Applied GeoSystems, Inc.
A RESNA Company

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Working To Restore Nature

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TRANSMITTAL

TO: MR. PAUL SMITH
ACDEH
80 SWAN WAY, ROOM 200
OAKLAND, CALIFORNIA 94621

DATE: 3/9/92
PROJECT NUMBER: 60026.06
SUBJECT: ARCO STATION 276, 10600 MACARTHUR BOULEVARD, OAKLAND, CALIFORNIA.

FROM: JOEL COFFMAN
TITLE: PROJECT GEOLOGIST

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LETTER REPORT
QUARTERLY GROUNDWATER MONITORING
Fourth Quarter 1991
at
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

March 5, 1992

60026.06

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March 5, 1992
0214ccar
60026.06

Mr. Chuck Carmel
ARCO Products Company
P.O. Box 5811
San Mateo, California 94402

Subject: Fourth Quarter 1991 Groundwater Monitoring Report for ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California.

Mr. Carmel:

As requested by ARCO Products Company (ARCO), this letter report summarizes the methods and results of the fourth quarter 1991 groundwater monitoring performed by RESNA at the above-referenced site. The station is on the southeastern side of the intersection of 106th Avenue and MacArthur Boulevard in Oakland, California, as shown on the Site Vicinity Map, Plate 1. ARCO has requested that RESNA perform monthly groundwater monitoring and quarterly sampling to monitor hydrocarbon concentrations associated with the former waste-oil and gasoline tanks to monitor concentrations of volatile organic compounds (VOCs), and to evaluate trends in the hydrocarbon concentrations and groundwater gradient over time at the site.

Prior to the present monitoring, Kaldveer Associates (Kaldveer), Pacific Environmental Group (Pacific), and RESNA (formerly Applied GeoSystems [AGS] and Western Geologic Resources ([WGR]) performed investigations related to the former underground gasoline and waste-oil storage tanks at this site and on the adjacent site (Foothill Square Shopping Center). In 1988, Kaldveer performed environmental assessments which included a survey of past and present site and near-vicinity conditions, drilling 12 soil borings in the Foothill Square Shopping Center, and collecting and analyzing groundwater grab samples from the borings (Kaldveer, October 3, 1988 and October 7, 1988). RESNA performed soil sampling and installed five groundwater monitoring wells at Foothill Square Shopping Center (WGR, January 17, 1989). In December 1988, Pacific performed soil sampling during removal of the waste-oil tank (Pacific, February 6, 1989). In March 1989, RESNA installed groundwater monitoring wells MW-1 through MW-5 on the site (AGS, August 8, 1989). Wells MW-2 was installed in a shallow perched zone, and wells MW-1 and MW-3 through

MW-5 were installed in a deeper zone. In June 1989, Pacific performed a soil gas survey on the site and on the Foothill Square Shopping Center property (Pacific, July 17, 1989). In January and February 1990, RESNA drilled three exploratory soil borings, collected soil samples from the new tank pit area, and observed removal of the gasoline tanks (AGS, February 11, 1991). Quarterly monitoring at the site was initiated in October 1989 (AGS, August 6, 1990). In October and November 1991, RESNA performed a subsurface investigation, which included installation of recovery well RW-1, and an aquifer step-drawdown, pump, and recovery test (a report is forthcoming). The results of previous quarterly monitoring and the investigations performed at the site are presented in the reports listed in the references attached to this letter report. The locations of the onsite groundwater monitoring wells and pertinent site features are shown on the Generalized Site Plan, Plate 2. The offsite boring and groundwater monitoring well locations are presented in the referenced reports.

Groundwater Sampling and Gradient Evaluation

RESNA personnel performed monthly monitoring of groundwater elevations on October 17, November 5, and December 24, 1991, and quarterly sampling was performed on November 5 and 6, 1991. Groundwater monitoring wells MW-1, MW-3 through MW-5, and RW-1 were purged and sampled for total petroleum hydrocarbon as gasoline (TPHg) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) on November 5, 1991; wells were sampled for VOCs on November 6, 1991. Monthly monitoring consisted of measuring depth-to-water (DTW) levels, subjectively analyzing the groundwater for the presence of petroleum hydrocarbon sheen and floating product, and removing floating product from wells as necessary. Quarterly sampling consisted of the monthly monitoring tasks followed by purging and sampling groundwater from monitoring wells MW-1, MW-3, MW-4, MW-5, and recovery well RW-1. Well MW-2 was not sampled for laboratory analysis due to the presence of floating product. The groundwater sampling protocol is attached in Appendix A. Work was performed in accordance with the site safety plan (AGS, March 6, 1989).

The DTW levels, wellhead elevations, and groundwater elevations for this and previous monitoring episodes are summarized in Table 1, Cumulative Groundwater Monitoring Data.

Groundwater elevations decreased approximately 0.50 feet between October and December 1991. Subjective analyses of water samples from well MW-2 (the only well screened in the shallow water-bearing zone) between October 17 and December 24, 1991 indicated the presence of floating product ranging from approximately 0.01 to 0.20 feet (see Table 1). Subjective analyses of water from wells MW-1, MW-3, MW-4, and MW-5 wells did not indicate the presence of floating product during this quarter. Groundwater gradient interpretations from this quarter's monitoring data are shown on the Groundwater Gradient

Maps, Plates 3 through 5. The elevation data for well MW-2 was not used in evaluating the gradient because the well is screened in a separate shallow perched water-bearing zone, unlike the other wells at the site. Groundwater flow was interpreted to be toward the north-northwest, with an average gradient of 0.003. These gradient interpretations are generally consistent with previously evaluated groundwater gradients for this site.

Monitoring wells MW-1, MW-3, MW-4, and MW-5 were purged and sampled on November 5 and 6, 1991 in accordance with the attached protocol in Appendix A. Purge water was removed by a licensed hazardous waste hauler; the Uniform Hazardous Waste Manifest is also attached in Appendix A.

Laboratory Methods

Water samples collected from wells MW-1, MW-3, MW-4, MW-5, and RW-1 on November 5 and 6, 1991 were delivered under Chain of Custody protocol to Sequoia Analytical in Redwood City, California (Hazardous Waste Testing Laboratory Certification No. 1210). The water samples from the November 5, 1991 groundwater sampling episode were analyzed for TPHg and BTEX using modified Environmental Protection Agency (EPA) Methods 5030/8015/8020. The water samples collected on November 6, 1991 were analyzed for twenty-nine VOCs by EPA Method 601.

Laboratory Analysis

Results of these and previous water analyses are summarized in Table 2, Cumulative Results of Laboratory Analyses of Water Samples--TPHg, total petroleum hydrocarbons as diesel (TPHd), BTEX, and total oil and grease (TOG) and in Table 3, Cumulative Results of Laboratory Analyses of Water Samples--VOCs and Metals. TPHg, benzene, and tetrachloroethene concentration contours are shown on Plates 6, 7, and 8, respectively. The Chain of Custody Records and Laboratory Analysis Reports are attached in Appendix A.

Results of quarterly laboratory analyses of groundwater samples indicated the following.

- Nondetectable concentrations of TPHg in the sample from well MW-1 (<30 parts per billion [ppb]), and detectable concentrations of TPHg in samples from wells MW-3 (290 ppb), MW-4 (900 ppb), MW-5 (77 ppb), and RW-1 (750 ppb);

- Concentrations of benzene did not exceed the Maximum Contaminant Level (MCL) of 1 ppb in samples from wells MW-1 (<0.30 ppb) and MW-5 (1.0 ppb), but did exceed the MCL in the samples from well RW-1 (4.8 ppb); the

sample from well MW-3 contained less than 1.5 ppb, and the sample from well MW-4 contained less than 3.0 ppb;

- Concentrations of toluene did not exceed the State Recommended Action Level (AL) of 100 ppb in any of the samples from the wells: MW-1 (<0.30 ppb), MW-3 (<1.5 ppb), MW-4 (<3.0 ppb), MW-5 (3.6 ppb), and RW-1 (3.7 ppb);

- Concentrations of ethylbenzene did not exceed the MCL of 680 ppb in any of the samples from the wells: MW-1 (<0.30 ppb), MW-3 (<1.5 ppb), MW-4 (<3.0 ppb), MW-5 (0.60 ppb), and RW-1 (3.0 ppb);

- Concentrations of total xylenes did not exceed the MCL of 1,750 in any of the samples from the wells: MW-1 (<0.30 ppb), MW-3 (<1.5 ppb), MW-4 (<3.0 ppb), MW-5 (2.6 ppb), and RW-1 (3.0 ppb);

- Concentrations of tetrachloroethene (PCE) did not exceed the MCL of 5 ppb in the sample from well MW-1 (<0.50 ppb), but did exceed the MCL in the samples from wells MW-3 (400 ppb), MW-4 (1,000 ppb), MW-5 (12 ppb), and RW-1 (980 ppb);

- Concentrations of trichloroethene (TCE) did not exceed the MCL of 5 ppb in samples from wells MW-1 (<0.50 ppb), MW-3 (<5.0 ppb), MW-5 (<0.50 ppb), RW-1 (<5.0 ppb), but did slightly exceed the MCL in the sample from well MW-4 (6.3 ppb);

Monitoring and Removal of Free Product

Floating product was measured and removed from well MW-2 during monthly and quarterly monitoring episodes. Quantities of floating product and water removed are presented in Table 4. A Horner EZY Floating Product Skimmer was installed in monitoring well MW-2 on December 24, 1991, to passively collect floating product in the well. The total cumulative recovered product for the site to date is approximately 18.15 gallons.

