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QUARTERLY GROUNDWATER MONITORING AND REMEDIATION SYSTEM OPERATION
First Quarter 1994

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

60026.19

6194

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June 7, 1994

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

Subject: Quarterly Groundwater Monitoring and Remediation System Operation
First Quarter 1994
ARCO Station 276
10600 MacArthur Boulevard, 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 and Remediation System Operation 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 Integrated Wastestream Management Inc. (IWM) of Milpitas, 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 IWM'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 collecting field data, sampling treatment unit influent and effluent, and adjusting the system to optimize system performance. Evaluation of remediation system operation was performed by RESNA using laboratory analytical results and collected field data. Previous environmental work at the site is summarized in RESNA reports cited in the References section.

GROUNDWATER MONITORING

Field Work

IWM field personnel were onsite February 4, 1994, to measure depth-to-water (DTW) levels, perform subjective analysis for the presence of product, and perform quarterly sampling in groundwater in wells MW-1 through MW-8, and RW-1. Wells MW-2 and MW-7 are constructed in a shallow water-bearing zone, and wells MW-1, MW-3 through MW-6, MW-8, and RW-1 are constructed in a deeper water-bearing zone.

Laboratory Analyses

Water samples were analyzed by Columbia Analytical Services, Inc., located in San Jose, California (Hazardous Waste Testing Laboratory Certification #1426) for benzene, toluene, ethylbenzene, and total xylenes (BTEX), and total petroleum hydrocarbons as gasoline (TPHg) using Environmental Protection Agency (EPA) Methods 5030/8020/California DHS LUFT Method, and for Volatile Organic Compounds (VOCs) using EPA Method 624. In addition, the sample from well MW-4 was analyzed for total oil and grease (TOG) using Standard Methods 5520C/F. The Chain of Custody Records and Laboratory Analyses Reports are included in Appendix A.

Results of Groundwater Monitoring

Groundwater elevations rose an average of about 0.21 foot in wells MW-3 through MW-6, MW-8, and RW-1, and rose an average of about 4.28 feet in wells MW-2 and MW-7, since last quarter. Well MW-1 was not used in evaluation of groundwater levels due to an anomalously large increase in elevation (8.85 feet). No floating product or product sheen was noted in the wells during this quarter. Based on February 4, 1994, DTW data, groundwater appears to be mounding around wells MW-3 and MW-5 (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.

Laboratory analytical results of groundwater samples from wells MW-1, MW-3 through MW-

6, MW-8, and RW-1 indicated nondetectable concentrations of TPHg and BTEX. Detection limits for TPHg and BTEX were less than 50 parts per billion (ppb) and less than 0.5 ppb, respectively, with the exception of samples collected from wells MW-3, MW-4, MW-6, and RW-1, where detection limits were raised due to matrix interference (single peaks, possibly PCE) in the sample. Laboratory analytical results of groundwater samples from wells MW-2 and MW-7 indicated concentrations of TPHg and benzene of 2,100 ppb and 110 ppb, and 44,000 ppb and 900 ppb, respectively (Plate 4). TOG in well MW-4 continued to be not detected at the detection limit of 0.5 parts per million (ppm). Concentrations of Tetrachloroethene continued to be detected in wells MW-1, MW-3, MW-4, MW-5, MW-6, and RW-1 (Plate 5).

Floating Product Removal

Product is no longer seen in wells, therefore, product bailing has been discontinued. The total product removed to date is presented in Table 2.

REMEDIATION SYSTEM OPERATION

The major components of the Vapor Extraction System (VES) include eight vapor extraction wells (VW-1 through VW-7, and monitoring well MW-2), a 1.5 horsepower Rotron vacuum blower, and a 500 standard cubic feet per minute (scfm) natural gas fired Anguil Catalytic Oxidizer (cat-ox) for the combustion treatment of extracted gasoline vapors. Cat-ox operation is authorized under the Bay Area Air Quality Management District (BAAQMD) Permit to Operate #5998.

VES Operation

The VES was not operated during the first quarter 1994, due to low TPHg concentrations in soil gas. An attempt to startup and pulse the VES was made on March 25, 1994, but two blown fuses prevented startup of the system. Replacement of the fuses, startup, and pulsing of the VES will occur early in the second quarter 1994. VES operation data and laboratory results of air samples for previous quarters are located in Table 5 and Table 6.

PAST AND FUTURE WORK

First Quarter 1994

- Performed first quarter 1994 groundwater monitoring.
- Monitored TPHg vapor concentrations and depth to water in vapor extraction wells

to evaluate the possibility of restarting the remediation system.

- Attempted startup and pulsing of interim remediation system.
- Submitted fourth quarter groundwater monitoring report to ARCO and regulatory agencies.

Second Quarter 1994

- Perform second quarter 1994 groundwater monitoring.
- Startup and pulsing of interim remediation system.
- Monitor TPHg vapor concentrations and depth to water in vapor extraction wells to evaluate the possibility of restarting the remediation system.
- Submit first quarter 1994 groundwater and remediation system monitoring report to ARCO and regulatory agencies.

REPORTING REQUIREMENTS

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

Mr. Barney Chan
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, Suite 500
Oakland, California 94612

Mr. Richard Gilcrease
Drake Builders
5201 Sacramento Avenue
Richmond, California 94804

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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

David Peterson
Staff Engineer

John B. Bobbitt, R.G. 4313
Senior Project Geologist

REGISTERED GEOLOGIST
JOHN BAILEY BOBBITT
No. 4313
STATE OF CALIFORNIA

Attachments:
References

Plate 1: Site Vicinity Map
Plate 2: Generalized Site Plan
Plate 3: Groundwater Gradient Map, February 4, 1994
Plate 4: TPHg/Benzene Concentrations in Groundwater, February 4, 1994
Plate 5: PCE Concentrations in Groundwater, February 4, 1994

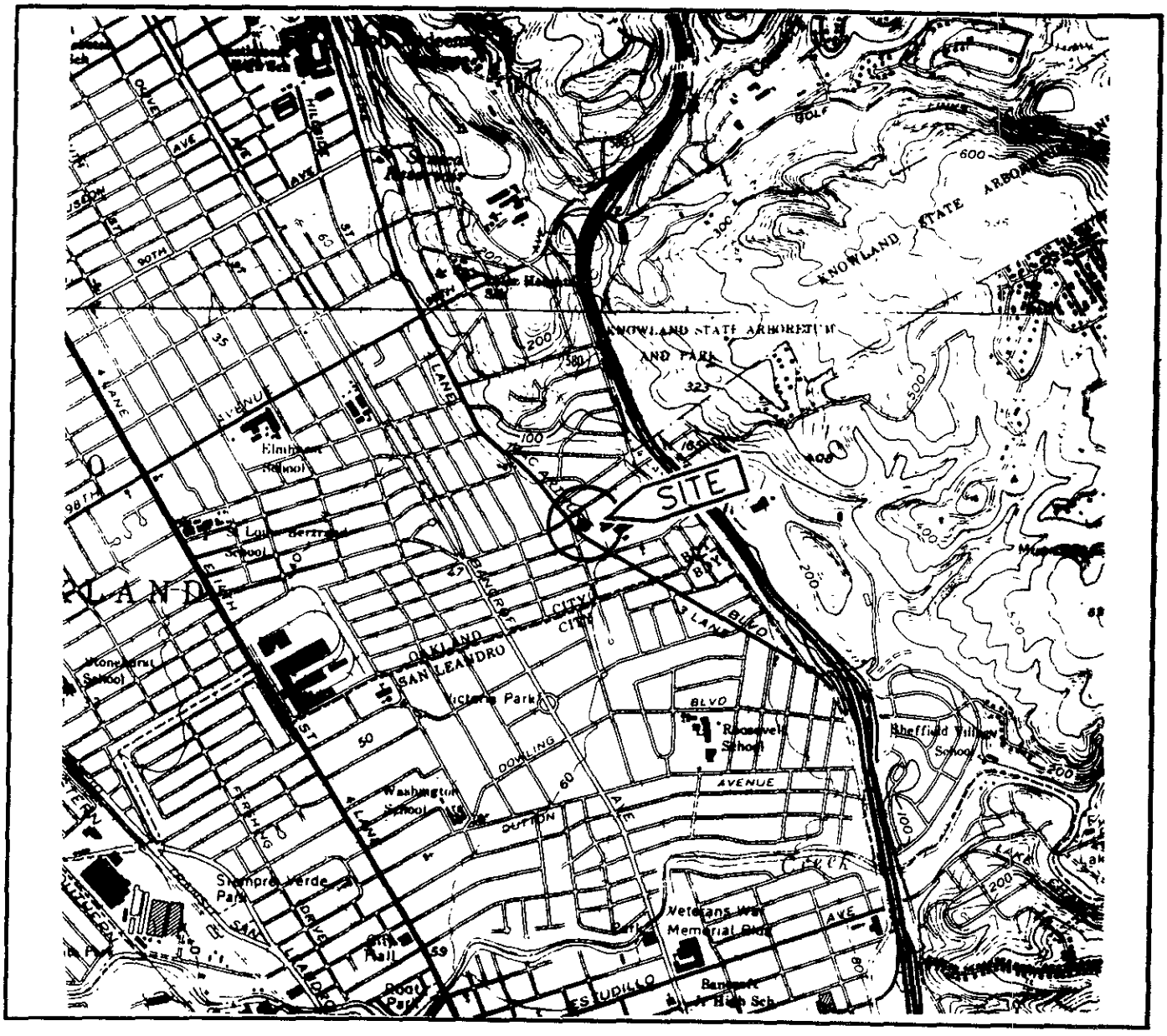
Table 1: Cumulative Groundwater Monitoring Data
Table 2: Approximate Cumulative Product Removed
Table 3: Cumulative Results of Laboratory Analyses of Groundwater Samples--TPHg, TPHd, BTEX, and TOG
Table 4: Cumulative Results of Laboratory Analyses of Groundwater Samples--VOCs and Metals
Table 5: Vapor Extraction System Operation Data
Table 6: Cumulative Results of Laboratory Analyses of Air Samples

Appendix A: IWM's Summary of Ground Water Sample Analyses, Field Report, Ground Water Sample Field Data Sheets, and Laboratory Analytical Reports with Chain-of-Custody Record

REFERENCES

RESNA. February 1, 1993. Additional Subsurface Investigation and Interim Remediation at ARCO Station 276, 10600 MacArthur Boulevard in Oakland, California. RESNA Report 60026.05.

RESNA. March 31, 1994. Letter Report Quarterly Groundwater Monitoring and Remediation System Operation Fourth Quarter 1993 at ARCO Station 276, 10600 MacArthur Boulevard in Oakland, California. RESNA Report 60026.13.



Base: U.S. Geological Survey
7.5–Minute Quadrangles
Oakland East/San Leandro, California.
Photorevised 1988

LEGEND

⊙ = Site Location

N

Approximate Scale

2000 1000 0 2000 4000

feet

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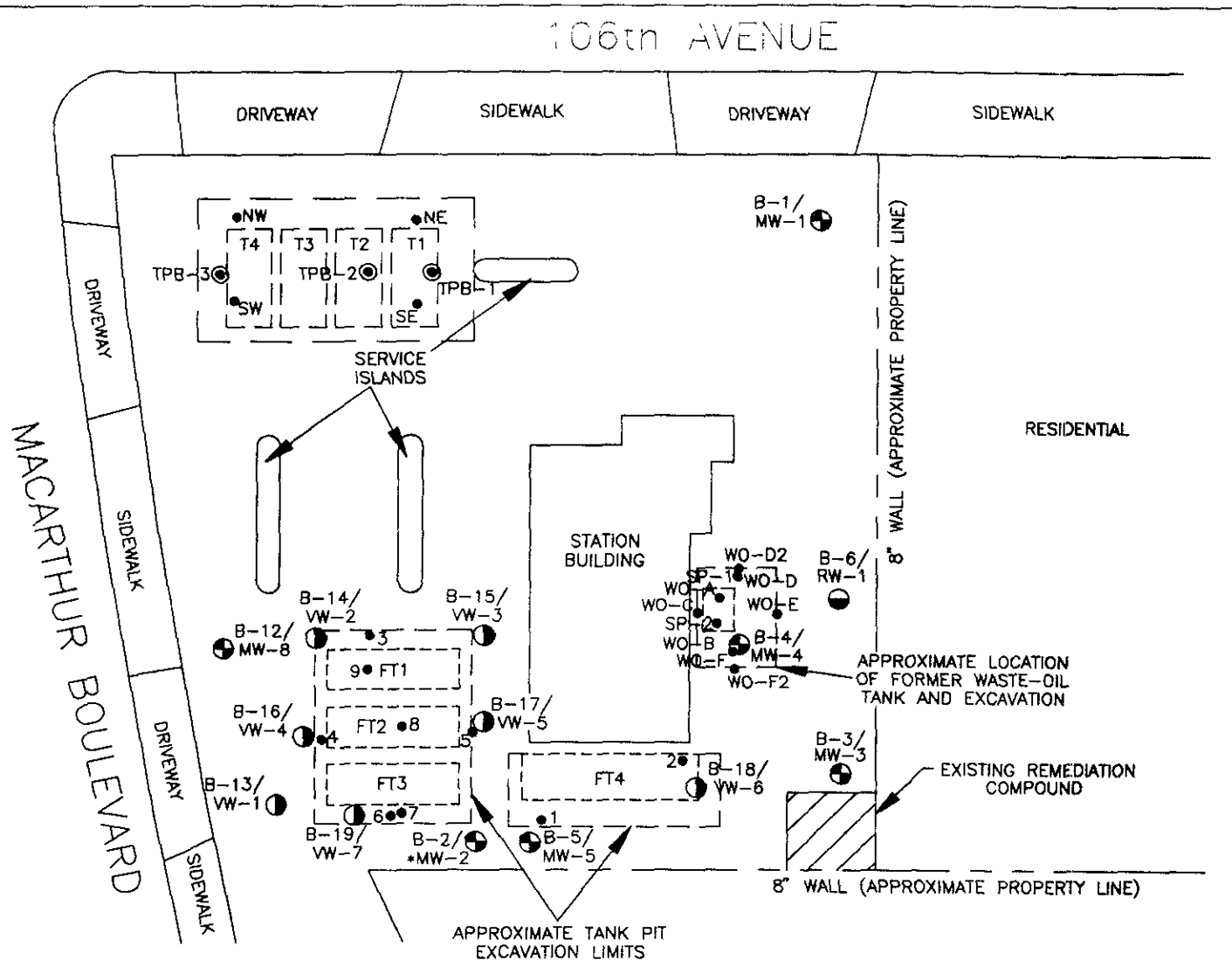
SITE VICINITY MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
1



