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LETTER REPORT
QUARTERLY GROUNDWATER MONITORING AND REMEDIATION SYSTEM OPERATION
First Quarter 1994

ARCO Station 2035
1001 San Pablo Avenue
Albany, California

69036.17

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June 8, 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 2035
1001 San Pablo Avenue, Albany, 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 operation was performed by RESNA and consists of collecting field data, sampling the treatment unit influent and effluent vapor stream and adjusting the system to optimize performance. Evaluation of remediation system operation was performed by RESNA using laboratory analytical results and collected field data. Previous environmental work performed at the site is summarized in RESNA's reports cited in the References section.

GROUNDWATER MONITORING

Field Work

IWM field personnel were onsite February 1, 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-6, and RW-1.

Laboratory Analyses

Water samples were analyzed by Columbia Analytical Services, Inc., located in San Jose, California (Hazardous Waste Testing Laboratory Certification #1426) for benzene, toluene, ethylbenzene, and total xylenes (BTEX), and total petroleum hydrocarbons as gasoline (TPHg) using Environmental Protection Agency (EPA) Methods 5030/8020/DHS LUFT Method. In addition, the water sample from groundwater monitoring well MW-3 (located next to the former waste-oil tank pit) was analyzed for total oil and grease (TOG) using Standard Method 5520 C and F. The chain of custody records and laboratory analysis reports are included in Appendix A.

Results of Groundwater Monitoring

Groundwater elevations rose an average of approximately 1.41 feet in wells MW-1 through MW-5, dropped 1.69 feet in well MW-6, and rose 9.46 feet in well RW-1, since last quarter. No floating product or product sheen was noted in any wells during this quarter. Based on February 1, 1994 DTW data, groundwater was interpreted to flow toward the west with a gradient of approximately 0.02 ft/ft (Plate 3). Recovery well RW-1 was not used in the gradient evaluation because it possessed an anomalously high groundwater elevation. Groundwater monitoring data from this and previous quarters is presented in Table 1. The results of IWM's field work on the site are presented in Appendix A.

The following trends in hydrocarbon concentrations have been identified since the last quarter: concentrations of TPHg and benzene decreased in well MW-1; increased or remained not detected in well MW-3; and remained not detected in wells MW-2 and MW-4 through MW-6 (Plate 4). Extraction well RW-1 is no longer being sampled in association with quarterly groundwater monitoring because it is connected to the interim remediation system.

Product Removal

No floating product or sheen was observed this quarter during groundwater monitoring. A floating product skimmer was removed from well RW-1 prior to system startup in December 1993. Quantities of floating product recovered to date are presented in Table 4.

REMEDIATION SYSTEM OPERATION

The system consists of both a Groundwater Extraction System (GES) and a Vapor Extraction System (VES). The GES has not been started and therefore will not be discussed in this report. The VES uses 9 vapor extraction wells (VW-1 through VW-9), one groundwater extraction well (RW-1), and two air sparge wells (AS-1, and AS-2), to vapor extract from a total of 12 wells. The major components of the VES include a 5 horsepower positive displacement blower, and a 100 standard cubic feet per minute (scfm) Therm-Tech VAC 10 combination thermal and catalytic oxidizer (oxidizer) for the combustion treatment of extracted gasoline vapors. The oxidizer can be operated in either the thermal or catalytic mode to minimize supplemental fuel costs as hydrocarbon concentrations in extracted soil gas decline. Oxidizer operation is authorized under the Bay Area Air Quality Management District (BAAQMD) Permit to Operate Application #10931.

VES Startup and Operation

The oxidizer operated in the thermal mode with extraction occurring from nine of the available 12 extraction wells during the first quarter 1994. Cumulative VES operational data is summarized in Table 5 and includes extraction well on/off status, flowrates, and TPHg vapor concentrations. The VES was shutdown on January 24, 1994 due to rising groundwater levels causing submersion of the well screen in the vapor extraction wells. In addition, groundwater being drawn into the condensate drum caused frequent system shutdowns. Restarting of the VES will occur upon initial startup of the GES which is expected to occur during the second quarter 1994.

The system operated on wells VW-1 through VW-9 during the first quarter 1994. The combined well flow rates for the extraction wells ranged from 37 to 41 standard cubic feet per minute (scfm) at vacuums ranging from 40 to 42 inches of water column (WC). Dilution air flowrates measured during the quarter were 23 scfm during the quarter. The addition of dilution air is currently necessary to reduce the blower vacuum and prevent the oxidizer from shutting down due to a high vacuum condition. The oxidizer is designed to shutdown at a high vacuum of approximately 60 inches of WC. The VES operated for a total of 408 hours of the available 2,160 hours during the first quarter 1994.

Air Sampling and Analysis

Air samples were collected in Tedlar® sample bags using polyvinyl chloride (PVC) tubing and an electric air vacuum sampling pump. Air samples were analyzed for TPHg and for the gasoline constituents BTEX using modified EPA Methods 5030/8015/8020 by Sequoia Analytical Laboratories in Redwood City, California. The results of laboratory analyses of air samples collected from individual wells and from the oxidizer influent and effluent are summarized in Table 6. Copies of laboratory analytical results with chain-of-custody records for air samples are included in Appendix A.

From the sampling on January 12, 1994, TPHg vapor concentrations from the oxidizer influent (with dilution air) were 2,500 micrograms per cubic meter (mg/m^3). Assuming a molecular weight of 95 grams/mole for TPHg, the oxidizer influent concentrations were 644 parts per million (ppm) by volume. TPHg vapor concentrations in the oxidizer effluent were 52 mg/m^3 while effluent benzene concentrations were 0.93 mg/m^3.

Mass Extraction and Emission Rates

Using the analytical results and system influent flowrates (measured after dilution air), the TPHg extraction rates from the wells and TPHg and benzene emissions rates to the atmosphere were calculated. TPHg extraction rates are summarized in Table 7 and TPHg and benzene emission rates are shown in Table 8. TPHg mass extraction rates for the quarter ranged from 11.6 to 14.4 pounds per day (ppd). Total TPHg mass extracted by the VES during first quarter 1994 is estimated at 230 pounds, bringing the total since startup to 324 pounds.

The TPHg emission rates were 0.30 ppd while the benzene emissions were 0.005 ppd. Based on the influent and effluent concentrations, the thermal destruction efficiency (DE) of the oxidizer was 97.9%. Pursuant to BAAQMD permit requirements, this reported DE is in compliance with the minimum required 90% DE for TPHg influent concentrations less than 1,000 parts per million (ppm). In addition, the mass emission rate for benzene was below the 0.05 ppd (benzene) emission limit applicable to this site.

PREVIOUS AND FUTURE WORK

First Quarter 1994

- Performed First Quarter 1994 groundwater monitoring.
- Performed operation and maintenance of interim remediation system.
- Submitted Fourth Quarter 1993 Quarterly Groundwater Monitoring Report to ARCO and regulatory agencies.

Second Quarter 1994

- Perform Second Quarter 1994 groundwater monitoring.
- Initiate startup of the GES in conjunction with restarting the VES.
- Perform operation and maintenance of interim remediation system after startup.
- Submit a report of findings for the air sparge pilot test to ARCO and regulatory agencies.
- Submit First Quarter 1994 Quarterly Groundwater Monitoring Report to ARCO and regulatory agencies.

REPORTING REQUIREMENTS

Copies of this report should 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
Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, California 94612

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If you have any questions or comments, please call us at (510) 440-3300.

Sincerely,
RESNA Industries Inc.