Conclusions and Recommendations

The lateral extent of petroleum hydrocarbons in groundwater has not been defined except for the northern corner of the site. Samples from well MW-1, located in the northern corner of the site, have been nondetectable for TPHg and BTEX since April 1989 with the exception of samples collected on February 1990, which indicated 91 ppb TPHg and 0.36 ppb xylenes. Concentrations of TPHg and BTEX in groundwater from monitoring wells MW-3, MW-4, and MW-5 fluctuated slightly, but were generally consistent with previous

sampling episodes. Laboratory results also reported TPHg and BTEX in the sample from recovery well RW-1, which was sampled for the first time. Tetrachloroethene, previously detected in wells MW-4 and MW-5, has been detected in samples from all of the wells sampled on the site except well MW-1.

It is recommended that monthly groundwater monitoring and quarterly groundwater sampling for TPHg and BTEX by Methods 5030/8015/8020, and VOCs by EPA Method 601 for wells MW-1 through MW-5 continue. Since TOG has been nondetectable in MW-4 since July 1990, annual sampling of this well for TOG is recommended (scheduled for first quarter 1992). RESNA also recommends continued monthly product removal from the product skimmer in well MW-2. Further, it is recommended that water level data and quarterly sampling data from offsite wells be correlated with the same data obtained from the onsite wells to allow better evaluation of the groundwater gradient flow directions in the shallow and deeper water bearing zones, and to further evaluate the extent of petroleum hydrocarbons and VOCs in the site area. Additional recommendations for further assessment will be included under separate cover.

Schedule

Monthly groundwater monitoring and quarterly sampling will continue. RESNA will continue to interpret monthly groundwater data and analyze quarterly sampling and laboratory data to evaluate trends in petroleum hydrocarbons and changes in groundwater gradient with time. Free product collected in the product skimmer will continue to be removed on a monthly basis; routine adjustments to the product skimmer will be performed as necessary during these visits. Onsite vapor extraction wells to be tied into the existing vapor extraction system at the site are scheduled to be installed in March to April 1992. A work plan for offsite groundwater monitoring wells will be delivered to ARCO and the regulatory agencies in April 1992. The next quarterly monitoring episode is scheduled for March 1992.

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

Mr. Paul Smith
Alameda County Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

Mr. Eddy So
Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster, Suite 500
Oakland, California 94612

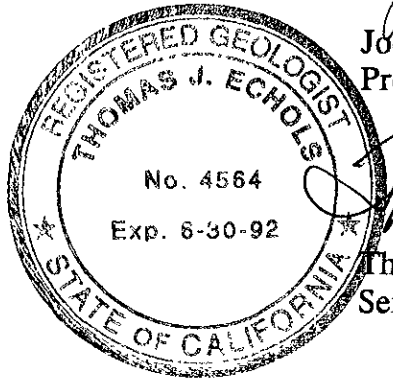
If you have any questions or comments, please call us at (408) 264-7723.

Sincerely,
RESNA

L. J. Leet

Lou Leet
Staff Geologist

Joel Coffman
Project Geologist



Thomas J. Echols, R. G.
Senior Geologist

cc: H.C. Winsor, ARCO

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Groundwater Gradient Map, October 17, 1991
Plate 4, Groundwater Gradient Map, November 5, 1991
Plate 5, Groundwater Gradient Map, December 24, 1991
Plate 6, TPHg Concentrations in Groundwater, November 5, 1991
Plate 7, Benzene Concentrations in Groundwater, November 5, 1991
Plate 8, Tetrachloroethene Concentrations in Groundwater, November 6, 1991

Table 1, Cumulative Groundwater Monitoring Data
Table 2, Cumulative Results of Laboratory Analyses of Water Samples--TPHg, TPHd, BTEX, and TOG
Table 3, Cumulative Results of Laboratory Analyses of Water Samples--VOCs and Metals
Table 4, Approximate Cumulative Product Removed

Appendix A: Groundwater Sampling Protocol
Chain of Custody Record
Laboratory Analysis Reports
Uniform Hazardous Waste Manifest

REFERENCES

Applied GeoSystems. April 16, 1991. First Quarter 1991 Ground-Water Monitoring at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS Job 60026

Applied GeoSystems, February 11, 1991. Report Underground Gasoline Storage Tank Removal and Replacement at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS Job 19014-5.

Applied GeoSystems. January 29, 1991. Fourth Quarter 1990 Ground-Water Monitoring at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS Job 60026.01.

Applied GeoSystems. January 2, 1991. Letter Report Quarterly Ground-Water Monitoring Third Quarter 1990 at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS Job 60026.01.

Applied GeoSystems. August 6, 1990. Letter Report Quarterly Ground-Water Monitoring Fourth Quarter 1989 and First and Second Quarters 1990. AGS Job No. 19014-1.

Applied GeoSystems. March 6, 1989. Site Safety Plan for ARCO Station No. 276, Oakland, California. AGS Job No. 19014-1.

Applied GeoSystems. August 8, 1989. Report Limited Subsurface Environmental Investigation. AGS Job No. 19014-1.

Kaldveer Associates. October 3, 1988. Preliminary Environmental Assessment Proposed Foothill Square Oakland, California. Job No. KE812-3, 12056.

Kaldveer Associates. October 7, 1988. Preliminary Soil And Groundwater Quality Testing Program Foothill Square Oakland, California. Job No. KE812-3A, 12302.

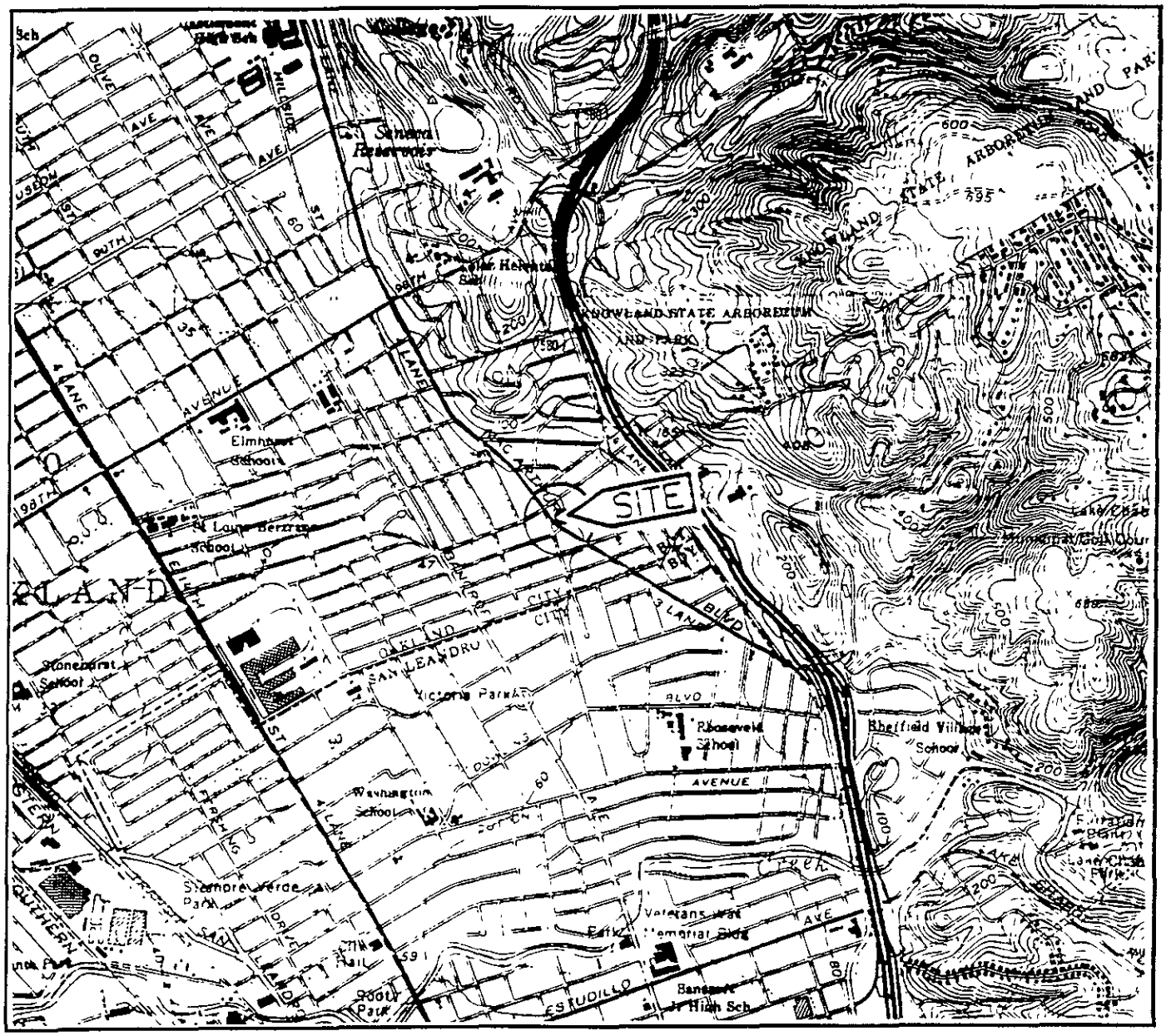
Pacific Environmental Group, Inc. February 6, 1989. Former Waste-Oil Tank Pit Analytical Results and Site Plan of ARCO Station No. 276. Copy of letter sent to Ms. Mary Meirs, Alameda County Environmental Health Department Hazardous Material Division.