EXPLANATION

TPB-3 = Boring in proposed new tank pit (RESNA, 1990)

B-19/ VW-7 = Vapor well (RESNA, 1992)

B-12/ MW-8 = Groundwater monitoring well (RESNA, 1989 and 1992)

B-7/ RW-1 = Recovery well (RESNA, 1991)

MW-3 (WGR) = Groundwater monitoring well (WGR, 1988)

* = Well screened in shallow water-bearing zone

NW = New tank pit excavation bottom sample (RESNA, 1990)

9 = Former tank pit sample (S7-TP1SW-1 through -9; RESNA, 1990)

SP-2 WO-F WO-F2 = Former waste-oil tank pit excavation bottom and sidewall sample (PEG, 1988)

T4 = Existing underground storage tanks

FT4 = Former underground storage tanks

B-11/ *MW-7

MW-3 (WGR)

B-10/ MW-6

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

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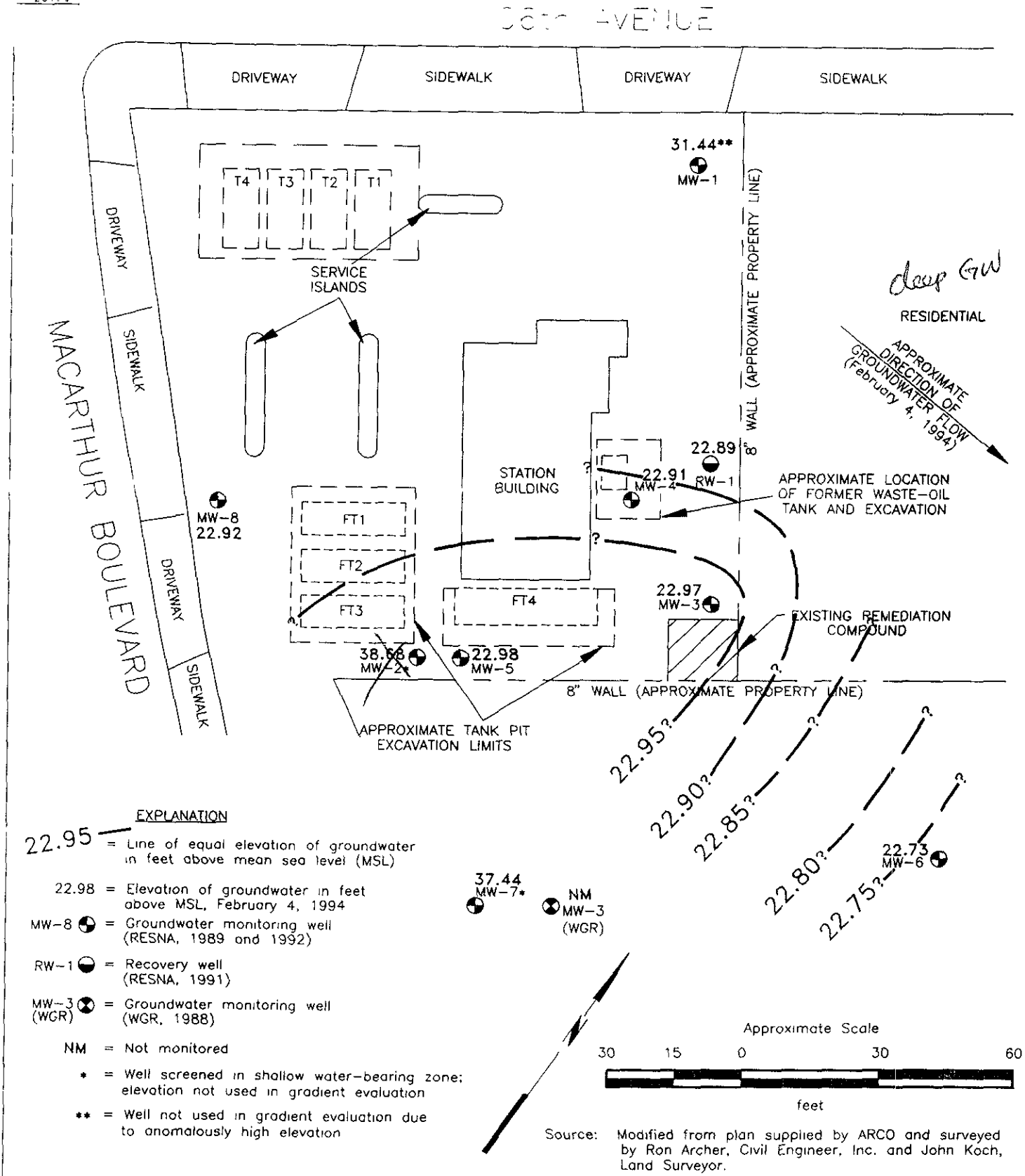
GENERALIZED SITE PLAN
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 2



Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

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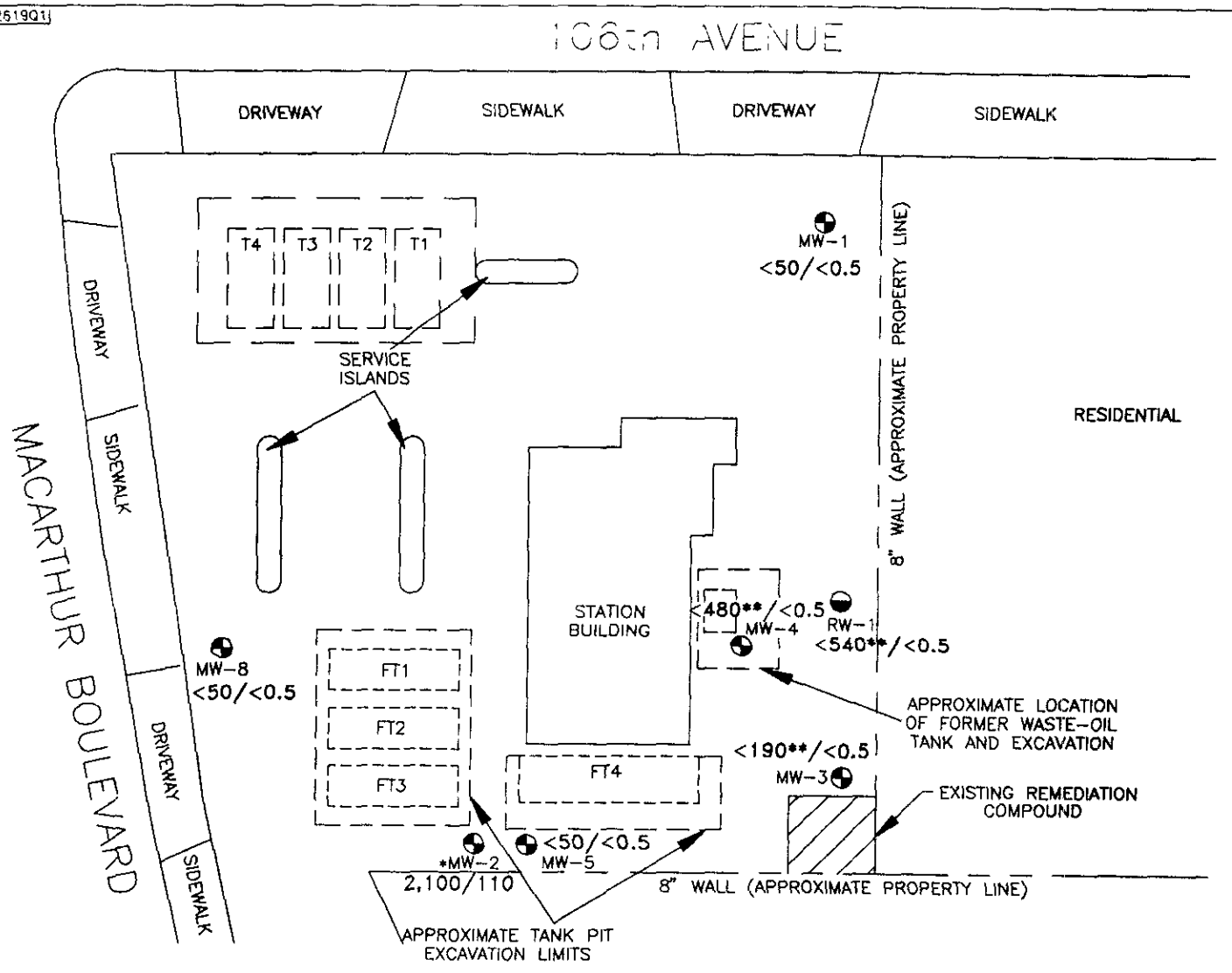
GROUNDWATER GRADIENT MAP

ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 3

C2519Q1



EXPLANATION

<50/<0.5 = Concentrations of total petroleum hydrocarbons as gasoline (TPHg) and benzene in groundwater in parts per billion, February 4, 1994

MW-8 = Groundwater monitoring well (RESNA, 1989 and 1992)

RW-1 = Recovery well (RESNA, 1991)

MW-3 (WGR) = Groundwater monitoring well (WGR, 1988)

* = Well screened in shallow water-bearing zone

** = Detection limit reportedly raised by laboratory because of matrix interference or high analyte concentration requiring dilution or does not match gas fingerprint

40,000/900
*MW-7

NS
MW-3
(WGR)

MW-6
<830**/<2.5**

Approximate Scale
30 15 0 30 60
feet

Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

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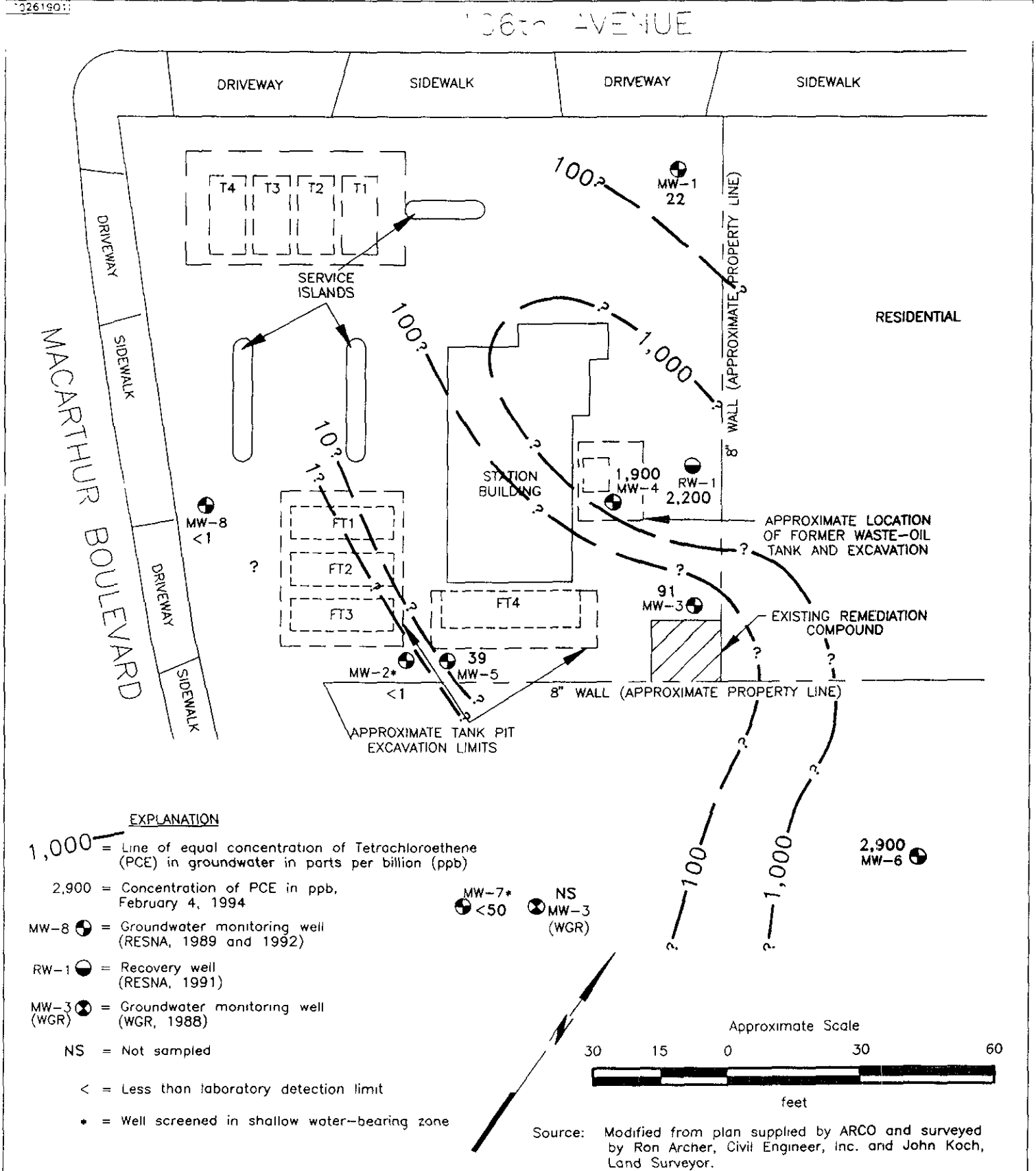
TPHg/BENZENE CONCENTRATIONS IN GROUNDWATER
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 4



Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

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TETRACHLOROETHENE (PCE) CONCENTRATIONS IN GROUNDWATER
ARCO Station 276
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Oakland, California

PLATE 5

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 1 of 8)

Well Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-1	55.91			
04/17/89		33.04	22.87	None
04/24/89		33.84	22.07	None
10/13/89		37.19	18.72	None
02/01/90		36.73	19.18	None
07/31/90		36.42	19.49	None
08/01/90		36.41	19.50	None
08/28/90		36.88	19.03	None
10/30/90		37.73	18.18	None
11/20/90		37.92	18.37	None
12/19/90		37.90	18.01	None
01/30/91		38.06	17.85	None
02/27/91		37.66	18.25	None
03/20/91		36.77	19.14	None
04/30/91		34.63	21.28	None
05/31/91		34.83	21.08	None
07/24/91		35.96	19.95	None
08/06/91		36.21	19.70	None
09/03/91		36.74	19.17	None
10/17/91		37.57	18.34	None
11/05/91		37.65	18.26	None
12/24/91		38.14	17.77	None
01/19/92		37.62	18.29	None
02/20/92		36.23	19.68	None
03/10/92		34.58	21.33	None
04/20/92		32.82	23.09	None
05/15/92		33.17	22.74	None
06/30/92		34.55	21.36	None
07/15/92		34.90	21.01	None
08/25/92	55.92	35.34	20.58	None
09/09/92		35.71	20.21	None
10/31/92		36.62	19.30	None
11/20/92		36.90	19.02	None
12/16/92		36.18	19.74	None
01/22/93		32.24	23.68	None
02/12/93		30.65	25.27	None
03/26/93		28.36	27.56	None
04/30/93		28.45	27.47	None
05/12/93		28.88	27.04	None
06/17/93		29.67	26.25	None
08/18/93		31.44	24.48	None
11/10/93		33.33	22.59	None
02/04/94		24.48	31.44	None

See notes on page 8 of 8.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 2 of 8)

Well Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-2				
04/17/89		17.20	38.15	None
04/24/89		17.83	37.52	None
10/13/89	55.35	20.15*	35.20*	0.03
02/01/90		NM	NM	NM
07/31/90		18.90	36.45	None
08/01/90		18.23*	37.03*	1.04
08/28/90		21.25*	34.10*	0.83
10/30/90		24.21*	31.14*	1.04
11/20/90		25.08*	30.27*	0.60
12/19/90		18.23*	37.12*	None
01/30/91		19.47*	35.88*	0.03
02/27/91		18.84*	36.51*	0.02
03/20/91		16.02*	39.33*	0.01
04/30/91		16.55	38.80	Sheen
05/31/91		18.41*	36.94*	0.01
07/24/91		19.81	35.54	Sheen
08/06/91		20.59*	34.76*	0.14
09/03/91		23.23*	32.12*	0.54
10/17/91		24.81*	30.54*	0.20
11/05/91		18.88*	36.47*	0.01
12/24/91		19.34*	36.01*	0.09
01/19/92		18.00	37.35	Sheen
02/20/92		14.81**	40.54	Skimmer
03/10/92		14.95**	40.40	Skimmer
04/20/92		16.13	39.22	None
05/15/92		17.66	37.69	None
06/30/92		19.11	36.24	Sheen
07/15/92		19.50	35.85	None
08/25/92	55.10	21.35*	33.73*	0.05
09/09/92		22.70*	32.40*	0.05
10/31/92		22.34	32.76	None
11/20/92		19.85*	32.25*	0.02[1]
12/16/92		NM	NM	NM
01/22/93		13.10	42.00	None
02/12/93		14.71	40.39	0.05[1]
03/26/93		Well	Inaccessible	
04/30/93		15.48	39.62	None
05/12/93		15.81*	39.29*	0.01
06/17/93		18.45	36.65	None
08/18/93		NM	NM	Nm
11/10/93		21.24	33.86	None[1]
02/04/94		16.42	38.68	None

See notes on page 8 of 8.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California

Well Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-3				
04/24/89		34.47	22.08	None
10/13/89	56.55	37.60	18.95	None
02/01/90		37.20	19.35	None
07/31/90		36.90	19.65	None
08/01/90		36.87	19.68	None
08/28/90		37.33	19.22	None
10/30/90		38.15	18.40	None
11/20/90		38.33	18.58	None
12/19/90		38.30	18.25	None
01/30/91		Well	Dry	
02/27/91		38.11	18.44	None
03/20/91		37.26	19.29	None
04/30/91		35.02	21.53	None
05/31/91		35.26	21.29	None
07/24/91		36.40	20.15	None
08/06/91		36.66	19.89	None
09/03/91		37.20	19.35	None
10/17/91		38.04	18.51	None
11/05/91		38.08	18.47	None
12/24/91		Well	Dry	
01/19/92		38.07	18.48	None
02/20/92		36.71	19.84	None
03/10/92		34.96	21.59	None
04/20/92		33.20	23.35	None
05/15/92		33.70	22.85	None
06/30/92		34.97	21.58	None
07/15/92		35.35	21.20	None
08/25/92	56.55	35.94	20.61	None
09/09/92		36.19	20.36	None
10/31/92		36.13	20.42	None
11/20/92		37.40	19.15	None
12/16/92		36.68	19.87	None
01/22/93		32.58	23.97	None
02/12/93		30.86	25.69	None
03/26/93		28.60	27.95	None
04/30/93		28.79	27.76	None
05/12/93		29.17	27.38	None
06/17/93		30.11	26.44	None
08/18/93		31.91	24.64	None
11/10/93		33.80	22.75	None
02/04/94		33.58	22.97	None

See notes on page 8 of 8.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 4 of 8)

Well Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-4				
04/17/89		33.87	22.07	None
04/24/89		33.76	22.18	None
10/13/89	55.94	37.03	18.91	None
02/01/90		36.57	19.37	None
07/31/90		36.39	19.55	None
08/01/90		36.32	19.62	None
08/28/90		36.79	19.15	None
10/30/90		37.62	18.32	None
11/20/90		37.82	18.52	None
12/19/90		37.74	18.20	None
01/30/91		37.97	17.97	None
02/27/91		37.52	18.42	None
03/20/91		36.69	19.25	None
04/30/91		34.48	21.46	None
05/31/91		34.73	21.21	None
07/24/91		35.86	20.08	None
08/06/91		36.15	19.79	None
09/03/91		36.66	19.28	None
10/17/91		37.49	18.45	None
11/05/91		37.54	18.40	None
12/24/91		38.01	17.93	None
01/19/92		37.48	18.46	None
02/20/92		36.11	19.83	None
03/10/92		34.96	21.54	None
04/20/92		32.60	23.34	None
05/15/92		33.12	22.82	None
06/30/92		34.06	21.88	None
07/15/92		NR	NR	NR
08/25/92	55.98	35.22	20.76	None
09/09/92		35.63	20.35	None
10/31/92		33.84	22.14	None
11/20/92		36.87	19.11	None
12/16/92		36.09	19.89	None
01/22/93		31.98	24.00	None
02/12/93		30.31	25.67	None
03/26/93		27.97	28.01	None
04/30/93		28.24	27.74	None
05/12/93		28.60	27.38	None
06/17/93		29.54	26.44	None
08/18/93		31.37	24.61	None
11/10/93		33.27	22.71	None
02/04/94		33.07	22.91	None

See notes on page 8 of 8.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 5 of 8)

Well Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-5				
04/17/89		33.17	22.26	None
04/24/89		33.06	22.37	None
10/13/89	55.43	36.33	19.10	None
02/01/90		35.96	19.47	None
07/31/90		35.70	19.73	None
08/01/90		35.69	19.74	None
08/28/90		36.14	19.29	None
10/30/90		36.94	18.49	None
11/20/90		37.09	18.64	None
12/19/90		37.05	18.38	None
01/30/91		37.26	18.17	None
02/27/91		36.81	18.62	None
03/20/91		36.04	19.39	None
04/30/91		33.75	21.68	None
05/31/91		34.01	21.42	None
07/24/91		35.20	20.23	None
08/06/91		35.48	19.95	None
09/03/91		36.00	19.43	None
10/17/91		36.84	18.59	None
11/05/91		36.86	18.57	None
12/24/91		37.31	18.12	None
01/19/92		36.95	18.48	None
02/20/92		35.39	20.04	None
03/10/92		33.67	21.76	None
04/20/92		31.80	23.63	None
05/15/92		32.37	23.06	None
06/30/92		34.00	21.43	None
07/15/92		34.32	21.11	None
08/25/92	55.43	35.76	19.67	None
09/09/92		34.97	20.46	None
10/31/92		35.97	19.46	None
11/20/92		36.26	19.17	None
12/16/92		35.45	19.98	None
01/22/93		31.05	24.38	None
02/12/93		29.42	26.01	None
03/26/93		27.07	28.36	None
04/30/93		27.40	28.03	None
05/12/93		27.83	27.60	None
06/17/93		28.84	26.59	None
08/18/93		30.75	24.68	None
11/10/93		32.70	22.73	None
02/04/94		32.45	22.98	None

See notes on page 8 of 8.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 6 of 8)

Well Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-6	61.21			
06/30/92		35.50	25.71	None
07/15/92		39.89	21.32	None
08/25/92		34.90	26.31	None
09/09/92		NM	NM	NM
10/31/92		NM	NM	NM
11/20/92		NM	NM	NM
12/16/92		NM	NM	NM
01/22/93		36.52	24.69	None
02/12/93		35.65	25.56	None
03/28/93		33.33	27.88	None
04/30/93		33.56	27.65	None
05/12/93		33.95	27.26	None
06/17/93		34.90	26.31	None
08/18/93		36.72	24.49	None
11/10/93		38.64	22.57	None
02/04/94		38.48	22.73	None
MW-7	58.22			
06/30/92		23.70	34.52	None
07/15/92		23.10	35.12	None
08/25/92		34.23	23.99	None
09/09/92		26.30*	31.92*	1.31
10/31/92		35.44	22.78	None
11/20/92		23.47*	34.75*	0.02
12/16/92		19.07*	39.15*	0.04
01/22/93		16.56*	41.66*	0.02
02/12/93		18.22*	40.00*	0.04
03/26/93		18.04	40.18	None
04/30/93		19.34	38.88	NM
05/12/93		19.80*	38.42*	0.01
06/17/93		22.63*	35.59*	0.01
08/18/93		22.44*	35.78	0.01
11/10/93		24.51	33.71	None[1]
02/04/94		20.78	37.44	None
MW-8	53.65			
08/25/92		NR	NR	NR
09/09/92		33.20	20.45	None
10/31/92		37.12	16.53	None
11/24/92		34.45	19.20	None
12/16/92		NM	NM	NM
01/22/93		28.59	25.06	None

See notes on page 8 of 8.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
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Well Date	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-8 (cont.)				
02/12/93		27.57	26.08	None
03/26/93		25.16	28.49	None
04/30/93		25.50	28.15	None
05/12/93		25.95	27.70	None
06/17/93		NM	NM	NM
08/18/93		28.97	24.68	None
11/10/93		30.96	22.69	None
02/04/94		30.73	22.92	None
RW-1				
11/05/91	56.32	37.89	18.43	None
12/24/91		38.35	17.97	None
01/19/92		37.82	18.50	None
02/20/92		36.42	19.90	None
03/10/92		34.74	21.58	None
04/20/92		32.90	23.42	None
05/15/92		33.43	22.89	None
06/30/92		34.74	21.58	None
07/15/92		35.12	21.20	None
08/25/92		36.75	19.57	None
09/09/92		35.99	20.33	None
10/31/92		34.32	22.00	None
11/20/92		37.11	19.21	None
12/16/92		36.40	19.92	None
01/22/93		32.30	24.02	None
02/12/93		30.64	25.68	None
03/26/93		28.32	28.00	None
04/30/93		28.55	27.77	None
05/12/93		28.94	27.38	None
06/17/93		29.89	26.43	None
08/18/93		31.74	24.58	None
11/10/93		33.61	22.71	None
02/04/94		33.43	22.89	None

See notes on page 8 of 8.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
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Notes:
Depths are in feet below top of each well casing.
Elevations are referenced in feet above mean sea level.
Floating product thickness reported in feet.