Erin D. Krueger

Erin D. Krueger
Staff Geologist

David Peterson
Staff Engineer

Richard H. Walls

Richard H. Walls, P.E. 43139
Senior Project Engineer

Attachments:

References

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

Table 1: Cumulative Groundwater Monitoring Data
Table 2: Cumulative Results of Laboratory Analyses of Water Samples - TPHg and BTEX
Table 3: Cumulative Results of Laboratory Analyses of Water Samples - TPHd, TOG, VOCs, BNAs, PCBs and Metals
Table 4: Approximate Cumulative Product Recovered
Table 5: Vapor Extraction System Operation Data
Table 6: Cumulative Results of Laboratory Analysis of Air Samples
Table 7: Vapor Extraction System Estimated Gasoline Removal
Table 8: Vapor Extraction System Destruction Efficiencies and Emission Rates

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

Appendix B: Laboratory Analytical Results of Air Samples with Chain-of-Custody Records

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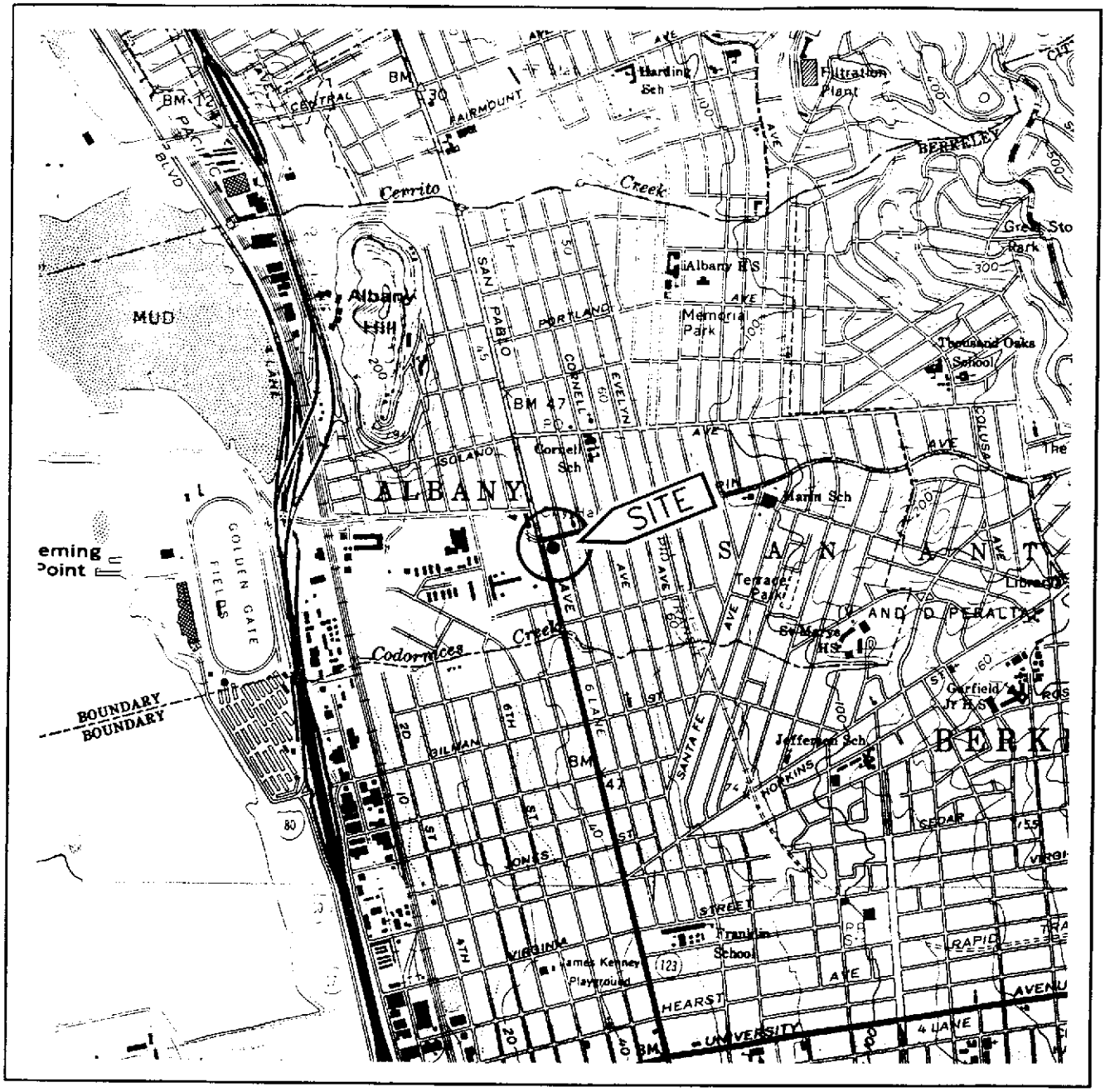
REFERENCES

RESNA November 30, 1992. Additional Subsurface Environmental Investigation and Vapor Extraction Test at ARCO Station 2035, 1001 San Pablo Avenue, Albany, California. 69036.05

RESNA March 31, 1994. Letter Report, Quarterly Groundwater and Remediation System Monitoring Fourth Quarter 1993 at ARCO Station 2035, 1001 San Pablo Avenue, Albany, California. 69036.08



Source: U.S. Geological Survey
7.5-Minute Quadrangles
Richmond/Oakland West, California
Photorevised 1980

N

Approximate Scale
2000 1000 0 2000
feet

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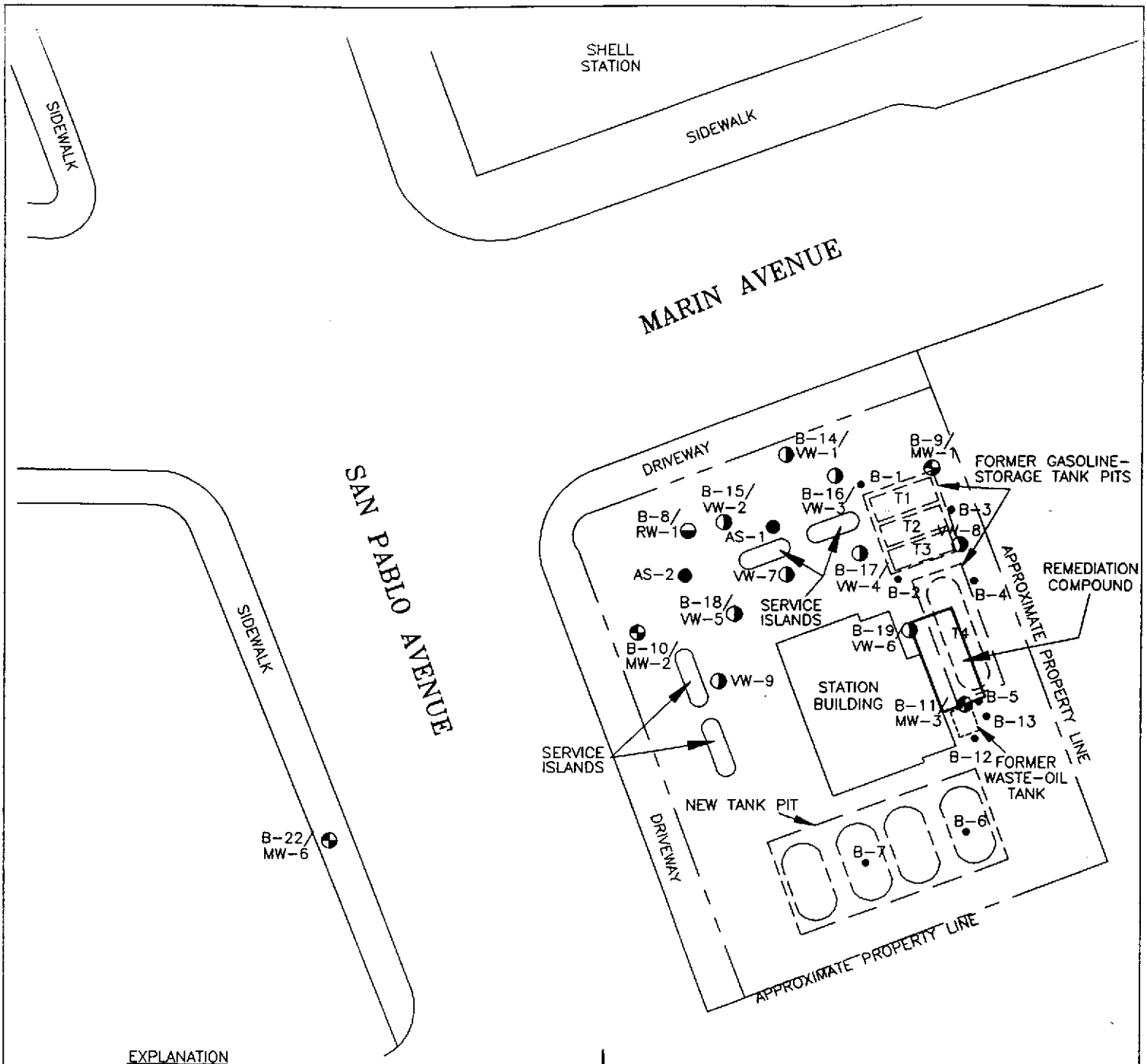
SITE VICINITY MAP
ARCO Station 2035
1001 San Pablo Avenue
Albany, California

PLATE
1



EXPLANATION

- B-19/VW-6 ◑ = Boring/vapor extraction well (RESNA, August 1992 and June 1993)
- B-8/RW-1 ◒ = Boring/recovery well (Exceltech, October 1991)
- B-22/MW-6 ◓ = Boring/monitoring well (Exceltech, October 1991)
- AS-2 ● = Air sparge well (RESNA, June 1993)
- B-13 • = Soil boring (RESNA, August 1989, June 1991, and August 1992)

N

Approximate Scale

40 20 0 40 80

feet

Source: Surveyed by John E. Koch, Land Surveyor.