REFERENCES
(continued)

Pacific Environmental Group, Inc. July 17, 1989. Soil Gas Investigation at ARCO Station No. 276.

RESNA/Applied GeoSystems. July 11, 1991. Letter Report Quarterly Ground-Water Monitoring, Second Quarter 1991 at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS 60026.02

Western Geologic Resources, Inc. January 17, 1989. Soil Sampling and Monitoring Well Installation Foothill Square Shopping Center Oakland, California. Job No. 8-088.01.



Base: U.S. Geological Survey
7.5-Minute Quadrangles
Oakland East/San Leandro,
Photorevised 1980

N

LEGEND

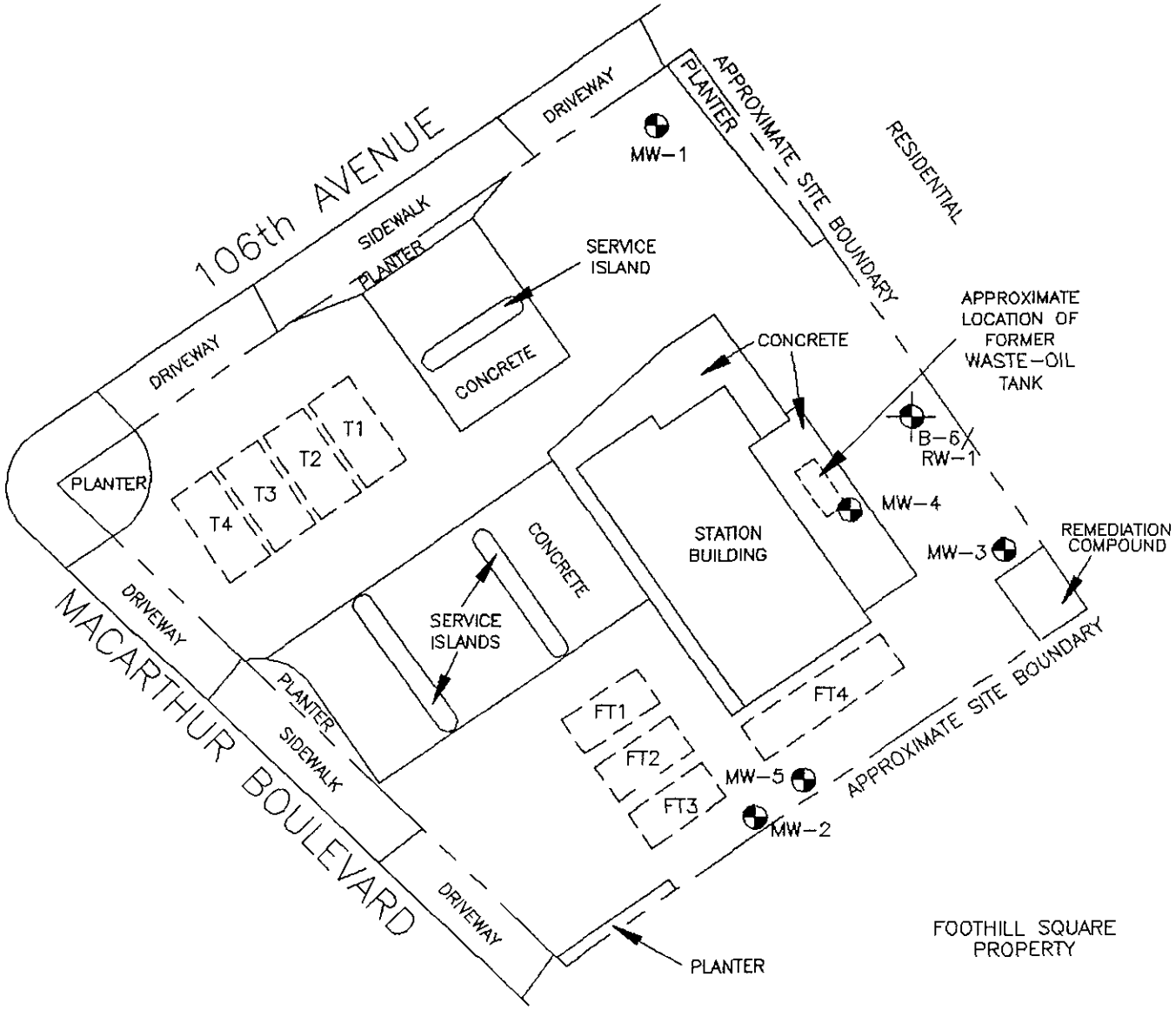
⊙ = Site Location

Approximate Scale

2000 1000 0 2000 4000

feet

RESNA	**SITE VICINITY MAP** **ARCO Station 276** **10600 MacArthur Boulevard** **Oakland, California**	**PLATE** **1**
PROJECT 60026.06		



EXPLANATION

B-6/RW-1 = Recovery well (RESNA, 1991)

MW-5 = Monitoring well (Applied GeoSystems, 1989)

T4 = Existing underground Storage Tanks

FT4 = Former underground Storage Tanks

N

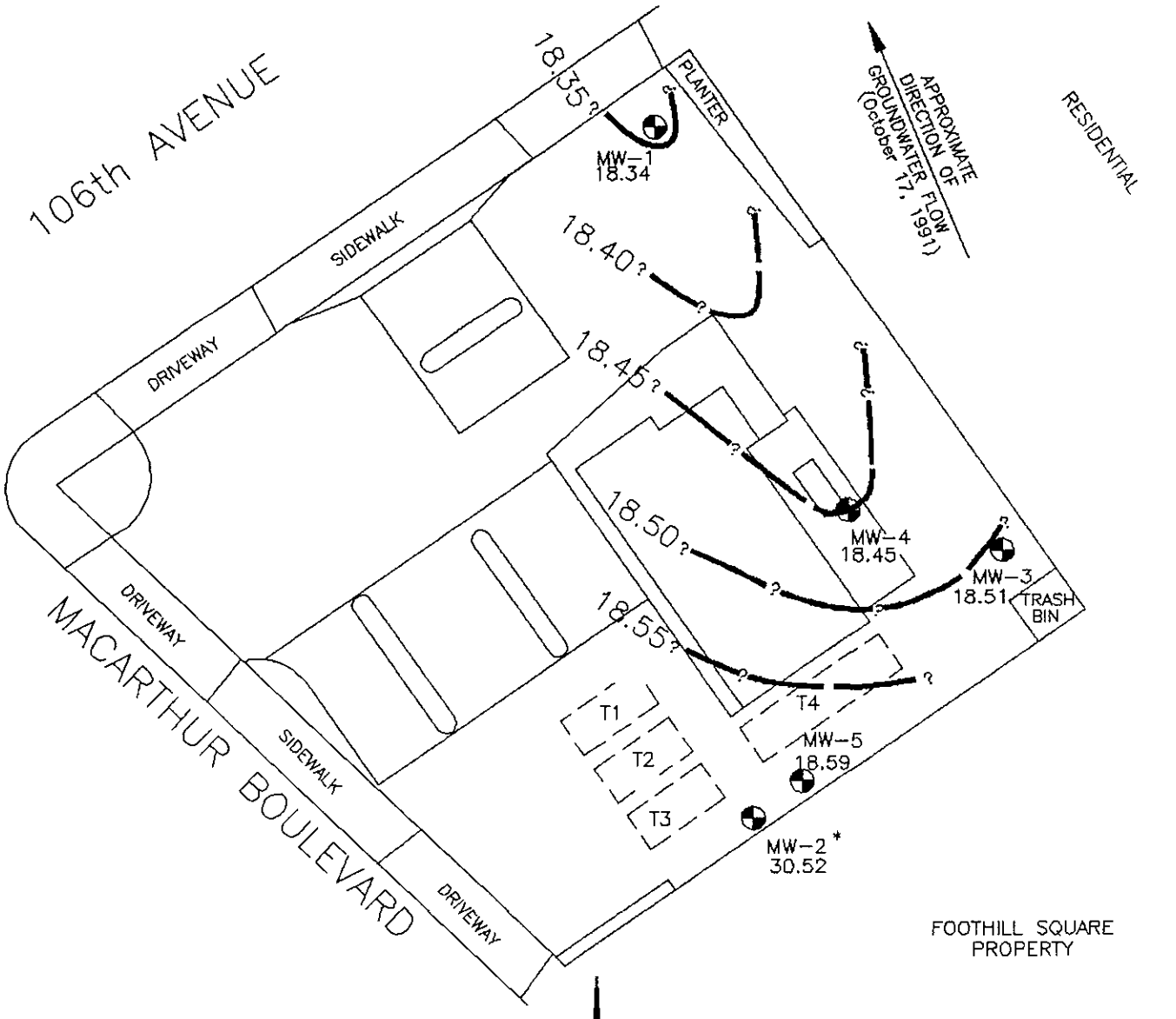
Approximate Scale

30 15 0 30 60

feet

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

RESNA	**GENERALIZED SITE PLAN** **ARCO Station 276** **10600 MacArthur Boulevard** **Oakland, California**	**PLATE** **2**
PROJECT 60026.06		