* = Depth to water and water elevation adjusted as followed: The thickness of the floating product and the ground-water depths were recorded. The recorded thickness of the floating product was then multiplied by 0.80 to obtain an approximate value for the displacement of water by the floating product. This approximate displacement value was then subtracted from the measured depth to water to obtain a calculated depth to water (potentiometric surface).

1 = Floating product was detected during purging of the groundwater from the well.

NM = Not monitored.

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TABLE 2
APPROXIMATE CUMULATIVE PRODUCT REMOVED
ARCO Station 276
Oakland, California

Year Date	Floating Product Removed (gallons)
1991	18.15
1992	0.39
1993	
MW-2	
01-29-93	Sheen - Not Removed
02-26-93	Sheen - Not Removed
03-24-93	Sheen - Not Removed
05-12-93	Sheen - Not Removed
08-18-93	Not Measured
11-10-93	None
MW-7	
01-29-93	Sheen - Not Removed
02-26-93	Sheen - Not Removed
03-24-93	Sheen - Not Removed
05-12-93	Sheen - Not Removed
08-18-93	Sheen - Not Removed
11-10-93	None
1993 Total:	0.00 Gallons
Product Removed to Date:	18.54 gallons

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TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES–TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
(Page 1 of 4)

Well / Date	TPHg (ppb)	TPHd (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	TOG (ppb)
MW-1							
04/24/89	<50	NA	<0.50	<0.50	<0.50	<0.50	NA
10/13/89	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
02/01/90#	91	NA	<0.30	<0.30	<0.30	0.36	NA
07/31/90	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
10/30/90	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
01/30/91	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
04/30/91	<30	NA	<0.30	<0.30	<0.30	<0.30	NA
08/06/91	<30	NA	<0.30	<0.30	<0.30	<0.30	NA
11/05/91	<30	NA	<0.30	<0.30	<0.30	<0.30	NA
03/10/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
06/30/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
09/09/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
11/20/92	<50	<0.5	<0.5	<0.5	<0.5	<0.5	NA
02/12/93	<50	<0.5	<0.5	<0.5	<0.5	<0.5	NA
05/12/93	<100*	NA	<0.5	<0.5	<0.5	<0.5	NA
08/18/93	<51*	NA	<0.5	<0.5	<0.5	<0.5	NA
11/10/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
02/04/94	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
MW-2							
04/24/89	165,000	NA	13,000	21,000	2,100	12,700	NA
10/13/89	Not sampled–floating product						
02/01/90	Not sampled–sheen						
07/31/90	240,000	NA	14,000	24,000	3,000	17,000	NA
10/30/90	Not sampled–floating product						
01/30/91	Not sampled–floating product						
04/30/91	Not sampled–sheen						
08/06/91	Not sampled–floating product						
11/05/91	Not sampled–floating product						
03/10/92	220,000	NA	8,200	13,000	4,500	22,000	NA
06/30/92	130,000	NA	10,000(9,300)	16,000(18,000)	4,700(4,200)	24,000(27,000)	NA
09/09/92	Not sampled–floating product						
11/20/92	Not sampled–floating product						
02/12/93	Not sampled–floating product						
05/12/93	Not sampled–floating product						
08/18/93	Not sampled						
11/10/93	Not sampled-floating product entered during purging						
02/04/94	2,100	NA	110(170)	5.6(9)	26(36)	110(160)	NA

See notes on Page 4 of 4.

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TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
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Well Date	TPHg (ppb)	TPHd (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	TOG (ppb)
MW-3							
04/24/89#	560	NA	0.54	0.75	<0.50	<0.50	NA
10/13/89#	450	NA	<0.50	<0.50	<0.50	<0.50	NA
02/01/90#	360	NA	<0.30	<0.30	<0.30	0.85	NA
08/01/90#	440	NA	<0.50	<0.50	<0.50	<0.50	NA
10/30/90#	340	NA	<0.5	<0.5	<0.5	<0.5	NA
01/30/91	Not sampled--well dry						
04/30/91	Not sampled--well inaccessible due to construction						
08/06/91#	430	NA	<0.30	<0.30	<0.30	<0.30	NA
11/05/91#	290	NA	<1.5	<1.5	<1.5	<1.5	NA
03/10/92	<360*	NA	<0.5	<0.5	<0.5	<0.5	NA
06/30/92	<530*	NA	<0.5	<0.5	<0.5	<0.5	NA
09/09/92	<290*	NA	<0.5	<0.5	<0.5	<0.5	NA
11/20/92	<270*	NA	<0.5	<0.5	<2.4*	<1.8*	NA
02/12/93	<500*	NA	<0.5	<0.5	<0.5	<0.5	NA
05/12/93	<670*	NA	<0.5	<0.5	<0.5	<0.5	NA
08/18/93	<590*	NA	<0.5	<0.5	<0.5	<0.5	NA
11/10/93	<400*	NA	<0.5	<0.5	<0.5	<0.9*	NA
02/04/94	<190*	NA	<0.5	<0.5	<0.5	<0.5	NA
MW-4							
04/24/89#	2,500	NA	270	1.4	<0.50	85	NA
10/13/89#	760	NA	0.86	<0.50	1.2	<0.50	NA
02/01/90#	680	NA	<0.30	<0.30	<0.30	1.6	NA
07/31/90#	470	240	<0.50	<0.50	<0.50	<0.50	<500
10/30/90#	430	<100	<0.5	<0.5	<0.5	<0.5	<500
01/30/91	<50	<100	<0.5	<0.5	1.2	<0.5	<500
04/30/91#	600	NA	<0.30	0.30	<0.30	0.43	NA
08/06/91#	520	NA	<0.30	<0.30	<0.30	<0.30	NA
11/05/91#	900	NA	<3.0	<3.0	<3.0	<3.0	NA
03/10/92	<730*	NA	<0.5	<0.5	<0.5	<0.5	<2,500
06/30/92	<670*	NA	<0.5	<0.5	<2.3*	500	500
09/09/92	<470*	NA	<0.5	<0.5	<0.5	<0.5	3,600
11/20/92	<680*	NA	<0.5	<0.5	<6.3*	<3.2*	800
02/12/93	<860*	NA	<0.5	<0.5	<0.5	<0.5	25,000
05/12/93	<670*	NA	<0.5	<0.5	<1.4*	<1.3*	120,000
08/18/93	<700*	NA	<0.5	<0.5	<0.5	<0.5	<500
11/10/93	<460*	NA	<0.5	<0.5	<0.5	<1.3*	<500
02/04/94	<480*	NA	<0.5	<0.5	<0.5	1.4	<500

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TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES–TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
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Well Date	TPHg (ppb)	TPHd (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	TOG (ppb)
MW-5							
04/24/89#	130	NA	0.67	<0.50	<0.50	<0.50	NA
10/13/89#	75	NA	<0.50	<0.50	<0.50	<0.50	NA
02/01/90#	81	NA	0.94	0.88	<0.30	1.8	NA
07/31/90#	110	NA	<0.50	<0.50	<0.50	<0.50	NA
10/30/90	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
01/30/91	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
04/30/91#	120	NA	<0.30	<0.30	<0.30	<0.30	NA
08/06/91	<30	NA	<0.30	<0.30	<0.30	<0.30	NA
11/05/91#	77	NA	1.0	3.6	0.60	2.6	NA
03/10/92	<110*	NA	<0.5	<0.5	<0.5	<0.6*	NA
06/30/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
09/09/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
11/24/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
02/12/93	<150*	NA	<0.5	<0.5	<0.5	<0.5	NA
05/12/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
08/18/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
11/10/93	<50	NA	<0.5	<0.5	<0.5	<1.4*	NA
02/04/94	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
MW-6							
06/30/92	<850*	NA	<0.5	<0.5	<0.5	<0.5	NA
09/09/92	NS	NS	NS	NS	NS	NS	NS
11/20/92	NS	NS	NS	NS	NS	NS	NS
02/12/93	<1,900*	NA	<2.5*	<2.5*	<2.5*	<2.5*	NA
05/12/93	<1,600*	NA	<2.5*	<2.5*	<2.5*	<2.5*	NA
08/18/93	<1,500*	NA	<2.5*	<2.5*	<2.5*	<2.5*	NA
11/10/93	<1,000*	NA	<2.5*	<2.5*	<2.5*	<2.5*	NA
02/04/94	<830*	NA	<2.5*	<2.5*	<2.5*	3.1	NA
MW-7							
06/30/92	71,000	NA	5,100(5,100)	6,600(6,800)	2,300(2,300)	14,000(16,000)	NA
09/09/92	Not sampled--floating product						
11/20/92	Not sampled--floating product						
02/12/93	Not sampled--floating product						
05/12/93	Not sampled--floating product						
08/18/93	Not sampled--floating product						
11/10/93	Not sampled-floating product entered during purging						
02/04/94	40,000	NA	900(940)	980(950)	1,100(1,100)	9,700(9,100)	NA
MW-8							
09/09/92	<50	NA	3.4(4)	<0.5	<0.5	0.7	NA
11/24/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA

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TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES–TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
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Well Date	TPHg (ppb)	TPHd (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	TOG (ppb)
MW-8 (cont.)							
02/12/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
05/12/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
08/18/93	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
11/10/93	<50	NA	<0.5	<0.5	<0.5	1.1	NA
02/04/94	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
RW-1							
11/05/91#	750	NA	4.8	3.7	<3.0	<3.0	NA
03/10/92	<140*	NA	<0.5	<0.5	<0.5	<0.6*	NA
06/30/92	<400*	NA	<0.5	<0.5	<0.5	<0.5	NA
09/09/92	<520*	NA	<0.5	<0.5	<0.5	<0.5	NA
11/24/92	<650*	NA	<0.5	<0.5	<8.6*	<7.2*	NA
02/12/93	<260*	NA	<0.5	<0.5	<0.5	<0.5	NA
05/12/93	<240*	NA	<0.5	<0.5	<0.5	<0.5	NA
08/18/93	<230*	NA	<0.5	<0.5	<0.5	<0.5	NA
11/10/93	<380*	NA	<0.5	<0.5	<0.5	<0.8*	NA
02/04/94	<540*	NA	<0.5	<0.5	<0.5	<1.5*	NA
January 1990							
MCLs	—	—	1.0	—	680	1,750	—
DWAL	—	—	—	100	—	—	—

Results in parts per billion (ppb).
TPHg and BTEX: Total petroleum hydrocarbons as gasoline and benzene, toluene, ethylbenzene, and total xylenes using EPA method 5030/8020/California DHS LUFT Method.
TPHd: Total petroleum hydrocarbons as diesel using EPA method 3550/3510.
B: Benzene, T: Toluene, E: Ethylbenzene, T: Total Xylene isomers
BTEX: Measured using EPA method 8020/602.
TOG: Total oil and grease using Standard Methods 5520 C&F.
NA: Not analyzed.
NS: Not sampled.
<: Results reported as less than detection limit.
#: Based on new results, the chromatograph peaks previously interpreted to be TPHg and BTEX have been reinterpreted to be a single peak hydrocarbon possibly (PCE).
*: Detection limit reportedly raised by laboratory due to matrix interference or chromatogram does not match typical gasoline finger print or detection limit raised due to high analyte concentration requiring sample dilution.
( ): BTEX as measured using EPA Method 624
1: Anality concentration is an estimate because this anality was also found in the method blank.
MCL: Maximum contaminant level
DWAL: Drinking water action level

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TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--VOCs and Metals
ARCO Station 276
Oakland, California
(Page 1 of 4)

Well / Date	Compound	VOCs (ppb)	Cd (ppm)	Cr (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)
MW-1							
09/03/91	Tetrachloroethene	4.5	NA	NA	NA	NA	NA
11/06/91	All Compounds	<2.0	NA	NA	NA	NA	NA
03/10/92	Tetrachloroethene	8.2	NA	NA	NA	NA	NA
06/30/92	Tetrachloroethene	15	NA	NA	NA	NA	NA
09/09/92	Tetrachloroethene	6	NA	NA	NA	NA	NA
11/20/92	Tetrachloroethene	2	NA	NA	NA	NA	NA
02/12/93	Tetrachloroethene	92	NA	NA	NA	NA	NA
05/12/93	Tetrachloroethene	280	NA	NA	NA	NA	NA
08/18/93	Tetrachloroethene	120	NA	NA	NA	NA	NA
11/10/93	Tetrachloroethene	46	NA	NA	NA	NA	NA
02/04/94	Tetrachloroethene	22	NA	NA	NA	NA	NA
MW-2							
09/03/91	———	Not sampled--floating product					
11/06/91	———	Not sampled--floating product					
03/10/92	Tetrachloroethene	0.9	NA	NA	NA	NA	NA
	1,2-Dichloroethene	5.4					
06/30/92**	All Compounds	<2,000	NA	NA	NA	NA	NA
09/09/92	———	Not sampled--floating product					
11/20/92	———	Not sampled--floating product					
02/12/93	———	Not sampled--floating product					
05/12/93		Not sampled--floating product					
08/18/93		Not sampled					
11/10/93		Not sampled-floating product entered the well during purging					
02/04/94	All Compounds	<MDLs	NA	NA	NA	NA	NA
MW-3							
09/03/91	Tetrachloroethene	1,600	NA	NA	NA	NA	NA
11/06/91	Tetrachloroethene	400	NA	NA	NA	NA	NA
03/10/92	Freon 12	3.4	NA	NA	NA	NA	NA
	cis-1,2-Dichloroethene	1.0					
	Trichloroethene	5.6					
	Tetrachloroethene	980					
06/30/92**	Tetrachloroethene	1,500	NA	NA	NA	NA	NA
09/09/92	Tetrachloroethene	800	NA	NA	NA	NA	NA
11/20/92	Tetrachloroethene	690	NA	NA	NA	NA	NA
02/12/93	Tetrachloroethene	1,200	NA	NA	NA	NA	NA
05/12/93	Tetrachloroethene	1,600	NA	NA	NA	NA	NA
08/18/93	Tetrachloroethene	1,300	NA	NA	NA	NA	NA
11/10/93	Tetrachloroethene	1,300	NA	NA	NA	NA	NA
02/04/94	Tetrachloroethene	91	NA	NA	NA	NA	NA

See notes on Page 4 of 4.

