laboratories (Sequoia), located in Redwood City, California for the presence of BTEX and TPHg using modified EPA Methods 5030/8020/8015. Water samples collected on the first day of operation, December 21, 1993, were analyzed (within 24 hours of sample collection) and results were reported to EBMUD.

Summary of laboratory analytical results of water samples collected for the period of December 21, 1993 through December 29, 1993, are presented in Table 4. Copies of the Groundwater Treatment System - O&M Performance Data, Laboratory Reports and Chain of Custody Records are attached in Appendix B.

As indicated on Table 4, BTEX and TPHg concentrations in effluent water (SP-108 "D") discharged to the sewer were less than their respective laboratory detection limits and thus within EBMUD permit limits. Non-detectable levels of BTEX and TPHg were reported in samples collected effluent to the first 400-pound liquid-phase activated carbon canister.

GRS Performance

GRS functioned properly and continuously during the period of December 21, 1993 through December 29, 1993. As indicated on the Groundwater Treatment System - O&M Performance Data (Appendix B), a cumulative total of approximately 7,192 gallons of water has been treated and discharged to the sewer system. Laboratory analytical results indicated that carbon breakthrough had not occurred. Carbon was not replaced during this monitoring period.

Previous and Future Work

Fourth Quarter 1993

- Submitted Letter Report, Quarterly Groundwater Monitoring, Third Quarter 1993 at ARCO Station 374. RESNA Report 60025.12, October 19, 1993.
- Performed Fourth Quarter 1993 Groundwater Monitoring.
- Completed construction and begin operation of Groundwater Remediation System.

First Quarter 1994

- Submitted Startup Report - WASTEWATER DISCHARGE PERMIT #502-85611, First Month of Operation and Maintenance, Groundwater Extraction and Remediation System, ARCO Service Station 374. RESNA Report 60025.12, February 1, 1994.
- Continue operation and maintenance of Groundwater Remediation System.
- Perform First Quarter 1994 Groundwater Monitoring.

Reporting Requirements


RESNA recommends that copies of this report be forwarded to:

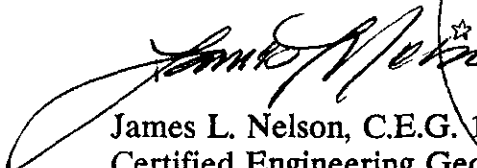
Ms. Susan Hugo
Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

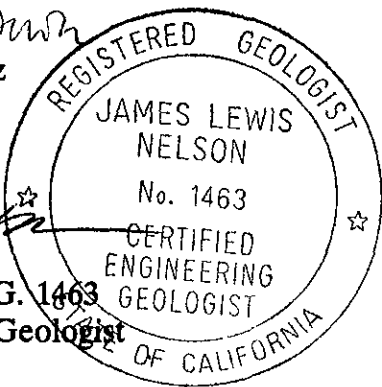
Mr. Richard Hiatt
California Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, California 94612

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

Sincerely,
RESNA Industries Inc.


Zbigniew L. Ignatowicz
Staff Geologist


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



Attachments: References

- Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Groundwater Gradient Map, October 13, 1993
Plate 4, TPHg/Benzene Concentrations In Groundwater,
October 13, and 14, 1993
Plate 5, Vapor & Groundwater P&ID
- Table 1, Cumulative Groundwater Monitoring Data
Table 2, Cumulative Results of Laboratory Analyses of Groundwater --
TPHg, TPHd, BTEX, and TOG
Table 3, Cumulative Results of Laboratory Analyses of Groundwater --
VOCs and Metals
Table 4, Summary of Laboratory Analytical Results of the GRS
Groundwater Samples
- Appendix A: EMCON's Field Reports, Depth To Water/Floating Product
Survey Results, Summary of Groundwater Monitoring Data,
Certified Analytical Reports with Chain of Custody, and Water
Sample Field Data Sheets
- Appendix B: Groundwater Treatment System - O&M Performance Data,
Laboratory Analytical Results and Chain of Custody Record

REFERENCES

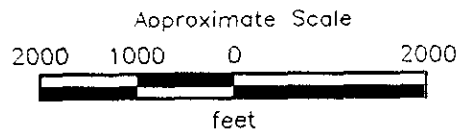
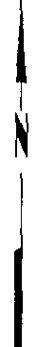
RESNA Industries Inc. Report on Offsite Subsurface Environmental Investigation at ARCO Station 374, 6407 Telegraph Avenue, Oakland, California. RESNA Report 60035-5, September 23, 1992.

RESNA. Letter Report, Quarterly Groundwater Monitoring Third Quarter 1993 at ARCO Station 374, 6407 Telegraph Avenue, Oakland, California. RESNA Report 60025.12, October 19, 1993.

RESNA. Notification of System Startup for Groundwater Extraction and Treatment System at ARCO Station 374, 6407 Telegraph Avenue, Oakland, California. RESNA 60025-11, December 16, 1993.



Source U.S Geological Survey
 7 1/2-Minute Quadrangles
 Oakland East/West, California
 Photorevised 1976

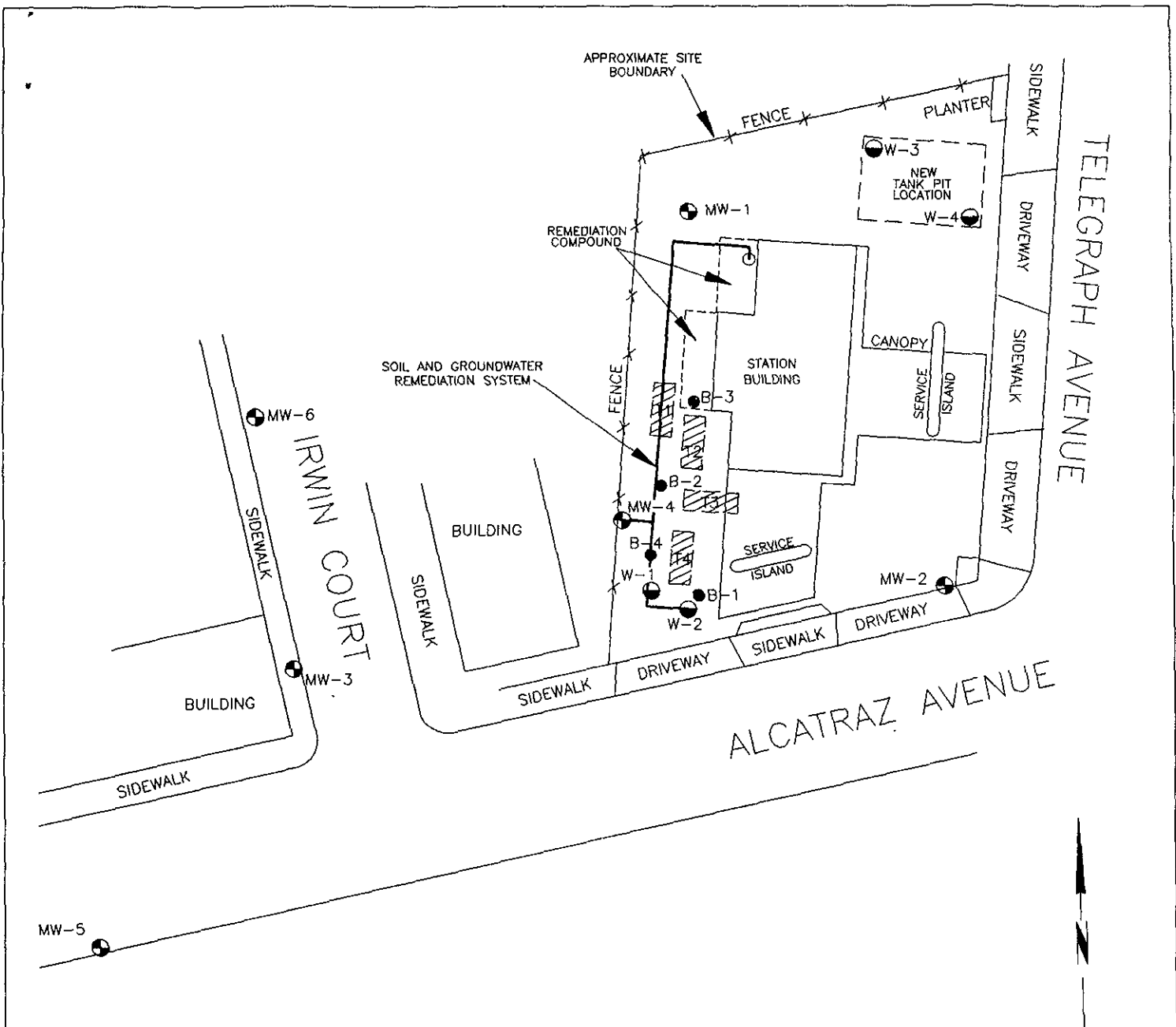


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
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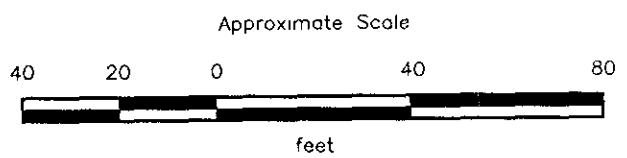
SITE VICINITY MAP
 ARCO Station 374
 6407 Telegraph Avenue
 Oakland, California

PLATE
 1



EXPLANATION

- B-4 ● = Soil boring (RESNA, 1988)
- MW-6 ⊕ = Monitoring well (RESNA, July 1989, and April 1992)
- W-4 ⊖ = Tonk pit monitoring well (RESNA, 1988)
-  = Former underground storage tanks



Source: Surveyed by John Koch, Licensed Land Surveyor.

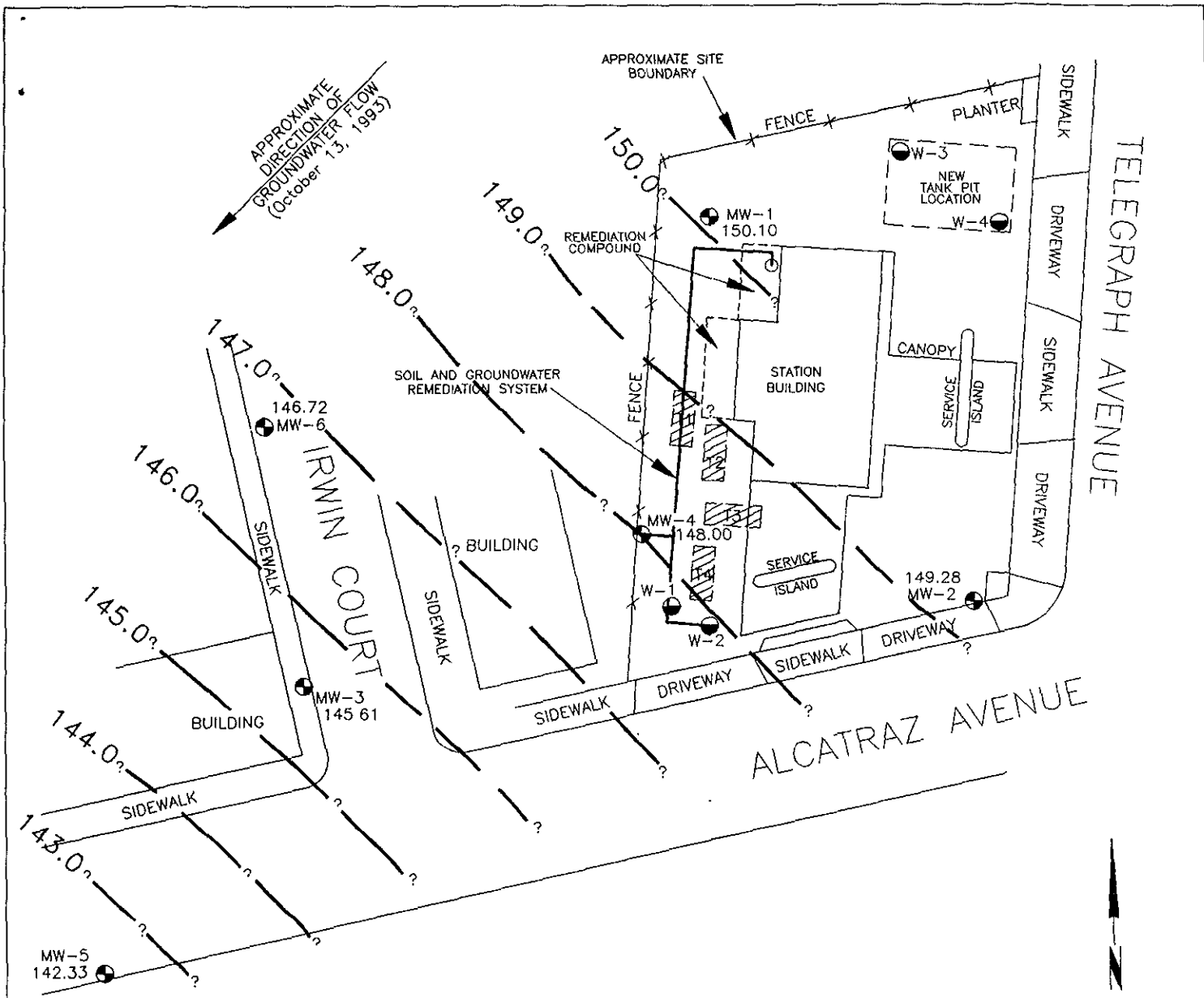
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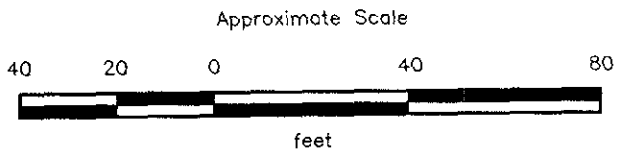
GENERALIZED SITE PLAN
ARCO Station 374
6407 Telegraph Avenue
Oakland, California