EXPLANATION

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

18.59 = Elevation of groundwater in feet MSL October 17, 1991

MW-2 * = Well constructed in a shallow perched zone and not used for groundwater gradient interpretation

MW-5 ◓ = Monitoring well (Applied GeoSystems, 1989)

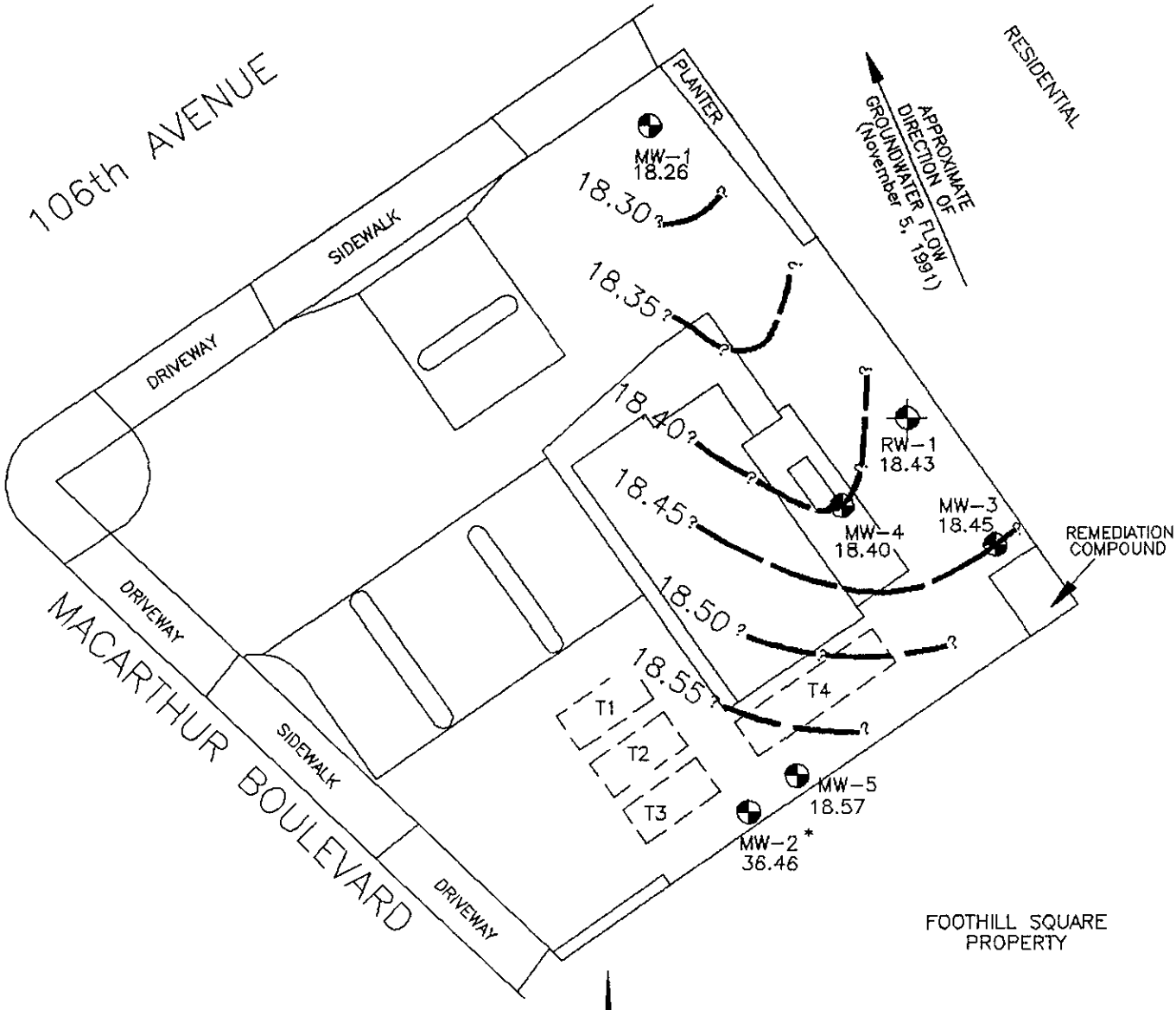
Approximate Scale

30 15 0 30 60

feet

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

RESNA	**GROUNDWATER GRADIENT MAP** **ARCO Station 276** **10600 MacArthur Boulevard** **Oakland, California**	**PLATE** **3**
PROJECT 60026.06		



EXPLANATION

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

18.57 = Elevation of groundwater in feet MSL November 5, 1991

MW-2 * = Well constructed in a shallow perched zone and not used for groundwater gradient interpretation

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

MW-5 = Monitoring well (Applied GeoSystems, 1989)

N

Approximate Scale

30 15 0 30 60

feet

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

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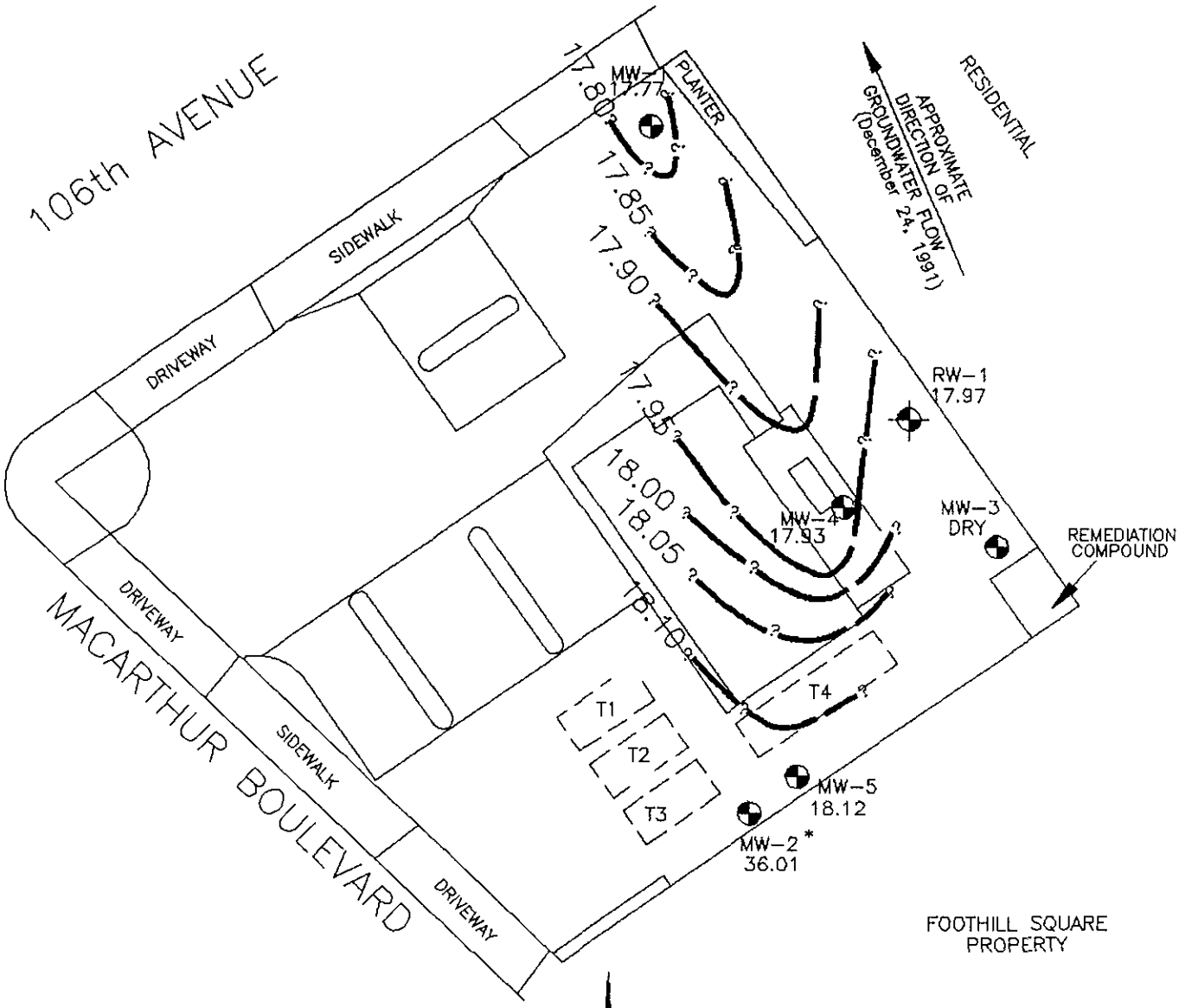
PROJECT 60026.06