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TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--VOCs and Metals
ARCO Station 276
Oakland, California
(Page 2 of 4)

Well / Date	Compound	VOCs (ppb)	Cd (ppm)	Cr (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)
MW-4							
07/31/90	Trichloroethene	7.5	NA	NA	NA	NA	NA
	Tetrachloroethene	1600	NA	NA	NA	NA	NA
	1,2 Dichloroethene	0.7	NA	NA	NA	NA	NA
10/30/90	Trichloroethene	8.1	NA	NA	NA	NA	NA
	Tetrachloroethene	3600	NA	NA	NA	NA	NA
	1,2 Dichloroethene	0.7	NA	NA	NA	NA	NA
01/30/91	Trichloroethene	12	NA	NA	NA	NA	NA
	Tetrachloroethene	4,900	NA	NA	NA	NA	NA
04/30/91	Tetrachloroethene	2,200	NA	NA	NA	NA	NA
08/06/91	Tetrachloroethene	1,700	<0.010	0.065	0.0067	0.14	0.096
09/03/91	Tetrachloroethene	2,000	NA	NA	NA	NA	NA
11/06/91	Tetrachloroethene	1,000	NA	NA	NA	NA	NA
	Trichloroethene	6.3	NA	NA	NA	NA	NA
03/10/92	cis-1,2-Dichloroethene	4.0	NA	NA	NA	NA	NA
	Trichloroethene	13					
	Tetrachloroethene	2,300					
06/30/92**	Tetrachloroethene	1,800	NA	NA	NA	NA	NA
09/09/92	Tetrachloroethene	1,300	NA	NA	NA	NA	NA
11/20/92	Tetrachloroethene	1,700	NA	NA	NA	NA	NA
02/12/93	Tetrachloroethene	1,800	NA	NA	NA	NA	NA
05/12/93	Tetrachloroethene	1,500	NA	NA	NA	NA	NA
08/18/93	Tetrachloroethene	1,800	NA	NA	NA	NA	NA
11/10/93	Tetrachloroethene	1,800	NA	NA	NA	NA	NA
02/04/94	Tetrachloroethene	1,900	NA	NA	NA	NA	NA
MW-5							
08/06/91	Tetrachloroethene	7.3	NA	NA	NA	NA	NA
09/03/91	Tetrachloroethene	25	NA	NA	NA	NA	NA
11/06/91	Tetrachloroethene	12	NA	NA	NA	NA	NA
03/10/92	Trichloroethene	1.3	NA	NA	NA	NA	NA
	Tetrachloroethene	300					
06/30/92	Tetrachloroethene	30	NA	NA	NA	NA	NA
09/09/92	Tetrachloroethene	120	NA	NA	NA	NA	NA
11/24/92	Tetrachloroethene	93	NA	NA	NA	NA	NA
02/12/93	Tetrachloroethene	210	NA	NA	NA	NA	NA
05/12/93	Tetrachloroethene	50	NA	NA	NA	NA	NA
08/18/93	Tetrachloroethene	80	NA	NA	NA	NA	NA
11/10/93	Tetrachloroethene	42	NA	NA	NA	NA	NA
02/04/94	Tetrachloroethene	39	NA	NA	NA	NA	NA

See notes on Page 4 of 4.

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TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--VOCs and Metals
ARCO Station 276
Oakland, California
(Page 3 of 4)

Well / Date	Compound	VOCs (ppb)	Cd (ppm)	Cr (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)
MW-6							
06/30/92**	Tetrachloroethene	2,400	NA	NA	NA	NA	NA
09/09/92	----------		Inaccessible well--paved over				
11/20/92	----------		Inaccessible well--paved over				
02/12/93	Tetrachloroethene	4,200	NA	NA	NA	NA	NA
05/12/93	Tetrachloroethene	3,500	NA	NA	NA	NA	NA
08/18/93	Tetrachloroethene	3,000	NA	NA	NA	NA	NA
11/10/93	Tetrachloroethene	3,900	NA	NA	NA	NA	NA
02/04/94	Tetrachloroethene	2,900	NA	NA	NA	NA	NA
MW-7							
06/30/92**	All Compounds	<1000	NA	NA	NA	NA	NA
09/09/92	----------		Not sampled--floating product				
11/20/92	----------		Not sampled--floating product				
02/12/93	----------		Not sampled--floating product				
05/12/93	----------		Not sampled--floating product				
08/18/93	----------		Not sampled--floating product				
11/10/93	----------		Not sampled-floating product entered the well during purging				
02/04/94	All Compounds	<MDLs	NA	NA	NA	NA	NA
MW-8							
09/09/92	Tetrachloroethene	37	NA	NA	NA	NA	NA
11/24/92	Tetrachloroethene	2					
02/12/93	Tetrachloroethene	<1	NA	NA	NA	NA	NA
05/12/93	Tetrachloroethene	<1	NA	NA	NA	NA	NA
08/18/93	Tetrachloroethene	<1	NA	NA	NA	NA	NA
11/10/93	Tetrachloroethene	<1	NA	NA	NA	NA	NA
02/04/94	All Compounds	<MDLs	NA	NA	NA	NA	NA
RW-1							
11/06/91	Tetrachloroethene	980	NA	NA	NA	NA	NA
03/10/92	Trichloroethene	1.7	NA	NA	NA	NA	NA
	Tetrachloroethene	400					
06/30/92**	Tetrachloroethene	1,100	NA	NA	NA	NA	NA
09/09/92	Tetrachloroethene	1,500	NA	NA	NA	NA	NA
11/24/92	Tetrachloroethene	1,500	NA	NA	NA	NA	NA

See notes on Page 4 of 4.

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TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--VOCs and Metals
ARCO Station 276
Oakland, California
(Page 4 of 4)

Well / Date	Compound	VOCs (ppb)	Cd (ppm)	Cr (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)
RW-1 (cont.)							
02/12/93	Tetrachloroethene	620	NA	NA	NA	NA	NA
05/12/93	Tetrachloroethene	500	NA	NA	NA	NA	NA
08/18/93	Tetrachloroethene	470	NA	NA	NA	NA	NA
11/10/93	Tetrachloroethene	1,500	NA	NA	NA	NA	NA
02/04/94	Tetrachloroethene	2,200	NA	NA	NA	NA	NA
MCLs		5	0.010	0.05	0.05	5.0	

NOTES:
Results in parts per billion (ppb), except heavy metals which are in parts per million (ppm).
VOCs: Halogenated Volatile Organic Compounds using EPA method 601/8010 and 624. Compounds not shown were not detected.
Cd: Cadmium using EPA method 200.7.
Cr: Chromium using EPA method 200.7.
Pb: Lead using EPA method 239.7.
Zn: Zinc using EPA method 200.7.
Ni: Nickel using EPA method 200.7.
<: Results reported as less than the detection limit.
MDL: Laboratory Method Detection Limit
NA: Not analyzed. Compounds not shown not detected.
*: Exceeds the MCL of 5 ppb concentration of tetrachloroethane.
MCLs: Maximum Contaminant Levels as reported by the California Department of Health Services 10/24/90.
**: Raised Method Reporting Limit (MRL) due to high anality concentration requiring sample dilution.

TABLE 5
VAPOR EXTRACTION SYSTEM OPERATION DATA
ARCO STATION 276
Oakland, California
(Page 1 of 2)

DATE	VAPOR EXTRACTION WELLS ON LINE STATUS								COMB WELL FLOW (scfm)	DILUT FLOW (scfm)	INF FLOW (scfm)	INF VAC ("WC)	TPH_g WELL CONC (mg/m^3)	TPH_g INF CONC (mg/m^3)	TPH_g EFF CONC (mg/m^3)
	VW-1	VW-2	VW-3	VW-4	VW-5	VW-6	VW-7	MW-2							
8/25/92			✓	✓					80	420	500	NM	NS	NS	NS
9/09/92			✓	✓					80	420	500	NM	9,500	NS	NS
10/05/92			✓	✓					80	420	500	22	1,200	578	18
10/23/92			✓	✓					54	446	500	22	990	240	12
11/03/92		✓			✓				45	455	500	29	350	64	<10
11/17/92	✓								73	427	500	22	200	NS	NS
12/07/92			✓	✓					60	440	500	41	<10	<10	<10
12/21/92		✓							44	456	500	40	37	NS	NS
1/05/93		✓							30	470	500	45	34	53	17
1/05/93	SYSTEM SHUTDOWN FROM 1/05/93 TO 7/19/93 (HIGH GROUNDWATER LEVEL).														
7/19/93			✓						35	465	500	25	250	20	25
8/10/93		✓							80	420	500	40	110	8.7	10
8/25/93					✓				50	450	500	35	19	NS	NS
9/09/93								✓	47	453	500	NM	330	87	18
9/22/93	SYSTEM SHUTDOWN 9/09/93 TO 10/06/93 FOR REPAIR OF FAILED FLAME ROD.														
10/06/93		✓		✓					47	453	500	18	NS	51	5.6

SEE NOTES PAGE 2 OF 2.

TABLE 5
VAPOR EXTRACTION SYSTEM OPERATION DATA
ARCO STATION 276
Oakland, California
(Page 2 of 2)

DATE	VAPOR EXTRACTION WELLS ON LINE STATUS								COMB WELL FLOW (scfm)	DILUT FLOW (scfm)	INF FLOW (scfm)	INF VAC ("WC)	TPHg WELL CONC (mg/m³)	TPHg INF CONC (mg/m³)	TPHg EFF CONC (mg/m³)
	VW-1	VW-2	VW-3	VW-4	VW-5	VW-6	VW-7	MW-2							
10/18/93	SYSTEM SHUTDOWN 10/18/93 TO 11/23/93 FOR REPAIR OF A CLOGGED FLAME ARRESTOR.														
11/23/93	✓	✓	✓	✓	✓		✓	✓	70	430	500	27	209	57	12
12/09/93	✓	✓	✓	✓	✓		✓	✓	70	430	500	54	NS	9.7	64
12/29/93	✓	✓	✓	✓	✓		✓	✓	45	455	500	34	NS	<5.0	<5.0
12/29/93	SYSTEM SHUTDOWN ON 12/29/93 DUE TO LOW TPHg VAPOR CONCENTRATIONS IN SOIL GAS.														
THE SYSTEM WAS NOT OPERATED DURING THE FIRST QUARTER 1994 DUE TO LOW TPHg CONCENTRATIONS IN SOIL GAS.															

NOTES:
COMB WELL FLOW = Combined well flow rates
DIL AIR FLOW = Dilution air flow rates
INF FLOW = Influent Flow Rate to therm-ox (well plus dilution flows)
scfm = standard cubic feet per minute
INF VAC = Influent Vacuum
"WC = inches of water column vacuum
TPHg = Total petroleum hydrocarbons as gasoline
WELL TPHg CONC = Concentration of TPHg vapor in combined well flow
TPHg INF CONC = Concentration of TPHg vapor in therm-ox influent flow
TPHg EFF CONC = Concentration of TPHg vapor in therm-ox effluent flow
mg/m^3 = milligrams per cubic meter
✓ = Vapor Extraction Well Online
NS = Not Sampled
NM = Not Measured

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TABLE 6
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF AIR SAMPLES
ARCO Station 276
Oakland, California
(Page 1 of 3)

Sample Location (Date)	Sample ID.	TPHg	B	T	E	X
VW-1						
11/17/92	AS-VW1	200	2	3	0.6	4
VW-2						
8/10/93	AS-VW2	110	0.95	0.48	0.56	1.8
8/25/93	AS-VW2	30	0.31	0.23	0.46	1.9
VW-3						
7/19/93	AS-VW3-14:00	250	1	2	1	2
8/10/93	AS-VW3	20	<0.05	0.20	0.73	2.2
VW-4						
8/10/93	AS-VW4	1900	7	3	3	7
9/22/93	AS-VW4	110	2.5	0.92	0.43	1.6
VW-5						
8/25/93	AS-VW5	19	0.46	0.22	0.43	1.5
9/09/93	AS-VW5	22	0.26	3.2	0.53	2.0
VW-6						
12/21/92	A-VW6	37	<0.5	5	<0.5	1
MW-2						
9/09/93	AS-MW2	330	2.9	4.5	0.47	10
9/22/93	AS-VW2#	130	0.94	1.7	0.84	2.7
COMBINED WELLS						
6/19/91	WELLS	810	22	7.6	1.2	6.6
7/11/91	WELL	960	18	8.1	<3.0	12
7/19/93	AS-VW3-14:45#	1000	3	2	2	3
8/22/91	WELLS	920	27	6.5	1.2	9.6
4/27/92	WELL FIELD	<6.0	<0.06	0.085	<0.06	0.21
5/27/92	WELL FIELD	33	<0.06	0.28	0.14	0.42
6/26/92	WELL FIELD	110	0.35	0.64	0.23	1.4
7/06/92	WELL INFL	85	1.5	0.81	0.21	1.2
8/03/92	WELL FIELD	160	2.6	0.77	0.21	1.0
9/09/92	WELL FIELD	540	7.7	18	5.5	36
10/05/92	AS-WELLSNFL	990	17	17	4	22
11/03/92	A3-AEUFEO	350	6	7	1	12
12/16/92	COMB WELLS	<10	<0.5	2	<0.5	2
1/05/93	WELL INFL	34	<0.5	0.8	,0.5	3
11/23/93	AS-COMBINE WELLS	290	2.2	1.2	0.86	5.1

SEE NOTES ON PAGE 3 OF 3.

