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

Dec 2, 1991

60026.02

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TRANSMITTAL

TO: MR. PAUL SMITH
COUNTY OF ALAMEDA-DEH
80 SWAN WAY
ROOM 200
OAKLAND, CALIFORNIA 94621

DATE: 12/2/91
PROJECT NUMBER: 60026.02
SUBJECT: ARCO STATION 276, 10600 MACARTHUR BOULEVARD, OAKLAND, CALIFORNIA.

FROM: LOU LEET
TITLE: GEOLOGIC TECHNICIAN

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ARCO

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December 2, 1991
1010ccar
60026.02

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

Subject: Third 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 third 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 at the site, and to evaluate trends in the hydrocarbon concentrations and groundwater gradient over time.

Prior to the present monitoring, Kaldveer Associates (Kaldveer), Pacific Environmental Group (Pacific), Western Geologic Resources (WGR), and RESNA (formerly Applied GeoSystems [AGS]) 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). WGR 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). 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). 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 July 24, August 6, and September 3, 1991, and quarterly sampling was performed on August 6, 1991. At ARCO's request, an additional sampling episode was performed on September 3, 1991 to obtain groundwater samples for volatile organic compounds (VOCs) analysis. 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. Sampling episodes consisted of the monthly monitoring tasks followed by purging and sampling groundwater from monitoring wells MW-1, MW-3, MW-4, and MW-5. Well MW-2 was not sampled for laboratory analysis due to the presence of floating product. The DTW levels, wellhead elevations, and groundwater elevations for this and previous monitoring episodes are summarized in Table 1, Cumulative Groundwater Monitoring Data. The groundwater sampling protocol is attached in Appendix A. Work was performed in accordance with the site safety plan (AGS, March 6, 1989).

Subjective analyses of water samples from well MW-2 (the only well screened in the shallow water bearing zone) between July 24 and September 3, 1991 indicated a sheen to approximately 0.54 feet of floating product (see Table 1). Subjective analyses of the other wells did not indicate the presence of floating product during this quarter.

Groundwater elevations decreased approximately 0.80 feet between July and September 1991. 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 contained free product and is screened in a shallow perched water-bearing zone. Groundwater flow was interpreted to be toward the north-northeast, 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 August 6 and September 3, 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 Analysis

Water samples collected from wells MW-1, MW-3, MW-4 and MW-5 on August 6 and September 3, 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 August 6, 1991 groundwater sampling episode were analyzed for total petroleum hydrocarbons as gasoline (TPHg), and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using modified Environmental Protection Agency (EPA) Methods 5030/8015/8020; water samples from well MW-4 and MW-5 were also analyzed for twenty-nine VOCs by EPA Method 8010. In addition, a water sample from MW-4 was analyzed for the metals cadmium, chromium, lead, zinc, and nickel using EPA Methods 200.7 and 239.2. Wells MW-1, MW-3, MW-4, and MW-5 were also sampled on September 3, 1991 and analyzed for VOCs by EPA Method 8010. 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 dielsel (TPHd), BTEX, and total oil and grease (TOG) and Table 3, Cumulative Results of Laboratory Analyses of Water Samples--VOCs and Metals. The Chain of Custody Records and Laboratory Analysis Reports are attached in Appendix A. TPHg, benzene, and tetrachloroethene concentration contours are shown on Plates 6, 7, and 8, respectively.

Results of this quarter's laboratory analyses of groundwater samples indicated:

- nondetectable concentrations of TPHg in well MW-1 and MW-5, 430 parts per billion (ppb) in well MW-3, and 520 ppb in well MW-4;
- nondetectable concentrations of BTEX in wells MW-1 and MW-3 through MW-5;
- nondetectable concentrations VOCs (with the exception of tetrachloroethene) in all wells sampled;
- concentrations of tetrachloroethene (PCE) exceeded the State Maximum Contaminant Level (MCL) of 5 ppb in wells MW-4 (1,700 ppb) and MW-5 (7.3 ppb) on August 6, 1991 and in wells MW-3 (1,600 ppb), MW-4 (2,000 ppb), and MW-5 (25 ppb) on September 3, 1991;

- well MW-4 contained nondetectable concentrations of cadmium, 0.0067 parts per million (ppm) lead, 0.14 ppm zinc, and 0.096 ppm nickel, which did not exceed the MCLs for those metals; and

- the concentration of chromium exceeded the MCL of 0.05 ppm in well MW-4 (0.065 ppm).

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. The total cumulative recovered product for the site is approximately 18.15 gallons.

Conclusions and Recommendations

Monitoring well MW-1, downgradient of the former underground storage tanks, continues to show nondetectable concentrations of TPHg and BTEX. In well MW-4, the concentration of tetrachloroethene, which reportedly increased during the fourth quarter of 1990 and first quarter of 1991, decreased during this quarter; TPHg and xylene decreased slightly during this quarter. The TPHg concentration decreased from 120 ppb to nondetectable in monitoring well MW-5 during this quarter.

Tetrachloroethene, previously detected in wells MW-4 and MW-5, has been detected in all wells on the site except well MW-2 which was not tested because in contained product sheen. The highest concentrations detected during the September 3, 1991 sampling were in wells MW-3 and MW-4.

It is recommended that monthly groundwater monitoring and quarterly groundwater sampling for TPHg and BTEX by Methods 8030/8015/8020, and VOCs by EPA Method 8010 in wells MW-1 through MW-5 continue. RESNA recommends obtaining a background water sample from an offsite well that does not have detectable concentrations of TPHg, BTEX, and VOCs, if possible, in order to obtain background heavy metals concentrations for the area. 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 product removal from 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 evaluation of the groundwater gradient flow directions in the shallow and lower water bearing zones, and the extent of petroleum hydrocarbons and VOCs in the site area. Additional recommendations for further assessment will be included under separate cover.

Schedule

RESNA will continue the monthly water-level measurements and quarterly groundwater monitoring at this site to evaluate trends in petroleum hydrocarbons and changes in groundwater gradient with time. Routine well maintenance, removal of free product, and quality control will be performed as necessary during these site visits. The next quarterly monitoring episode is scheduled for November 5, 1991. A product recovery well was installed on October 30, 1991, and an aquifer pump test is scheduled to be conducted in November 1991.

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. Lester Feldman
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

Lou Leet
Geologic Technician

Joan E. Tiernan
Registered Civil
Engineer 044600

cc: H.C. Winsor, ARCO

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Groundwater Gradient Map, July 24, 1991
Plate 4, Groundwater Gradient Map, August 6, 1991
Plate 5, Groundwater Gradient Map, September 3, 1991
Plate 6, TPHg Concentrations in Groundwater, August 6, 1991
Plate 7, Benzene Concentrations in Groundwater, August 6, 1991
Plate 8, Tetrachloroethene Concentrations in Groundwater, September 3, 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.