GROUNDWATER GRADIENT MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 4



EXPLANATION

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

18.12 = Elevation of groundwater in feet MSL December 24, 1991

MW-2 * = Well constructed in a shallow perched zone and not used for groundwater gradient interpretation

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

MW-5 = Monitoring well (Applied GeoSystems, 1989)

N

Approximate Scale

30 15 0 30 60

feet

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

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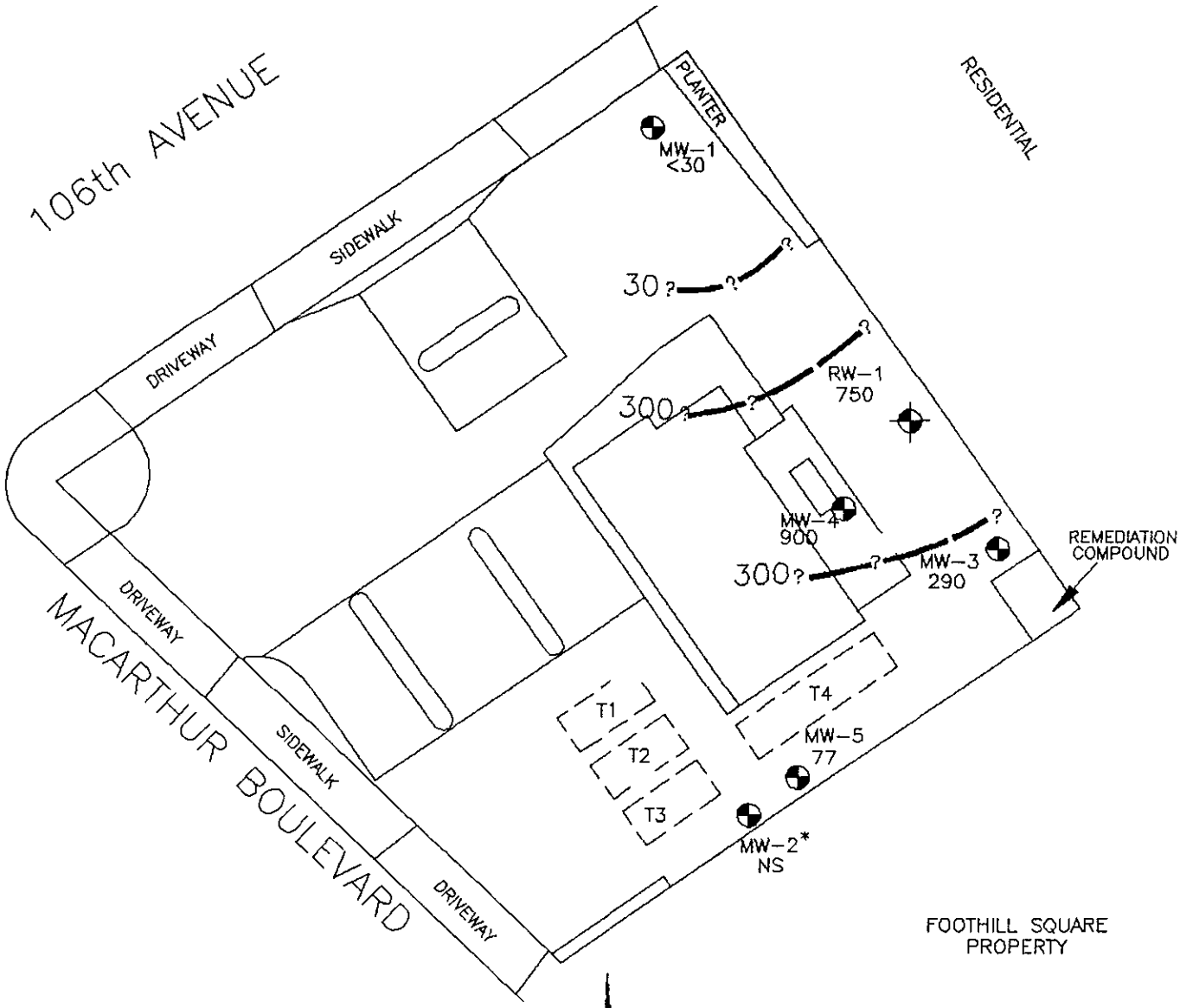
PROJECT 60026.06

GROUNDWATER GRADIENT MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 5



EXPLANATION

300 = Line of equal concentration of TPHg, in ppb, November 5, 1991

900 = Concentration of TPHg in groundwater, in ppb, November 5, 1991

NS = Not sampled

* = Product or product sheen

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

MW-5 = Monitoring well (Applied GeoSystems, 1989)

N

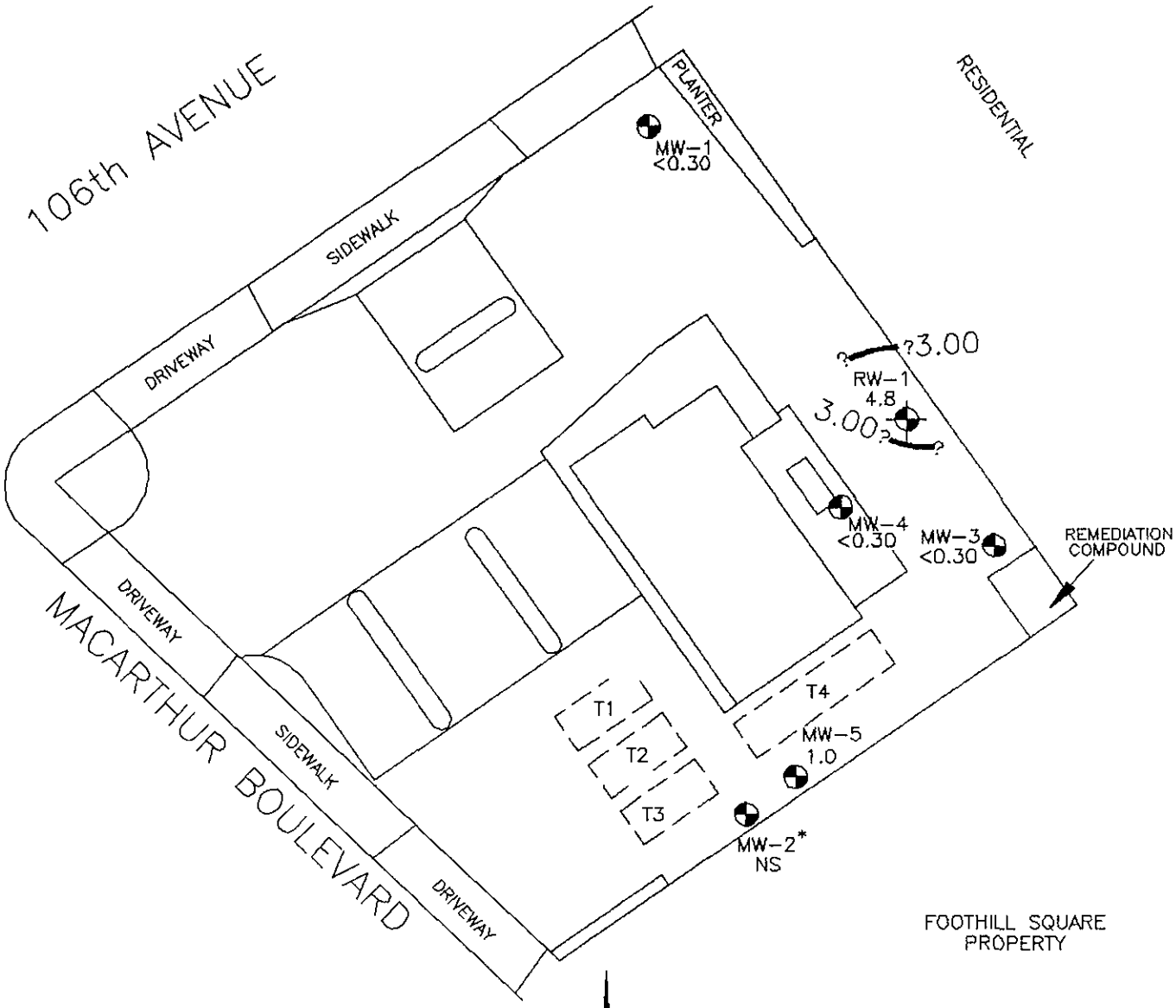
Approximate Scale

30 15 0 30 60

feet

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

RESNA	**TPHg CONCENTRATION IN GROUNDWATER ARCO Station 276 10600 MacArthur Boulevard Oakland, California**	**PLATE 6**
PROJECT 60026.06		



EXPLANATION

3.0 = Line of equal concentration of Benzene in ppb, November 5, 1991

1.0 = Concentration of Benzene in groundwater, in groundwater, in ppb, November 5, 1991

NS = Not sampled

* = Product or product sheen

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

MW-5 = Monitoring well (Applied GeoSystems, 1989)