PLATE
2



EXPLANATION

- = Line of equal elevation of groundwater in feet above mean sea level (MSL)
- 150.10 = Elevation of groundwater in feet above MSL October 13, 1993
- MW-6 = Monitoring well (RESNA, July 1989, and April 1992)
- W-4 = Tank pit monitoring well (RESNA, 1988)
- = Former underground storage tanks



Source: Surveyed by John Koch, Licensed Land Surveyor.

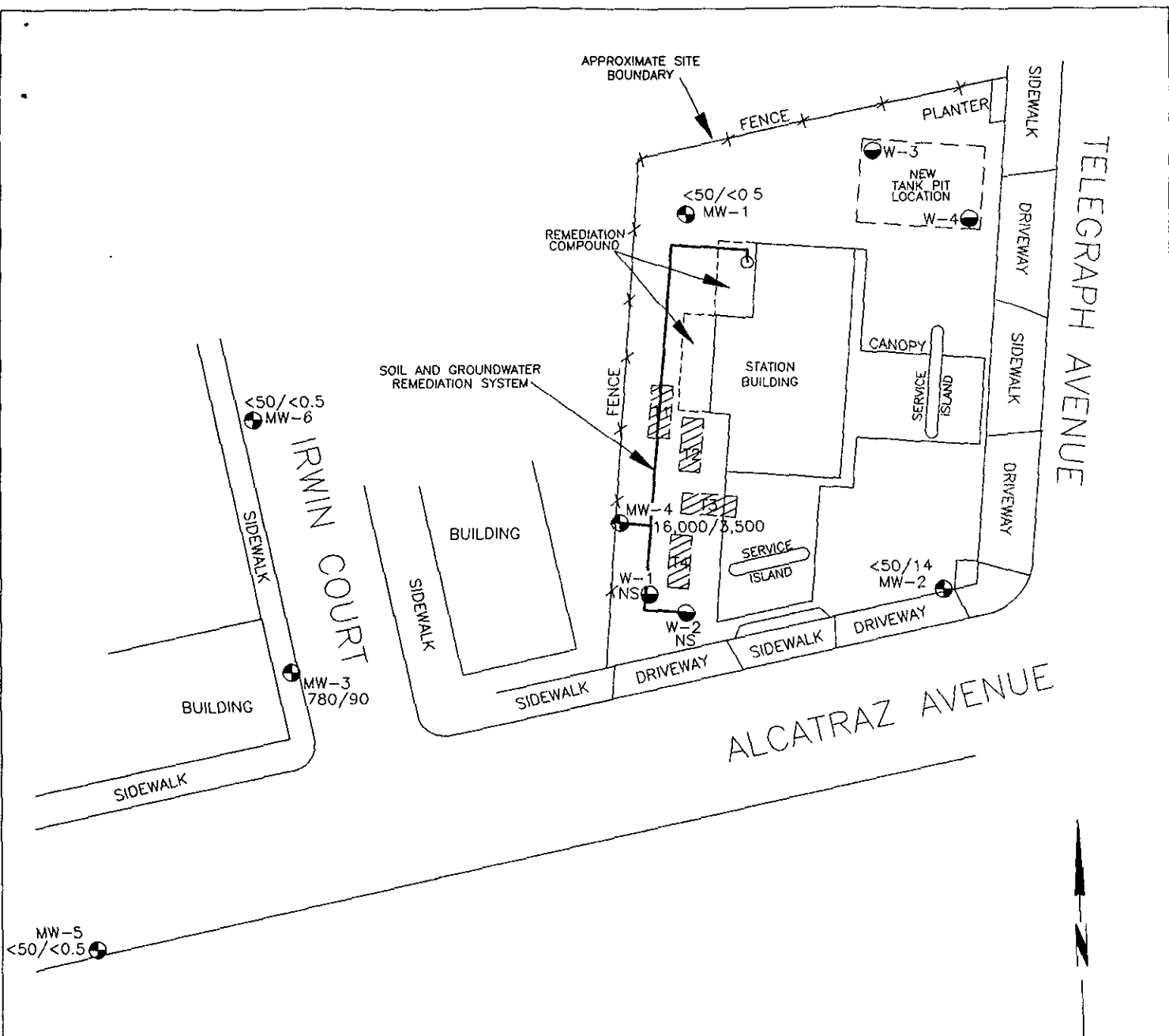
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00251204

GROUNDWATER GRADIENT MAP
ARCO Station 374
6407 Telegraph Avenue
Oakland, California

PLATE
3



EXPLANATION

16,000/3,500 = Concentration of TPHg/benzene in groundwater in parts per billion, October 13 and 14, 1993

MW-6 = Monitoring well (RESNA, July 1989, and April 1992)

W-4 = Tank pit monitoring well (RESNA, 1988)

= Former underground storage tanks

NS = Not sampled, tank pit well

Approximate Scale



Source: Surveyed by John Koch, Licensed Land Surveyor.



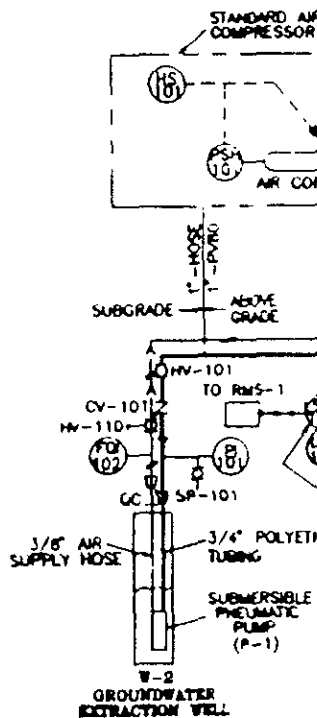
PROJECT 60025.12

00251204

**TPHg/BENZENE CONCENTRATIONS
IN GROUNDWATER
ARCO Station 374
6407 Telegraph Avenue
Oakland, California**

**PLATE
4**

(SUPPLIED BY OTHERS)
 (SUA)



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PROJECT

60025.12

PLATE

5

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
 ARCO Station 374
 Oakland, California
 (Page 1 of 5)

<u>Well Date</u>	<u>Well Elevation</u>	<u>Depth-to-Water</u>	<u>Water Elevation</u>	<u>Floating Product</u>
<u>MW-1</u>				
07/20/89		8.04	151.40	None
08/30/89		8.47	150.97	None
10/04/89	159.44	8.50	150.94	None
01/10/90		6.74	152.70	None
08/07/90		6.87	152.57	None
12/06/90		7.35	152.09	None
12/19/90		7.22	152.22	None
01/29/91		8.28	151.16	None
02/20/91		7.98	151.46	None
04/25/91		6.89	152.55	None
05/31/91		7.64	151.80	None
07/08/91		8.17	151.27	None
08/09/91		8.58	150.86	None
09/25/91		8.82	150.62	None
10/17/91		8.96	150.48	None
11/20/91		8.60	150.84	None
12/27/91		8.71	150.73	None
01/19/92		7.83	151.61	None
02/19/92		6.68	152.76	None
03/09/92		4.47	154.97	None
04/15/92	158.91**	6.44	152.47	None
05/12/92		7.31	151.60	None
06/16/92		7.97	150.94	None
07/14/92		8.22	150.69	None
08/07/92		8.46	150.45	None
09/22/92		6.76	152.15	None
10/12/92		7.13	151.78	None
11/23/92		7.24	151.67	None
12/16/92		6.44	152.47	None
01/21/93		5.03	153.88	None
02/22/93		4.93	153.98	None
03/25/93		5.13	153.78	None
04/27/93		5.68	153.23	None
08/04/93		7.91	151.00	None
10/13/93		8.81	150.10	None
<u>MW-2</u>				
07/20/89		8.15	150.31	None
08/30/89		8.42	150.04	None
10/04/89	158.46	8.40	150.06	None
01/10/90		6.12	152.34	None

See notes on page 5 of 5

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 374
Oakland, California
(Page 2 of 5)

Well Date	Well Elevation	Depth-to-Water	Water Elevation	Floating Product
<u>MW-2</u>				
08/07/90		6.35	152.11	None
12/06/90		7.15	151.31	None
12/19/90		7.38	151.08	None
01/29/91		8.41	150.05	None
02/20/91		8.26	150.20	None
04/25/91		7.70	150.76	None
05/31/91		8.10	150.36	None
07/08/91		8.34	150.12	None
08/09/91		8.51	149.95	None
09/25/91		8.66	149.80	None
10/17/91		8.80	149.66	None
11/20/91		8.66	149.80	None
12/27/91		8.57	149.89	Sheen
01/19/92		8.25	150.21	None
02/19/92		7.50	150.96	None
03/09/92		7.40	151.06	None
04/15/92	157.92**	7.72	150.20	None
05/12/92		8.01	149.91	None
06/16/92		8.25	149.67	None
07/14/92		8.33	149.59	None
08/07/92		8.42	149.50	None
09/22/92		6.13	151.79	None
10/12/92		6.80	151.12	None
11/23/92		7.15	150.77	None
12/16/92		6.66	151.26	None
01/21/93		5.93	151.99	None
02/22/93		6.01	151.91	None
03/25/93		5.91	152.01	None
04/27/93		6.63	151.29	None
08/04/93		8.02	149.90	None
10/13/93		8.64	149.28	None
<u>MW-3</u>				
07/20/89		7.58	146.60	None
08/30/89		8.00	146.18	None
10/04/89	154.18	7.73	146.45	Emulsion
01/10/90		7.78	146.40	None
08/07/90		7.66	146.52	None
12/06/90		7.75	146.43	None
12/19/90		7.58	146.60	None
01/29/91	154.18	7.60	146.58	None

See notes on page 5 of 5

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 374
Oakland, California
(Page 3 of 5)