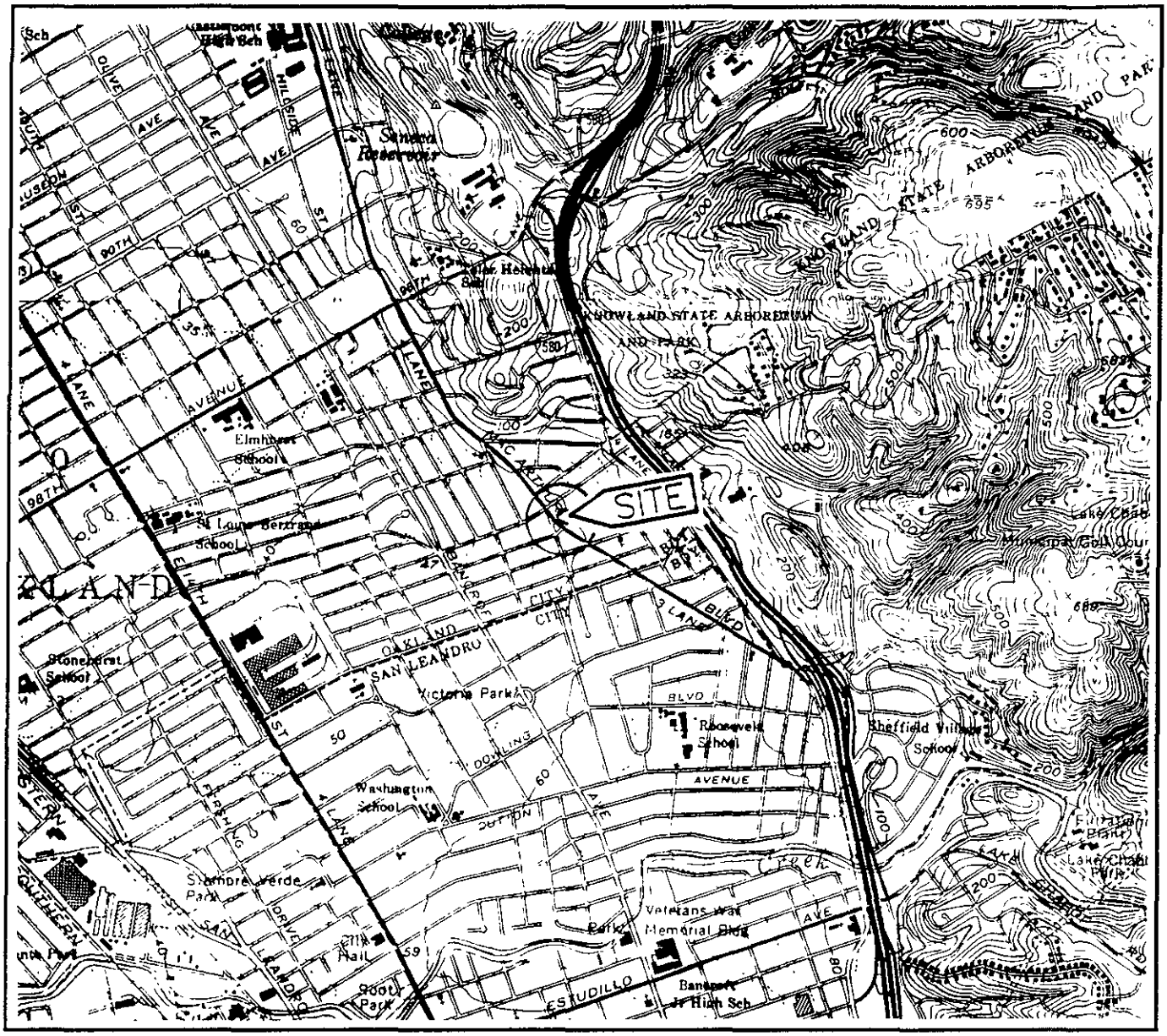
Pacific Environmental Group, Inc. February 6, 1989. Former Waste-Oil Tank Pit Analytical Results and Site Plan of ARCO Station No. 276. Copy of letter sent to Ms. Mary Meirs, Alameda County Environmental Health Department Hazardous Material Division.

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

REFERENCES
(continued)

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.

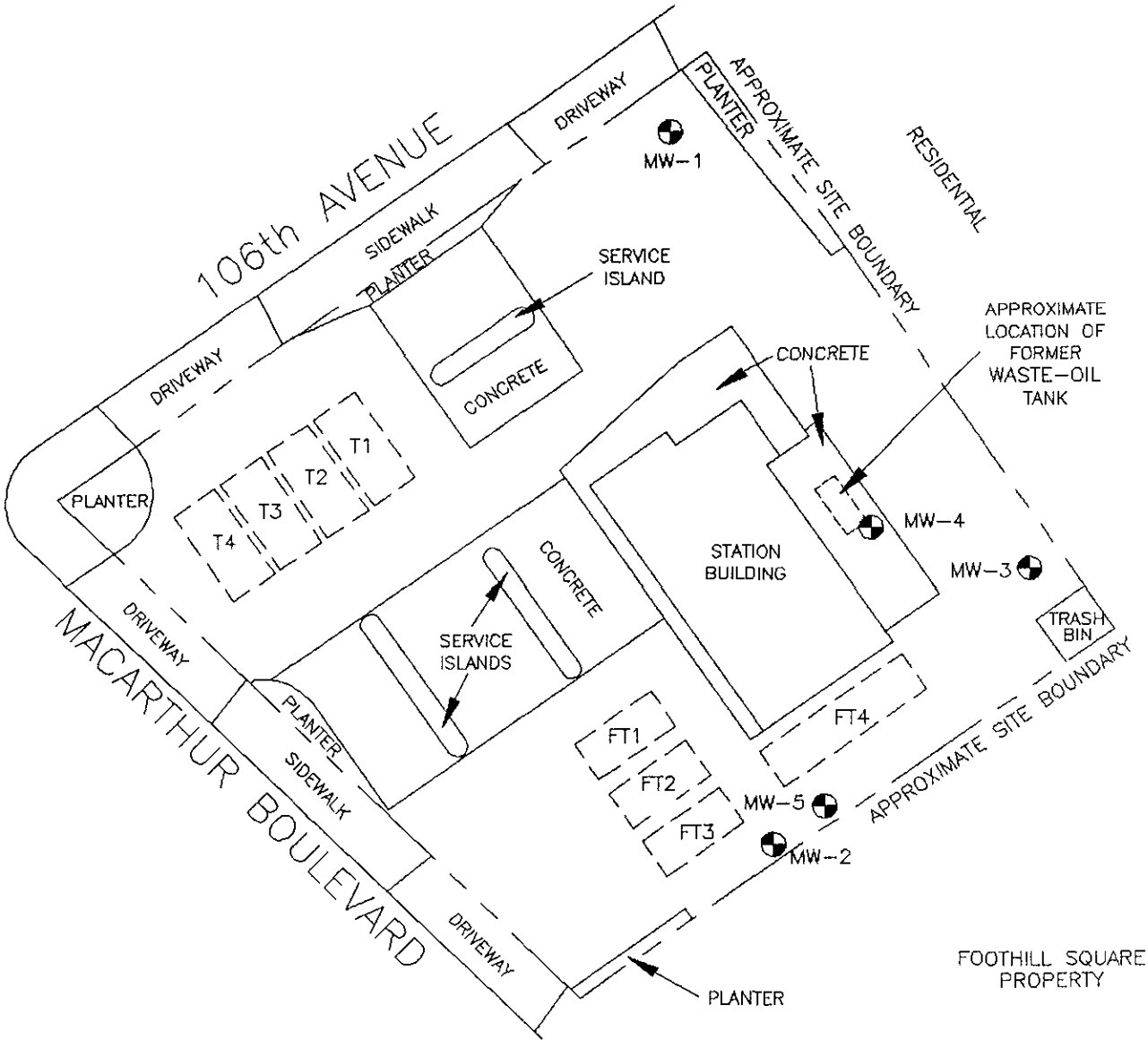


Base: U.S. Geological Survey
7.5-Minute Quadrangles
Oakland East/San Leandro,
California.
Photorevised 1980