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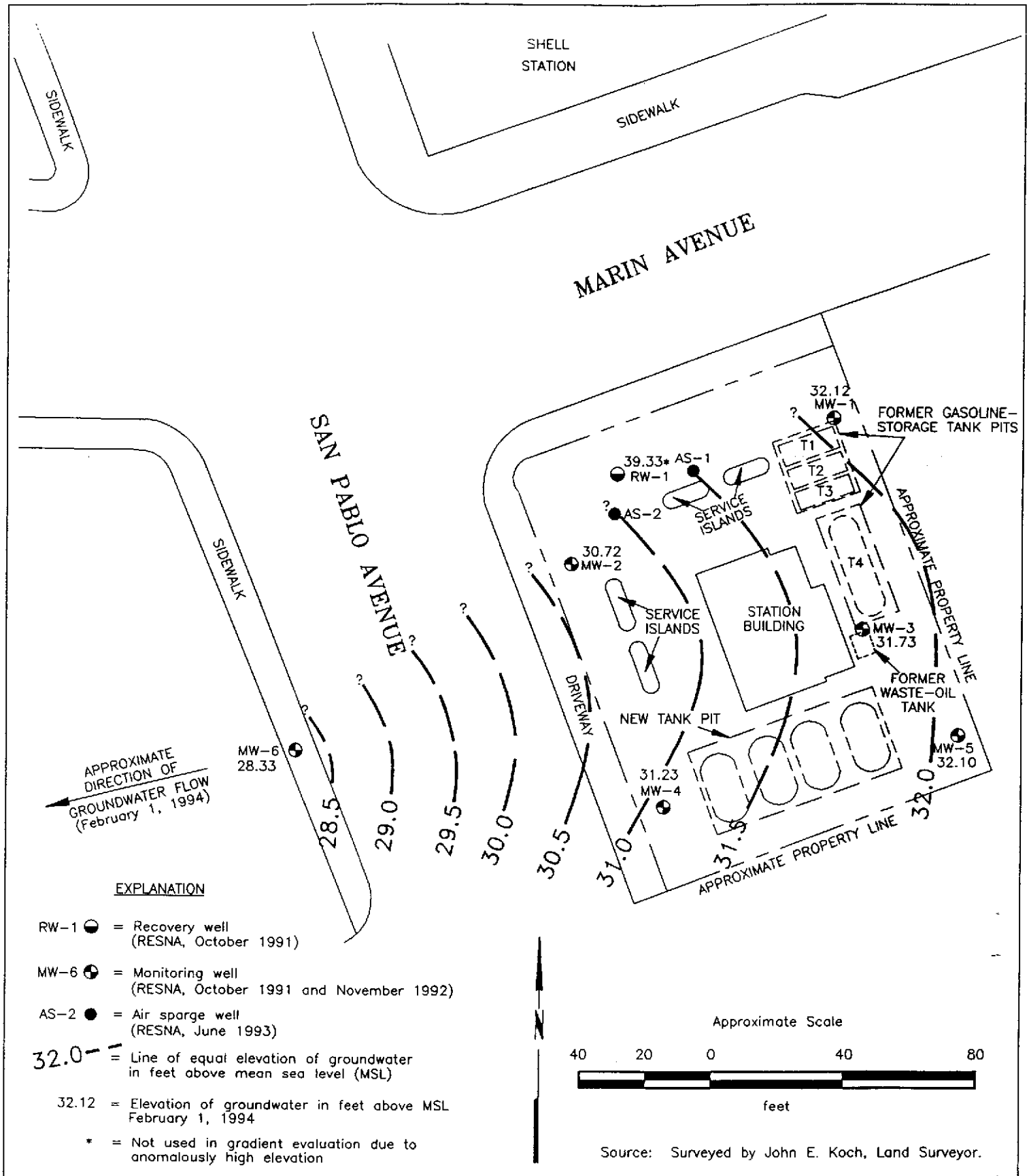
GENERALIZED SITE PLAN
ARCO Station 2035
1001 San Pablo Avenue
Albany, California

PLATE 2



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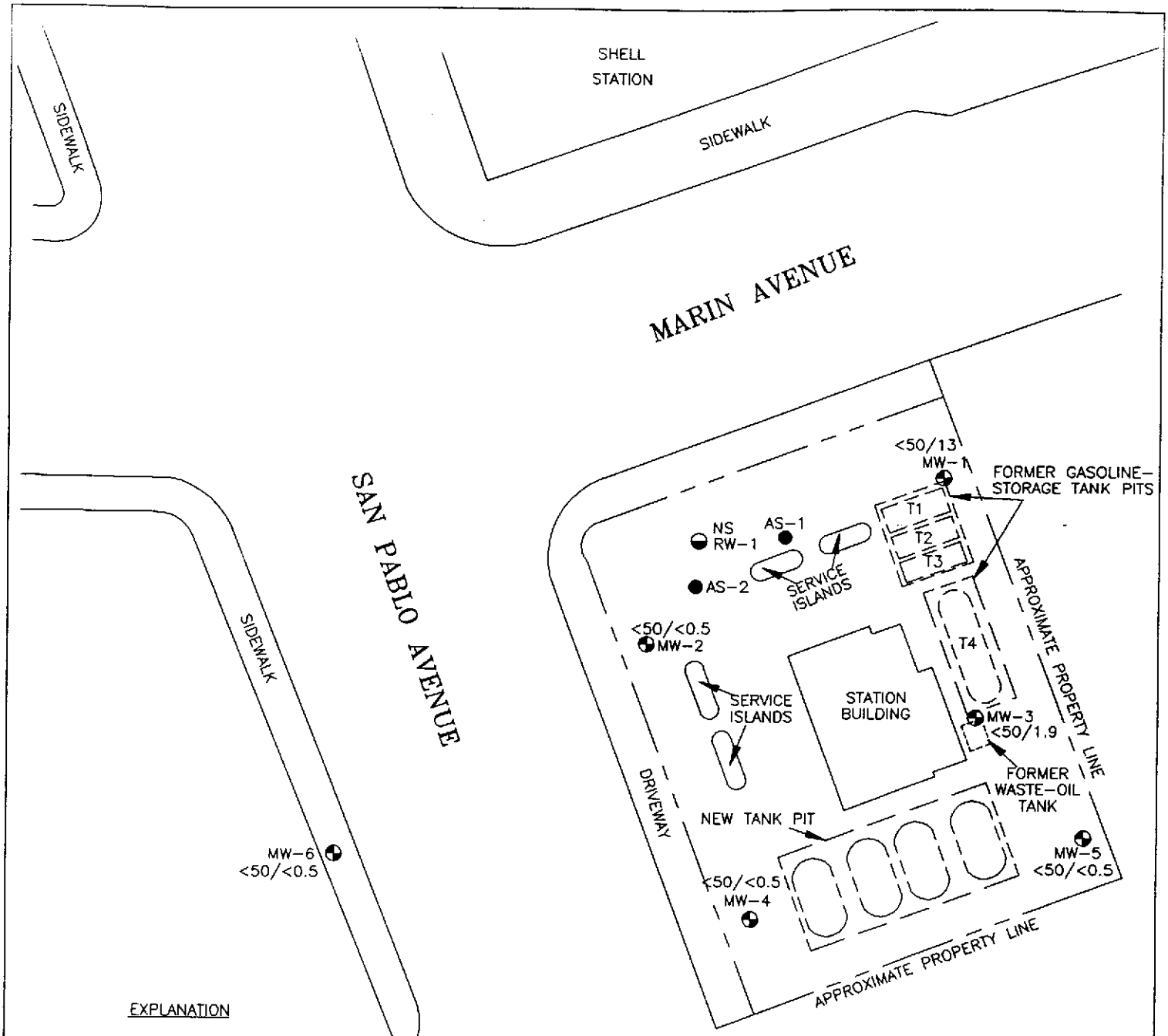
GROUNDWATER GRADIENT MAP
ARCO Station 2035
1001 San Pablo Avenue
Albany, California

PLATE 3



EXPLANATION

RW-1 ◒ = Recovery well (RESNA, October 1991)

MW-6 ◒ = Monitoring well (RESNA, October 1991 and November 1992)

AS-2 ● = Air sparge well (RESNA, June 1993)

<50/13 = Concentration of TPHg/Benzene in groundwater, in parts per billion, February 1, 1994

NS = Not sampled due to operation of the interim remediation system

N

Approximate Scale

40 20 0 40 80

feet

Source: Surveyed by John E. Koch, Land Surveyor.