Well Date	Well Elevation	Depth-to-Water	Water Elevation	Floating Product
<u>MW-3</u>				
02/20/91		7.51	146.67	None
04/25/91		6.37	147.81	None
05/31/91		7.19	146.99	None
07/08/91		7.60	146.58	None
08/09/91		7.94	146.24	None
09/25/91		8.23	145.95	None
10/17/91		8.44	145.74	None
11/20/91		8.78	145.40	None
12/27/91		8.05	146.13	Sheen
01/19/92		7.65	146.53	None
02/19/92		6.48	147.70	None
03/09/92		5.45	148.73	None
04/15/92	153.64**	7.75	145.89	None
05/12/92		7.45	146.19	None
06/16/92		7.51	146.13	None
07/14/92		7.60	146.04	None
08/07/92		7.85	145.79	None
09/22/92		7.73	145.91	None
10/12/92		7.83	145.81	None
11/23/92		6.98	146.66	None
12/16/92		5.96	147.68	None
01/21/93		4.62	149.02	None
02/22/93		5.15	148.49	None
03/25/93		5.45	148.19	None
04/27/93		5.79	147.85	None
08/04/93		7.24	146.40	None
10/13/93		8.03	145.61	None
<u>MW-4</u>				
07/20/89		8.09	148.99	None
08/30/89		8.45	148.63	Sheen
10/04/89	157.08	8.57	148.51	Sheen
01/10/90		7.26	149.82	None
08/07/90		6.87	150.21	None
12/06/90		8.02*	149.06*	Sheen
12/19/90		7.69	149.39	None
01/29/91		8.39	148.69	Sheen
02/20/91		8.16	148.92	None
04/25/91		7.14	149.94	None
05/31/91		7.64	149.44	None
07/08/91		8.34	148.74	None

See notes on page 5 of 5

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 374
Oakland, California
(Page 4 of 5)

Well Date	Well Elevation	Depth-to-Water	Water Elevation	Floating Product
<u>MW-4</u>				
08/09/91		8.60	148.48	None
09/25/91		8.80	148.28	None
10/17/91		8.98	148.10	None
11/20/91		8.78	148.30	None
12/27/91		8.82	148.26	Sheen
01/19/92		8.18	148.90	None
02/19/92		7.62	149.46	None
03/09/92		6.68	150.40	None
04/15/92	156.53**	6.96	149.57	None
05/12/92		7.45	149.08	None
06/16/92		7.94	148.59	None
07/14/92		8.21	148.32	None
08/07/92		8.41	148.12	None
09/22/92		6.14	150.39	None
10/12/92		6.45	150.08	None
11/23/92		7.48	149.05	None
12/16/92		6.95	149.58	None
01/21/93		5.53	151.00	None
02/22/93		5.83	150.70	None
03/25/93		5.96	150.57	None
04/27/93		6.30	150.23	None
08/04/93		7.71	148.82	None
10/13/93		8.53	148.00	None
<u>MW-5</u>				
04/15/92	151.33**	8.05	143.28	None
05/12/92		8.44	142.89	None
06/16/92		8.74	142.59	None
07/14/92		9.70	141.63	None
08/07/92		9.10	142.23	None
09/22/92		9.26	142.07	None
10/25/92#		9.24	142.09	None
11/23/92			Well Inaccessible	
12/16/92		8.20	143.13	None
01/21/93		7.89	143.44	None
02/22/93		7.29	144.03	None
03/25/93		7.51	143.82	None
04/27/93		7.72	143.61	None
08/05/93		8.66	142.67	None
10/13/93		9.00	142.33	None

See notes on page 5 of 5

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 374
Oakland, California
(Page 5 of 5)

Well Date	Well Elevation	Depth-to-Water	Water Elevation	Floating Product
<u>MW-6</u>				
04/15/92	153.84**	4.55	149.29	None
05/12/92		5.32	148.52	None
06/16/92		5.91	147.93	None
07/14/92		6.08	147.76	None
08/07/92		6.36	147.48	None
09/22/92		6.53	147.31	None
10/25/92#		6.54	147.30	None
11/23/92		5.75	148.09	None
12/16/92		4.69	149.15	None
01/21/93		3.82	150.02	None
02/22/93		3.78	150.06	None
03/25/93		3.93	149.91	None
04/27/93		4.30	149.54	None
08/05/93		5.39	148.45	None
10/13/93		7.12	146.72	None

Notes:

Elevations and depth-to-water (DTW) measured in feet.

* = Floating Product.

** = Wellheads surveyed by John E. Koch on April 27, 1992. Well elevation datum is mean sea level (msl).

= Wells inaccessible on October 12, 1992 due to parked cars. EMCON returned and sampled on October 25, 1992.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER--TPHg, TPHd, BTEX, AND TOG
ARCO Service Station 374
Oakland, California
(Page 1 of 3)

Date/Well	TPHg	TPHd	B	T	E	X	TOG
<u>MW-1</u>							
07/21/89	33	NA	0.77	1.6	1.5	5.0	NA
08/30/89	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
10/04/89	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
01/10/90	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
08/07/90	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
12/06/90	<50	NA	3.6	2.7	0.60	5.80	NA
02/20/91	<50	NA	<0.50	<0.50	<0.50	<0.50	NA
07/08/91	<30	NA	<0.30	<0.30	<0.30	<0.30	NA
09/25/91	<30	NA	0.57	0.57	0.54	1.7	NA
11/20/91	57	NA	9.2	3.7	0.63	2.5	NA
03/09/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
04/15/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
07/14/92	<50	NA	<0.5	0.7	<0.5	1.3	NA
10/12/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
01/21/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
04/27/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
08/04/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
10/13/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
<u>MW-2</u>							
07/21/89	4,200	NA	280	210	38	24	NA
08/30/89	4,200	NA	160	260	45	240	NA
10/04/89	4,300	NA	860	300	29	330	NA
01/10/90	8,000	NA	890	710	120	760	NA
08/07/90	6,000	NA	880	76	25	80	NA
12/06/90	1,600	NA	330	69	18	63	NA
02/20/91	1,300	NA	160	46	13	48	NA
07/08/91	310	NA	76	18	7.7	24	NA
09/25/91	83	NA	17	0.69	2.2	4.1	NA
11/20/91	180	NA	46	6.1	3.0	8.7	NA
03/09/92	690	NA	170	25	21	58	NA
04/15/92	86	NA	20	2.3	3.8	8.5	NA
07/14/92	160	NA	46	1.4	1.2	3.5	NA
10/12/92	230	NA	59	7.0	5.5	11	NA
01/21/93	450	NA	70	6.6	22	54	NA
04/27/93	<50	NA	6.6	<0.5	0.7	1.1	NA
08/04/93	<50	NA	2.1	<0.5	<0.5	<0.5	NA
10/13/93	<50	NA	14	<0.5	<0.5	<0.5	NA

See notes on page 3 of 3

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER--TPHg, TPHd, BTEX, AND TOG
ARCO Service Station 374
Oakland, California
(Page 2 of 3)

Date/Well	TPHg	TPHd	B	T	E	X	TOG
<u>MW-3</u>							
07/21/89	430	NA	9	4.8	<0.50	50	NA
08/30/89	1,200	NA	85	46	8.4	55	NA
10/04/89	7,000	NA	580	900	120	670	NA
01/10/90	940	NA	130	59	21	73	NA
08/07/90	2,300	NA	180	64	59	120	NA
12/06/90	460	350	52	55	14	39	NA
02/20/91	470	<100	36	30	9.3	31	<5,000
07/08/91	2,500	NA	240	470	74	320	NA
09/25/91	1,100	NA	120	110	34	120	NA
11/20/91	1,000	NA	180	140	43	140	NA
03/10/92	1,200	NA	200	110	53	130	NA
04/15/92	1,600	NA	200	13	110	81	NA
07/14/92	5,200	NA	620	44	310	250	NA
10/12/92	850	NA	150	5.2	55	46	NA
01/21/93	620	NA	100	12	35	35	NA
04/27/93	1,700	NA	180	83	64	100	NA
08/04/93	380	NA	70	12	29	41	NA
10/13/93	780	NA	90	6.0	40	31	NA
<u>MW-4</u>							
07/21/89	8,700	NA	720	360	120	640	NA
08/30/89	7,300	NA	630	220	72	320	NA
10/04/89	21,000	NA	2,300	1,300	280	1,300	NA
01/10/90	4,300	NA	470	250	63	430	NA
08/07/90	69,000	28,000	8,700	4,200	540	4,600	<5,000
12/06/90	Not sampled--product sheen						
02/20/91	5,200	<100	690	200	95	580	<5,000
07/08/91	1,700	NA	280	68	37	170	NA
09/25/91	6,300	NA	2,100	290	210	590	NA
11/20/91	2,700	NA	1,200	200	110	320	NA
03/10/92	690	NA	180	80	18	43	NA
04/15/92	8,500	NA	2,100	750	280	1,000	NA
07/14/92	10,000	NA	2,900	530	290	930	NA
10/12/92	19,000	690*	5,200	1,600	490	1,800	NA
01/21/93	22,000	1,400*	4,400	1,300	580	2,200	NA
04/27/93	21,000	1,100*	4,800	1,200	630	2,400	NA
08/04/93	23,000	1,500*	6,600	1,700	770	2,600	NA
10/13/93	16,000	670*	3,500	800	470	1,800	NA

See notes on page 3 of 3

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER--TPHg, TPHd, BTEX, AND TOG
ARCO Service Station 374
Oakland, California
(Page 3 of 3)

Date/Well	TPHg	TPHd	B	T	E	X	TOG
<u>MW-5</u>							
04/15/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
07/14/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
10/25/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
01/21/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
04/27/93	<50	NA	0.5	1.0	<0.5	0.8	NA
08/05/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
10/14/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
<u>MW-6</u>							
04/15/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
07/15/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
10/25/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
01/21/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
04/27/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
08/05/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
10/13/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
MCL:	—	—	1	—	680	1,750	—
DWAL:	—	—	—	100	—	—	—

Results in micrograms per liter ($\mu\text{g/L}$) = parts per billion (ppb).

TPHg : Total petroleum hydrocarbons as gasoline using EPA method 5030/8015.

TPHd : Total petroleum hydrocarbons as diesel using EPA method 3510/8015.

BTEX : B: Benzene, T: Toluene, E: Ethylbenzene, X: Total Xylene isomers; measured using EPA method 8020/602.

TOG : Total oil and grease measured using Standard Method 5520 B/F.

< : Results reported as less than the detection limit.

NA : Not analyzed

* : The sample contains a lower boiling point hydrocarbon mixture quantitated as diesel. The chromatogram does not match a typical diesel fingerprint.

FB-1 : Field blank.

MCL : State Maximum Contaminant Level (October 1990).

DWAL: State recommended Drinking Water Action Level (October 1990).

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER--VOCs and Metals
ARCO Service Station 374
Oakland, California
(Page 1 of 1)

Well Date	VOC (ppb)	Cd (ppm)	Cr (ppm)	Pb (ppm)	Ni (ppm)	Zn (ppm)
<u>MW-4</u> 07/31/90	Nondetectable for thirty one compounds tested (<1.0)	NA	NA	NA	NA	NA
02/20/91	Chloromethane* 3.4; nondetectable for twenty eight other compounds tested (<0.5)	NA	NA	NA	NA	NA
11/20/91	NA Sampling discontinued	<0.010	<0.010	<0.0050	<0.050	0.019

Halogenated Volatile Organics measured by EPA method 601/8010.