N

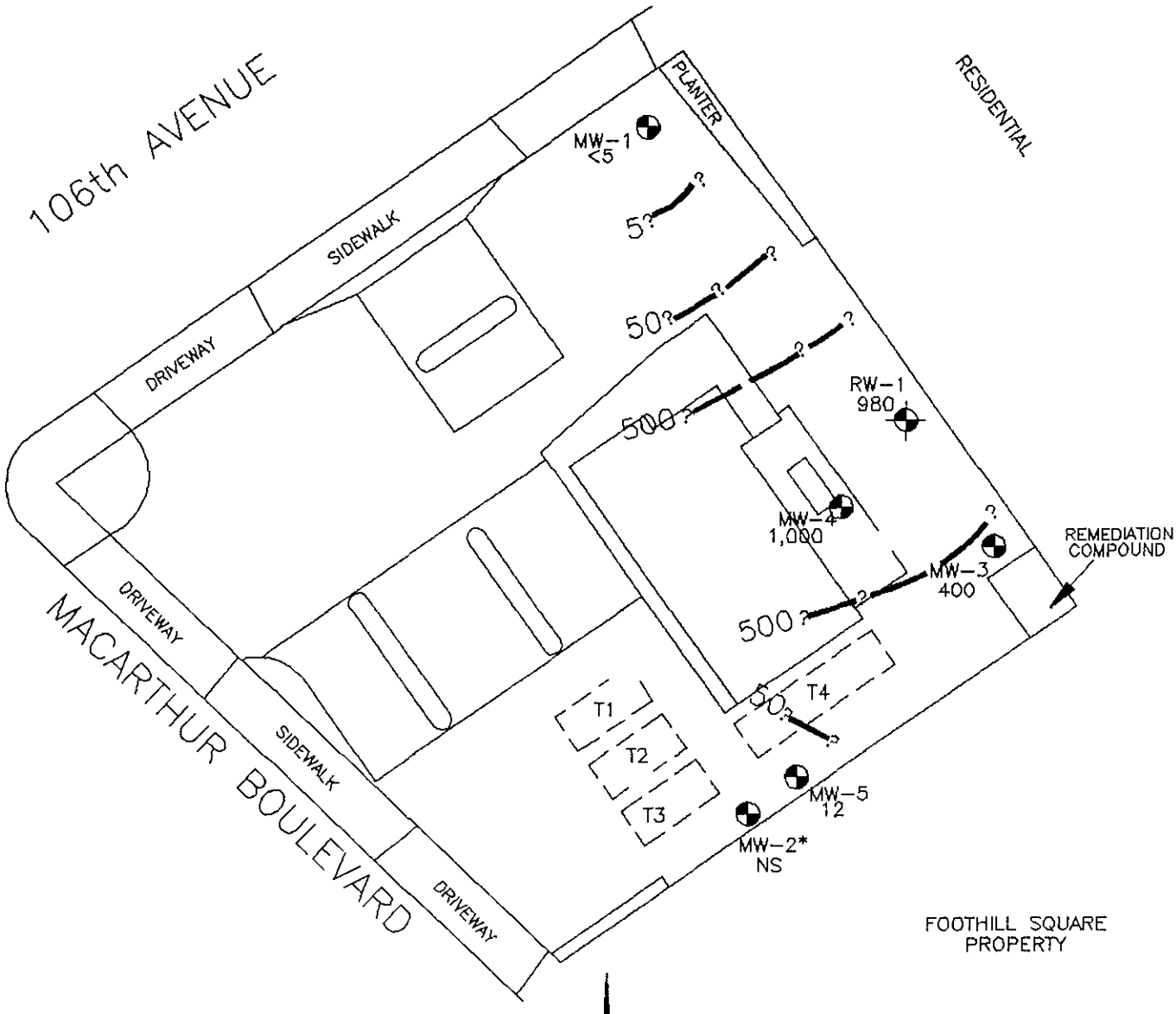
Approximate Scale

30 15 0 30 60

feet

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

RESNA	**BENZENE CONCENTRATIONS IN GROUNDWATER ARCO Station 276 10600 MacArthur Boulevard Oakland, California**	**PLATE 7**
PROJECT 60026.06		



EXPLANATION

500 = Line of equal concentration of Tetrachlorothene in ppb, November 6, 1991

1,000 = Concentration of Tetrachlorothene in groundwater, in ppb, November 6, 1991

NS = Not sampled

* = Product or product sheen

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

MW-5 = Monitoring well (Applied GeoSystems, 1989)

N

Approximate Scale

30 15 0 30 60

feet

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

RESNA

PROJECT 60026.06

TETRACHLOROTHENE CONCENTRATIONS IN GROUNDWATER
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 8

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 1 of 3)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-1				
04/17/89		33.04	22.87	None
04/24/89		33.84	22.07	None
10/13/89	55.91	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
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	Sheen
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

See notes on page 3 of 3.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 2 of 3)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-2 Cont.				
11/05/91		18.88*	36.47*	0.01
12/24/91		19.34*	36.01*	0.09
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	
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

See notes on page 3 of 3.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 3 of 3)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-4 Cont.				
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
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
RW-1				
11/05/91	56.32	37.89	18.43	None
12/24/91		38.35	17.97	None

Depths are in feet below top of each well casing.
Elevations are referenced in feet above mean sea level.
Floating product reported in feet.
* = Depth to water and water elevation adjusted according to protocol in Appendix A.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES--TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
(Page 1 of 2)

Date/Well	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
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						
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
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	<5,000
10/30/90	430	<100	<0.5	<0.5	<0.5	<0.5	<5,000
01/30/91	<50	<100	<0.5	<0.5	1.2	<0.5	<5,000
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

See notes on Page 2 of 2.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES--TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
(Page 2 of 2)

Date/Well	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
RW-1							
11/05/91	750	NA	4.8	3.7	<3.0	<3.0	NA
January 1990							
MCLs	—	—	1.0	—	680	1,750	—
ALs	—	—	—	100	—	—	—

Results in parts per billion (ppb).
TPHg: Total petroleum hydrocarbons as gasoline by EPA method 8015.
TPHd: Total petroleum hydrocarbons as diesel by EPA method 3550/3510.
B: Benzene, T: Toluene, E: Ethylbenzene, T: Total Xylene isomers
BTEX: Measured by EPA method 8020/602.
NA: Not analyzed.
<: Results reported as less than detection limit.

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES--VOCs and Metals
ARCO Station 276
Oakland, California
(Page 1 of 2)

Date/Well	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
MW-2							
09/03/91	———	Not sampled--floating product					
11/06/91	———	Not sampled--floating product					
MW-3							
09/03/91	Tetrachloroethene	1,600*	NA	NA	NA	NA	NA
11/06/91	Tetrachloroethene	400*	NA	NA	NA	NA	NA
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
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

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES–VOCs and Metals
ARCO Station 276
Oakland, California
(Page 2 of 2)

Date/Well	Compound	VOCs (ppb)	Cd (ppm)	Cr (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)
RW-1							
11/06/91	Tetrachloroethene	980*	NA	NA	NA	NA	NA
MCLs		—	0.010	0.05	0.05	5.0	—

Results in parts per billion (ppb), except heavy metals which are in parts per million (ppm).
VOCs: Volatile Organic Compounds by EPA method 601/8010. Compounds not shown were not detected.
Cd: Cadmium by EPA method 200.7.
Cr: Chromium by EPA method 200.7.
Pb: Lead by EPA method 239.7.
Zn: Zinc by EPA method 200.7.
Ni: Nickel by EPA method 200.7.
<: Results reported as less than the detection limit.
NA: Not analyzed. Compounds not shown not detected.
*: Exceeds the MCL of 5 ppb concentration of tetrachloroethene.
MCLs: Maximum Contaminant Levels as reported by the California Department of Health Services 10/24/90.

TABLE 4
APPROXIMATE CUMULATIVE PRODUCT REMOVED
ARCO Station 276
Oakland, California

Date	Floating Product Removed (gallons)
MW-2	
06/08/89	4
06/15/89	5
06/21/89	4
07/12/89	0.8
07/19/89	0.75
07/26/89	0.3
08/22/89	1
09/18/89	0.1
10/04/89	0.1
12/07/89	0.1
10/30/90	0.5
11/20/90	0.25
01/30/91	0.25
02/27/91	0.1
03/20/91	0.1
04/30/91	0.1
05/31/91	0.1
07/24/91	Sheen
08/06/91	0.1
09/03/91	0.5
Total:	18.15 Gallons

APPENDIX A

GROUNDWATER SAMPLING PROTOCOL

The static water level in each well that contained water was measured with a Solinst® water-level indicator; this instrument is accurate to the nearest 0.01 foot. The static water level in each well that was suspected to contain floating product was measured with an ORS® interface probe; this instrument is accurate to the nearest 0.01 foot. The probe contains two different sensor units, one for detecting the liquid/air interface, and one for distinguishing between water and hydrocarbon. 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). Groundwater monitoring wells MW-1 through MW-5 were surveyed by Ron Archer, Civil Engineer, Inc., of Pleasanton, California, a licensed land surveyor; recovery well RW-1 was surveyed by John Koch, a licensed land surveyor on November 9, 1991. The calculated ground-water depths were subtracted from wellhead elevations measured to calculate the differences in groundwater elevations.