LEGEND

⊙ = Site Location

RESNA	**SITE VICINITY MAP** **ARCO Station 276** **10600 MacArthur Boulevard** **Oakland, California**	**PLATE** **1**
PROJECT 60026.02		



EXPLANATION

MW-5 = Groundwater monitoring well (RESNA, 1989)

T4 = Existing underground gasoline Storage Tanks

FT4 = Former underground gasoline Storage Tanks

N

Approximate Scale

30 15 0 30 60

feet

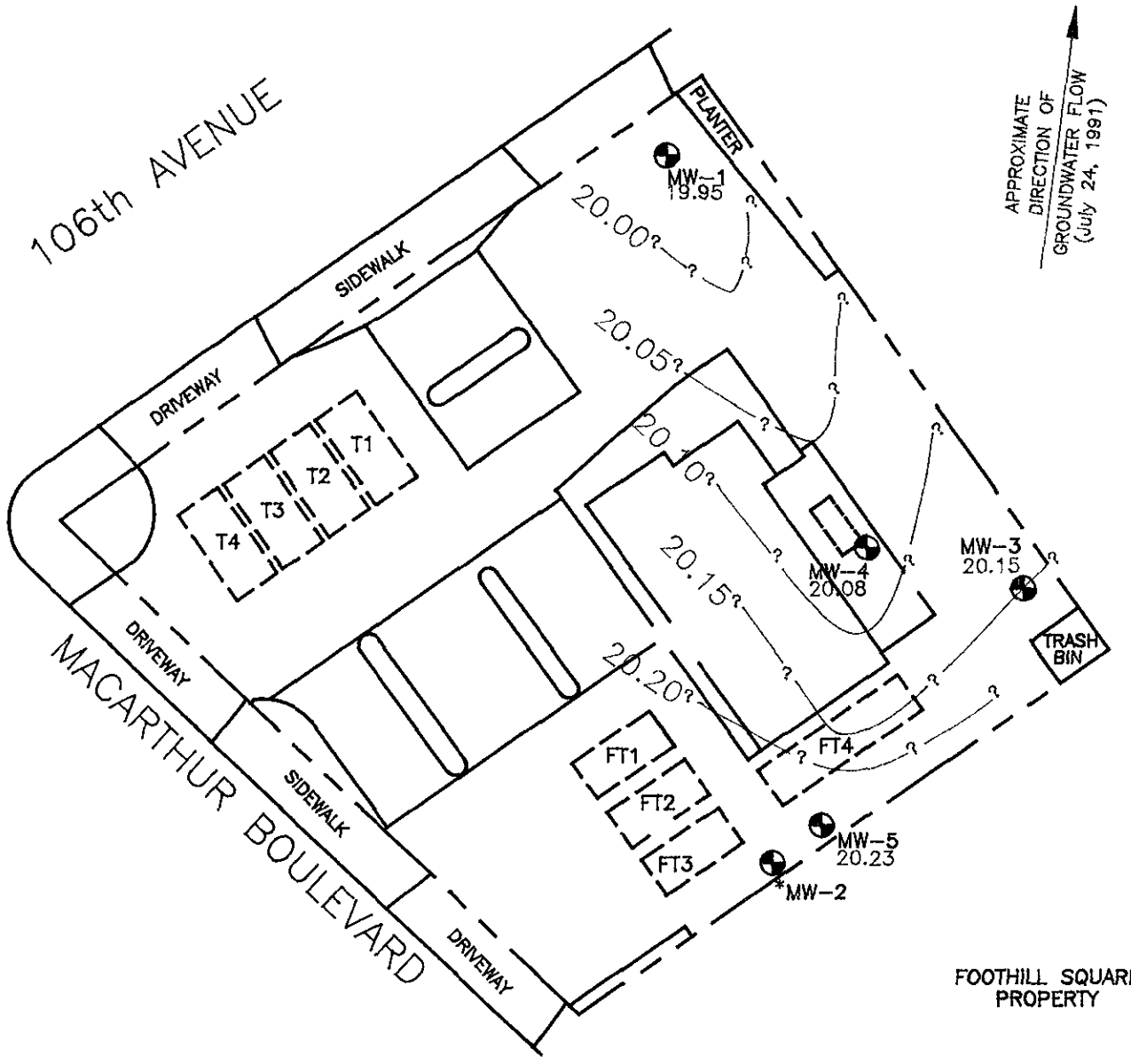
Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc.

RESNA

PROJECT 60026.02

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

PLATE 2



EXPLANATION

20.20— = Line of equal elevation of groundwater above mean sea level (MSL)

20.23 = Elevation of groundwater in feet MSL July 24, 1991

MW-5 ⊕ = Monitoring well (RESNA, 1989)

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

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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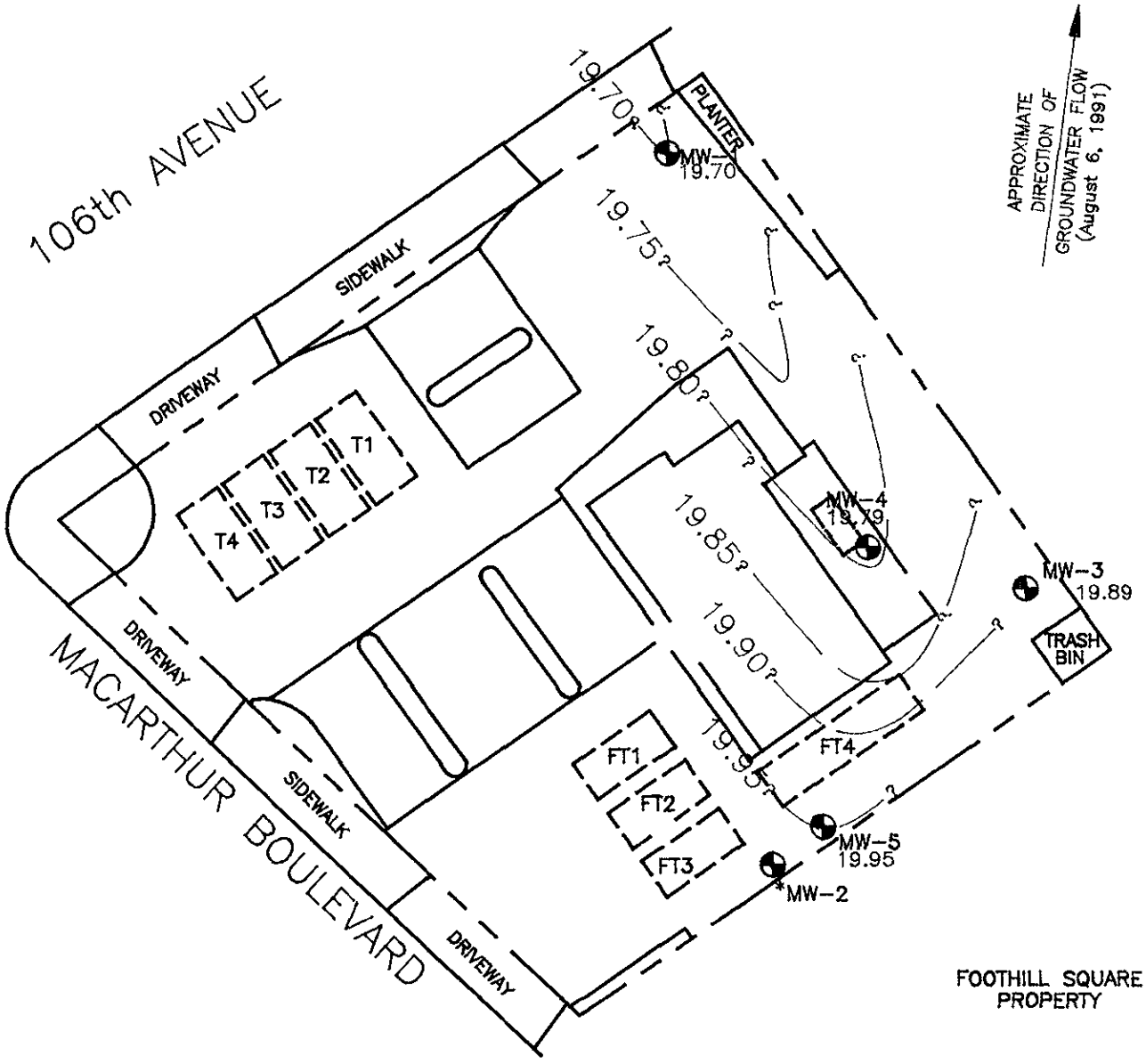
PROJECT 60026.02