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TPHg/BENZENE CONCENTRATIONS IN GROUNDWATER
ARCO Station 2035
1001 San Pablo Avenue
Albany, California

PLATE 4

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 2035
Albany, California
(Page 1 of 4)

Well Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Evidence of Product
MW-1				
10/29/91	41.41	11.86	29.55	None
11/07/91		10.94	30.47	None
11/14/91		10.97	30.44	None
01/19/92		10.06	31.35	None
02/19/92		8.65	32.76	None
03/19/92		8.33	33.08	None
04/21/92		9.32	32.09	None
05/12/92		9.82	31.59	None
06/12/92		10.50	30.91	None
07/15/92		10.69	30.72	None
08/07/92		10.53	30.88	None
09/08/92		11.04	30.37	None
10/26/92		11.24	30.17	None
11/23/92		10.90	30.51	None
12/16/92		9.40	32.01	None
01/13/93		7.73	33.68	None
02/22/93		7.56	33.85	None
03/25/93		8.48	32.93	None
04/13/93		8.91	32.50	None
05/22/93		9.68	31.73	None
06/17/93		9.68	31.73	None
07/27/93		10.09	31.32	None
08/24/93		10.51	30.90	None
12/08/93		10.39	31.02	None
02/01/94		9.29	32.12	None
MW-2				
10/29/91	40.38	11.10	29.28	None
11/07/91		11.20	29.18	None
11/14/91		11.21	29.17	None
01/19/92		10.44	29.94	None
02/19/92		8.70	31.68	None
03/19/92		8.84	31.54	None
04/21/92		9.80	30.58	None
05/12/92		10.29	30.09	None
06/12/92		10.95	29.43	None
07/15/92		11.15	29.23	None
08/07/92		11.01	29.37	None
09/08/92		11.41	28.97	None
10/26/92		11.60	28.78	None
11/23/92		7.31	33.07	None

See notes on page 4 of 4.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 2035
Albany, California
(Page 2 of 4)

Well Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Evidence of Product
MW-2 (cont.)				
12/16/92		9.82	30.56	None
01/13/93		8.25	32.13	None
02/22/93		8.25	32.13	None
03/25/93		8.82	31.56	None
04/13/93		9.30	31.08	None
05/22/93		10.57	29.81	None
06/17/93		10.25	30.13	None
07/27/93		10.48	29.90	None
08/24/93		10.82	29.56	None
12/08/93		10.68	29.70	None
02/01/94		9.66	30.72	None
MW-3				
10/29/91	41.44	11.62	29.82	None
11/07/91		11.52	29.92	None
11/14/91		11.50	29.94	None
01/19/92		10.56	30.88	None
02/19/92		9.52	31.92	None
03/19/92		9.01	32.43	None
04/21/92		9.70	31.74	None
05/12/92		10.29	31.15	None
06/12/92		11.26	30.18	None
07/15/92		11.28	30.16	None
08/07/92		11.15	30.29	None
09/08/92		11.70	29.74	None
10/26/92		12.15	29.29	None
11/23/92		12.55	28.89	None
12/16/92		10.15	31.29	None
01/13/93		9.12	32.32	None
02/22/93		8.18	33.26	None
03/25/93		8.57	32.87	None
04/13/93		9.55	31.89	None
05/22/93		10.56	30.88	None
06/17/93		10.41	30.70	None
07/27/93		10.53	30.91	None
08/24/93		10.86	30.58	None
12/08/93		10.91	30.53	None
02/01/94		9.71	31.73	None

See notes on page 4 of 4.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 2035
Albany, California
(Page 3 of 4)

Well Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Evidence of Product
MW-4				
01/13/93	40.33	8.05	32.28	None
02/22/93		7.58	32.75	None
03/25/93		8.27	32.06	None
04/13/93		8.54	31.79	None
05/22/93		9.52	30.81	None
06/17/93		9.53	30.80	None
07/27/93		10.14	30.19	None
08/24/93		10.42	29.91	None
12/08/93		10.31	30.02	None
02/01/94		9.10	31.23	None
MW-5				
01/13/93	41.84	8.22	33.62	None
02/22/93		7.92	33.92	None
03/25/93		8.67	33.17	None
04/13/93		9.18	32.66	None
05/22/93		10.12	31.72	None
06/17/93		10.03	31.81	None
07/27/93		10.74	31.10	None
08/24/93		11.02	30.82	None
12/08/93		10.92	30.92	None
02/01/94		9.74	32.10	None
MW-6				
01/13/93	40.13	9.84	30.29	None
02/22/93		9.94	30.19	None
03/25/93		10.68	29.45	None
04/13/93		11.12	29.01	None
05/22/93		11.74	28.39	None
06/17/93		11.75	28.38	None
07/27/93		12.20	27.93	None
08/24/93		12.41	27.72	None
12/08/93		10.11	30.02	None
02/01/94		11.80	28.33	None
RW-1				
10/29/91	40.33	10.85	29.48	Sheen
11/07/91		11.97	28.36	0.01
11/14/91		11.03	29.30	0.01
01/19/92		10.22*	30.11*	3.26
02/19/92		8.49*	31.84*	2.14

See notes on page 4 of 4.

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TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 2035
Albany, California
(Page 4 of 4)

Well Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Evidence of Product
RW-1 (cont.)				
03/19/92		8.50*	31.83*	0.50
04/21/92		9.68*	30.65	0.03
05/12/92	40.33	10.47	29.86	Product not measured
06/12/92		11.41	28.92	Product not measured
07/15/92		11.35	28.98	None
08/07/92		10.80*	29.53*	0.02
09/08/92		10.80*	29.53*	0.62
10/26/92		11.42*	28.91*	0.04
11/23/92		10.94	29.39	Sheen
12/16/92		9.78*	30.55*	0.51
01/13/93		8.35	31.98	Product in skimmer
02/22/93		7.94*	32.39*	0.01
03/25/93		8.81	31.52	None
04/13/93		9.67**	NC**	Product not measured
05/22/93		10.04	30.29	Sheen
06/17/93		10.26*	30.07*	0.01 in bailer
07/27/93		10.58	29.75	Sheen
08/24/93		10.80*	29.53*	0.05
12/08/93		10.46*	29.87*	0.30
02/01/94		1.00	39.33	None
AS-1***				
08/24/93	41.03	10.97	30.06	None
AS-2***				
08/24/93	40.31	10.45	29.86	None

Notes:

Depth-to-water measurements in feet below the top of the well casing.

* = Adjusted water level due to product. The recorded thickness of the floating product was 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. These calculated groundwater depths were subtracted from surveyed wellhead elevations to obtain the adjusted groundwater elevations.

** = Well contained product of unknown thickness. Groundwater elevation could not be corrected, therefore it was not used in gradient evaluation.

*** = Wells AS-1 and AS-2 were monitored during Third Quarter 1993 as a one-time event in conjunction with an air-sparge pilot test performed at the site.