- VOC = Volatile Organic Compound (results in micrograms per liter [$\mu\text{g/L}$])
- ppb = parts per billion (ppb).
- ppm = parts per million (ppm). Metal results in milligrams per liter (mg/L)
- NA = Not Analyzed
- Cd = Cadmium
- Cr = Chromium
- Pb = Lead
- Ni = Nickel
- Zn = Zinc

TABLE 4
SUMMARY OF LABORATORY ANALYTICAL RESULTS
OF GROUNDWATER REMEDIATION SYSTEM - GROUNDWATER SAMPLES
ARCO Service Station 374
Oakland, California
(Page 1 of 1)

Sample Port Number	Date	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Total Xylenes (ppb)
SP-102	12/21/93	NS	NS	NS	NS	NS
	12/23/93	9,300	1,200	160	200	1,500
	12/27/93	5,700	820	97	45	1,000
	12/29/93	5,800	950	110	34	1,100
SP-105 "A"	12/21/93	19,000	2,100	460	570	2,500
	12/23/93	10,000	1,200	230	530	1,700
	12/27/93	4,400	480	36	19	830
	12/29/93	2,400	340	18	<0.50	510
SP-106 "B"	12/21/93	<50	<0.50	<0.50	<0.50	<0.50
	12/23/93	<50	<0.50	<0.50	<0.50	<0.50
	12/27/93	<50	<0.50	<0.50	<0.50	<0.50
	12/29/93	<50	<0.50	<0.50	<0.50	<0.50
SP-108 "D"	12/21/93	<50	<0.50	<0.50	<0.50	<0.50
	12/23/93	<50	<0.50	<0.50	<0.50	<0.50
	12/27/93	<50	<0.50	<0.50	<0.50	<0.50
	12/29/93	<50	<0.50	<0.50	<0.50	<0.50

TPHg = Total petroleum hydrocarbons as gasoline.
 ppb = Parts per billion (micrograms per liter [$\mu\text{g/L}$])
 NS = Not sampled.
 SP-102 = Influent to the surge tank
 SP-105"A" = Influent to carbon canister #1
 SP-106"B" = Influent to carbon canister #2
 SP-108"D" = Effluent from the system (discharge to the sewer)

APPENDIX A

**EMCON'S FIELD REPORTS, DEPTH TO WATER/FLOATING PRODUCT
SURVEY RESULTS, SUMMARY OF GROUNDWATER MONITORING
DATA, CERTIFIED ANALYTICAL REPORTS WITH CHAIN OF
CUSTODY, AND WATER SAMPLE FIELD DATA SHEETS**



EMCON Associates

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

RECEIVED

NOV 4 1993

RESNA
SAN JOSE

Date November 2, 1993

Project OG70-004.01

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

ARCHIVE COPY
60025.12
ARCHIVE COPY

We are enclosing:

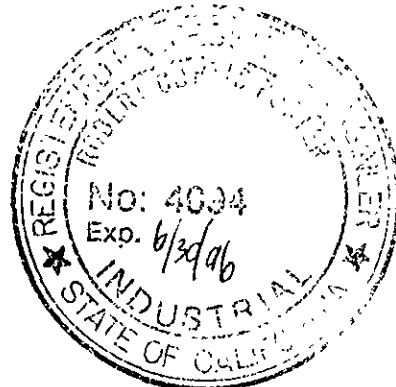
Copies	Description
<u>1</u>	<u>Depth To Water / Floating Product Survey Results</u>
<u>1</u>	<u>Summary of Groundwater Monitoring Data</u>
<u>1</u>	<u>Certified Analytical Reports with Chain-of-Custody</u>
<u>6</u>	<u>Water Sample Field Data Sheets</u>

For your: X Information Sent by: X Mail

Comments:

Enclosed are the data from the fourth quarter 1993 monitoring event at ARCO service station 374, 6407 Telegraph Avenue, Oakland, CA. Groundwater monitoring is conducted consistent with applicable regulatory guidelines. Please call if you have any questions: (408) 453-7300.

Reviewed by:



Jim Butera JB

Robert Porter
Robert Porter, Senior Project Engineer.



**FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY**

PROJECT # : 0G70-004.01

STATION ADDRESS : 6407 Telegraph Hill, Oakland, CA

DATE : 10-13-93

ARCO STATION # : 374

FIELD TECHNICIAN : Joe Wells

DAY : WED

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	Hex	OK	3259	OK	8.81	8.81	ND	ND	26.7	-
2	MW-6	OK	15/16	OK	0464	OK	7.12	7.12	ND	ND	14.6	-
3	MW-5	OK	Hex	OK	3499	OK	9.00	9.00	ND	ND	23.2	-
4	MW-2	OK	Hex	OK	3259	OK	8.64	8.64	ND	ND	26.4	-
5	MW-3	OK	Hex	OK	3259	OK	8.03	8.03	ND	ND	26.8	-
6	MW-4	OK	Hex	OK	3259	OK	8.53	8.53	ND	ND	26.5	-

WELL SURVEY POINTS ARE TOP OF CASING

Summary of Groundwater Monitoring Data
 Fourth Quarter 1993
 ARCO Service Station 374
 6407 Telegraph Hill, Oakland, California
 micrograms per liter ($\mu\text{g/l}$) or parts per billion (ppb)

Well ID and Sample Depth	Sampling Date	Depth To Water (feet)	Floating Product Thickness (feet)	TPH ¹ as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	TPH as Diesel (ppb)
MW-1(26)	10/13/93	8.81	ND. ²	<50.	<0.5	<0.5	<0.5	0.5	NR. ³
MW-2(26)	10/13/93	8.64	ND.	<50.	14.	<0.5	<0.5	<0.5	NR.
MW-3(26)	10/13/93	8.03	ND.	780.	90.	6.0	40.	31.	NR.
MW-4(26)	10/13/93	8.53	ND.	16,000.	3,500.	800.	470.	1,800.	670.
MW-5(23)	10/14/93*	9.00	ND.	<50.	<0.5	<0.5	<0.5	<0.5	NR.
MW-6(14)	10/13/93	7.12	ND.	<50.	<0.5	<0.5	<0.5	<0.5	NR.
FB-1 ⁴	10/13/93	NA. ⁵	NA.	<50.	<0.5	<0.5	<0.5	<0.5	NR.

1. TPH. = Total petroleum hydrocarbons

2. ND. = Not detected

3. NR. = Not reported, well was not scheduled for sample of the above parameter

4. FB. = Field blank

5. NA. = Not applicable

* = Due to inaccessability on 10/13/93, samples and water level data for well MW-5 were taken on 10/14/93.



October 28, 1993

Service Request No. SJ93-1272

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

Re: **EMCON Project No. 0G70-004.01**
ARCO Facility No. 374

Dear Mr. Butera:

Attached are the results of the water samples submitted to our lab on October 15, 1993. For your reference, these analyses have been assigned our service request number SJ93-1272.

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

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Carol J Klein

Keoni A. Murphy
Laboratory Manager

KAM/kmh

Annelise J. Bazar

Annelise J. Bazar
Regional QA Coordinator

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: EMCON Associates
Project: EMCON Project No. 0G70-004.01
 ARCO Facility No. 374
Sample Matrix: Water

Date Received: 10/15/93
Date Extracted: 10/26/93
Service Request No.: SJ93-1272

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

<u>Sample Name</u>	<u>Date Analyzed</u>	<u>TPH as Diesel</u>
MW-4 (26)	10/27/93	670. *
Method Blank	10/27/93	ND
MRL		50

* The sample contains a lower boiling point hydrocarbon mixture quantitated as diesel. The chromatogram does not match the typical diesel fingerprint.

Approved by: Carol Klein Date: 10-28-93

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
 Project: EMCON Project No. 0G70-004.01
 ARCO Facility No. 374

Date Received: 10/15/93
 Service Request No.: SJ93-1272
 Sample Matrix: Water

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

Sample Name:	<u>MW-1 (26)</u>	<u>MW-2 (26)</u>	<u>MW-3 (26)</u>
Date Analyzed:	10/18/93	10/18/93	10/18/93

<u>Analyte</u>	<u>MRL</u>			
Benzene	0.5	ND	14.	90.
Toluene	0.5	ND	ND	6.0
Ethylbenzene	0.5	ND	ND	40.
Total Xylenes	0.5	ND	ND	31.
TPH as Gasoline	50	ND	ND	780.

Sample Name:	<u>MW-4 (26)</u>	<u>MW-5 (23)</u>	<u>MW-6 (14)</u>
Date Analyzed:	10/18/93 *	10/18/93 *	10/18/93 *

<u>Analyte</u>	<u>MRL</u>			
Benzene	0.5	3,500.	ND	ND
Toluene	0.5	800.	ND	ND
Ethylbenzene	0.5	470.	ND	ND
Total Xylenes	0.5	1,800.	ND	ND
TPH as Gasoline	50	16,000.	ND	ND

* This sample was part of the analytical batch started on October 18, 1993. However, it was analyzed after midnight so the actual date analyzed is October 19, 1993.

Approved by: Carol Klein Date: 10-28-93

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-004.01
ARCO Facility No. 374

Date Received: 10/15/93
Service Request No.: SJ93-1272
Sample Matrix: Water

BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
 $\mu\text{g/L}$ (ppb)

Sample Name: FB-1 Method Blank
Date Analyzed: 10/18/93 * 10/18/93

<u>Analyte</u>	<u>MRL</u>		
Benzene	0.5	ND	ND
Toluene	0.5	ND	ND
Ethylbenzene	0.5	ND	ND
Total Xylenes	0.5	ND	ND
TPH as Gasoline	50	ND	ND

* This sample was part of the analytical batch started on October 18, 1993. However, it was analyzed after midnight so the actual date analyzed is October 19, 1993.

Approved by: Carol Klein Date: 10-28-93

APPENDIX A
LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-004.01
ARCO Facility No. 374

Date Received: 10/15/93
Service Request No.: SJ93-1272
Sample Matrix: Water

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

Date Analyzed: 10/27/93

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

Approved by: Carol Klein Date: 10-28-93

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-004.01
ARCO Facility No. 374

Date Received: 10/15/93
Service Request No.: SJ93-1272
Sample Matrix: Water

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

<u>Sample Name</u>	<u>Date Analyzed</u>	<u>Percent Recovery</u> <u>p-Terphenyl</u>
MW-4 (26)	10/27/93	83.
MS	10/27/93	86.
DMS	10/27/93	87.
Method Blank	10/27/93	97.
	CAS Acceptance Criteria	46-133

Approved by: Carol Klein Date: 10-28-93

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. OG70-004.01
ARCO Facility No. 374

Date Received: 10/15/93
Service Request No.: SJ93-1272
Sample Matrix: Water

Matrix Spike/Duplicate Matrix Spike Summary
Total Petroleum Hydrocarbons as Diesel
EPA Method 3510/DHS LUFT Method
 $\mu\text{g/L}$ (ppb)

Date Analyzed: 10/27/93

<u>Analyte</u>	<u>Spike Level</u>	<u>Sample Result</u>	<u>Spike Result</u>		<u>Percent Recovery</u>		<u>Acceptance Criteria</u>
			<u>MS</u>	<u>DMS</u>	<u>MS</u>	<u>DMS</u>	
Diesel	4,000.	ND	3,290.	3,410.	82.	85.	61-121

Approved by: Carol Klein Date: 10-28-93

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-004.01
ARCO Facility No. 374

Date Received: 10/15/93
Service Request No.: SJ93-1272

Initial Calibration Verification
BTEX and TPH as Gasoline
EPA Methods 5030/8020/DHS LUFT Method
 $\mu\text{g/L}$ (ppb)

Date Analyzed: 10/18/93

<u>Analyte</u>	<u>True Value</u>	<u>Result</u>	<u>Percent Recovery</u>	<u>CAS Percent Recovery Acceptance Criteria</u>
Benzene	25.	26.7	107.	85-115
Toluene	25.	26.8	107.	85-115
Ethylbenzene	25.	26.9	108.	85-115
Total Xylenes	75.	84.0	112.	85-115
TPH as Gasoline	250.	258.	103.	90-110

Approved by: Carol Klein Date: 10-28-93

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-004.01
ARCO Facility No. 374

Date Received: 10/15/93
Service Request No.: SJ93-1272
Sample Matrix: Water

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

<u>Sample Name</u>	<u>Date Analyzed</u>	<u>Percent Recovery</u> <i>α,α,α-Trifluorotoluene</i>
MW-1 (26)	10/18/93	89.
MW-2 (26)	10/18/93	90.
MW-3 (26)	10/18/93	97.
MW-4 (26)	10/18/93	91.
MW-5 (23)	10/18/93	91.
MW-6 (14)	10/18/93	91.
FB-1	10/18/93	90.
MW-1 (26) MS	10/18/93	89.
MW-1 (26) DMS	10/18/93	88.
Method Blank	10/18/93	85.
	CAS Acceptance Criteria	70-130