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

PLATE 3



EXPLANATION

19.95 — = Line of equal elevation of groundwater above mean sea level (MSL)

19.95 = Elevation of groundwater in fet MSL August 6, 1991

MW-5 = Monitoring well (RESNA, 1989)

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

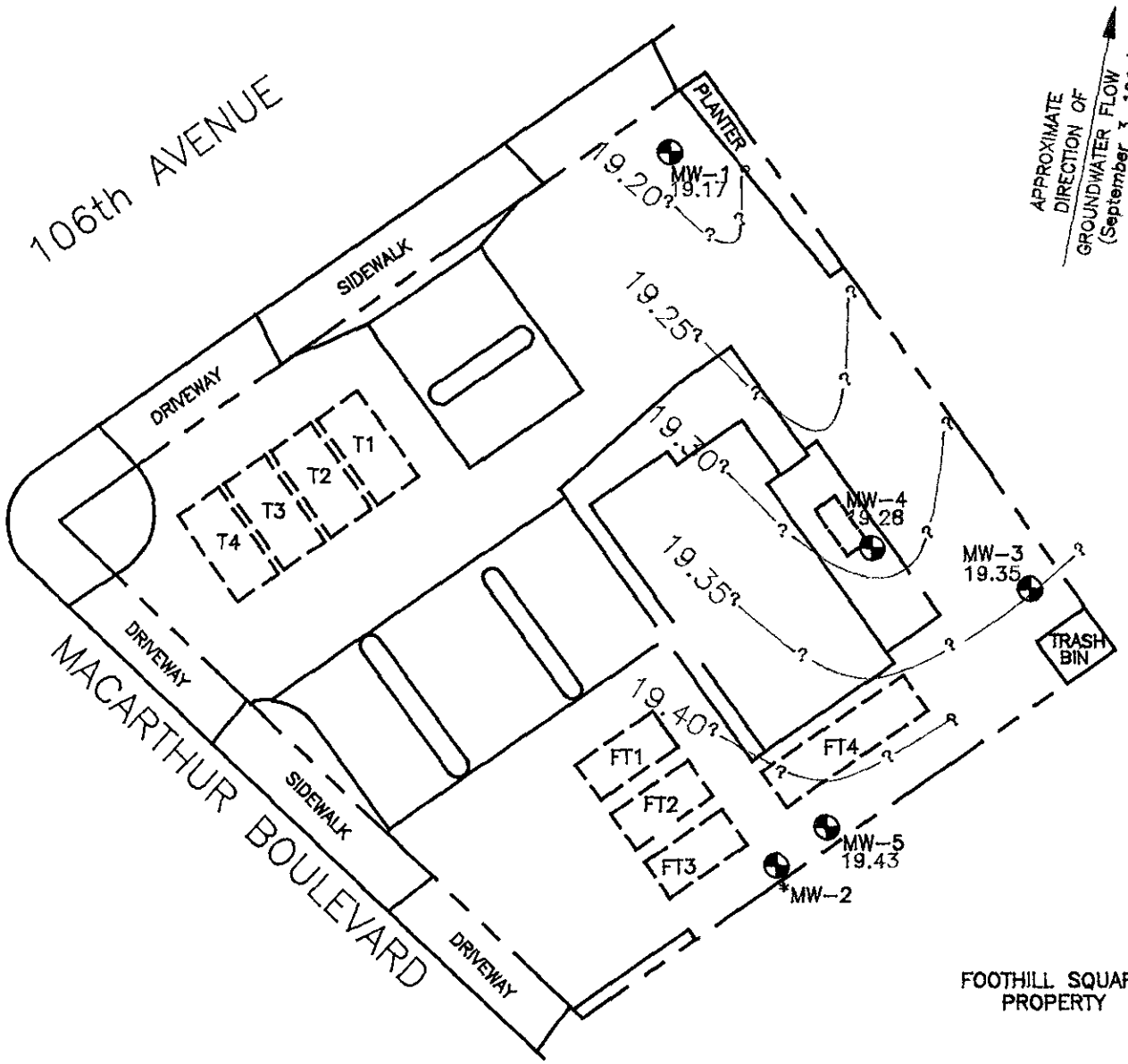
Approximate Scale

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** **4**
PROJECT 60026.02		



EXPLANATION

19.40 — = Line of equal elevation of groundwater above mean sea level (MSL)

19.43 = Elevation of groundwater in feet MSL September 3, 1991

MW-5 = Monitoring well (RESNA, 1989)