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TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES - TPHg and BTEX
ARCO Station 2035
Albany, California
(Page 1 of 2)

Well Date	TPHg	B	T	E	X
MW-1					
10/29/91	620	76	69	15	60
03/19/92	6,500	2,600	89	42	290
06/12/92	2,900	1,100	2.5	21	15
09/08/92	820	350	<5*	<5*	<5*
10/26/92	190	68	<0.5	0.6	<0.5
01/13/93	430	130	5.3	5.0	9.0
04/13/93	5,300	2,100	<20*	63	36
08/24/93	630	230	<2.5*	3.1	3.3
12/08/93	81	20	<0.5	0.9	<0.5
02/01/94	<50	13	<0.5	0.5	0.6
MW-2					
10/29/91	<60	2.4	4.6	0.48	2.3
03/19/92	<50	6.8	0.9	<0.5	1.1
06/12/92	<50	<0.5	<0.5	<0.5	<0.5
09/08/92	<50	<0.5	<0.5	<0.5	<0.5
10/26/92	<50	<0.5	<0.5	<0.5	<0.5
01/13/93	<50	<0.5	<0.5	<0.5	<0.5
04/13/93	<50	<0.5	<0.5	<0.5	<0.5
08/24/93	<50	<0.5	<0.5	<0.5	<0.5
12/08/93	<50	<0.5	<0.5	<0.5	<0.5
02/01/94	<50	<0.5	<0.5	<0.5	<0.5
MW-3					
10/29/91	32	2.1	2.8	0.35	1.8
03/19/92	2,100	780	8.8	16	58
06/12/92	720	210	<2.5*	23	4.0
09/08/92	<50	5.3	<0.5	<0.5	<0.5
10/26/92	<50	0.6	<0.5	<0.5	<0.5
01/13/93	<50	1.1	<0.5	<0.5	<0.5
04/13/93	68	13	<0.5	1.6	1.1
08/24/93	<50	<0.5	<0.5	<0.5	<0.5
12/08/93	<50	<0.5	<0.5	<0.5	<0.5
02/01/94	<50	1.9	<0.5	2.1	<0.5
MW-4					
01/13/93	<50	<0.5	1.3	<0.5	1.6
04/13/93	<50	<0.5	<0.5	<0.5	<0.5
08/24/93	<50	<0.5	<0.5	<0.5	<0.5
12/08/93	<50	<0.5	<0.5	<0.5	<0.5
02/01/94	<50	<0.5	<0.5	<0.5	<0.5

See notes on page 2 of 2.

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TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES - TPHg and BTEX
ARCO Station 2035
Albany, California
(Page 2 of 2)

Well Date	TPHg	B	T	E	X
MW-5					
01/13/93	<50	<0.5	<0.5	<0.5	<0.5
04/13/93	<50	<0.5	<0.5	<0.5	<0.5
08/24/93	<50	<0.5	<0.5	<0.5	<0.5
12/08/93	<50	<0.5	<0.5	<0.5	<0.5
02/01/94	<50	<0.5	<0.5	<0.5	<0.5
MW-6					
01/13/93	<50	<0.5	<0.5	<0.5	<0.5
04/13/93	<50	<0.5	<0.5	<0.5	<0.5
08/24/93	<50	<0.5	<0.5	<0.5	<0.5
12/08/93	<50	<0.5	<0.5	<0.5	<0.5
02/01/94	<50	<0.5	<0.5	<0.5	<0.5
RW-1					
10/29/91	Not sampled--sheen				
03/19/92	Not sampled--floating product				
06/12/92	Not sampled--floating product				
09/08/92	Not sampled--floating product				
10/23/92	Not sampled--floating product				
01/13/93	Not sampled--floating product in skimmer				
04/13/93	Not sampled--floating product				
08/24/93	Not sampled--floating product				
12/08/93	Not sampled--floating product				
02/01/94	Not sampled--connected to remediation system				
AS-1**					
08/24/93	2,400	78	87	52	370
AS-2**					
08/24/93	30,000	1,300	2,800	980	5,900
MCL:	---	1	---	680	1,750
DWAL:	---	---	100	---	---

Notes:
Results in parts per billion (ppb).
TPHg = Total petroleum hydrocarbons as gasoline using EPA Method 5030/8015/8020.
BTEX = B: benzene, T: toluene, E: ethylbenzene, X: total xylenes isomers, analyzed using EPA Method 5030/8015/8020.
< = Results reported below the laboratory detection limit.
* = Laboratory Raised Methods Reporting Limit (MRL) due to high analyte concentration requiring sample dilution.
** = Wells AS-1 and AS-2 were monitored during Third Quarter 1993 as a one-time event in conjunction with an air-sparge pilot test performed at the site.
MCL = State Maximum Contaminant Level (October 1990).
DWAL = State Drinking Water Action Level (October 1990).

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TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES
- TPHd, TOG, VOC, BNAs, PCB and Metals
ARCO Station 2035
Albany, California

Well Date	TPHd	TOG	VOC	BNAs	PCB	Cd	Cr	Pb	Ni	Zn
MW-3										
10/29/91	NA	<5,000	ND[a]	NA	NA	<10	<10	<5	<50	45
03/19/92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06/12/92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09/08/92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/26/92	<50	(600)[600]	ND[b]	NA	NA	NA	NA	NA	NA	NA
12/01/92	NA	NA	NA	ND[c]	ND[d]	NA	NA	NA	NA	NA
01/13/93	NA	(780)[1,100]	NA	NA	NA	NA	NA	NA	NA	NA
04/13/93	NA	(<0.5)[<0.5]	NA	NA	NA	NA	NA	NA	NA	NA
08/24/93	NA	(<0.5)[<0.5]	NA	NA	NA	NA	NA	NA	NA	NA
12/08/93	NA	(900)[500]	NA	NA	NA	NA	NA	NA	NA	NA
02/01/94	NA	(<500)[<500]	NA	NA	NA	NA	NA	NA	NA	NA
MCL:	—	—	—	—	—	10	50	50	—	—

Notes:
Results in parts per billion (ppb).

TPHd = Total petroleum hydrocarbons as diesel analyzed using EPA Method 3510/California DHS LUFT Method.
TOG = Total oil and grease analyzed using Standard Method 5520B&F or 5520C (780) and 5520F [1.100].
VOCs = Volatile organic compounds analyzed using EPA Method 624.
BNAs = Semivolatile organic compounds analyzed using EPA Method 3510/8270.
PCBs = Polychlorinated biphenyls analyzed using EPA Method 3510/8080.
Cd = Cadmium analyzed using EPA Method 200.7.
Cr = Chromium analyzed using EPA Method 200.7.
Ni = Nickel analyzed using EPA Method 200.7.
Zn = Zinc analyzed using EPA Method 200.7.
Pb = Lead analyzed using EPA Method 3010.
NA = Not analyzed.
< = Results reported below the laboratory detection limit.
ND = Not detected; detection limit varied according to analyte.
[a] = All 37 compounds were nondetectable except for toluene (3.0 ppb).
[b] = All 41 compounds analyzed were nondetectable.
[c] = All 34 compounds analyzed were nondetectable.
[d] = All 7 compounds analyzed were nondetectable.
MCL = State Maximum Contaminant Level (October 1990).

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TABLE 4
APPROXIMATE CUMULATIVE PRODUCT RECOVERED
ARCO Station 2035
Albany, California

Well	YEAR	Product Recovered (gallons)
RW-1		
	1992 TOTAL:	22.30
	1993 TOTAL:	1.0
	1994 TO DATE:	0.0
	TOTAL TO DATE:	23.30

Product measured and bailed by RESNA or EMCON personnel.

TABLE 5
VAPOR EXTRACTION SYSTEM OPERATION DATA
ARCO Station 2035, Albany, California
(Page 1 of 2)

DATE	VAPOR EXTRACTION WELLS ON LINE STATUS										COMB WELL FLOW (scfm)	DIL AIR FLOW (scfm)	INF FLOW (scfm)	INF VAC ("WC)	TPHg WELL CONC (mg/m^3)	TPHg INF CONC (mg/m^3)	TPHg EFF CONC (mg/m^3)
	VW 1	VW 2	VW 3	VW 4	VW 5	VW 6	VW 7	VW 8	VW 9	RW 1							
12/07/93	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10	90	100	NM	10,000	1,400	76
12/08/93	SYSTEM SHUTDOWN AND NOT SAMPLED DUE TO A FAILED SAMPLING PUMP																
12/09/93	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10	90	100	40	NS	1,400	130
12/10/93	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	5	82	87	38	NS	1,500	21
12/15/93	✓	✓	✓	✓	✓	✓	✓	✓	✓		45	55	100	65	NS	1,800	NS
12/16/93	SYSTEM SHUTDOWN 12/16/93 TO 12/21/93 DUE TO FAILURE OF THE PROCESS BLOWER																
12/21/93	✓	✓	✓	✓	✓	✓	✓	✓	✓		20	80	100	48	NS	NS	NS
12/25/93	SYSTEM SHUTDOWN 12/25/93 TO 12/29/93 DUE TO A CONTROL FAULT OF THE OXIDIZER																
12/29/93	✓	✓	✓	✓	✓	✓	✓	✓	✓		54	24	78	60	NS	NS	NS
12/31/93	SYSTEM SHUTDOWN 12/31/93 DUE TO HIGH LIQUID LEVEL IN THE KNOCKOUT DRUM																
01/07/94	✓	✓	✓	✓	✓	✓	✓	✓	✓		37	23	60	40	NS	NS	NS
01/12/94	✓	✓	✓	✓	✓	✓	✓	✓	✓		41	23	64	42	NS	2,500	52
01/24/94	SYSTEM SHUTDOWN 1/24/94 DUE TO NO AVAILABLE WELL SCREEN.																