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TABLE 6
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF AIR SAMPLES
ARCO Station 276
Oakland, California
(Page 2 of 3)

Sample Location (Date)	Sample ID.	TPHg	B	T	E	X
INFLUENT						
6/12/91	INFLUENT	<6.0	0.081	<0.06	<0.06	<0.06
6/19/91	INFLUENT	140	2.8	1.8	0.24	5.2
7/11/91	INFLUENT	140	4.0	1.4	0.62	4.5
8/22/91	INFLUENT	130	3.4	1.2	0.27	3.0
9/05/91	INFLUENT	86	3.2	1.0	<0.30	1.7
12/20/91	INFLUENT	32	0.40	0.20	<0.06	0.43
1/03/92	INFLUENT	7.5	0.12	<0.06	<0.06	<0.06
1/17/92	INFLUENT	<6.0	<0.06	<0.06	<0.06	<0.06
2/18/92	INFLUENT	<6.0	<0.06	<0.06	<0.06	<0.06
3/02/92	INFLUENT	9.7	0.095	0.22	0.13	1.1
3/17/92	INFLUENT	<6.0	<0.06	<0.06	<0.06	<0.06
3/31/92	INFLUENT	<6.0	<0.06	<0.06	<0.06	<0.06
4/27/92	INFLUENT	<6.0	<0.06	<0.06	<0.06	0.078
5/11/92	INFLUENT	8.2	0.068	0.23	0.064	0.44
5/27/92	INFLUENT	<6.0	<0.06	0.13	<0.06	0.097
6/08/92	INFLUENT	7.8	0.17	0.10	<0.06	<0.06
6/24/92	INFL	6.5	<0.06	0.10	0.11	0.44
7/06/92	INFL	<5.0	<0.05	<0.05	<0.05	<0.05
7/20/92	INFL	<5.0	0.13	0.078	<0.05	<0.05
8/03/92	INFL	12	0.17	0.17	<0.05	<0.05
8/18/92	INFL	<5.0	<0.05	0.37	<0.05	0.15
9/09/92	INFL	1,200	13	36	14	95
9/21/92	INFL	610	6.5	20	9.4	53
10/05/92	AS-SYSSNFL	240	3	3	0.6	5
11/04/92	A2-INF	64	1	2	<0.5	6
12/16/92	INFL	<10	<0.5	<0.5	<0.5	1
1/05/93	INFL	53	<0.5	1	<0.5	3
7/19/93	AS-SYSINF	20	<0.5	2	<0.5	<0.5
8/10/93	AS-INF	8.7	<0.05	0.061	0.33	0.79
9/09/93	AS-INFL	82	<0.125	14	0.79	3.6
10/06/93	AS-COMBINE INFLUENT	51	1.5	2.0	0.38	1.3
11/23/93	AS-INFLUENT	57	0.89	5.1	0.50	2.0
12/09/93	AS-INFLUENT	9.7	<0.050	0.73	0.73	2.2
12/29/93	AS-INFLUENT	<5.0	<0.050	<0.050	<0.050	<0.050
EFFLUENT						
6/12/91	EFFLUENT	<6.0	<0.06	<0.06	<0.06	<0.06
6/19/91	EFFLUENT	28	0.33	0.57	0.14	2.4
7/11/91	EFFLUENT	<6.0	0.063	0.077	<0.06	0.25
8/22/91	EFFLUENT	20	0.29	0.39	0.069	1.0
12/20/91	EFFLUENT	<6.0	<0.06	<0.06	<0.06	<0.06

SEE NOTES ON PAGE 3 OF 3.

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TABLE 6
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF AIR SAMPLES
ARCO Station 276
Oakland, California
(Page 3 of 3)

Sample Location (Date)	Sample ID.	TPHg	B	T	E	X
EFFLUENT						
1/17/92	EFFLUENT	<6.0	<0.06	<0.06	<0.06	<0.06
4/27/92	EFFLUENT	<6.0	<0.06	<0.06	<0.06	0.089
5/27/92	EFFLUENT	<6.0	<0.06	0.097	<0.06	0.060
6/24/92	EFFL	<6.0	<0.06	<0.06	<0.06	0.34
7/06/92	EFFL	<5.0	<0.05	0.073	<0.05	<0.05
8/03/92	EFFL	<5.0	<0.05	0.11	0.065	0.34
9/09/92	EFFL	18	0.24	0.64	0.23	1.6
10/05/92	AS-SYSEFFL	12	0.8	1	<0.5	2
11/03/92	A1-EFF	<10	<0.5	<0.5	<0.5	<0.5
12/16/92	EFFL	<10	<0.5	3	<0.5	1
1/05/93	EFFL	17	<0.5	8	<0.5	1
7/19/93	AS-SYSEFF	25	<0.5	8	<0.5	1
8/10/93	AS-EFF	10	<0.05	0.098	0.46	1.5
9/09/93	AS-EFFL	18	0.13	<0.05	0.72	2.3
10/06/93	AS-EFFLUENT 1	5.6	0.061	0.44	0.29	0.90
11/23/93	AS-EFFLUENT	12	<0.050	1.3	0.42	1.3
12/09/93	AS-EFFLUENT	64	1.2	6.1	2.9	10
12/29/93	AS-EFFLUENT	<5.0	<0.050	0.69	<0.050	0.33

NOTES:
Results in milligrams per cubic meter (mg/m^3).
BTEX and TPHg analyzed using EPA Methods 5030/8015/8020.
TPHg = Total petroleum hydrocarbons as gasoline
COMBINED WELLS = Combined well flow prior to fresh air dilution.
INFLUENT = Influent to oxidizer after fresh air dilution.
EFFLUENT = Effluent from oxidizer to atmosphere.
# = Sample labeled improperly by lab.

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APPENDIX A

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

I NTEGRATED
W ASTESTREAM
M ANAGEMENT, INC.

February 28, 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-276 in Oakland, California. Integrated Wastestream Management measured the depth to water and collected samples from wells at this site on February 4, 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

Summary of Ground Water Sample Analyses ARCO Facility No. A-276, Oakland, California

WELL NUMBER	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	RW-1
DATE SAMPLED	2/4/94	2/4/94	2/4/94	2/4/94	2/4/94	2/4/94	2/4/94	2/4/94	2/4/94
DEPTH TO WATER	24.48	16.42	33.58	33.07	32.45	38.48	20.78	30.73	33.43
SHEEN	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
PRODUCT THICKNESS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TPHg	ND	2100	<190	<480	ND	<830	40,000	ND	<540
BTEX									
BENZENE	ND	110	ND	ND	ND	<2.5	900	ND	ND
TOLUENE	ND	5.6	ND	ND	ND	<2.5	980	ND	ND
ETHLYBENZENE	ND	26	ND	ND	ND	<2.5	1,100	ND	ND
XYLENES	ND	110	ND	1.4	ND	3.1	9,700	ND	<1.5
EPA 624									
BENZENE	ND	170	<5	<20	ND	<50	940	ND	<20
TOLUENE	ND	9	<5	<20	ND	<50	950	ND	<20
PCE	22	ND	91	1,900	39	2,900	<50	ND	2,200
ETHYLBENZENE	ND	36	<5	<20	ND	<50	1,100	ND	<20
XYLENES	ND	160	<25	<100	ND	<250	9,100	ND	<100
SM 5520 C									
OIL & GREASE	NA	NA	NA	ND	NA	NA	NA	NA	NA
SM 5520 F									
HYDROCARBONS	NA	NA	NA	ND	NA	NA	NA	NA	NA

FOOTNOTES:

Concentrations reported in ug/L (ppb).
TPHg = Total Purgeable Petroleum Hydrocarbons (USEPA Method 8015 Modified)
BTEX Distinction (USEPA Method 8020)
PCE = Tetrachloroethene (USEPA Method 8010)
DCE = cis-1, 2-Dichloroethene (USEPA Method 8010)
TCE = Trichloroethene (USEAP Method 8010)
ND = Not Detected.

FIELD REPORT

DEPTH TO WATER / FLOATING PRODUCT SURVEY

SITE ARRIVAL TIME: 730

SITE DEPARTURE TIME: 1930

WEATHER CONDITIONS: Sunny/cool

PROJECT NO.: _____ LOCATION: 10600 MacArthur OAK DATE: 2-4-94

CLIENT/STATION #: Arco 276 FIELD TECHNICIAN: Vince/Francisco DAY OF WEEK: Friday

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
1	MW-5	OK	Yes	OK	OK	OK	47.0	32.45	32.45	N/A	N/A	N	4"	
2	MW-8	OK	Yes	OK	OK	O	47.7	30.73+	30.73+				4"	
3	MW-1	OK	Yes	OK	OK	OK	38.8	24.48-	24.48-				2"	
4	RW-1	OK	Yes	OK	OK	O	48.9	33.43-	33.43-				6"	
5	MW-3	OK	Yes	OK	OK	OK	38.6	33.58-	33.58-				2"	
6	MW-4	OK	Yes	OK	OK	OK	48.3	33.07	33.07				2"	
7	MW-6	OK	Yes	OK	OK	OK	54.1	38.48-	38.48				2" Sampled also by Argus	
8	MW-2	OK	Yes	OK	OK	OK	27.6	16.42-	16.42-				4"	
9	MW-7	OK	Yes	OK	OK	OK	55.0	20.78+	20.78+				2" Also sampled by Argus	

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-5

CLIENT/STATION #: ARCO 276 ADDRESS: 10600 Mac Arthur 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 47.0 - DTW 32.45 X GALLON/LINEAR FT. 0.66 X CASING VOLUME 3 = CALCULATED PURGE 28.80 ACTUAL PURGE 29.0

DATE PURGED: 2-4-94 START (2400 Hr) 1138 END (2400 Hr) 1155

DATE SAMPLED: 2-4-94 START (2400 Hr) 1205 END (2400 Hr) 1205

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1143	3	7.33	0.53	66.9	clear	
1146	8	6.83	0.46	66.7	clear	
1149	14	6.57	0.45	66.5	clear	
1153	21	6.59	0.44	66.1	clear	
1155	29	6.58	0.44	65.3	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: _____

PRINT NAME: Vince Valdes

SIGNATURE: Vince Valdes

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-8

CLIENT/STATION #: ARCO 276 ADDRESS: 10600 MacArthur 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 47.7 - DTW 30.73 x GALLON/LINEAR FT. 0.66 x CASING VOLUME 3 = CALCULATED PURGE 33.60 ACTUAL PURGE 34.0

DATE PURGED: 2-4-94 START (2400 Hr) 1219 END (2400 Hr) 1238

DATE SAMPLED: 2-4-94 START (2400 Hr) 1246 END (2400 Hr) 1246

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1221	3	~~6.78~~	0.50	63.2	CLOUDY	
1225	8	6.86	0.53	62.7	CLEAR	
1229	18	6.96	0.51	60.0	CLEAR	
1234	24	7.00	0.45	57.2	CLEAR	
1238	34	6.88	0.52	61.5	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: _____

PRINT NAME: Vince Valdes

SIGNATURE: Vince Valdes

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-1

CLIENT/STATION #: ARCO 276 ADDRESS: 10600 MacArthur 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 38.8 - DTW 24.48 X GALLON/LINEAR FT. 0.17 X CASING VOLUME 3 = CALCULATED PURGE 7.30 ACTUAL PURGE 8.0

DATE PURGED: 2-4-94 START (2400 Hr) 1320 END (2400 Hr) 1332

DATE SAMPLED: 2-4-94 START (2400 Hr) 1327 END (2400 Hr) 1337

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1323	2	6.75	1.57	60.1	cloudy	
1326	4	6.65	1.76	60.3	cloudy	
1330	6	6.63	1.79	59.9	clear	
1332	8	6.67	1.81	59.6	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: _____

PRINT NAME: Francisco Abungan

SIGNATURE: Francisco Abungan

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: RW - 1

CLIENT/STATION #: ARCO 276 ADDRESS: 1068 Mac Arthur 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 48.9 - DTW 33.43 X GALLON/LINEAR FT. 1.5 X CASING VOLUME 3 = CALCULATED PURGE 109.6 ACTUAL PURGE 70.0