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

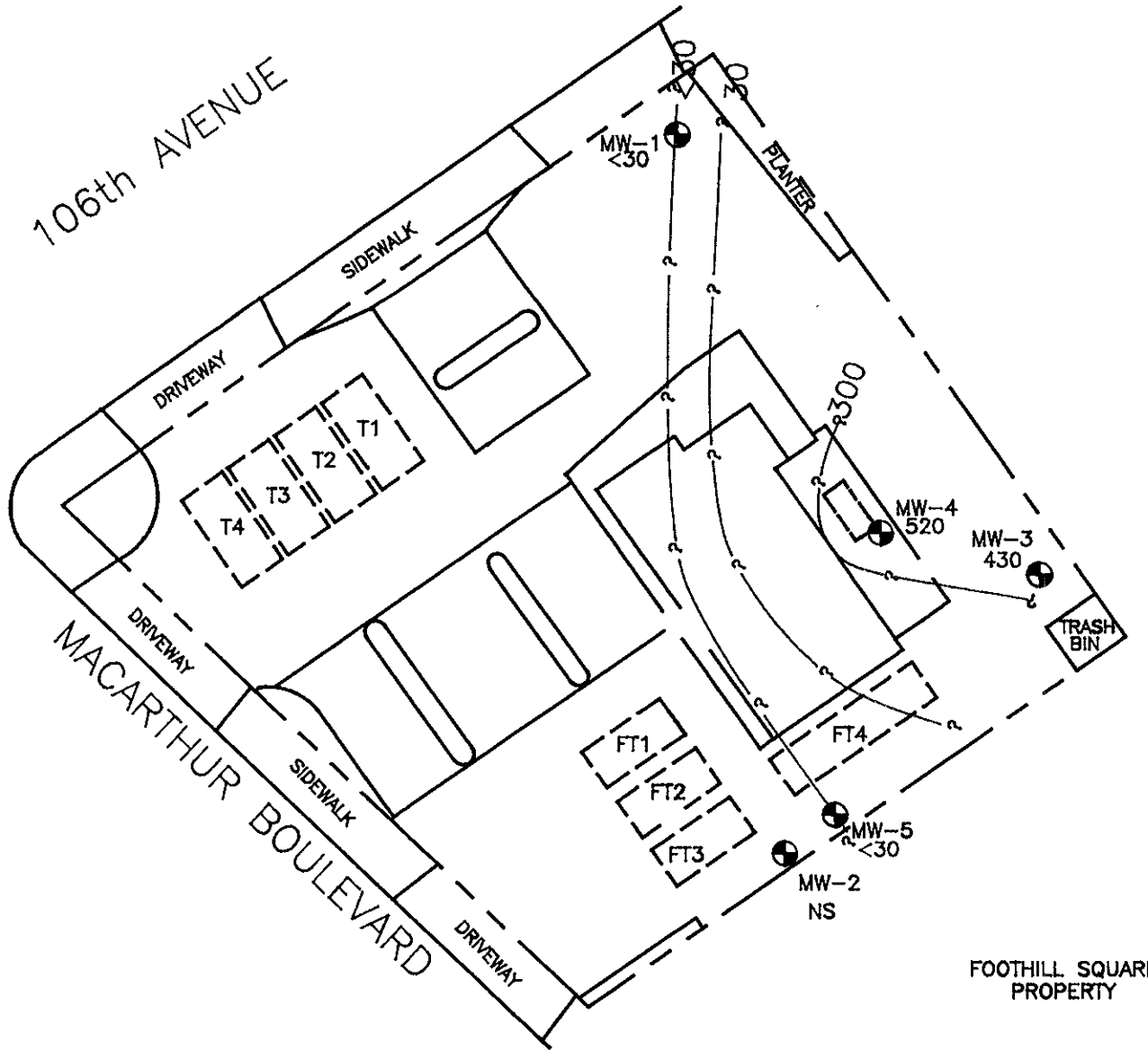
Approximate Scale

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** **5**
PROJECT 60026.02		



EXPLANATION

300 — = Line of equal concentration of TPHg in groundwater, in ppb, August 6, 1991

520 = Concentration of TPHg in groundwater in ppb, August 6, 1991

MW-5 = Groundwater monitoring well (RESNA, 1989)

NS = Not sampled due to product or product sheeen

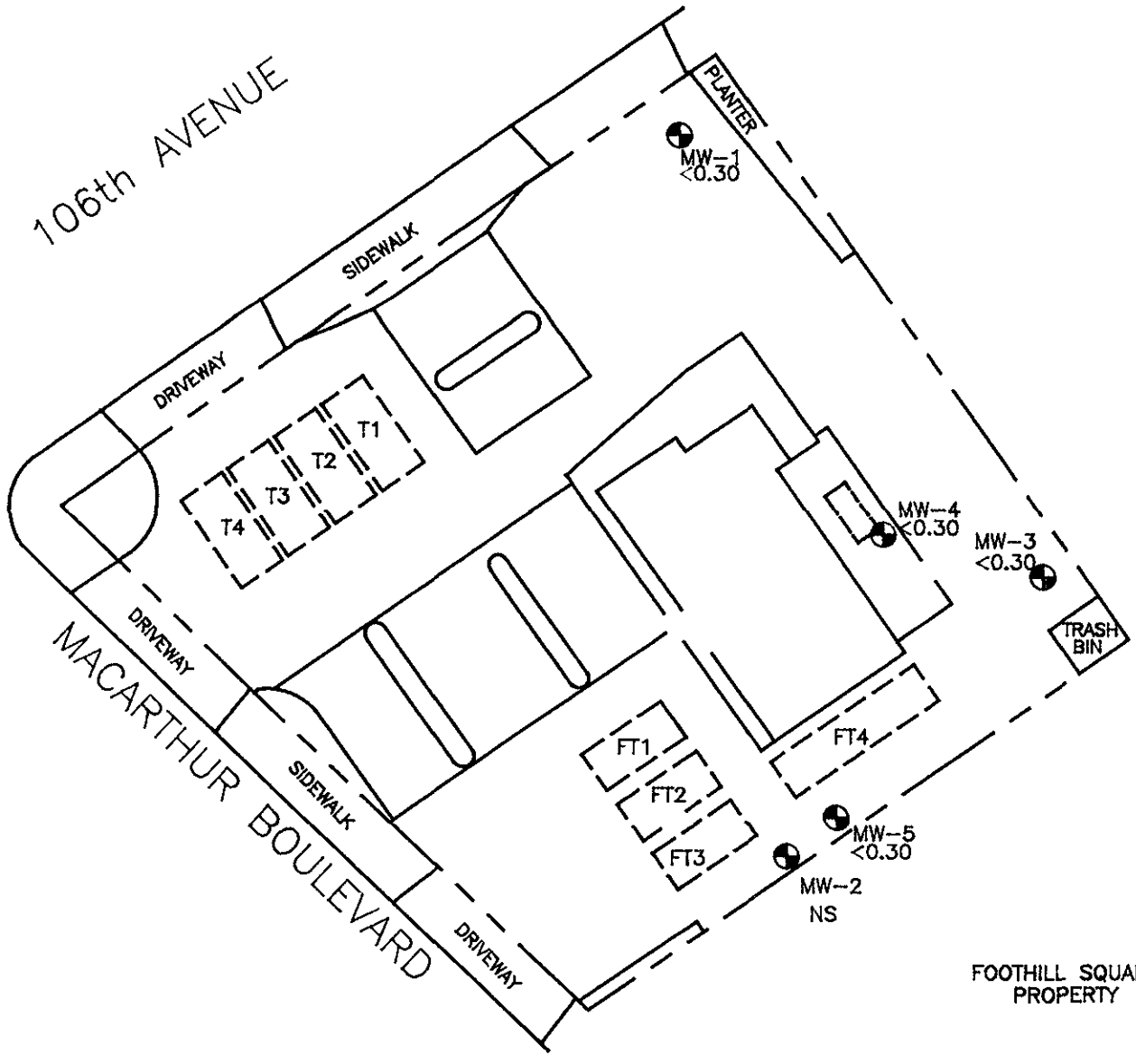
Approximate Scale

30 15 0 30 60

feet

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

RESNA	**TPHg CONCENTRATIONS IN GROUNDWATER ARCO Station 276 10600 MacArthur Boulevard Oakland, California**	**PLATE 6**
PROJECT 60026.02		



EXPLANATION

<0.30 = Concentration of Benzene in groundwater in ppb, August 6, 1991

MW-5 = Monitoring well (RESNA, 1989)