SEE NOTES ON PAGE 2 OF 2.

TABLE 5
VAPOR EXTRACTION SYSTEM OPERATION DATA
ARCO Station 2035, Albany, California
(Page 2 of 2)

NOTES:
COMB WELL FLOW = Combined Well Flow Rates
DIL AIR FLOW = Dilution Air Flow Rate
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 2035, Albany, California
(Page 1 of 2)

Sample Location & Date	Sample ID	TPHg	Benzene	Toluene	Ethylbenzene	Total Xylenes
VW-1 12/09/93	AS-HV-1	9,700	990	430	<0.05	38
VW-2 12/09/93	AS-HV-2	21,000	1,200	630	79	240
VW-3 12/09/93	AS-HV-3	8,000	270	400	57	200
VW-4 12/09/93	AS-HV-4	9,000	250	320	44	140
VW-5 12/09/93	AS-HV-5	2,100	11	280	32	110
VW-6 12/09/93	AS-HV-6	9,600	450	330	46	140
VW-7 12/09/93	AS-HV-7	12,000	1,300	480	32	91
VW-8 12/09/93	AS-HV-8	4,900	89	38	<0.05	18
VW-9 12/09/93	AS-HV-9	6,600	130	74	58	120
RW-1 12/09/93	AS-HV-10	6,800	130	82	36	77
ALL WELLS 12/07/93	AS-COMBINE WELLS	10,000	540	300	31	100

See notes on page 2 of 2.

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TABLE 6
CUMULATIVE RESULTS OF LABORATORY ANALYSES
OF AIR SAMPLES
ARCO Station 2035, Albany, California
(Page 2 of 2)

Sample Location & Date	Sample ID	TPHg	Benzene	Toluene	Ethylbenzene	Total Xylenes
INFLUENT						
12/07/93	AS-INFLUENT	1,400	38	22	3.5	11
12/09/93	AS-INFLUENT	1,400	60	67	17	55
12/10/93	AS-INFLUENT	1,500	100	39	6.1	19
12/15/93	AS-INFLUENT	1,800	79	73	13	42
01/12/94	AS-INFLUENT	2,500	37	140	27	110
EFFLUENT						
12/07/93	AS-EFFLUENT	76	2.3	4.8	2.1	7.2
12/09/93	AS-EFFLUENT	130	3.1	21	4.6	15
12/10/93	AS-EFFLUENT	21	<0.05	1.7	1.4	5.0
01/12/94	AS-EFFLUENT	52	0.93	2.4	1.1	7.4

Notes:

Results in milligrams per cubic meter (mg/m^3), equivalent to micrograms per liter ($\mu g/l$).
TPHg = Total petroleum hydrocarbons as gasoline
BTEX and TPHg analyzed using EPA method 5030/8015/8020.
ALL WELLS = Sample taken before fresh air dilution.
INFLUENT = Samples taken after fresh air dilution before entering Therm-Ox.
EFFLUENT = Samples taken from exhaust stack of Therm-Ox.

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TABLE 7
VAPOR EXTRACTION SYSTEM ESTIMATED GASOLINE REMOVAL
ARCO Station 2035
Albany, California

OPERATING PERIOD FROM	OPERATING PERIOD TO	OPERATING HRS THIS PERIOD	TOTAL HOURS IN PERIOD	PERCENT OF TIME OPERATIONAL	ESTIMATED EXTRACTION RATE (ppd)	TOTAL POUNDS REMOVED	TOTAL GALLONS REMOVED
1/01/94	1/07/94	0	158	0 %	SYSTEM SHUTDOWN		
1/07/94	1/12/94	123	123	100 %	11.6	59	9.5
1/12/94	1/24/94	285	288	99 %	14.4	171	27
1/24/94	3/31/94	0	1,591	0 %	SYSTEM SHUTDOWN		
TOTAL THIS QUARTER		408	2,160	19 %	--	230	37
TOTAL SINCE STARTUP		738	2,745	27 %	--	324	52

NOTES:
ppd = Pounds per day
Example Calculations:
Extraction Rate (ppd) = Inf. Conc.($\mu g/\ell$) x Total Flow(scfm) x 1,440 min/day x 1 lb/454,000,000 μg x 28.32 ℓ/ft^3
Pounds Removed = Operating hours(hrs) ÷ 24(hrs/day) x Extraction rate(lb/day)
Gallons Removed = Pounds removed(lbs) ÷ 6.22 (lbs/gal)

TABLE 8
VAPOR EXTRACTION SYSTEM
DESTRUCTION EFFICIENCIES AND EMISSION RATES
ARCO Station 2035
Albany, California

SAMPLING DATE	TPHg DESTRUCTION EFFICIENCY	TPHg EMISSION RATE (ppd)	BENZENE EMISSION RATE (ppd)
1/12/94	97.9 %	0.30	0.0053

NOTES:
TPHg = Total purgeable hydrocarbons as gasoline
ppd = Pounds per day
Example Calculations:
Destruction efficiency (%) = [TPHg Inf. Conc. - TPHg Eff. Conc.]/TPHg Inf. Conc. x 100
Emission Rate (lb/day) = Eff. Conc.($\mu g/\ell$) x Total Flow(scfm) x 1,440 min/day x 1 lb/454,000,000 μg x 28.32 ℓ/ft^3

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APPENDIX A

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

I NTEGRATED
W ASTESTREAM
M ANAGEMENT, INC.

February 22, 1994

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

Dear Mr. John Young:

Attached are the field data sheets and analytical results for quarterly ground water sampling at ARCO Facility No. A-2035 in Albany, California. Integrated Wastestream Management measured the depth to water and collected samples from wells at this site on February 1, 1994.

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

Please call us if you have any questions.

Sincerely,
Integrated Wastestream Management

Tom DeLon
Project Manager

Walter H. Howe
Registered Geologist

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

I NTEGRATED
W ASTESTREAM
M ANAGEMENT

A2035QA4.XLS

Summary of Ground Water Sample Analyses ARCO Facility No. A-2035, Albany, California

WELL NUMBER	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	RW-1
DATE SAMPLED	2/1/94	2/1/94	2/1/94	2/1/94	2/1/94	2/1/94	2/1/94
DEPTH TO WATER	9.29	9.66	9.71	9.10	9.74	11.80	1.00
SHEEN	NONE	NONE	NONE	NONE	NONE	NONE	NONE
PRODUCT THICKNESS	NA	NA	NA	NA	NA	NA	NA
TPHg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	**
BTEX							
BENZENE	13	N.D.	1.9	N.D.	N.D.	N.D.	**
TOLUENE	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	**
ETHLYBENZENE	0.5	N.D.	2.1	N.D.	N.D.	N.D.	**
XYLENES	0.6	N.D.	N.D.	N.D.	N.D.	N.D.	**
SM 5520 C							
OIL & GREASE	NA	NA	N.D.	NA	NA	NA	NA
SM 5520 F							
HYDROCARBONS	NA	NA	N.D.	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)

N.D. = Not Detected.
NA = Not applicable
** = Well obstruction, unable to sample

FIELD REPORT

DEPTH TO WATER / FLOATING PRODUCT SURVEY

SITE ARRIVAL TIME: 1350

SITE DEPARTURE TIME: 1730

WEATHER CONDITIONS: Sunny/Fair

PROJECT NO.: _____ LOCATION: 1001 San Pablo Ave. DATE: 2-21-94

CLIENT/STATION #: Arco 7035 FIELD TECHNICIAN: Vince / Francisco DAY OF WEEK: Monday

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
6	MW-1	OK	YES	OK	OK	OK	29.6	9.29	9.29	N/A	N/A	No	4"	
1	MW-2	OK	YES	OK	OK	OK	28.7	9.66	9.66				4"	
2	MW-3	OK	YES	OK	OK	OK	32.8	9.71	9.71				4"	
3	MW-4	OK	YES	OK	OK	OK	25.0	9.16	9.16				4"	
4	MW-5	OK	YES	OK	OK	OK	24.2	9.74	9.74				4"	
5	MW-6	OK	YES	OK	OK	OK	24.2	11.50	11.50				2"	
7	RW-1	OK	YES	OK	OK	OK	25.0	1.00	1.00				4" NO SAMPLE RECOMMENDED W/HOSES CONNECTED TO WELL	

A bailer was not used for subjective evaluation on RW-1. The results were obtained by visual observations from surface. 2.0.