Water samples collected for subjective evaluation were collected by gently lowering approximately half the length of a new disposable bailer or a clean Teflon® bailer past the air-water interface (if possible) and collecting a sample from near the surface of the water in the well. The samples were checked for evidence of free hydrocarbon product.
Before water samples were collected from the groundwater monitoring wells, the wells were purged until stabilization of the temperature, pH, and conductivity was obtained. A minimum of approximately 1 well casing volume of water was purged before these wells were pumped dry or these characteristics stabilized. The quantity of water purged from the wells was calculated as follows:

1 well casing volume = $\pi r^2 h(7.48)$ where:
r = radius of the well casing in feet.
h = column of water in the well in feet (well depth - depth to water).
7.48 = conversion constant from cubic feet to gallons.

gallons of water purged/gallons in 1 well casing volume = well casing volume removed.

After purging, each well was allowed to recharge to at least approximately 80% of the initial water level unless the well was very slow to recover. Water samples were then collected with a new, disposable bailer. The water samples were carefully poured into 40-milliliter

glass vials, which were filled so as to produce a positive meniscus. Each sample container was preserved with hydrochloric acid when appropriate, sealed with a cap containing a Teflon® septum, and subsequently examined for air bubbles to avoid headspace which would allow volatilization to occur. The samples were promptly transported in iced storage in a thermally-insulated ice chest, accompanied by a Chain of Custody Record, to a California-certified laboratory. Purge water was removed from the site by a licensed hazardous waste hauler.

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. ~~2107-91-5~~ 276-91-5

Chain of Custody

ARCO Facility no. ~~276-6002603~~ 2107-6703-04 | City (Facility) Oakland | Project manager (Consultant) JOEL COFFMAN/LOU LEE

ARCO engineer CHUCK CARMEL | Telephone no (ARCO) | Telephone no (Consultant) (408) 264-7723 | Fax no (Consultant) (408) 264-2435

Consultant name RESNA | Address (Consultant) 3315 ALMADEN EXPRESS WAY, SUITE 34 SAN JOSE, CA

Laboratory name SEQUOIA

Contract number 07-073

Method of shipment Sequoia Tech

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 ☐	
U-37-MW1	MW1	3		X		X		11/06/91	15:30						X					692	
U-38-MW3	MW3	3		X		X		11/06/91	15:52						X					93	
U-36	MW5	3		X		X		11/06/91	16:00						X					94	
U-37-MW4	MW4	3		X		X		11/06/91	13:40						X					95	
U-37	RW1	3		X		X		11/06/91	15:20						X					96	
U-37-RW1	RW1	3		X		X	X	11/05/91	14:39		X									97	
U-37	MW1	3		X		X	X	11/05/91	14:30		X									98	
U-36	MW5	3		X		X	X	11/05/91	15:05		X									99	
U-37	MW4	3		X		X	X	11/05/91	14:44		X									1700	
U-38-MW3	MW3	3		X		X	X	11/05/91	14:56		X									01	

Special detection Limit/reporting

Special QA/QC

Remarks

Lab number

Turnaround time

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

Condition of sample: good

Temperature received: cool

Relinquished by sampler	Date	Time	Received by
	11/7/91	3:24pm	
Relinquished by	Date	Time	Received by
	11/7/91	4:50pm	
Relinquished by	Date	Time	Received by laboratory

Date 11/7 Time 5:10 pm

Distribution: White copy — Laboratory, Canary copy — ARCO Environmental Engineering, Pink copy — Consultant

APPC-3292 (2-91)

SEQUOIA ANALYTICAL

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

RECEIVED
NOV 25 1991
RESNA
SAN JOSE

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95112
Attention: Joel Coffman

Project: ARCO 276, Oakland

Enclosed are the results from 10 water samples received at Sequoia Analytical on November 7,1991. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
1111692	Water, W-37-MW1	11/6/91	EPA 601
1111693	Water, W-38-MW3	11/6/91	EPA 601
1111694	Water, W-36-MW5	11/6/91	EPA 601
1111695	Water, W-37-MW4	11/6/91	EPA 601
1111696	Water, W-37-RW1	11/6/91	EPA 601
1111697	Water, W-37-RW1	11/5/91	EPA 5030/8015/8020
1111698	Water, W-37-MW1	11/5/91	EPA 5030/8015/8020
1111699	Water, W-36-MW5	11/5/91	EPA 5030/8015/8020
1111700	Water, W-37-MW4	11/5/91	EPA 5030/8015/8020
1111701	Water, W-38-MW3	11/5/91	EPA 5030/8015/8020

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

Very truly yours,

SEQUOIA ANALYTICAL

Maria Lee

Maria Lee
Project Manager

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Nov 5, 1991
3315 Almaden Expwy., Suite 34	Matrix Descript:	Water	Received:	Nov 7, 1991
San Jose, CA 95112	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Nov 15, 1991
Attention: Joel Coffman	First Sample #:	111-1698	Reported:	Nov 22, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons µg/L (ppb)	Benzene µg/L (ppb)	Toluene µg/L (ppb)	Ethyl Benzene µg/L (ppb)	Xylenes µg/L (ppb)
111-1698	W-37-MW1	N.D.	N.D.	N.D.	N.D.	N.D.
111-1699	W-36-MW5	77	1.0	3.6	0.60	2.6
Detection Limits:		**30**	**0.30**	**0.30**	**0.30**	**0.30**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline fuel standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

SEQUOIA ANALYTICAL

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(415) 364-9600 • FAX (415) 364-9233

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled: Nov 5, 1991
3315 Almaden Expwy., Suite 34	Matrix Descript:	Water	Received: Nov 7, 1991
San Jose, CA 95112	Analysis Method:	EPA 5030/8015/8020	Analyzed: Nov 16, 1991
Attention: Joel Coffman	First Sample #:	111-1701	Reported: Nov 22, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons µg/L (ppb)	Benzene µg/L (ppb)	Toluene µg/L (ppb)	Ethyl Benzene µg/L (ppb)	Xylenes µg/L (ppb)
111-1701	W-38-MW3	290	N.D.	N.D.	N.D.	N.D.
Detection Limits:		150	1.5	1.5	1.5	1.5

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline fuel standard.
Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

Please Note:
Chromatogram Pattern: ( ) gasoline fuel ( ) non-gasoline fuel ( ) non-fuel.

1111697 RRR <3>

SEQUOIA ANALYTICAL

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Nov 5, 1991
3315 Almaden Expwy., Suite 34	Matrix Descript:	Water	Received:	Nov 7, 1991
San Jose, CA 95112	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Nov 16, 1991
Attention: Joel Coffman	First Sample #:	111-1697	Reported:	Nov 22, 1991

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons µg/L (ppb)	Benzene µg/L (ppb)	Toluene µg/L (ppb)	Ethyl Benzene µg/L (ppb)	Xylenes µg/L (ppb)
111-1697	W-37-RW1	750	4.8	3.7	N.D.	N.D.
111-1700	W-37-MW4	900	N.D.	N.D.	N.D.	N.D.
Detection Limits:		**300**	**3.0**	**3.0**	**3.0**	**3.0**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline fuel standard.
Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

SEQUOIA ANALYTICAL

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Nov 6, 1991
3315 Almaden Expwy., Suite 34	Sample Descript:	Water, W-37-MW1	Received:	Nov 7, 1991
San Jose, CA 95112	Analysis Method:	EPA 601	Analyzed:	Nov 19, 1991
Attention: Joel Coffman	Lab Number:	111-1692	Reported:	Nov 22, 1991

PURGEABLE HALOCARBONS (EPA 601)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	0.50	N.D.
Bromoform	1.0	N.D.
Bromomethane	1.0	N.D.
Carbon tetrachloride	0.50	N.D.
Chlorobenzene	0.50	N.D.
Chloroethane	1.0	N.D.
2-Chloroethylvinyl ether	1.0	N.D.
Chloroform	0.50	N.D.
Chloromethane	1.0	N.D.
Dibromochloromethane	0.50	N.D.
1,2-Dichlorobenzene	0.50	N.D.
1,3-Dichlorobenzene	0.50	N.D.
1,4-Dichlorobenzene	0.50	N.D.
Dichlorodifluoromethane	2.0	N.D.
1,1-Dichloroethane	0.50	N.D.
1,2-Dichloroethane	0.50	N.D.
1,1-Dichloroethene	0.50	N.D.
cis-1,2-Dichloroethene	0.50	N.D.
trans-1,2-Dichloroethene	0.50	N.D.
1,2-Dichloropropane	0.50	N.D.
cis-1,3-Dichloropropene	1 0	N.D.
trans-1,3-Dichloropropene	1.0	N.D.
Methylene chloride	2.0	N.D.
1,1,2,2-Tetrachloroethane	0.50	N.D.
Tetrachloroethene	0.50	N.D.
1,1,1-Trichloroethane	0.50	N.D.
1,1,2-Trichloroethane	0.50	N.D.
Trichloroethene	0.50	N.D.
Trichlorofluoromethane	1.0	N.D.
Vinyl chloride	1.0	N.D.