NS = Not sampled due to product or product sheeen

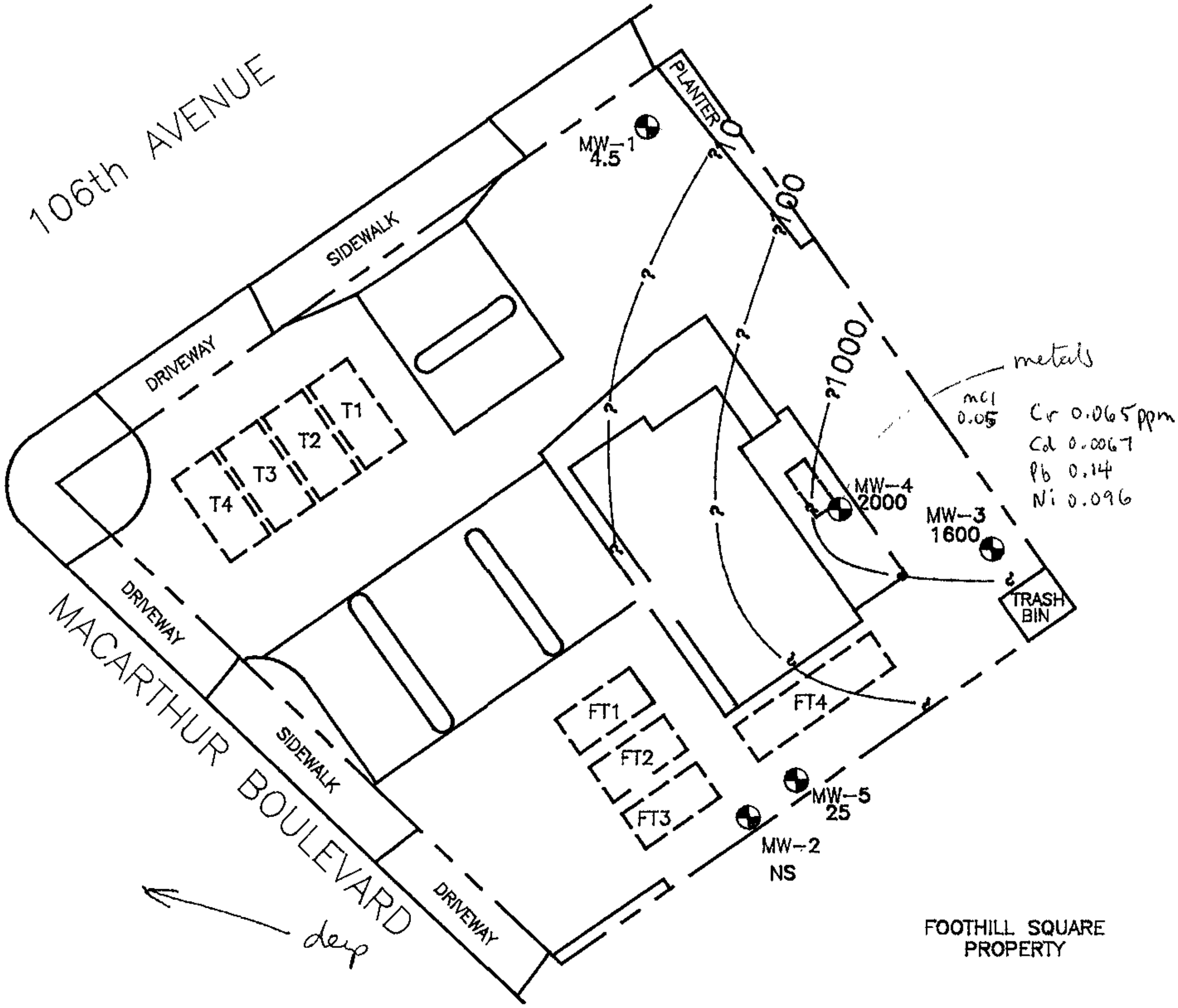
Approximate Scale

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 60026.02		



EXPLANATION

1000 = Line of equal concentration of Tetrachloroethene in groundwater, in ppb, September 3, 1991

2000 = Concentration of Tetrachloroethene in groundwater, in ppb, September 3, 1991

MW-5 = Groundwater monitoring well (RESNA, 1989)

NS = Not sampled due to product or product sheen

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	TETRACHLOROETHENE CONCENTRATIONS IN GROUNDWATER ARCO Station 276 10600 MacArthur Boulevard Oakland, California	PLATE 8
PROJECT 60026.02		

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
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	Odor
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

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-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
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		6.32	19.62	None
08/28/90		36.79	19.15	None
10/30/90		37.62	18.32	None
11/20/90		37.82	18.52	None
12/19/90		37.74	18.20	None
01/30/91		37.97	17.97	None
02/27/91		37.52	18.42	None
03/20/91		36.69	19.25	None
04/30/91		34.48	21.46	None
05/31/91		34.73	21.21	None
07/24/91		35.86	20.08	None
08/06/91		36.15	19.79	None
09/03/91		36.66	19.28	None

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-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

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
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						
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
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

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

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 1)

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
MW-2							
09/03/91	----------	Not sampled--floating product					
MW-3							
09/03/91	Tetrachloroethene	1,600*	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
MW-5							
08/06/91	Tetrachloroethene	7.3*	NA	NA	NA	NA	NA
09/03/91	Tetrachloroethene	25*	NA	NA	NA	NA	NA
MCL		---	0.010	0.05	0.05	5.0	---

Results in parts per billion (ppb), except heavy metals which are in parts per million (ppm).
NA: Not analyzed.
*: Exceeds the MCL of 5 ppb concentration of tetrachloroethene.
Compounds not shown not detected.
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

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.

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. These calculated ground-water depths were subtracted from wellhead elevations measured by Ron Archer, Civil Engineer, Inc., of Pleasanton, California, a licensed land surveyor, to calculate the differences in ground-water 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 ground-water 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. 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

Chain of Custody

Task Order No. 276-91 SB

ARCO Facility no: 276-6.0026.02	City (Facility): OAKLAND	Project manager (Consultant): EL COFFMAN/LOU LEET	Laboratory name: SEQUOIA
ARCO engineer: CHUCK CARMEL	Telephone no (ARCO):	Telephone no (Consultant): (408) 264-7723	Fax no (Consultant): (408) 264-2435
Consultant name: RESNA/AGS	Address (Consultant): 3315 ALMADEN EXPRESSWAY, SUITE 34 SAN JOSE, CA		Contract number:

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 ☐	METALS 6010	
W-RINSATE	1	1	1081900	X		X		8-6-91	2:10		X					1081900			HOLD			
W-36.3-MW1	4	4	1081901	X		X	X	8-6-91	1:50		X					1081901						
W-36.7-MW3	4	4	1081902	X		X	X	8-6-91	1:50		X					1081902						
W-37-MW4	4	4	1081903	X		X	X	8-6-91	14:20		X					1081903						
W-37-MW4	2	2		X		X		8-6-91	14:20						X		↓					
W-36-MW4	1	1	1081905	X		X	HNO3	8-6-91	14:20							1081905					X	
W-35-MW5	4	4	1081904	X		X	X	8-6-91	14:00		X					1081904						
W-35-MW5	2	2		X		X		8-6-91	14:00						X		↓					

Special detection Limit/reporting: HOLD

Method of shipment:

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: L. J. Leet	Date/Time: 8-7-91 12:01	Received by: Ken Van Sambroek	
Relinquished by:	Date/Time:	Received by:	
Relinquished by:	Date/Time:	Received by laboratory:	Date: 8-7 Time: 1325

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

APP-C-3292 (2-91)

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Aug 6, 1991
3315 Alameda Expwy., #34	Matrix Descript:	Water	Received:	Aug 7, 1991
San Jose, CA 95112	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Aug 15, 1991
Attention: Joel Coffman	First Sample #:	108-1901	Revised:	Sep 6, 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)
108-1901	W-36.3 MW1	N.D.	N.D.	N.D.	N.D.	N.D.
108-1902	W-36.7 MW3	430	N.D.	N.D.	N.D.	N.D.
108-1903	W-37-MW4	520	N.D.	N.D.	N.D.	N.D.
108-1904	W-35-MW5	N.D.	N.D.	N.D.	N.D.	N.D.