Approved by: Carol Klein Date: 10-28-93

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
 Project: EMCON Project No. 0G70-004.01
 ARCO Facility No. 374

Date Received: 10/15/93
 Service Request No.: SJ93-1272
 Sample Matrix: Water

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

Sample Name: MW-1 (26)
 Date Analyzed: 10/18/93

Percent Recovery

Analyte	Spike Level	Sample Result	Spike Result		MS DMS		CAS Acceptance Criteria
			MS	DMS	MS	DMS	
Benzene	25.	ND	26.5	27.4	106.	110.	76-122
Toluene	25.	ND	27.1	27.4	108.	110.	75-127
Ethylbenzene	25.	ND	26.4	26.6	106.	106.	70-135

Approved by: Carol Klein Date: 10-28-93

APPENDIX B
CHAIN OF CUSTODY

ARCO Facility no. 374	City (Facility) OAKLAND	Project manager (Consultant) JIM BUTERA	Laboratory name CAS
ARCO engineer Kyle Chivistic	Telephone no (ARCO) 571-2434	Telephone no (Consultant) 4537300	Contract number 07077
Consultant name EMCON ASSOCIATES	Address (Consultant) 1901 KINGWOOD Avenue San Jose		Method of shipment SAMPLET - WILL DELIVER

Sample I.D.	Lab no	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH/CAS EPA M602/8020/8015	TPH Modified 8015 GAS Diesel LL	Oil and Grease 413.1 413.2	TPH EPA 418 1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/6270	TCLP Metals VOA VOA	SAM Metals EPA 60107000	TTLIC STLC	Lead Org/DHS	Lead EPA 74207421	
			Soil	Water	Other	Ice	Acid																
MW1(26)1-2	1-2	2		X		X	HCl	10-13-93	1204		X												
MW2(26)3-4	3-4	2					HCl	10-13-93	1317		X												
MW3(26)5-6	5-6	2					HCl	10-13-93	1402		X												
MW4(26)7-8	7-8	2					HCl	10-13-93	1436		X												
MW5(23)9-10	9-10	2					HCl	10-14-93	1152		X												
MW6(14)11-12	11-12	2					HCl	10-13-93	1236		X												
FB1	13-14	2					HCl	10-13-93	1236		X												
MW4(26)15-16	15-16	2	X			X	NP	10-13-93	1436		X												

Special detection Limit/reporting
Lowest possible

Special QA/QC
AS Normal

Remarks
**2-40ml HCl
2-LITER NP**

Lab number
5393-1272

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 sample [Signature]	Date 10-15-93 Time 9:05
Relinquished by	Date Time Received by
Relinquished by	Date Time Received by laboratory [Signature] Date 10-15-93 Time 9:05 AM



WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 0670-004-01
 PURGED BY: J Williams
 SAMPLED BY: J Williams

SAMPLE ID: MW-1
 CLIENT NAME: ARCO 374
 LOCATION: Oakland, Ca

TYPE: Ground Water Surface Water Treatment Effluent Other
 CASING DIAMETER (inches): 2 3 4 4.5 6 Other

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 11.68
 DEPTH TO WATER (feet): 881 CALCULATED PURGE (gal.): 35.06
 DEPTH OF WELL (feet): 26.7 ACTUAL PURGE VOL. (gal.): 35

DATE PURGED: 10-13-93 Start (2400 Hr) 1145 End (2400 Hr) 1159
 DATE SAMPLED: 10-13-93 Start (2400 Hr) 1204 End (2400 Hr) 1204

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1148</u>	<u>12</u>	<u>6.42</u>	<u>979</u>	<u>71.2</u>	<u>CLEAR</u>	<u>CLEAR</u>
<u>1153</u>	<u>24</u>	<u>6.45</u>	<u>988</u>	<u>69.2</u>	<u>BROWN</u>	<u>MOD</u>
<u>1159</u>	<u>35</u>	<u>6.44</u>	<u>1064</u>	<u>68.0</u>	<u>11</u>	<u>11</u>
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

D. O. (ppm): NR ODOR: NONE NR NR
 (COBALT 0 - 100) (NTU 0 - 200)

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

PURGING EQUIPMENT

SAMPLING EQUIPMENT

- | | | | |
|------------------------------------------------------|---------------------------------------------------|------------------------------------------|------------------------------------------------------|
| <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailer (Teflon®) | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon®) |
| <input checked="" type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailer (PVC) | <input type="checkbox"/> DDL Sampler | <input type="checkbox"/> Bailer (Stainless Steel) |
| <input type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated |
| Other _____ | Other _____ | Other _____ | Other _____ |

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: _____

Meter Calibration: Date: 10-13-93 Time: 1123 Meter Serial #: 9010 Temperature °F: 69.8
 (EC 1000 1043 / 1000) (DI _____) (pH 7 7.00 / 7.00) (pH 10 10.04 / 10.00) (pH 4 399 / _____)

Location of previous calibration: _____
 Signature: Joe Williams Reviewed By: JWS Page 1 of 6



WATER SAMPLE FIELD DATA SHEET

Rev. 2. 5/91

PROJECT NO: 0670-004-01
PURGED BY: J Williams
SAMPLED BY: J Williams

SAMPLE ID: MW-2
CLIENT NAME: ARCO 374
LOCATION: Oakland, Ca

TYPE: Ground Water Surface Water Treatment Effluent Other
CASING DIAMETER (inches): 2 3 4 4.5 6 Other

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 11.60
DEPTH TO WATER (feet): 8.64 CALCULATED PURGE (gal.): 34.80
DEPTH OF WELL (feet): 26.4 ACTUAL PURGE VOL. (gal.): 35

DATE PURGED: 10-13-93 Start (2400 Hr) 1303 End (2400 Hr) 1312
DATE SAMPLED: 10-13-93 Start (2400 Hr) 1315 End (2400 Hr) 1317

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1305</u>	<u>12</u>	<u>6.61</u>	<u>715</u>	<u>73.3</u>	<u>CLEAR</u>	<u>CLEAR</u>
<u>1308</u>	<u>24</u>	<u>6.68</u>	<u>726</u>	<u>71.6</u>	<u>11</u>	<u>11</u>
<u>1312</u>	<u>35</u>	<u>6.70</u>	<u>746</u>	<u>70.5</u>	<u>11</u>	<u>TRACE</u>
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

D. O. (ppm): NR ODOR: NONE 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	
<input type="checkbox"/> 2" Bladder Pump	<input type="checkbox"/> Bailer (Teflon &)	<input type="checkbox"/> 2" Bladder Pump	<input checked="" type="checkbox"/> Bailer (Teflon &)
<input checked="" type="checkbox"/> Centrifugal Pump	<input type="checkbox"/> Bailer (PVC)	<input type="checkbox"/> DDL Sampler	<input type="checkbox"/> Bailer (Stainless Steel)
<input type="checkbox"/> Submersible Pump	<input type="checkbox"/> Bailer (Stainless Steel)	<input type="checkbox"/> Dipper	<input type="checkbox"/> Submersible Pump
<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated	<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated
Other: _____	Other: _____	Other: _____	Other: _____

WELL INTEGRITY: OK LOCK #. 3259

REMARKS: _____

Meter Calibration: Date: 10-13-93 Time: 1123 Meter Serial #: 9010 Temperature °F: _____
(EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____) (pH 10 _____ / _____) (pH 4 _____ / _____)
Location of previous calibration: MW-1

Signature: Joe Williams Reviewed By: JB Page 2 of 6



WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 0670-004-01
 PURGED BY: J Williams
 SAMPLED BY: J Williams

SAMPLE ID: MW-3
 CLIENT NAME: ARCO 374
 LOCATION: Oakland, Ca

TYPE: Ground Water Surface Water Treatment Effluent Other
 CASING DIAMETER (inches): 2 3 4 4.5 6 Other

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 12.26
 DEPTH TO WATER (feet): 803 CALCULATED PURGE (gal.): 36.78
 DEPTH OF WELL (feet): 26.8 ACTUAL PURGE VOL. (gal.): 37

DATE PURGED: 10-13-93 Start (2400 Hr) 1346 End (2400 Hr) 1356
 DATE SAMPLED: 10-13-93 Start (2400 Hr) 1400 End (2400 Hr) 1402

TIME (2400 Hr)	VOLUME (gal)	pH (units)	E.C. (umhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1348</u>	<u>12.5</u>	<u>6.34</u>	<u>685</u>	<u>71.4</u>	<u>CLEAR</u>	<u>CLEAR</u>
<u>1351</u>	<u>25</u>	<u>6.48</u>	<u>686</u>	<u>71.3</u>	<u>11</u>	<u>TRACE</u>
<u>1356</u>	<u>37</u>	<u>6.55</u>	<u>753</u>	<u>67.7</u>	<u>BROWN</u>	<u>MOD</u>
D. O. (ppm):	<u>NR</u>		ODOR: <u>STRAW</u>		<u>NR</u>	<u>NR</u>
					(COBALT 0 - 100)	(NTU 0 - 200)

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

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
<input type="checkbox"/> 2" Bladder Pump	<input type="checkbox"/> Bailer (Teflon®)	<input type="checkbox"/> 2" Bladder Pump	<input type="checkbox"/> Bailer (Teflon®)
<input checked="" type="checkbox"/> Centrifugal Pump	<input type="checkbox"/> Bailer (PVC)	<input type="checkbox"/> ODL Sampler	<input type="checkbox"/> Bailer (Stainless Steel)
<input type="checkbox"/> Submersible Pump	<input type="checkbox"/> Bailer (Stainless Steel)	<input type="checkbox"/> Dipper	<input type="checkbox"/> Submersible Pump
<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated	<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated
Other _____		Other _____	

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: _____

Meter Calibration: Date: 10-13-93 Time: 1123 Meter Serial #: 9010 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 6



WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 0670-004-01

SAMPLE ID: MW-4

PURGED BY: J Williams

CLIENT NAME: ARCO 374

SAMPLED BY: J Williams

LOCATION: Oakland, Ca

TYPE: Ground Water Surface Water Treatment Effluent Other

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

CASING ELEVATION (feet/VMSL): <u>NR</u>	VOLUME IN CASING (gal.): <u>11.74</u>
DEPTH TO WATER (feet): <u>8.53</u>	CALCULATED PURGE (gal.): <u>35.22</u>
DEPTH OF WELL (feet): <u>26.5</u>	ACTUAL PURGE VOL. (gal.): <u>35</u>

DATE PURGED: <u>10-13-93</u>	Start (2400 Hr) <u>1419</u>	End (2400 Hr) <u>1428</u>
DATE SAMPLED: <u>10-13-93</u>	Start (2400 Hr) <u> </u>	End (2400 Hr) <u>1436</u>

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (umhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1420</u>	<u>12</u>	<u>6.33</u>	<u>1644</u>	<u>71.6</u>	<u>GREY</u>	<u>MOD</u>
<u>1423</u>	<u>25</u>	<u>6.36</u>	<u>1679</u>	<u>70.9</u>	<u>11</u>	<u>11</u>
<u>1428</u>	<u>35</u>	<u>6.31</u>	<u>1475</u>	<u>72.3</u>	<u>11</u>	<u>11</u>

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

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

PURGING EQUIPMENT			SAMPLING EQUIPMENT		
<input type="checkbox"/> 2' Bladder Pump	<input type="checkbox"/> Bailer (Teflon®)	<input type="checkbox"/> 2' Bladder Pump	<input checked="" type="checkbox"/> Bailer (Teflon®)	<input type="checkbox"/> DDL Sampler	<input type="checkbox"/> Bailer (Stainless Steel)
<input checked="" type="checkbox"/> Centrifugal Pump	<input type="checkbox"/> Bailer (PVC)	<input type="checkbox"/> Dipper	<input type="checkbox"/> Submersible Pump	<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated
<input type="checkbox"/> Submersible Pump	<input type="checkbox"/> Bailer (Stainless Steel)	Other: _____	Other: _____		
<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated				