DATE PURGED: 2-4-94 START (2400 Hr) 1325 END (2400 Hr) 1359

DATE SAMPLED: 2-4-94 START (2400 Hr) 1408 END (2400 Hr) 1408

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1328	5	6.76	1.12	59.9	clear	
1334	25	6.90	1.55	57.6	clear	
1342	45	7.26	1.32	56.5	clear	
1349	55	7.24	1.33	54.1	clear	
1359	70	7.21	1.34	53.9	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: _____

PRINT NAME: Vince Valdes

SIGNATURE: Vince Valdes

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-3

CLIENT/STATION #: ARCO 276 ADDRESS: 10600 MacArthur 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 38.6 - DTW 33.58 X GALLON/LINEAR FT. 0.17 X CASING VOLUME 3 = CALCULATED PURGE 2.56 ACTUAL PURGE 3.0

DATE PURGED: 2-4-94 START (2400 Hr) 1345 END (2400 Hr) 1357

DATE SAMPLED: 2-4-94 START (2400 Hr) 1415 END (2400 Hr) 1415

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1349	1	7.31	0.82	57.6	Cloudy	
1352	2	7.20	0.81	57.4	Cloudy	
1357	3	7.21	0.76	57.2	Cloudy	

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

PURGING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon®)
✓ Centrifugal Pump ____ Bailer (PVC)
____ Submersible Pump ____ Bailer (Stainless Steel)
____ Dedicated
Other: _____

SAMPLING EQUIPMENT

____ 2" Bladder Pump ____ Bailer (Teflon®)
____ DDL Sampler ____ Bailer (Stainless Steel)
____ Dipper ____ Submersible Pump
✓ Bailer Disposable ____ Dedicated
Other: _____

REMARKS: _____

PRINT NAME: Francisco Abungan

SIGNATURE: Francisco Abungan

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-4

CLIENT/STATION #: ARCO 276 ADDRESS: 10600 MacArthur 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 48.3 - DTW 33.07 X GALLON/LINEAR FT. 0.17 X CASING VOLUME 3 = CALCULATED PURGE 7.76 | ACTUAL PURGE 8.0

DATE PURGED: 2-4-94 START (2400 Hr) 1410 END (2400 Hr) 1424

DATE SAMPLED: 2-4-94 START (2400 Hr) 1430 END (2400 Hr) 1430

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1412	2	7.21	0.89	62.8	cloudy	
1416	4	7.19	0.85	62.3	cloudy	
1419	6	7.14	0.79	619	clear	
1424	8	7.08	0.78	617	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: _____

PRINT NAME: Vince Valdez

SIGNATURE: Vince Valdez

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-6

CLIENT/STATION #: ARCC 276 ADDRESS: 10600 MacArthur 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 54.1 - DTW 38.48 X GALLON/LINEAR FT. 0.17 X CASING VOLUME 3 = CALCULATED PURGE 7.96 ACTUAL PURGE 8.0

DATE PURGED: 2-4-94 START (2400 Hr) 1830 END (2400 Hr) 1856

DATE SAMPLED: 2-4-94 START (2400 Hr) 1900 END (2400 Hr) 1910

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1830	5	6.82	2050	22°C	cloudy	
1835	9	6.93	2050	16	clear	
1840	17	6.99	2020	17	clear	
1847	23	7.07	2020	17.3	clear	
1856	30	7.06	2030	16.3°	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 was also purged & sampled by Augeus on the same day.

PRINT NAME: Vince Valdes

SIGNATURE: Vince Valdes

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-2

CLIENT/STATION #: ARCO 276 ADDRESS: 10600 Mac Arthur 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 27.6 - DTW 16.42 X GALLON/LINEAR FT. 0.66 X CASING VOLUME 3 = CALCULATED PURGE 22.13 ACTUAL PURGE 23.0

DATE PURGED: 2-4-94 START (2400 Hr) 1525 END (2400 Hr) 1531

DATE SAMPLED: 2-4-94 START (2400 Hr) 1553 END (2400 Hr) 1553

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1526	4	6.91	1.03	64.5	cloudy	
1528	11	6.95	1.01	64.1	clear	
1529	16	6.98	.98	63.8	clear	
1531	23	7.01	.94	63.4	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: _____

PRINT NAME: Vince Valdes

SIGNATURE: Vince Valdes

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-7

CLIENT/STATION #: ARCO 276 ADDRESS: 10600 Mac Arthur 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 33.0 - DTW 20.78 X (GALLON/LINEAR FT.) 0.17 X (CASING VOLUME) 3 = (CALCULATED PURGE) 17.52 ACTUAL PURGE: 17.5

DATE PURGED: 2-4-94 START (2400 Hr) 1715 END (2400 Hr) 1734

DATE SAMPLED: 2-4-94 START (2400 Hr) 1740 END (2400 Hr) 1740

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1715	4	6.98	510	20°C	cloudy	
1720	8	6.80	600	21°C	cloudy	
1728	11	6.85	600	20°C	clear	
1734	17½	6.75	600	19°C	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 was also purged & sampled by Argus on the same day

PRINT NAME: Vince Valdes

SIGNATURE: Vince Valdes

Columbia Analytical Services, Inc.

February 22, 1994

Service Request No. SJ94-0179

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

Re: **ARCO Facility No. 276**

Dear Ms. Austin/Mr. DeLon:

Attached are the results of the water samples submitted to our lab on February 9, 1994. For your reference, these analyses have been assigned our service request number SJ94-0179.

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

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
Project: ARCO Facility No. 276
Sample Matrix: Water

Dates Collected: 02/04/94
Date Received: 02/09/94
Date Extracted: N/A
Date Analyzed: 02/11, 14/94
Service Request: SJ94-0179

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	**Date Analyzed**					
MW-1	02/11/94	ND	ND	ND	ND	ND
MW-2	02/14/94	110.	5.6	26.	110.	2,100.
MW-3	02/11/94	ND	ND	ND	ND	<190. (a)
MW-4	02/11/94	ND	ND	ND	1.4	<480. (a)
MW-5	02/11/94	ND	ND	ND	ND	ND
MW-6	02/11/94 (b)	<2.5 (c)	<2.5 (c)	<2.5 (c)	3.1	<830. (a)
MW-7	02/11/94 (b)	900.	980.	1,100.	9,700.	40,000.
MW-8	02/11/94	ND	ND	ND	ND	ND
RW-1	02/11/94	ND	ND	ND	<1.5 (c)	<540. (a)
Method Blank	02/11/94	ND	ND	ND	ND	ND
Method Blank	02/14/94	ND	ND	ND	ND	ND

(a) Raised MRL, the sample contains a single non-fuel component eluting in the gasoline range, and quantitated as gasoline. The chromatogram does not match the typical gasoline fingerprint.
(b) This sample was part of the analytical batch started on February 11, 1994. However, it was analyzed after midnight so the atual date analyzed is February 12, 1994.
(c) Raised MRL due to matrix interference requiring sample dilution.

Approved By: Kevin A Murphy Date: February 22, 1994

1924 Bleyward Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. 276
Sample Matrix: Water

Dates Collected: 02/04/94
Date Received: 02/09/94
Date Extracted: N/A
Date Analyzed: 02/16/94
Service Request: SJ94-0179

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

Sample Name:		MW-1	MW-2	MW-3 (a)
Analyte	**MRL**			
Chloromethane	10	ND	ND	<50
Vinyl Chloride	10	ND	ND	<50.
Bromomethane	10	ND	ND	<50.
Chloroethane	10	ND	ND	<50.
Trichlorofluoromethane (CFC 11)	1	ND	ND	<5.
Trichlorotrifluoroethane (CFC 113)	10	ND	ND	<50.
1,1-Dichloroethene	1	ND	ND	<5.
Acetone	20	ND	ND	<100.
Carbon Disulfide	1	ND	ND	<5.
Methylene Chloride	10	ND	ND	<50.
trans-1,2-Dichloroethene	1	ND	ND	<5.
cis-1,2-Dichloroethene	1	ND	ND	<5.
2-Butanone (MEK)	10	ND	ND	<50.
1,1-Dichloroethane	1	ND	ND	<5.
Chloroform	1	ND	ND	<5.
1,1,1-Trichloroethane (TCA)	1	ND	ND	<5.
Carbon Tetrachloride	1	ND	ND	<5.
Benzene	1	ND	170.	<5.
1,2-Dichloroethane	1	ND	ND	<5.
Vinyl Acetate	10	ND	ND	<50.
Trichloroethene (TCE)	1	ND	ND	<5.
1,2-Dichloropropane	1	ND	ND	<5.
Bromodichloromethane	1	ND	ND	<5
2-Chloroethyl Vinyl Ether	10	ND	ND	<50.
trans-1,3-Dichloropropene	1	ND	ND	<5.
4-Methyl-2-pentanone (MIBK)	10	ND	ND	<50.
2-Hexanone	10	ND	ND	<50.
Toluene	1	ND	9.	<5.
cis-1,3-Dichloropropene	1	ND	ND	<5.
1,1,2-Trichloroethane	1	ND	ND	<5.
Tetrachloroethene (PCE)	1	22.	ND	91.
Dibromochloromethane	1	ND	ND	<5.
Chlorobenzene	1	ND	ND	<5.
Ethylbenzene	1	ND	36.	<5
Styrene	1	ND	ND	<5.
Total Xylenes	5	ND	160.	<25
Bromoform	1	ND	ND	<5.
1,1,2,2-Tetrachloroethane	1	ND	ND	<5.
1,3-Dichlorobenzene	1	ND	ND	<5.
1,4-Dichlorobenzene	1	ND	ND	<5.
1,2-Dichlorobenzene	1	ND	ND	<5.

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

Approved By: Kevin A Murphy Date: February 27, 1994

[910179 XLW]8240W4/2/22/94

• San Jose, California 95134 • Telephone 408/437-2400 • Fax 408/437-9356

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. 276
Sample Matrix: Water

Dates Collected: 02/04/94
Date Received: 02/09/94
Date Extracted: N/A
Date Analyzed: 02/16/94
Service Request: SJ94-0179

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

Sample Name:	MW-4 (a)	MW-5	MW-6 (a)
Analyte	**MRL**		
Chloromethane	10	<200.	ND	<500.
Vinyl Chloride	10	<200.	ND	<500.
Bromomethane	10	<200.	ND	<500.
Chloroethane	10	<200.	ND	<500.
Trichlorofluoromethane (CFC 11)	1	<20.	ND	<50.
Trichlorotrifluoroethane (CFC 113)	10	<200.	ND	<500.
1,1-Dichloroethene	1	<20.	ND	<50.
Acetone	20	<400.	ND	<1,000.
Carbon Disulfide	1	<20.	ND	<50.
Methylene Chloride	10	<200	ND	<500.
trans-1,2-Dichloroethene	1	<20.	ND	<50.
cis-1,2-Dichloroethene	1	<20	ND	<50.
2-Butanone (MEK)	10	<200.	ND	<500.
1,1-Dichloroethane	1	<20.	ND	<50.
Chloroform	1	<20.	ND	<50.
1,1,1-Trichloroethane (TCA)	1	<20.	ND	<50.
Carbon Tetrachloride	1	<20.	ND	<50.
Benzene	1	<20.	ND	<50.
1,2-Dichloroethane	1	<20.	ND	<50.
Vinyl Acetate	10	<200.	ND	<500.
Trichloroethene (TCE)	1	<20.	ND	<50.
1,2-Dichloropropane	1	<20.	ND	<50
Bromodichloromethane	1	<20.	ND	<50.
2-Chloroethyl Vinyl Ether	10	<200.	ND	<500
trans-1,3-Dichloropropene	1	<20.	ND	<50.
4-Methyl-2-pentanone (MIBK)	10	<200.	ND	<500.
2-Hexanone	10	<200.	ND	<500.
Toluene	1	<20.	ND	<50.
cis-1,3-Dichloropropene	1	<20.	ND	<50.
1,1,2-Trichloroethane	1	<20.	ND	<50.
Tetrachloroethene (PCE)	1	1,900.	39.	2,900.
Dibromochloromethane	1	<20.	ND	<50.
Chlorobenzene	1	<20.	ND	<50.
Ethylbenzene	1	<20.	ND	<50
Styrene	1	<20.	ND	<50.
Total Xylenes	5	<100.	ND	<250.
Bromoform	1	<20.	ND	<50.
1,1,2,2-Tetrachloroethane	1	<20.	ND	<50.
1,3-Dichlorobenzene	1	<20.	ND	<50.
1,4-Dichlorobenzene	1	<20.	ND	<50
1,2-Dichlorobenzene	1	<20.	ND	<50.