Analytes reported as N D. were not present above the stated limit of detection

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

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SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Nov 6, 1991
3315 Almaden Expwy., Suite 34	Sample Descript:	Water, W-38-MW3	Received:	Nov 7, 1991
San Jose, CA 95112	Analysis Method:	EPA 601	Analyzed:	Nov 20, 1991
Attention: Joel Coffman	Lab Number:	111-1693	Reported:	Nov 22, 1991

PURGEABLE HALOCARBONS (EPA 601)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	5.0	N.D.
Bromoform	10	N.D.
Bromomethane	10	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	10	N.D.
2-Chloroethylvinyl ether	10	N.D.
Chloroform	5.0	N.D.
Chloromethane	10	N.D.
Dibromochloromethane	5.0	N.D.
1,2-Dichlorobenzene	5.0	N.D.
1,3-Dichlorobenzene	5.0	N.D.
1,4-Dichlorobenzene	5.0	N.D.
Dichlorodifluoromethane	20	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
cis-1,2-Dichloroethene	5.0	N.D.
trans-1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	10	N.D.
trans-1,3-Dichloropropene	10	N.D.
Methylene chloride	20	N.D.
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	**5.0**	**400**
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	5.0	N.D.
Trichlorofluoromethane	10	N.D.
Vinyl chloride	10	N.D.

Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

SEQUOIA ANALYTICAL

Malia Lee
Project Manager

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Nov 6, 1991
3315 Almaden Expwy., Suite 34	Sample Descript:	Water, W-37-MW4	Received:	Nov 7, 1991
San Jose, CA 95112	Analysis Method:	EPA 601	Analyzed:	Nov 20, 1991
Attention: Joel Coffman	Lab Number:	111-1695	Reported:	Nov 22, 1991

PURGEABLE HALOCARBONS (EPA 601)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	5.0	N.D.
Bromoform	10	N.D.
Bromomethane	10	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	10	N.D.
2-Chloroethylvinyl ether	10	N.D.
Chloroform	5.0	N.D.
Chloromethane	10	N.D.
Dibromochloromethane	5.0	N.D.
1,2-Dichlorobenzene	5.0	N.D.
1,3-Dichlorobenzene	5.0	N.D.
1,4-Dichlorobenzene	5.0	N.D.
Dichlorodifluoromethane	20	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
cis-1,2-Dichloroethene	5.0	N.D.
trans-1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	10	N.D.
trans-1,3-Dichloropropene	10	N.D.
Methylene chloride	20	N.D.
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	**5.0**	**1,000**
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	**5.0**	**6.3**
Trichlorofluoromethane	10	N.D.
Vinyl chloride	10	N.D.

Analytes reported as N D were not present above the stated limit of detection Because matrix effects and/or other factors required additional sample dilution. detection limits for this sample have been raised

SEQUOIA ANALYTICAL

Maria Lee

Maria Lee
Project Manager

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Nov 6, 1991
3315 Almaden Expwy., Suite 34	Sample Descript:	Water, W-36-MW5	Received:	Nov 7, 1991
San Jose, CA 95112	Analysis Method:	EPA 601	Analyzed:	Nov 20, 1991
Attention: Joel Coffman	Lab Number:	111-1694	Reported:	Nov 22, 1991

PURGEABLE HALOCARBONS (EPA 601)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	0.50	N.D.
Bromoform	1.0	N.D.
Bromomethane	1.0	N.D.
Carbon tetrachloride	0.50	N.D.
Chlorobenzene	0.50	N.D.
Chloroethane	1.0	N.D.
2-Chloroethylvinyl ether	1.0	N.D.
Chloroform	0.50	N.D.
Chloromethane	1.0	N.D.
Dibromochloromethane	0.50	N.D.
1,2-Dichlorobenzene	0.50	N.D.
1,3-Dichlorobenzene	0.50	N.D.
1,4-Dichlorobenzene	0.50	N.D.
Dichlorodifluoromethane	2.0	N.D.
1,1-Dichloroethane	0.50	N.D.
1,2-Dichloroethane	0.50	N.D.
1,1-Dichloroethene	0.50	N.D.
cis-1,2-Dichloroethene	0.50	N.D.
trans-1,2-Dichloroethene	0.50	N.D.
1,2-Dichloropropane	0.50	N.D.
cis-1,3-Dichloropropene	1.0	N.D.
trans-1,3-Dichloropropene	1.0	N.D.
Methylene chloride	2.0	N.D.
1,1,2,2-Tetrachloroethane	0.50	N.D.
Tetrachloroethene	**0.50**	**12**
1,1,1-Trichloroethane	0.50	N.D.
1,1,2-Trichloroethane	0.50	N.D.
Trichloroethene	0.50	N.D.
Trichlorofluoromethane	1.0	N.D.
Vinyl chloride	1.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Maria Lee

Maria Lee
Project Manager

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SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Nov 6, 1991
3315 Almaden Expwy., Suite 34	Sample Descript:	Water, W-37-RW1	Received:	Nov 7, 1991
San Jose, CA 95112	Analysis Method:	EPA 601	Analyzed:	Nov 20, 1991
Attention: Joel Coffman	Lab Number:	111-1696	Reported:	Nov 22, 1991

PURGEABLE HALOCARBONS (EPA 601)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	5.0	N.D.
Bromoform	10	N.D.
Bromomethane	10	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	10	N.D.
2-Chloroethylvinyl ether	10	N.D.
Chloroform	5.0	N.D.
Chloromethane	10	N.D.
Dibromochloromethane	5.0	N.D.
1,2-Dichlorobenzene	5.0	N.D.
1,3-Dichlorobenzene	5.0	N.D.
1,4-Dichlorobenzene	5.0	N.D.
Dichlorodifluoromethane	20	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
cis-1,2-Dichloroethene	5.0	N.D.
trans-1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	10	N.D.
trans-1,3-Dichloropropene	10	N.D.
Methylene chloride	20	N.D.
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	**5.0**	**980**
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	5.0	N.D.
Trichlorofluoromethane	10	N.D.
Vinyl chloride	10	N.D.

Analytes reported as N.D. were not present above the stated limit of detection. Because matrix effects and/or other factors required additional sample dilution, detection limits for this sample have been raised.

SEQUOIA ANALYTICAL

Maria Lee

Maria Lee
Project Manager

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

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95112
Attention: Joel Coffman

Client Project ID: ARCO 276, Oakland

QC Sample Group: 1111692-696

Reported: Nov 22, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	1,1-Dichloro-ethene	Trichloro-ethene	Chloro-benzene
Method:	EPA 601	EPA 601	EPA 601
Analyst:	C. Pollock	C. Pollock	C. Pollock
Reporting Units:	µg/L	µg/L	µg/L
Date Analyzed:	Nov 20, 1991	Nov 20, 1991	Nov 20, 1991
QC Sample #:	BLK112091	BLK112091	BLK112091
Sample Conc.:	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10
Conc. Matrix Spike:	10	8.0	10
Matrix Spike % Recovery:	100	80	100
Conc. Matrix Spike Dup.:	10	11	11
Matrix Spike Duplicate % Recovery:	100	110	110
Relative % Difference:	0.0	32	10

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

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

Please print or type. *Form designed for use on elite (12-pitch typewriter).*

See instructions on back of page 6.

Toxic Substances Control Program
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CAL0000[illegible]	Manifest Document No. 00003	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address: ARCO, P. O. Box 5811, San Mateo CA 94402	A. State Manifest Document Number 91507279
4. Generator's Phone (415) 571-2434/571-2428	B. State Generator's ID HYHQ21[illegible]
5. Transporter 1 Company Name: H & H Ship Service Company — 6. US EPA ID Number CAD00[illegible]	C. State Transporter's ID 20058[illegible]
	D. Transporter's Phone (415) 543-4335
7. Transporter 2 Company Name — 8. US EPA ID Number	E. State Transporter's ID
	F. Transporter's Phone
9. Designated Facility Name and Site Address: H & H Ship Service Company, 220 China Basin Street, San Francisco, CA 94107 — 10. US EPA ID Number CAD00[illegible]	G. State Facility's ID CAD004771160
	H. Facility's Phone (415) 543-4835

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. OIL AND WATER NON-RCRA HAZARDOUS WASTE LIQUID	001	TT	00330	G	State 134, 135 EPA/Other
b.					State EPA/Other
c.					State EPA/Other
d.					State EPA/Other

J. Additional Descriptions for Materials Listed Above: FUEL, OIL AND WATER PROFILE #A0942	K. Handling Codes for Wastes Listed Above: a. 01 b. c. d.

15. Special Handling Instructions and Additional Information

JOB #9593
24 Hr. Emergency Contact: H & H #(415) 543-4835
APPROPRIATE PROTECTIVE CLOTHING AND RESPIRATOR

JOB SITE: ARCO STATION, #0276
10600 MacArthur Avenue
Oakland, California

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month	Day	Year
[illegible]	[signature]	11	0[illegible]	9[illegible]

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
JAMES R. MORGAN	[signature]	11	06	91

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.

Printed/Typed Name	Signature	Month	Day	Year

GENERATOR / TRANSPORTER / FACILITY

IN CASE OF EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802; WITHIN CALIFORNIA, CALL 1-800-852-7550

91507279

DO NOT WRITE BELOW THIS LINE.

DHS 8022A (12/90)
EPA 8700—22

Yellow: GENERATOR RETAINS