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: _____

Meter Calibration: Date: 10/13-93 Time: 1123 Meter Serial #: 9010 Temperature °F: _____
 (EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____ ; (pH 10 _____ / _____) (pH 4 _____ / _____)

Location of previous calibration: MW-1
 Signature: Joe Williams Reviewed By: [Signature] Page 4 of 6



WATER SAMPLE FIELD DATA SHEET

Rev 2. 5/91

PROJECT NO: 0670-004-01

SAMPLE ID: MW-5

PURGED BY: J Williams

CLIENT NAME: ARCO 374

SAMPLED BY: J Williams

LOCATION: Oakland CA

TYPE: Ground Water Surface Water Treatment Effluent Other

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 9.27

DEPTH TO WATER (feet): 9.00 CALCULATED PURGE (gal.): 27.83

DEPTH OF WELL (feet): 23.2 ACTUAL PURGE VOL. (gal.): 24

DATE PURGED: 10-14-93 Start (2400 Hr) 1135 End (2400 Hr) 1142

DATE SAMPLED: 10-14-93 Start (2400 Hr) 1150 End (2400 Hr) 1152

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1137</u>	<u>9.5</u>	<u>6.94</u>	<u>636</u>	<u>71.7</u>	<u>CLEAR</u>	<u>CLEAR</u>
<u>1140</u>	<u>19</u>	<u>6.85</u>	<u>626</u>	<u>70.8</u>	<u>11</u>	<u>11</u>
<u>1156</u>	<u>DRIED Recharge</u>	<u>7.07</u>	<u>639</u>	<u>69.5</u>	<u>BROWN</u>	<u>HEAVY</u>
			<u>24 GALLONS</u>			

D. O. (ppm): NR ODOR: None (COBALT 0 - 100) NR (NTU 0 - 200) NR

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

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
<input type="checkbox"/> 2" Bladder Pump	<input type="checkbox"/> Bailer (Teflon®)	<input type="checkbox"/> 2" Bladder Pump	<input checked="" type="checkbox"/> Bailer (Teflon®)
<input checked="" type="checkbox"/> Centrifugal Pump	<input type="checkbox"/> Bailer (PVC)	<input type="checkbox"/> DDL Sampler	<input type="checkbox"/> Bailer (Stainless Steel)
<input type="checkbox"/> Submersible Pump	<input type="checkbox"/> Bailer (Stainless Steel)	<input type="checkbox"/> Dipper	<input type="checkbox"/> Submersible Pump
<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated	<input type="checkbox"/> Well Wizard™	<input type="checkbox"/> Dedicated
Other: _____		Other: _____	

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: _____

Meter Calibration: Date: 10-14-93 Time: 1115 Meter Serial #: 9010 Temperature °F: 68.8

(EC 1000 1000 / 1000) (DI _____) (pH 7 7.04 / 7.00) (pH 10 10.01 / 10.06) (pH 4 4.04 / _____)

Location of previous calibration: _____

Signature: Jac Reviewed By: JB Page 5 of 6



WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

PROJECT NO: 0670-004-01
PURGED BY: Williams
SAMPLED BY: Williams

SAMPLE ID: MW-6
CLIENT NAME: ARCO 374
LOCATION: Oakland, Ca

TYPE: Ground Water Surface Water Treatment Effluent Other
CASING DIAMETER (inches): 2 3 4 4.5 6 Other

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 4.88
DEPTH TO WATER (feet): 7.12 CALCULATED PURGE (gal.): 14.66
DEPTH OF WELL (feet): 14.6 ACTUAL PURGE VOL. (gal.): 16

DATE PURGED: 10-13-93 Start (2400 Hr) 1228/1226 End (2400 Hr) 1231
DATE SAMPLED: 10-13-93 Start (2400 Hr) 1235 End (2400 Hr) 1236

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
<u>1228</u>	<u>5</u>	<u>6.58</u>	<u>539</u>	<u>70.7</u>	<u>BROWN</u>	<u>HEAVY</u>
<u>1230</u>	<u>10</u>	<u>6.59</u>	<u>584</u>	<u>70.2</u>	<u>11</u>	<u>11</u>
	<u>DRIED</u>	<u>Time 1231</u>	<u>16 GALLONS</u>			
<u>1239</u>	<u>Recharge</u>	<u>6.62</u>	<u>587</u>	<u>70.9</u>	<u>BROWN</u>	<u>HEAVY</u>
D. O. (ppm):	<u>NR</u>	ODOR:	<u>None</u>		<u>NR</u>	<u>NR</u>

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

- | PURGING EQUIPMENT | | SAMPLING EQUIPMENT | |
|------------------------------------------------------|---------------------------------------------------|------------------------------------------|-------------------------------------------------------|
| <input type="checkbox"/> 2" Bladder Pump | <input type="checkbox"/> Bailer (Teflon Ⓢ) | <input type="checkbox"/> 2" Bladder Pump | <input checked="" type="checkbox"/> Bailer (Teflon Ⓢ) |
| <input checked="" type="checkbox"/> Centrifugal Pump | <input type="checkbox"/> Bailer (PVC) | <input type="checkbox"/> DDL Sampler | <input type="checkbox"/> Bailer (Stainless Steel) |
| <input type="checkbox"/> Submersible Pump | <input type="checkbox"/> Bailer (Stainless Steel) | <input type="checkbox"/> Dipper | <input type="checkbox"/> Submersible Pump |
| <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated | <input type="checkbox"/> Well Wizard™ | <input type="checkbox"/> Dedicated |
| Other: _____ | | Other: _____ | |

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: _____

Meter Calibration: Date: 10/13/93 Time: 1123 Meter Serial #: 9010 Temperature °F: _____
(EC 1000 _____ / _____) (DI _____) (pH 7 _____ / _____) (pH 10 _____ / _____) (pH 4 _____ / _____)
Location of previous calibration: MW-1

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

APPENDIX B

**GROUNDWATER TREATMENT SYSTEM - O&M PERFORMANCE
DATA, LABORATORY REPORTS AND CHAIN OF CUSTODY RECORD**

GROUNDWATER TREATMENT SYSTEM - O&M PERFORMANCE DATA
 ARCO STATION 374, OAKLAND, CALIFORNIA, USA.

DATE: December 21, 1993
 INITIALS: Zbigniew L. Ignatowicz

Instrument ID.	INSTRUMENT OR DESCRIPTION	Monitor. FREQ.	MEASUREMENT	UNITS	TIME	SAMPLE (Y OR N)	SAMPLE ID.	Convers. MEASURE	UNITS	COMMENTS
PI-109	COMPRESS. AIR PRESS. TO W-2	2 x week	95	PSI	13:15	N				
FQI-101	FLOW TOTALIZER = FLOW FROM SYSTEM TO SEWER		225	GAL	13:15	N		FLOW RATE	GPM	
FQI-102	FLOW FROM W-2 TO SYSTEM (MONITOR AT THE W-2 WELL HEAD- NOT IN THE COMPOUND)		2978	GAL	15:30	N		FLOW RATE	GPM	
PI-101			58	PSI	15:30	N				
PI-103	PRESS. INLET TO 1-ST CARBON		6.5	PSI	15:15	N				
PI-104	PRESS. INLET TO 2-ND CARBON		4.0	PSI	15:15	N				
PI-105	PRESS. INLET TO 3-RD CARBON		1.5	PSI	15:15	N				
PI-102	WATER PRESS. TO SURGE TANK FILTER 2 / INLET		1.0	PSI	15:15	N				
PS-106	WATER PRESS. TO SURGE TANK FILTER 2 / OUTLET		0.0	PSI	15:15	N				
PRESSURE BALANCE	PRESSURE DIFFERENCE F/2/INLET - F/2/OUTLET		1.0	PSI	15:15	N				
SP-105--A	INFLUENT- SURGE TANK > IN.C-1		40	ml	15:20	Y	SP-105			
SP-106--B	OUTLET C-1 >>> INLET C-2		40	ml	15:20	Y	SP-106			
SP-107--C	OUTLET C-2 >>> INLET C-3		NO	ml		Y*				
SP-108--D	EFFLUENT-OUT. C-3 > TO SEWER		40	ml	15:20	Y	SP-108			
SP-102	FIRST INFLUENT, FROM WELL W-2 TO SURGE TANK		NO	ml		N				
PI-107	WATER PRESS. FROM SURGE TANK TO SYSTEM FILTER 3 Inlet		10.0	PSI	15:20	N				
PI-108	WATER PRESS. FROM SURGE TANK TO SYSTEM FILTER 3 Outlet		9.0	PSI	15:20	N				
PRESSURE BALANCE	PRESSURE DIFFERENCE F/3/INLET - F/3/OUTLET		1.0	PSI	15:20	N				

Notes:

Y* = SAMPLE ONLY IF THERE IS A BREAK THROUGH (HYDROCARBONS DETECTED) IN SP-106--B.
 PLEASE SEE LABORATORY RESULTS FROM PREVIOUS SAMPLING ROUND.

MONITOR : DTW IN W-1 Not Measured [FEET], DTW IN W-2 Not Measured [FEET], DTW IN MW-4 Not Measured [FEET]

Surge tank was filled-up with ground water in 42 minutes and groundwater was discharged to the system in 7 minutes.

GROUNDWATER TREATMENT SYSTEM - O&M PERFORMANCE DATA
 ARCO STATION 374, OAKLAND, CALIFORNIA, USA.

DATE: December 23, 1993
 INITIALS: Zbigniew L. Ignatowicz

Instrument ID.	INSTRUMENT OR DESCRIPTION	Monitor. FREQ.	MEASUREMENT	UNITS	TIME	SAMPLE (Y OR N)	SAMPLE ID.	Convers. MEASURE	UNITS	COMMENTS
PI-109	COMPRESS. AIR PRESS. TO W-2	2 x week	95.0	PSI	14:55	N				
FQI-101	FLOW TOTALIZER = FLOW FROM SYSTEM TO SEWER		4,817.20	GAL	15:27	N		FLOW RATE	GPM	
			4,855.35		15:31					
FQI-102	FLOW FROM W-2 TO SYSTEM (MONITOR AT THE W-2 WELL HEAD- NOT IN THE COMPOUND)		39461	GAL	16:19	N		FLOW RATE	GPM	
PI-101			58	PSI	16:19	N				
PI-103	PRESS. INLET TO 1-ST CARBON		6.8	PSI	15:17	N				
PI-104	PRESS. INLET TO 2-ND CARBON		4.2	PSI	15:17	N				
PI-105	PRESS. INLET TO 3-RD CARBON		1.8	PSI	15:17	N				
PI-102	WATER PRESS. TO SURGE TANK FILTER 2 / INLET		1	PSI	14:55	N				
PS-106	WATER PRESS. TO SURGE TANK FILTER 2 / OUTLET		0	PSI	14:55	N				
PRESSURE BALANCE	PRESSURE DIFFERENCE F/2/INLET - F/2/OUTLET		1	PSI	14:55	N				
SP-105--A	INFLUENT- SURGE TANK > INC-1		40	ml	15:17	Y	SP-105			
SP-106--B	OUTLET C-1 >>> INLET C-2		40	ml	15:17	Y	SP-106			
SP-107--C	OUTLET C-2 >>> INLET C-3		NO	ml		Y*				
SP-108--D	EFFLUENT-OUT. C-3 > TO SEVER		40	ml	15:17	Y	SP-108			
SP-102	FIRST INFLUENT, FROM WELL W-2 TO SURGE TANK		40	ml	15:17	Y	SP-102			
PI-107	WATER PRESS. FROM SURGE TANK TO SYSTEM FILTER 3 Inlet		10	PSI	15:17	N				
PI-108	WATER PRESS. FROM SURGE TANK TO SYSTEM FILTER 3 Outlet		9	PSI	15:17	N				
PRESSURE BALANCE	PRESSURE DIFFERENCE F/3/INLET - F/3/OUTLET		1	PSI	15:17	N				

Notes: Y* = SAMPLE ONLY IF THERE IS A BREAK THROUGH (HYDROCARBONS DETECTED) IN SP-106--B.
 PLEASE SEE LABORATORY RESULTS FROM PREVIOUS SAMPLING ROUND.