Detection Limits:	**30**	**0.30**	**0.30**	**0.30**	**0.30**

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

SEQUOIA ANALYTICAL

Elizabeth W. Hackl
Project Manager

SEQUOIA ANALYTICAL

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

RESNA
3315 Alameda Expwy., #34
San Jose, CA 95112
Attention: Joel Coffman

Client Project ID: ARCO 276, Oakland

QC Sample Group: 1081900-04

Reported: Aug 26, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	G. Meyer	G. Meyer	G. Meyer	G. Meyer
Reporting Units:	µg/L	µg/L	µg/L	µg/L
Date Analyzed:	Aug 15, 1991	Aug 15, 1991	Aug 15, 1991	Aug 15, 1991
QC Sample #:	BLK081591	BLK081591	BLK081591	BLK081591
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10	10	10	30
Conc. Matrix Spike:	9.6	9.5	9.5	29
Matrix Spike % Recovery:	96	95	95	97
Conc. Matrix Spike Dup.:	10	10	9.9	30
Matrix Spike Duplicate % Recovery:	100	100	99	100
Relative % Difference:	4.1	5.1	4.1	3.4

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Elizabeth W. Hackl
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

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Aug 6, 1991
3315 Alameda Expwy., #34	Sample Descript:	Water, W-37-MW4	Received:	Aug 7, 1991
San Jose, CA 95112	Analysis Method:	EPA 5030/8010	Analyzed:	Aug 19, 1991
Attention: Joel Coffman	Lab Number:	108-1903	Reported:	Aug 26, 1991

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	50	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
Carbon tetrachloride	50	N.D.
Chlorobenzene	50	N.D.
Chloroethane	100	N.D.
2-Chloroethylvinyl ether	100	N.D.
Chloroform	50	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	50	N.D.
1,2-Dichlorobenzene	50	N.D.
1,3-Dichlorobenzene	50	N.D.
1,4-Dichlorobenzene	50	N.D.
1,1-Dichloroethane	50	N.D.
1,2-Dichloroethane	50	N.D.
1,1-Dichloroethene	50	N.D.
cis-1,2-Dichloroethene	50	N.D.
trans-1,2-Dichloroethene	50	N.D.
1,2-Dichloropropane	50	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Methylene chloride	200	N.D.
1,1,2,2-Tetrachloroethane	50	N.D.
Tetrachloroethene	**50**	**1,700**
1,1,1-Trichloroethane	50	N.D.
1,1,2-Trichloroethane	50	N.D.
Trichloroethene	50	N.D.
Trichlorofluoromethane	100	N.D.
Vinyl chloride	100	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

Elizabeth W. Hackl
Project Manager

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RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Aug 6, 1991
3315 Alameda Expwy., #34	Sample Descript:	Water, W-35-MW5	Received:	Aug 7, 1991
San Jose, CA 95112	Analysis Method:	EPA 5030/8010	Analyzed:	Aug 19, 1991
Attention: Joel Coffman	Lab Number:	108-1904	Reported:	Aug 26, 1991

HALOGENATED VOLATILE ORGANICS (EPA 8010)

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.
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**	**7.3**
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

Elizabeth W. Hackl
Project Manager

SEQUOIA ANALYTICAL

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

RESNA
3315 Alameda Expwy., #34
San Jose, CA 95112
Attention: Joel Coffman

Client Project ID: ARCO 276, Oakland

QC Sample Group: 1081903-04

Reported: Aug 26, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	1,1-Dichloro-ethene	Trichloro-ethene	Chloro-benzene
Method:	EPA 8010	EPA 8010	EPA 8010
Analyst:	J. Montierth	J. Montierth	J. Montierth
Reporting Units:	µg/L	µg/L	µg/L
Date Analyzed:	Aug 19, 1991	Aug 19, 1991	Aug 19, 1991
QC Sample #:	BLK081991	BLK081991	BLK081991
	MS	MS	MS
Sample Conc.:	N.D.	N.D.	N.D.
Spike Conc. Added:	2.0	2.0	2.0
Conc. Matrix Spike:	2.0	1.7	1.7
Matrix Spike % Recovery:	100	85	85
Conc. Matrix Spike Dup.:	2.2	1.9	1.8
Matrix Spike Duplicate % Recovery:	110	95	90
Relative % Difference:	9.5	11	5.7

SEQUOIA ANALYTICAL

Elizabeth W. Hackl
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

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Aug 6, 1991
3315 Alameda Expwy., #34	Sample Descript:	Water, W-36-MW4	Received:	Aug 7, 1991
San Jose, CA 95112			Analyzed:	8/ 19-20 /91
Attention: Joel Coffman	Lab Number:	108-1905	Reported:	Aug 26, 1991

LABORATORY ANALYSIS

Analyte	Detection Limit mg/L	Sample Results mg/L
Cadmium	0.010	N.D.
Chromium	0.010	0.065
Lead	0.0050	0.0067
Zinc	0.010	0.14
Nickel	0.050	0.096

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

SEQUOIA ANALYTICAL

Elizabeth W. Hackl
Project Manager

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

RESNA
3315 Alameda Expwy., #34
San Jose, CA 95112
Attention: Joel Coffman

Client Project ID: ARCO 276, Oakland

QC Sample Group: 108-1905

Reported: Aug 26, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Lead	Cadmium	Chromium	Nickel	Zinc
Method:	EPA 239.2	EPA 200.7	EPA 200.7	EPA 200.7	EPA 200.7
Analyst:	V. Patel	R. Sharma	R. Sharma	R. Sharma	R. Sharma
Reporting Units:	mg/L	mg/L	mg/L	mg/L	mg/L
Date Analyzed:	Aug 19, 1991	Aug 20, 1991	Aug 20, 1991	Aug 20, 1991	Aug 20, 1991
QC Sample #:	108-1943	108-2347	108-2347	108-2347	108-2347
Sample Conc.:	N.D.	0.013	0.040	N.D.	1.3
Spike Conc. Added:	0.10	1.0	1.0	1.0	1.0
Conc. Matrix Spike:	0.092	0.99	1.0	1.0	2.3
Matrix Spike % Recovery:	92	98	96	100	100
Conc. Matrix Spike Dup.:	0.098	1.0	1.0	1.0	2.4
Matrix Spike Duplicate % Recovery:	98	99	96	100	110
Relative % Difference:	6.3	1.0	0.0	0.0	4.3

SEQUOIA ANALYTICAL

Elizabeth W. Hackl
Project Manager

$$\text{\% Recovery:} \quad \frac{\text{Conc. of M S. - Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Conc. of M S. - Conc. of M S.D.}}{\text{(Conc. of M.S. + Conc. of M.S.D.) / 2}} \times 100$$

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 276-90-3

Chain of Custody

ARCO Facility no: 276-6026.02	City (Facility): OAKLAND	Project manager (Consultant): JOEL COFFMAN/LOU LEET	Laboratory name: SEQ401A
ARCO engineer: KYLE CHRISTIE	Telephone no (ARCO):	Telephone no (Consultant): (408) 264-7723	Fax no (Consultant): (408) 264-2435
Consultant name: RESNA	Address (Consultant): 3315 ALMADEN EXPRESSWAY, SUITE 34 SAN JOSE, CA		Contract number:

Sample ID	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 ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☐		
W-36-MW5				X		X		9-3-91	18:30						X							A-C
W-37-MW3				X		X		9-3-91	18:05						X					02		
W-36-MW1				X		X		9-3-91	17:55						X					03		
W-36-MW4				X		X		9-3-91	18:15						X					04		
W-36-MW1R				X		X		9-3-91	17:50	HOLD												