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-5

CLIENT/STATION #: ARCO 2035 ADDRESS: 1001 SAN PABLO AVE

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 24.2 - DTW 9.74 X GALLON (LINEAR FT.) 0.66 X CASING VOLUME 3 = CALCULATED PURGE 28.63 ACTUAL PURGE 23.0

DATE PURGED: 2-1-94 START (2400 HR) 1455 END (2400 HR) 1501
DATE SAMPLED: 2-1-94 START (2400 HR) 1510 END (2400 HR) 1515

TIME (2400 HR)	VOLUME (GAL.)	pH (UNITS)	E.C. (UMHOS/ CM@25 C)	TEMP. (F)	COLOR (VISUAL)	TURBIDITY (VISUAL)
1456	3	7.48	0.55	64.9	cloudy	
1458	12	7.29	0.51	64.0	clear	
1459	18	7.22	0.52	64.1	clear	
1501	23	7.19	0.50	63.9	clear	

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

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (TEFLON)	___ 2" Bladder Pump	___ Bailer (TEFLON)
✓ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Dedicated		✓ Bailer Disposable	___ Dedicated
Other: _____		Other: _____	

REMARKS: Well pumped dry at 23 gallons

PRINT NAME: Vince Valdez

SIGNATURE: Vince Valdez

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-4

CLIENT/STATION #: ARCO 2035 ADDRESS: 1001 SAN PABLO AVE

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

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

TD 25.0 - DTW 9.10 X GALLON/LINEAR FT. 0.66 X CASING VOLUME 3 = CALCULATED PURGE 31.48 ACTUAL PURGE 28.0

DATE PURGED: 2-1-94 START (2400 HR) 1515 END (2400 HR) 1522
DATE SAMPLED: 2-1-94 START (2400 HR) 1526 END (2400 HR) 1526

TIME (2400 HR)	VOLUME (GAL.)	pH (UNITS)	E.C. (UMHOS/ CM@25 C)	TEMP. (F)	COLOR (VISUAL)	TURBIDITY (VISUAL)
1516	4	6.57	0.47	66.0	cloudy	
1518	11	6.46	0.49	65.7	clear	
1519	16	6.42	0.48	65.9	clear	
1520	25	6.35	0.51	65.7	clear	
1522	28	6.45	0.54	65.6	clear	

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

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (TEFLON)	___ 2" Bladder Pump	___ Bailer (TEFLON)
✓ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Dedicated		✓ Bailer Disposable	___ Dedicated
Other: _____		Other: _____	

REMARKS: well pumped dry at 28 gallons

PRINT NAME: Vince Valdez

SIGNATURE: Vincent Valdez

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-2

CLIENT/STATION #: ARCO 2035 ADDRESS: 1001 SAN PABLO AVE

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 28.7 - DTW 9.66 X GALLON/LINEAR FT. 0.66 X CASING VOLUME 3 = CALCULATED PURGE 37.69 ACTUAL PURGE 40.0

DATE PURGED: 2-1-94 START (2400 HR) 1538 END (2400 HR) 1546
DATE SAMPLED: 2-1-94 START (2400 HR) 1552 END (2400 HR) 1557

TIME (2400 HR)	VOLUME (GAL.)	pH (UNITS)	E.C. (UMHOS/ CM@25 C)	TEMP. (F)	COLOR (VISUAL)	TURBIDITY (VISUAL)
1540	4	6.36	0.67	66.4	cloudy	
1541	10	6.52	0.68	66.3	clear	
1542	18	6.55	0.70	66.2	clear	
1544	26	6.61	0.70	66.5	clear	
1546	40	6.62	0.71	66.1	clear	

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

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (TEFLON)	___ 2" Bladder Pump	___ Bailer (TEFLON)
✓ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Dedicated		✓ Bailer Disposable	___ Dedicated
Other: _____		Other: _____	

REMARKS: _____

PRINT NAME: Vince Hedges

SIGNATURE: Vince Hedges

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-3

CLIENT/STATION #: ARCO 2035 ADDRESS: 1001 SAN PABLO AVE.

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 32.8 - DTW 9.71 X GALLON (LINEAR FT.) 0.66 X CASING VOLUME 3 = CALCULATED PURGE 45.71 ACTUAL PURGE 46.0

DATE PURGED: 2-1-94 START (2400 HR) 1606 END (2400 HR) 1615
DATE SAMPLED: 2-1-94 START (2400 HR) 1621 END (2400 HR) 1621

TIME (2400 HR)	VOLUME (GAL.)	pH (UNITS)	E.C. (UMHOS/ CM@25 C)	TEMP. (F)	COLOR (VISUAL)	TURBIDITY (VISUAL)
1607	4	6.73	063	650	clear	
1609	12	6.65	0.63	64.2	clear	
1611	25	6.64	0.75	64.6	clear	
1613	36	6.76	0.62	650	cloudy	
1615	46	6.72	0.62	648	cloudy	

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

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (TEFLON)	___ 2" Bladder Pump	___ Bailer (TEFLON)
✓ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Dedicated		✓ Bailer Disposable	___ Dedicated
Other: _____		Other: _____	

REMARKS: _____

PRINT NAME: Vince Vasquez

SIGNATURE: Vince Vasquez

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-6

CLIENT/STATION #: ARCO 2035 ADDRESS: 1001 SAN PABLO AVE

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 24.2 - DTW 11.80 X GALLON/LINEAR FT. 0.17 X CASING VOLUME 3 = CALCULATED PURGE 6.32 ACTUAL PURGE 7.0

DATE PURGED: 2-1-94 START (2400 Hr) 1632 END (2400 Hr) 1635

DATE SAMPLED: 2-1-94 START (2400 Hr) 1640 END (2400 Hr) 1645

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1634	2	6.70	0.70	66.4	cloudy	
1634	4	6.68	0.73	66.7	cloudy	
1635	7	6.70	0.75	66.5	cloudy	

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: _____

PAGE 2 OF 3

PRINT NAME: [illegible]

SIGNATURE: [illegible]

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: _____ WELL ID: MW-1

CLIENT/STATION #: ARCO 2035 ADDRESS: 1001 SAN PABLO

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 29.6 - DTW 9.29 X GALLON/LINEAR FT. 0.66 X CASING VOLUME 3 = CALCULATED PURGE 40.21 ACTUAL PURGE 41 C

DATE PURGED: 2-1-94 START (2400 Hr) 1650 END (2400 Hr) 1657

DATE SAMPLED: 2-1-94 START (2400 Hr) 1702 END (2400 Hr) 1702

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1651	6	6.94	0.614	64.6	cloudy	
1652	12	6.71	0.64	64.7	cloudy	
1653	23	6.67	0.70	64.5	clear	
1655	33	6.65	0.75	64.3	clear	
1657	41	6.65	0.75	64.1	clear	

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: _____

PAGE 7 OF 8

PRINT NAME: Vince Valdez

SIGNATURE: Vincent Valdez

Columbia Analytical Services, Inc.

February 16, 1994

Service Request No. SJ94-0166

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

Re: **ARCO Facility No. A2035**

Dear Ms. Austin/Mr. DeLon:

Attached are the results of the water samples submitted to our lab on February 7, 1994. For your reference, these analyses have been assigned our service request number SJ94-0166.