MONITOR : DTW IN W-1 Not Measured [FEET], DTW IN W-2 Not Measured [FEET], DTW IN MW-4 Not Measured [FEET]

MONITOR : DTB IN W-1 Not Measured [FEET], DTB IN W-2 Not Measured [FEET], DTB IN MW-4 Not Measured [FEET]

GROUNDWATER TREATMENT SYSTEM - O&M PERFORMANCE DATA
 ARCO STATION 374, OAKLAND, CALIFORNIA, USA.

DATE: December 27, 1993
 INITIALS: Zbigniew L. Ignatowicz

Instrument ID.	INSTRUMENT OR DESCRIPTION	Monitor. FREQ.	MEASUREMENT	UNITS	TIME	SAMPLE (Y OR N)	SAMPLE ID.	Convers. MEASURE	UNITS	COMMENTS
PI-109	COMPRESS. AIR PRESS. TO W-2	2 x week	105	PSI	11:55	N				
FQI-101	FLOW TOTALIZER = FLOW FROM SYSTEM TO SEWER		6860.80	GAL	13:22	N		FLOW RATE	GPM	
			6871.15		13:24					
FQI-102 PI-101	FLOW FROM W-2 TO SYSTEM (MONITOR AT THE W-2 WELL HEAD- NOT IN THE COMPOUND)		62245	GAL	13:29	N		FLOW RATE	GPM	
			58	PSI	13:29	N				
PI-103	PRESS. INLET TO 1-ST CARBON		7.5	PSI	13:14	N				
PI-104	PRESS. INLET TO 2-ND CARBON		4.7	PSI	13:14	N				
PI-105	PRESS. INLET TO 3-RD CARBON		2.0	PSI	13:14	N				
PI-102	WATER PRESS. TO SURGE TANK FILTER 2 / INLET		1	PSI	11:55	N				
PS-106	WATER PRESS. TO SURGE TANK FILTER 2 / OUTLET		0	PSI	11:55	N				
PRESSURE BALANCE	PRESSURE DIFFERENCE F/2/INLET - F/2/OUTLET		1	PSI	11:55	N				
SP-105--A	INFLUENT- SURGE TANK > IN.C-1		40	ml	13:14	Y	SP-105			
SP-106--B	OUTLET C-1 >>> INLET C-2		40	ml	13:14	Y	SP-106			
SP-107--C	OUTLET C-2 >>> INLET C-3		NO	ml		Y*				
SP-108--D	EFFLUENT-OUT. C-3 > TO SEWER		40	ml	13:14	Y	SP-108			
SP-102	FIRST INFLUENT, FROM WELL W-2 TO SURGE TANK		40	ml	13:14	Y	SP-102			
PI-107	WATER PRESS. FROM SURGE TANK TO SYSTEM FILTER 3 Inlet		10	PSI	13:14	N				
PI-108	WATER PRESS. FROM SURGE TANK TO SYSTEM FILTER 3 Outlet		9.5	PSI	13:14	N				
PRESSURE BALANCE	PRESSURE DIFFERENCE F/3/INLET - F/3/OUTLET		0.5	PSI	13:14	N				

Notes: Y* = SAMPLE ONLY IF THERE IS A BREAK THROUGH (HYDROCARBONS DETECTED) IN SP-106--B.
 PLEASE SEE LABORATORY RESULTS FROM PREVIOUS SAMPLING ROUND.

MONITOR : DTW IN W-1 Not Measured [FEET], DTW IN W-2 Not Measured [FEET], DTW IN MW-4 Not Measured [FEET]

MONITOR : DTB IN W-1 Not Measured [FEET], DTB IN W-2 Not Measured [FEET], DTW IN MW-4 Not Measured [FEET]

GROUNDWATER TREATMENT SYSTEM - O&M PERFORMANCE DATA
 ARCO STATION 374, OAKLAND, CALIFORNIA, USA.

DATE: December 29, 1993
 INITIALS: Zbigniew L. Ignatowicz

Instrument ID.	INSTRUMENT OR DESCRIPTION	Monitor. FREQ.	MEASUREMENT	UNITS	TIME	SAMPLE (Y OR N)	SAMPLE ID.	Convers. MEASURE	UNITS	COMMENTS
PI-109	COMPRESS. AIR PRESS. TO W-2	2 x week	102	PSI	12:42	N				49.3 hr
FQI-101	FLOW TOTALIZER = FLOW FROM SYSTEM TO SEWER		7127.65	GAL	12:41	N		FLOW RATE	GPM	
			7192.15		13:59					
FQI-102	FLOW FROM W-2 TO SYSTEM (MONITOR AT THE W-2 WELL HEAD- NOT IN THE COMPOUND)		69725.0	GAL	14:30	N		FLOW RATE	GPM	69734 after reconnecting the pump at 15:00
PI-101			56.0	PSI	14:30	N				
PI-103	PRESS. INLET TO 1-ST CARBON		7.0	PSI	13:56	N				
PI-104	PRESS. INLET TO 2-ND CARBON		4.3	PSI	13:56	N				
PI-105	PRESS. INLET TO 3-RD CARBON		1.7	PSI	13:56	N				
PI-102	WATER PRESS. TO SURGE TANK FILTER 2 / INLET		1.0	PSI	12:47	N				
PS-106	WATER PRESS. TO SURGE TANK FILTER 2 / OUTLET		0.0	PSI	12:47	N				
PRESSURE BALANCE	PRESSURE DIFFERENCE F/2/INLET - F/2/OUTLET		1.0	PSI	12:47	N				
SP-105--A	INFLUENT- SURGE TANK > IN.C-1		40	ml	13:47	Y	SP-105			
SP-106--B	OUTLET C-1 >>> INLET C-2		40	ml	13:47	Y	SP-106			
SP-107--C	OUTLET C-2 >>> INLET C-3		NO	ml		Y*				
SP-108--D	EFFLUENT-OUT. C-3 > TO SEWER		40	ml	13:47	Y	SP-108			
SP-102	FIRST INFLUENT, FROM WELL W-2 TO SURGE TANK		40	ml	13:10	Y	SP-102			
PI-107	WATER PRESS. FROM SURGE TANK TO SYSTEM FILTER 3 Inlet		9.7	PSI	13:56	N				
PI-108	WATER PRESS. FROM SURGE TANK TO SYSTEM FILTER 3 Outlet		9.5	PSI	13:56	N				
PRESSURE BALANCE	PRESSURE DIFFERENCE F/3/INLET - F/3/OUTLET		0.2	PSI	13:56	N				

Notes: Y* = SAMPLE ONLY IF THERE IS A BREAK THROUGH (HYDROCARBONS DETECTED) IN SP-106--B.
 PLEASE SEE LABORATORY RESULTS FROM PREVIOUS SAMPLING ROUND.

MONITOR : DTW IN W-1 10.24 [FEET], DTW IN W-2 10.75 [FEET], DTW IN MW-4 9.75 [FEET]

MONITOR : DTB IN W-1 11.55 [FEET], DTB IN W-2 12.85 [FEET], DTB IN MW-4 26.75 [FEET]



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: John Young

Client Project ID: Arco 374 Oakland
Sample Matrix: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 3LB4701

Sampled: Dec 21, 1993
Received: Dec 21, 1993
Reported: Dec 22, 1993

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 3LB4701 SP105	Sample I.D. 3LB4702 SP106	Sample I.D. 3LB4703 SP108
Purgeable Hydrocarbons	50	19,000	N.D.	N.D.
Benzene	0.50	2,100	N.D.	N.D.
Toluene	0.50	460	N.D.	N.D.
Ethyl Benzene	0.50	570	N.D.	N.D.
Total Xylenes	0.50	2,500	N.D.	N.D.
Chromatogram Pattern:		Gas	--	--

Quality Control Data

Report Limit Multiplication Factor:	40	1.0	1.0
Date Analyzed:	12/21/93	12/21/93	12/21/93
Instrument Identification:	GCHP-17	GCHP-17	GCHP-3
Surrogate Recovery, %: (QC Limits = 70-130%)	N.D.	N.D.	N.D.

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

SEQUOIA ANALYTICAL

Vickie Tague
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: John Young

Client Project ID: Arco 374 Oakland
Matrix: Liquid

QC Sample Group: 3LB4701-2

Reported: Dec 22, 1993

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

MS/MSD				
Batch#:	3L99501	3L99501	3L99501	3L99501
Date Prepared:	-	-	-	-
Date Analyzed:	12/21/93	12/21/93	12/21/93	12/21/93
Instrument I.D.#:	GCHP-17	GCHP-17	GCHP-17	GCHP-17
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike				
% Recovery:	93	94	95	93
Matrix Spike Duplicate				
% Recovery:	100	100	100	100
Relative % Difference:	7.3	6.2	5.1	7.3

LCS Batch#:	-	-	-	-
Date Prepared:	-	-	-	-
Date Analyzed:	-	-	-	-
Instrument I.D.#:	-	-	-	-
LCS % Recovery:	-	-	-	-

% Recovery Control Limits:	71-133	72-128	72-130	71-120

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

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.



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RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: John Young

Client Project ID: Arco 374 Oakland
Matrix: Liquid

QC Sample Group: 3LB4701-2

Reported: Dec 22, 1993

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

MS/MSD				
Batch#:	3L99501	3L99501	3L99501	3L99501
Date Prepared:	-	-	-	-
Date Analyzed:	12/21/93	12/21/93	12/21/93	12/21/93
Instrument I.D.#:	GCHP-3	GCHP-3	GCHP-3	GCHP-3
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	110	110	110	103
Matrix Spike Duplicate % Recovery:	84	84	85	83
Relative % Difference:	27	27	26	22

LCS Batch#:	-	-	-	-
Date Prepared:	-	-	-	-
Date Analyzed:	-	-	-	-
Instrument I.D.#:	-	-	-	-
LCS % Recovery:	-	-	-	-

% Recovery Control Limits:	71-133	72-128	72-130	71-120
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Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL


Vickie Tague
Project Manager

Please Note:

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ARCO Facility no. 374 City (Facility) OAKLAND Project manager (Consultant) JOHN YOUNG
 ARCO engineer MICHAEL WHELAN Telephone no. (ARCO) (408) 264-7723 Telephone no. (Consultant) (408) 264-2435
 Consultant name RESNA INDUSTRIES Address (Consultant) 3315 ALMADEN EXP. SUITE 34 SAN JOSE

Laboratory name SEQUOIA
 Contract number 07-073

Sample I.D.	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA 1602/8020/8015	TPH Modified 8015 Gas <input type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SM503E	EPA 801/8010	EPA 824/8240	EPA 825/8270	TCLP Metals <input type="checkbox"/> VOA <input type="checkbox"/> VOA <input type="checkbox"/>	Semi Metals EPA 801/8010 TTL <input type="checkbox"/> STL <input type="checkbox"/>	Lead Org./DHS Lead EPA 7420/7421 <input type="checkbox"/>		
			Soil	Water	Other	Ice	Acid															
A SP105	01	34		Water		X	HCL	12-21-93		X	X											
B SP106	02	34		Water		X	HCL	12-21-93		X	X											
C										X	X											
D SP108	03	34		Water		X	HCL	12-21-93		X	X											
NO SAMPLE COLLECTED																						

Method of shipment

Special detection Limit/reporting

Special QA/QC

Remarks
24 hr. turnaround time.