(a) Raised MRL due to high analyte concentration requring sample dilution

Approved By: _____ Date: February 27, 1994

[940179 XLW]8240WB/2/22/94

[illegible] • San Jose, California 95134 • Telephone 408/437-2400 • Fax 408/437-9356

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. 276
Sample Matrix: Water

Dates Collected: 02/04/94
Date Received: 02/09/94
Date Extracted: N/A
Date Analyzed: 02/16/94
Service Request: SJ94-0179

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

Sample Name:	MW-7 (a)	MW-8	RW-1 (a)
Analyte	**MRL**		
Chloromethane	10	<500.	ND	<200.
Vinyl Chloride	10	<500.	ND	<200.
Bromomethane	10	<500.	ND	<200.
Chloroethane	10	<500	ND	<200.
Trichlorofluoromethane (CFC 11)	1	<50.	ND	<20.
Trichlorotrifluoroethane (CFC 113)	10	<500.	ND	<200.
1,1-Dichloroethene	1	<50.	ND	<20
Acetone	20	<1,000.	ND	<400.
Carbon Disulfide	1	<50.	ND	<20.
Methylene Chloride	10	<500.	ND	<200.
trans-1,2-Dichloroethene	1	<50.	ND	<20.
cis-1,2-Dichloroethene	1	<50.	ND	<20.
2-Butanone (MEK)	10	<500.	ND	<200
1,1-Dichloroethane	1	<50.	ND	<20.
Chloroform	1	<50.	ND	<20.
1,1,1-Trichloroethane (TCA)	1	<50.	ND	<20.
Carbon Tetrachloride	1	<50.	ND	<20.
Benzene	1	940.	ND	<20.
1,2-Dichloroethane	1	<50.	ND	<20.
Vinyl Acetate	10	<500.	ND	<200.
Trichloroethene (TCE)	1	<50.	ND	<20.
1,2-Dichloropropane	1	<50.	ND	<20.
Bromodichloromethane	1	<50.	ND	<20
2-Chloroethyl Vinyl Ether	10	<500.	ND	<200.
trans-1,3-Dichloropropene	1	<50.	ND	<20
4-Methyl-2-pentanone (MIBK)	10	<500.	ND	<200.
2-Hexanone	10	<500.	ND	<200.
Toluene	1	950	ND	<20.
cis-1,3-Dichloropropene	1	<50.	ND	<20.
1,1,2-Trichloroethane	1	<50.	ND	<20.
Tetrachloroethene (PCE)	1	<50	ND	2,200.
Dibromochloromethane	1	<50.	ND	<20
Chlorobenzene	1	<50.	ND	<20.
Ethylbenzene	1	1,100.	ND	<20.
Styrene	1	<50.	ND	<20.
Total Xylenes	5	9,100.	ND	<100.
Bromoform	1	<50	ND	<20.
1,1,2,2-Tetrachloroethane	1	<50.	ND	<20.
1,3-Dichlorobenzene	1	<50.	ND	<20.
1,4-Dichlorobenzene	1	<50.	ND	<20
1,2-Dichlorobenzene	1	<50.	ND	<20.

(a) Raised MRL due to high analyte concentration requiring sample dilution

Approved By: Kevin Murphy Date: February 22, 1994

[940179 XLW]8240W9/2/22/94

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. 276
Sample Matrix: Water

Dates Collected: 02/04/94
Date Received: 02/09/94
Date Extracted: N/A
Date Analyzed: 02/16/94
Service Request: SJ94-0179

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

Sample Name: **Method Blank**

Analyte	MRL	
Chloromethane	10	ND
Vinyl Chloride	10	ND
Bromomethane	10	ND
Chloroethane	10	ND
Trichlorofluoromethane (CFC 11)	1	ND
Trichlorotrifluoroethane (CFC 113)	10	ND
1,1-Dichloroethene	1	ND
Acetone	20	ND
Carbon Disulfide	1	ND
Methylene Chloride	10	ND
trans-1,2-Dichloroethene	1	ND
cis-1,2-Dichloroethene	1	ND
2-Butanone (MEK)	10	ND
1,1-Dichloroethane	1	ND
Chloroform	1	ND
1,1,1-Trichloroethane (TCA)	1	ND
Carbon Tetrachloride	1	ND
Benzene	1	ND
1,2-Dichloroethane	1	ND
Vinyl Acetate	10	ND
Trichloroethene (TCE)	1	ND
1,2-Dichloropropane	1	ND
Bromodichloromethane	1	ND
2-Chloroethyl Vinyl Ether	10	ND
trans-1,3-Dichloropropene	1	ND
4-Methyl-2-pentanone (MIBK)	10	ND
2-Hexanone	10	ND
Toluene	1	ND
cis-1,3-Dichloropropene	1	ND
1,1,2-Trichloroethane	1	ND
Tetrachloroethene (PCE)	1	ND
Dibromochloromethane	1	ND
Chlorobenzene	1	ND
Ethylbenzene	1	ND
Styrene	1	ND
Total Xylenes	5	ND
Bromoform	1	ND
1,1,2,2-Tetrachloroethane	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND

Approved By: Kenneth Murphy Date: February 22, 1994

[940179 XLW]8240W10/2/22/94

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APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 276
Sample Matrix: Water

Dates Collected: 02/04/94
Date Received: 02/09/94
Date Extracted: N/A
Date Analyzed: N/A
Service Request: SJ94-0179

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*, 18th Ed., 1993.

Approved By: Edward Murphy Date: February 22, 1994

[940179 XLW]O&Gccsw5/2/22/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 276
Sample Matrix: Water

Dates Collected: 02/04/94
Date Received: 02/09/94
Date Extracted: N/A
Date Analyzed: N/A
Service Request: SJ94-0179

Laboratory Control 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	4.0	3.5	3.8	88.	96.	60-121

SM *Standard Methods for the Examination of Water and Wastewater*, 18th Ed., 1993.

Approved By: Donna Murphy Date: February 22, 1994

[940179 XLW]O&Glcsw7/2/22/94

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 276
Sample Matrix: Water

Dates Collected: 02/04/94
Date Received: 02/09/94
Date Extracted: N/A
Date Analyzed: 02/11, 14/94
Service Request: SJ94-0179

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

Sample Name	Date Analyzed	Percent Recovery a,a,a-Trifluorotoluene
MW-1	02/11/94	85.
MW-2	02/14/94	92.
MW-3	02/11/94	76.
MW-4	02/11/94	78.
MW-5	02/11/94	78.
MW-6	02/11/94	84.
MW-7	02/11/94	80.
MW-8	02/11/94	78.
RW-1	02/11/94	82
MW-8 (MS)	2/11/94	86.
MW-8 (DMS)	2/11/94	83.
Method Blank	02/11/94	86.
Method Blank	02/14/94	86.

CAS Acceptance Limits: 62-112

Approved By: Kevin Murphy

Date: February 27, 1994

[940179.XLW]8020sr1/2/22/94

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 276
Sample Matrix: Water

Dates Collected: 02/04/94
Date Received: 02/09/94
Date Extracted: N/A
Date Analyzed: 02/11/94
Service Request: SJ94-0179

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.	27.1	108.	85-115
Toluene	25.	27.1	108.	85-115
Ethylbenzene	25.	27.5	110.	85-115
Total Xylenes	75.	82.2	110.	85-115
TPH as Gasoline	250.	250.	100.	90-110

Approved By: Keanan Murphy Date: February 22, 1994

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Dates Collected:**	02/04/94
Project:	ARCO Facility No. 276	**Date Received:**	02/09/94
Sample Matrix:	Water	**Date Extracted:**	N/A
		Date Analyzed:	02/11/94
		Service Request:	SJ94-0179

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

Sample Name: MW-8

			Spike Result		Percent Recovery		CAS Acceptance
Analyte	**Spike Level**	**Sample Result**	**MS**	**DMS**	**MS**	**DMS**	**Criteria**
TPH as Gasoline	250.	ND	253.	256.	101.	102.	67-121

Approved By: Kevin A Murphy Date: February 22, 1994

[940179 XLW]8020tphms/2/22/94

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QA/QC Report

Client: IWM
Project: ARCO Facility No. 276
Sample Matrix: Water

Dates Collected: 02/04/94
Date Received: 02/09/94
Date Extracted: N/A
Date Analyzed: 02/16/94
Service Request: SJ94-0179

Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 624

Sample Name	Percent Recovery		
	1,2-Dichloroethane - D4	Toluene - D8	4-Bromofluorobenzene
MW-1	107.	96	96.
MW-2	109.	96.	96.
MW-3	105.	98.	93.
MW-4	106.	98.	95.
MW-5	106.	97.	95.
MW-6	106.	97.	95.
MW-7	107.	97.	96.
MW-8	107.	96.	93.
RW-1	107.	96.	94.
MW-3 (MS)	105.	96.	95.
MW-3 (DMS)	106.	98.	95.
Method Blank	105.	96.	97.
EPA Acceptance Limits	76-114	88-110	86-115

Approved By Kevin A Murphy Date: February 22, 1994

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Client: IWM
Project: ARCO Facility No. 276
Sample Matrix: Water

Dates Collected: 02/04/94
Date Received: 02/09/94
Date Extracted: N/A
Date Analyzed: 10/21/93
Service Request: SJ94-0179

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

Analyte	True Value	Result	Percent Recovery	CAS Acceptance Criteria
Chloromethane (a)	50	58.9	118.	70-130
Vinyl Chloride (a)	50	44.7	89.	70-130
Bromomethane (a)	50	39.3	79.	70-130
Chloroethane (a)	50	56.0	112.	70-130
Acetone (a)	50	68.0	136. (b)	70-130
1,1-Dichloroethene	50	48.0	96.	70-130
Carbon Disulfide	50	46.8	94.	70-130
Methylene Chloride	50	45.1	90.	70-130
trans-1,2-Dichloroethene	50	42.5	85.	70-130
cis-1,2-Dichloroethene	50	50.4	101.	70-130
1,1-Dichloroethane	50	46.3	93.	70-130
Vinyl Acetate (a)	50	34.0	68. (b)	70-130
2-Butanone (a)	50	53.9	108.	70-130
Chloroform	50	47.1	94.	70-130
1,1,1-Trichloroethane (TCA)	50	46.4	93.	70-130
Carbon Tetrachloride	50	48.0	96.	70-130
Benzene	50	45.9	92.	70-130
1,2-Dichloroethane	50	45.3	91.	70-130
Trichloroethene (TCE)	50	48 2	96.	70-130
1,2-Dichloropropane	50	44.1	88.	70-130
Bromodichloromethane	50	43 6	87	70-130
2-Chloroethyl Vinyl Ether	50	40.6	81	70-130
2-Hexanone (a)	50	53.4	107.	70-130
trans-1,3-Dichloropropene	50	46.7	93.	70-130
Toluene	50	46.3	93	70-130
cis-1,3-Dichloropropene	50	44 6	89.	70-130
1,1,2-Trichloroethane	50	46.3	93.	70-130
Tetrachloroethene (PCE)	50	50.2	100.	70-130
Dibromochloromethane	50	45.4	91.	70-130
Chlorobenzene	50	48.0	96.	70-130
Ethylbenzene	50	48.7	97.	70-130
o-Xylene	50	49 6	99.	70-130
Styrene	50	49.0	98.	70-130
Bromoform	50	45.5	91.	70-130
1,1,2,2-Tetrachloroethane	50	47.8	96.	70-130

(a) These recoveries are from an analysis on October 29, 1993.
(b) These two compounds were out of the CAS Acceptance Criteria. The data was accepted since the compounds were not present in any of the samples.

Approved By Kelly A Murphy Date February 22, 1994

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 276
Sample Matrix: Water

Dates Collected: 02/04/94
Date Received: 02/09/94
Date Extracted: N/A
Date Analyzed: 02/16/94
Service Request: SJ94-0179

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

Sample Name: MW-3

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria	Relative Percent Difference
1,1-Dichloroethene	1,000.	ND	974.	1,000.	97.	100.	61-145	3.
Trichloroethene	1,000.	ND	992.	1,030.	99.	103.	71-120	4.
Chlorobenzene	1,000.	ND	988.	976.	99.	98.	75-130	1
Toluene	1,000.	ND	970.	1,010.	97.	101.	76-125	4.
Benzene	1,000.	ND	1,010.	1,050.	101.	105.	76-127	4

Approved By: Kevin Murphy Date: February 22, 1994

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APPENDIX B

CHAIN OF CUSTODY

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. LOM - 94 - 5CC

Chain of Custody

ARCO Facility no. 276	City (Facility) OAKLAND	Project manager (Consultant) DOM Dr. Lom	Laboratory name Columbia
ARCO engineer Kyle Christie	Telephone no. (ARCO)	Telephone no. (Consultant) 408/942 5955	Fax no. (Consultant) 408/942 1499
Consultant name LOM	Address (Consultant) 950 Ames Ave Milp. 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 HCl	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☒ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐	
F-B	1-2	2		✓		✓	✓	2-4-94	750		✓	✓				✓					
MW-1	3-6	4		✓		✓	✓		1337		✓	✓				✓					
MW-2	7-10	4		✓		✓	✓		1553		✓	✓				✓					
MW-3	11-14	4		✓		✓	✓		1415		✓	✓				✓					
MW-4	15-19	5		✓		✓	✓		1430		✓	✓	✓			✓					
MW-5	20-23	4		✓		✓	✓		1205		✓	✓				✓					
MW-6	24-27	4		✓		✓	✓		1900		✓	✓				✓					
MW-7	28-31	4		✓		✓	✓		1740		✓	✓				✓					
MW-8	32-35	4		✓		✓	✓		1246		✓	✓				✓					
RW-1	36-39	4		✓		✓	✓		1408		✓	✓				✓					

Special detection Limit/reporting

Special QA/QC

Remarks: Hold on F-B

Lab number: SJ94-0179

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: Vince Valdes	Date: 2-9-94 Time: 915	Received by: Gina Austin	
Relinquished by: Gina Austin	Date: 2/9/94 Time: 1030	Received by: [signature]	Date: 2-9-94 Time: 10:40
Relinquished by	Date Time	Received by laboratory	Date Time

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