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

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Keoni A. Murphy
Laboratory Manager

Annelise J. Bazar
Regional QA Coordinator

KAM/kmh

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. A2035
Sample Matrix: Water

Dates Collected: 02/01/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: N/A
Service Request: SJ94-0166

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

Sample Name	Oil and Grease, IR	Hydrocarbons, IR
MW-3	ND	ND
Method Blank	ND	ND
MRL	0.5	0.5

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

Approved By: Kevin Murphy Date: February 16, 1994

[940166.XLW]Oil & Grease/2/16/94

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

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. A2035
Sample Matrix: Water

Dates Collected: 02/01/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: 02/08/94
Service Request: SJ94-0166

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

Analyte:	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH as Gasoline
Units:	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)
Method Reporting Limit:	0.5	0.5	0.5	0.5	50
Sample Name					
MW-1	13.	ND	0.5	0.6	ND
MW-2	ND	ND	ND	ND	ND
MW-3	1.9	ND	2.1	ND	ND
MW-4	ND	ND	ND	ND	ND
MW-5	ND	ND	ND	ND	ND
MW-6	ND	ND	ND	ND	ND
Method Blank	ND	ND	ND	ND	ND

Approved By: Kevin A Murphy Date: February 16, 1994

[940166.XLW]8020w1/2/16/94

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APPENDIX A

LABORATORY QC RESULTS

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM		**Dates Collected:**	02/01/94
Project:	ARCO Facility No.	A2035	**Date Received:**	02/07/94
Sample Matrix:	Water		**Date Extracted:**	N/A
			Date Analyzed:	N/A
			Service Request:	SJ94-0166

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

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

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

Approved By: Kevin Murphy Date: February 16, 1994

[940166.XLW]O&Gcesw4/2/16/94

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. A2035
Sample Matrix: Water

Dates Collected: 02/01/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: N/A
Service Request: SJ94-0166

Laboratory Control Spike Summary
Petroleum Hydrocarbons, IR
SM 5520 F
Units: mg/L (ppm)

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

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

Approved By: Edward Murphy Date: February 16, 1994

[940166.XLW]O&GlcswS/2/16/94

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM	**Dates Collected:**	02/01/94
Project:	ARCO Facility No. A2035	**Date Received:**	02/07/94
Sample Matrix:	Water	**Date Extracted:**	N/A
		Date Analyzed:	02/08/94
		Service Request:	SJ94-0166

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

Sample Name	Percent Recovery a,a,a-Trifluorotoluene
MW-1	77.
MW-2	88.
MW-3	78.
MW-4	88.
MW-5	81.
MW-6	79.
MS	79.
DMS	83.
Method Blank	88.

CAS Acceptance Limits: 62-112

Approved By: Kevin Murphy Date: February 16, 1994

[940166.XLW]8020sr1/2/16/94

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	IWM		**Dates Collected:**	02/01/94
Project:	ARCO Facility No.	A2035	**Date Received:**	02/07/94
Sample Matrix:	Water		**Date Extracted:**	N/A
			Date Analyzed:	02/08/94
			Service Request:	SJ94-0166

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.	27.8	111.	85-115
Toluene	25.	27.4	110.	85-115
Ethylbenzene	25.	27.4	110.	85-115
Total Xylenes	75.	83.4	111.	85-115
TPH as Gasoline	250.	253.	101.	90-110

Approved By: Kevin Murphy Date: February 16, 1994

[940166.XLW]8020ccs/2/16/94

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

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. A2035
Sample Matrix: Water

Dates Collected: 02/01/94
Date Received: 02/07/94
Date Extracted: N/A
Date Analyzed: 02/08/94
Service Request: SJ94-0166

Matrix Spike/Duplicate Matrix Spike Summary
BTE
EPA Methods 5030/8020
Units: µg/L (ppb)

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria
Benzene	25.	ND	28.4	26.6	114.	106.	75-135
Toluene	25.	ND	28.0	26.4	112.	106.	73-136
Ethylbenzene	25.	ND	28.1	26.4	112.	106.	69-142

Approved By: Kevin A. Murphy Date: February 16, 1994

[940166.XLW]8020btems/2/16/94

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APPENDIX B

CHAIN OF CUSTODY

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

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. IWM-94-5CC

Chain of Custody

ARCO Facility no. A 2035	City (Facility) Albany	Project manager (Consultant) TOM DeFon	Laboratory name Columbia
ARCO engineer Kyle Christie	Telephone no. (ARCO)	Telephone no. (Consultant) 408/942 8955 / Fax no. (Consultant) 408/942 1499	Contract number 07077
Consultant name IWM	Address (Consultant) 950 Ames av. Milp Ca 95035		Method of shipment CAS COURIER

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid (HCL)	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E (5520 F&F silica gel)	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 ☐		
TB FB	1-2	2		✓		✓	✓	2-1-94	1355		✓	✓										
MW-1	3-4	2		✓		✓	✓	〃	1702		✓	✓										
MW-2	5-6	2		✓		✓	✓	〃	1552		✓	✓										
MW-3	7-9	3		✓		✓	✓	〃	1621		✓	✓		✓								
MW-4	10-11	2		✓		✓	✓	〃	1526		✓	✓										
MW-5	12-13	2		✓		✓	✓	〃	1510		✓	✓										
MW-6	14-15	2		✓		✓	✓	〃	1640		✓	✓										

Special detection Limit/reporting

Special QA/QC

Remarks
Hold on TB-FB
5520 C&F PER AARON @ REINA 2/8/94 (408) 264-7723

Lab number 5J94-0166

Condition of sample: ok

Temperature received: cool

Relinquished by sampler: [signature]	Date 2-7-94	Time 9:03AM	Received by: [signature]
Relinquished by: [signature]	Date 2/7/94	Time	Received by: [signature] CAS - 2-7-94 11:10
Relinquished by	Date	Time	Received by laboratory / Date / Time

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

RESNA
Working to Restore Nature

APPENDIX B

LABORATORY ANALYTICAL RESULTS OF AIR SAMPLES WITH CHAIN-OF-CUSTODY RECORDS

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

RESNA	Client Project ID:	ARCO, 2035 Albany	Sampled:	Jan 12, 1994
3315 Almaden Expwy., Suite 34	Sample Matrix:	Air	Received:	Jan 14, 1994
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Reported:	Jan 26, 1994
Attention: John Young	First Sample #:	4A67801	Amended:	May 18, 1994

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX DISTINCTION

Analyte	Reporting Limit µg/L	Sample I.D. 4A67801 AS-Influent	Sample I.D. 4A67802 AS-Effluent
Purgeable Hydrocarbons	50	2,500	52
Benzene	0.50	37	0.93
Toluene	0.50	140	2.4
Ethyl Benzene	0.50	27	1.1
Total Xylenes	0.50	110	7.4
Chromatogram Pattern:		Gas + Non-Gas Mix < C8	Gas

Quality Control Data

Report Limit Multiplication Factor:	25	1.0
Date Analyzed:	1/14/94	1/14/94
Instrument Identification:	GCHP-17	GCHP-2
Surrogate Recovery, %: (QC Limits = 70-130%)	166*	101

* Coelution confirmed.

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 Clark
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

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

Client Project ID: ARCO, 2035 Albany
Matrix: Liquid
QC Sample Group: 4A67801

Reported: Jan 26, 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#:	4A38709	4A38709	4A38709	4A38709
Date Prepared:	-	-	-	-
Date Analyzed:	1/14/94	1/14/94	1/14/94	1/14/94
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:	110	110	110	110
Matrix Spike Duplicate % Recovery:	110	110	110	107
Relative % Difference:	0.0	0.0	0.0	2.8
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.

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 Clark
Project Manager

Sequoia Analytical

680 Chesapeake Drive, Redwood City, CA 94063, (415) 364-9600, FAX (415) 364-9233
1900 Bates Avenue, Suite L, Concord, CA 94520, (510) 686-9600, FAX (510) 686-9689
819 Striker Avenue, Suite 8, Sacramento, CA 95834, (916) 921-9600, FAX (916) 921-0100

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

Client Project ID: ARCO, 2035 Albany
Matrix: Liquid
QC Sample Group: 4A67802
Reported: Jan 26, 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#:	4A38709	4A38709	4A38709	4A38709
Date Prepared:	-	-	-	-
Date Analyzed:	1/14/94	1/14/94	1/14/94	1/14/94
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:	96	97	96	93
Matrix Spike Duplicate % Recovery:	94	95	94	93
Relative % Difference:	2.1	2.1	2.1	0.0
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 Clark
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. [illegible] X 1-5

Chain of Custody

ARCO Facility no. 2035	City (Facility) [illegible]	Project manager (Consultant)	Laboratory name
ARCO engineer [illegible] Michael Whelan	Telephone no. (ARCO)	Telephone no. (Consultant)	Fax no. (Consultant)
Consultant name [illegible]	Address (Consultant) [illegible]		Contract number 07073

Method of shipment: 9401678

Special detection Limit/reporting

Special QA/QC

Remarks: 1

Lab number: 9401678

Sample I.D.	Lab no.	Container no.	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☐ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ Semi VOA ☐ VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
AS-1	[illegible]	[illegible]						1-12-94	[illegible]											-01		
AS-1 [illegible]	[illegible]	[illegible]						"	[illegible]											-02		

Condition of sample:

Temperature received:

	Date	Time			
Relinquished by sampler [illegible]	1/14/94	9:50	Received by [illegible]		
Relinquished by [illegible]	1/14	1:25	Received by		
Relinquished by	Date	Time	Received by laboratory [illegible]	Date 01-14-94	Time 1325

Turnaround time

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

Distribution: W[illegible]opy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Cons[illegible]

A[illegible]92 (2-[illegible]