Lab number 9312347

Turnaround time

Priority Rush 24 hr.
 1 Business Day

Rush
 2 Business Days

Expedited
 5 Business Days

Standard
 10 Business Days

Condition of sample: _____ Temperature received: _____

Relinquished by sampler [Signature] Date 12-21-93 Time 1700 Received by _____

Relinquished by _____ Date _____ Time _____ Received by _____

Relinquished by _____ Date 12-21-93 Time 1700 Received by laboratory [Signature] Date _____ Time _____



SEQUOIA ANALYTICAL

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RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: John Young

Client Project ID: 60025.11, Arco 374
Sample Matrix: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 3LC9501

Sampled: Dec 23, 1993
Received: Dec 23, 1993
Reported: Dec 28, 1993

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 3LC9501 SP105	Sample I.D. 3LC9502 SP106	Sample I.D. 3LC9503 SP108	Sample I.D. 3LC9504 SP102
Purgeable Hydrocarbons	50	10,000	N.D.	N.D.	9,300
Benzene	0.50	1,200	N.D.	N.D.	1,200
Toluene	0.50	230	N.D.	N.D.	160
Ethyl Benzene	0.50	530	N.D.	N.D.	200
Total Xylenes	0.50	1,700	N.D.	N.D.	1,500
Chromatogram Pattern:		Gas	--	--	Gas

Quality Control Data

Report Limit Multiplication Factor:	50	1.0	1.0	50
Date Analyzed:	12/27/93	12/27/93	12/27/93	12/27/93
Instrument Identification:	GCHP-17	GCHP-17	GCHP-3	GCHP-3
Surrogate Recovery, %: (QC Limits = 70-130%)	92	101	96	101

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

SEQUOIA ANALYTICAL

V. Tague
Vickie Tague
Project Manager



SEQUOIA ANALYTICAL

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RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: John Young

Client Project ID: 60025.11, Arco 374
Matrix: Water

QC Sample Group: 3LC9501-2

Reported: Dec 28, 1993

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

MS/MSD				
Batch#:	3LC9503	3LC9503	3LC9503	3LC9503
Date Prepared:	-	-	-	-
Date Analyzed:	12/27/93	12/27/93	12/27/93	12/27/93
Instrument I.D.#:	GCHP-17	GCHP-17	GCHP-17	GCHP-17
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L

Matrix Spike % Recovery:	98	98	98	97
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Matrix Spike Duplicate % Recovery:	87	88	87	87
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Relative % Difference:	12	11	12	11
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LCS Batch#:	-	-	-	-
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Date Prepared:	-	-	-	-
Date Analyzed:	-	-	-	-
Instrument I.D.#:	-	-	-	-

LCS % Recovery:	-	-	-	-
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% Recovery Control Limits:	71-133	72-128	72-130	71-120
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Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.



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RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: John Young

Client Project ID: 60025.11, Arco 374
Matrix: Water

QC Sample Group: 3LC9503-4

Reported: Dec 28, 1993

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

MS/MSD Batch#:	3LC9503	3LC9503	3LC9503	3LC9503
Date Prepared:	-	-	-	-
Date Analyzed:	12/27/93	12/27/93	12/27/93	12/27/93
Instrument I.D.#:	GCHP-3	GCHP-3	GCHP-3	GCHP-3
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	95	94	96	93
Matrix Spike Duplicate % Recovery:	100	100	100	103
Relative % Difference:	5.1	6.2	4.1	10

LCS Batch#:	-	-	-	-
Date Prepared:	-	-	-	-
Date Analyzed:	-	-	-	-
Instrument I.D.#:	-	-	-	-
LCS % Recovery:	-	-	-	-

% Recovery Control Limits:	71-133	72-128	72-130	71-120
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Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. **6007-11-344-15-4**

Chain of Custody

ARCO Facility no. 374	City (Facility) CHICKLAND	Project manager (Consultant) JOHN YOUNG	Laboratory name ARCO
ARCO engineer MICHAEL WILLIAMS	Telephone no (ARCO)	Telephone no (Consultant) (818) 364-7723	Contract number 07-011
Consultant name RESNAI INDUSTRIES		Fax no. (Consultant) 4-818-364-2455	Method of shipment
Address (Consultant) 3315 ALMADEN EXP. SUITE 34, SAN JOSE CA			

Sample ID	Lab no.	Container no.	Matrix			Preservation		Sampling date	Sampling time	BTEX EPA 802/EPA 8020	BTEX/TPH EPA 1602/8020/8015	TPH Modified 8015 Gas <input type="checkbox"/> Diesel <input type="checkbox"/>	Oil and Grease 413.1 <input type="checkbox"/> 413.2 <input type="checkbox"/>	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCMP Metals <input type="checkbox"/> VOA <input type="checkbox"/> VOA <input type="checkbox"/>	Sem Metals EPA 8010/7000 FTLC <input type="checkbox"/> STLC <input type="checkbox"/>	Lead Org./DHS <input type="checkbox"/> Lead EPA 7480/7421 <input type="checkbox"/>	Special detection Limit/reporting		
			Soil	Water	Other	Ice	Acid																
SP105		4		X				12-23-93	15:14	X		X											
SP106		4		X				↓	↓	X		X											
SP108		4		X				↓	↓	X		X											
SP102		3		X				↓	15:20	X		X											

Special QA/QC

Remarks
**24 hr
TURNAROUND**

Lab number **911-115**

Turnaround time
Priority Rush **1 hr**
1 Business Day
Rush **2 hr**
2 Business Days
Expedited
5 Business Days
Standard
10 Business Days

Condition of sample:		Temperature received:	
Relinquished by sampler Michael Williams	Date 12/23/93	Time 11:00	Received by
Relinquished by	Date	Time	Received by
Relinquished by	Date	Time	Received by laboratory ARCO
	Date	Time	Date
			Time



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: John Young

Client Project ID: Arco 374, Oakland
Sample Matrix: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 3LD8901

Sampled: Dec 27, 1993
Received: Dec 27, 1993
Reported: Jan 11, 1994

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 3LD8901 SP105	Sample I.D. 3LD8902 SP106	Sample I.D. 3LD8903 SP108	Sample I.D. 3LD8904 SP102
Purgeable Hydrocarbons	50	4,400	N.D.	N.D.	5,700
Benzene	0.50	480	N.D.	N.D.	820
Toluene	0.50	36	N.D.	N.D.	97
Ethyl Benzene	0.50	19	N.D.	N.D.	45
Total Xylenes	0.50	830	N.D.	N.D.	1,000
Chromatogram Pattern:		Gas	--	--	Gas

Quality Control Data

Report Limit Multiplication Factor:	10	1.0	1.0	20
Date Analyzed:	1/3/94	12/30/93	12/30/93	12/30/93
Instrument Identification:	GCHP-2	GCHP-3	GCHP-3	GCHP-3
Surrogate Recovery, %: (QC Limits = 70-130%)	91	94	101	91

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

SEQUOIA ANALYTICAL

Vickie Tague
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: John Young

Client Project ID: Arco 374, Oakland
Matrix: Water

QC Sample Group: 3LD8901

Reported: Jan 11, 1994

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

MS/MSD	Benzene	Toluene	Ethyl Benzene	Xylenes
Batch#:	3LD0201	3LD0201	3LD0201	3LD0201
Date Prepared:	-	-	-	-
Date Analyzed:	1/3/94	1/3/94	1/3/94	1/3/94
Instrument I.D.#:	GCHP-2	GCHP-2	GCHP-2	GCHP-2
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	100	100	110	103
Matrix Spike Duplicate % Recovery:	100	100	100	103
Relative % Difference:	0.0	0.0	9.5	0.0

LCS Batch#:	-	-	-	-
Date Prepared:	-	-	-	-
Date Analyzed:	-	-	-	-
Instrument I.D.#:	-	-	-	-
LCS % Recovery:	-	-	-	-

% Recovery	Benzene	Toluene	Ethyl Benzene	Xylenes
Control Limits:	71-133	72-128	72-130	71-120

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

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

SEQUOIA ANALYTICAL

Vickie Tague
Vickie Tague
Project Manager



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RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: John Young

Client Project ID: Arco 374, Oakland
Matrix: Water

QC Sample Group: 3LD8902-4

Reported: Jan 11, 1994

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

MS/MSD				
Batch#:	3LC5602	3LC5602	3LC5602	3LC5602
Date Prepared:	-	-	-	-
Date Analyzed:	12/30/93	12/30/93	12/30/93	12/30/93
Instrument I.D.#:	GCHP-3	GCHP-3	GCHP-3	GCHP-3
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike				
% Recovery:	85	98	85	87
Matrix Spike Duplicate				
% Recovery:	100	100	100	100
Relative % Difference:	16	2.0	16	14

LCS Batch#:	-	-	-	-
Date Prepared:	-	-	-	-
Date Analyzed:	-	-	-	-
Instrument I.D.#:	-	-	-	-
LCS % Recovery:	-	-	-	-

% Recovery Control Limits:	71-133	72-128	72-130	71-120

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

SEQUOIA ANALYTICAL

Vickie Tague
Project Manager

Please Note:

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RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: John Young

Client Project ID: Arco 374-93-4, Oakland
Sample Matrix: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 3LE8601

Sampled: Dec 29, 1993
Received: Dec 29, 1993
Reported: Jan 10, 1994

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 3LE8601 SP105	Sample I.D. 3LE8602 SP106	Sample I.D. 3LE8603 SP108	Sample I.D. 3LE8604 SP102
Purgeable Hydrocarbons	50	2,400	N.D.	N.D.	5,800
Benzene	0.50	340	N.D.	N.D.	950
Toluene	0.50	18	N.D.	N.D.	110
Ethyl Benzene	0.50	N.D.	N.D.	N.D.	34
Total Xylenes	0.50	510	N.D.	N.D.	1,100
Chromatogram Pattern:		Gas	--	--	--

Quality Control Data

Report Limit Multiplication Factor:	5.0	1.0	1.0	20
Date Analyzed:	1/5/94	1/4/94	1/4/94	1/5/94
Instrument Identification:	GCHP-3	GCHP-2	GCHP-2	GCHP-3
Surrogate Recovery, %: (QC Limits = 70-130%)	110	94	97	82

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

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Project Manager



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RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: John Young

Client Project ID: Arco 374-93-4, Oakland
Matrix: Liquid

QC Sample Group: 3LE8601,4

Reported: Jan 10, 1994

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

MS/MSD				
Batch#:	G3LF2203	G3LF2203	G3LF2203	G3LF2203
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	1/5/94	1/5/94	1/5/94	1/5/94
Instrument I.D.#:	GCHP-3	GCHP-3	GCHP-3	GCHP-3
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	97	99	100	100
Matrix Spike Duplicate % Recovery:	96	98	99	100
Relative % Difference:	1.0	1.0	1.0	0.0

LCS Batch#:	-	-	-	-
Date Prepared:	-	-	-	-
Date Analyzed:	-	-	-	-
Instrument I.D.#:	-	-	-	-
LCS % Recovery:	-	-	-	-

% Recovery Control Limits:	71-30	72-128	72-130	71-120

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

Please Note:

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RESNA
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San Jose, CA 95118
Attention: John Young

Client Project ID: Arco 374-93-4, Oakland
Matrix: Liquid

QC Sample Group: 3LE8602-3

Reported: Jan 10, 1994

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

MS/MSD Batch#:	3LE7203	3LE7203	3LE7203	3LE7203
Date Prepared:	N.A.	N.A.	N.A.	N.A.
Date Analyzed:	1/4/94	1/4/94	1/4/94	1/4/94
Instrument I.D.#:	GCHP-2	GCHP-2	GCHP-2	GCHP-2
Conc. Spiked:	10 µg/L	10 µg/L	10 µg/L	30 µg/L
Matrix Spike % Recovery:	97	97	97	97
Matrix Spike Duplicate % Recovery:	98	98	99	100
Relative % Difference:	1.0	1.0	2.0	3.0

LCS Batch#:	-	-	-	-
Date Prepared:	-	-	-	-
Date Analyzed:	-	-	-	-
Instrument I.D.#:	-	-	-	-
LCS % Recovery:	-	-	-	-

% Recovery Control Limits:	71-30	72-128	72-130	71-120
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Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

Please Note:

The LCS is a control sample of known, interferent free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

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