Special detection Limit/reporting:

Special QA/QC:

Remarks:
5-DAY TURN-AROUND
VOC's

Lab number:

Condition of sample: good		Temperature received: cool	
Relinquished by sampler: L. J. Leet	Date: 9-4-91 Time: 10:41 AM	Received by:	
Relinquished by:	Date: 9-4-91 Time: 11:39 AM	Received by:	
Relinquished by:	Date: Time:	Received by laboratory:	Date: 9-4 Time: 1200

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

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

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

Project: ARCO 276, Oakland

Enclosed are the results from 4 water samples received at Sequoia Analytical on September 4,1991. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
1091201 A-C	Water, W-36-MW5	9/4/91	EPA 5030/8010
1091202 A-C	Water, W-37-MW3	9/4/91	EPA 5030/8010
1091203 A-C	Water, W-36-MW1	9/4/91	EPA 5030/8010
1091204 A-C	Water, W-36-MW4	9/4/91	EPA 5030/8010

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

Elizabeth W. Hackl
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:	Sep 4, 1991
3315 Almaden Expwy., Suite 34	Sample Descript:	Water, W-36-MW5	Received:	Sep 4, 1991
San Jose, CA 95112	Analysis Method:	EPA 5030/8010	Analyzed:	Sep 12, 1991
Attention: Joel Coffman	Lab Number:	109-1201 A-C	Reported:	Sep 13, 1991

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	0.75	N.D.
Bromoform	1.5	N.D.
Bromomethane	1.5	N.D.
Carbon tetrachloride	0.75	N.D.
Chlorobenzene	0.75	N.D.
Chloroethane	1.5	N.D.
2-Chloroethylvinyl ether	1.5	N.D.
Chloroform	0.75	N.D.
Chloromethane	1.5	N.D.
Dibromochloromethane	0.75	N.D.
1,2-Dichlorobenzene	0.75	N.D.
1,3-Dichlorobenzene	0.75	N.D.
1,4-Dichlorobenzene	0.75	N.D.
1,1-Dichloroethane	0.75	N.D.
1,2-Dichloroethane	0.75	N.D.
1,1-Dichloroethene	0.75	N.D.
cis-1,2-Dichloroethene	0.75	N.D.
trans-1,2-Dichloroethene	0.75	N.D.
1,2-Dichloropropane	0.75	N.D.
cis-1,3-Dichloropropene	1.5	N.D.
trans-1,3-Dichloropropene	1.5	N.D.
Methylene chloride	3.0	N.D.
1,1,2,2-Tetrachloroethane	0.75	N.D.
Tetrachloroethene	**0.75**	**25**
1,1,1-Trichloroethane	0.75	N.D.
1,1,2-Trichloroethane	0.75	N.D.
Trichloroethene	0.75	N.D.
Trichlorofluoromethane	1.5	N.D.
Vinyl chloride	1.5	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

Elizabeth W. Hackl
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:	Sep 4, 1991
3315 Almaden Expwy., Suite 34	Sample Descript:	Water, W-37-MW3	Received:	Sep 4, 1991
San Jose, CA 95112	Analysis Method:	EPA 5030/8010	Analyzed:	Sep 12, 1991
Attention: Joel Coffman	Lab Number:	109-1202 A-C	Reported:	Sep 13, 1991

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	50	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
Carbon tetrachloride	50	N.D.
Chlorobenzene	50	N.D.
Chloroethane	100	N.D.
2-Chloroethylvinyl ether	100	N.D.
Chloroform	50	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	50	N.D.
1,2-Dichlorobenzene	50	N.D.
1,3-Dichlorobenzene	50	N.D.
1,4-Dichlorobenzene	50	N.D.
1,1-Dichloroethane	50	N.D.
1,2-Dichloroethane	50	N.D.
1,1-Dichloroethene	50	N.D.
cis-1,2-Dichloroethene	50	N.D.
trans-1,2-Dichloroethene	50	N.D.
1,2-Dichloropropane	50	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Methylene chloride	200	N.D.
1,1,2,2-Tetrachloroethane	50	N.D.
Tetrachloroethene	**50**	**1,600**
1,1,1-Trichloroethane	50	N.D.
1,1,2-Trichloroethane	50	N.D.
Trichloroethene	50	N.D.
Trichlorofluoromethane	100	N.D.
Vinyl chloride	100	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

Elizabeth W. Hackl
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:	Sep 4, 1991
3315 Almaden Expwy., Suite 34	Sample Descript:	Water, W-36-MW1	Received:	Sep 4, 1991
San Jose, CA 95112	Analysis Method:	EPA 5030/8010	Analyzed:	Sep 12, 1991
Attention: Joel Coffman	Lab Number:	109-1203 A-C	Reported:	Sep 13, 1991

HALOGENATED VOLATILE ORGANICS (EPA 8010)

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.
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**	**4.6**
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

Elizabeth W. Hackl
Project Manager

1091201.RRR <3>

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

RESNA	Client Project ID:	ARCO 276, Oakland	Sampled:	Sep 4, 1991
3315 Almaden Expwy., Suite 34	Sample Descript:	Water, W-36-MW4	Received:	Sep 4, 1991
San Jose, CA 95112	Analysis Method:	EPA 5030/8010	Analyzed:	Sep 12, 1991
Attention: Joel Coffman	Lab Number:	109-1204 A-C	Reported:	Sep 13, 1991

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/L	Sample Results µg/L
Bromodichloromethane	50	N.D.
Bromoform	100	N.D.
Bromomethane	100	N.D.
Carbon tetrachloride	50	N.D.
Chlorobenzene	50	N.D.
Chloroethane	100	N.D.
2-Chloroethylvinyl ether	100	N.D.
Chloroform	50	N.D.
Chloromethane	100	N.D.
Dibromochloromethane	50	N.D.
1,2-Dichlorobenzene	50	N.D.
1,3-Dichlorobenzene	50	N.D.
1,4-Dichlorobenzene	50	N.D.
1,1-Dichloroethane	50	N.D.
1,2-Dichloroethane	50	N.D.
1,1-Dichloroethene	50	N.D.
cis-1,2-Dichloroethene	50	N.D.
trans-1,2-Dichloroethene	50	N.D.
1,2-Dichloropropane	50	N.D.
cis-1,3-Dichloropropene	100	N.D.
trans-1,3-Dichloropropene	100	N.D.
Methylene chloride	200	N.D.
1,1,2,2-Tetrachloroethane	50	N.D.
Tetrachloroethene	**50**	**2,000**
1,1,1-Trichloroethane	50	N.D.
1,1,2-Trichloroethane	50	N.D.
Trichloroethene	50	N.D.
Trichlorofluoromethane	100	N.D.
Vinyl chloride	100	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

Elizabeth W. Hackl
Project Manager

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

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

Client Project ID: ARCO 276, Oakland

QC Sample Group: 1091201-04

Reported: Sep 13, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	1,1-Dichloro-ethene	Trichloro-ethene	Chloro-benzene
Method:	EPA 8010	EPA 8010	EPA 8010
Analyst:	A. Fulcher	A. Fulcher	A. Fulcher
Reporting Units:	µg/L	µg/L	µg/L
Date Analyzed:	Sep 12, 1991	Sep 12, 1991	Sep 12, 1991
QC Sample #:	Matrix	Matrix	Matrix
Sample Conc.:	N.D.	N.D.	N.D.
Spike Conc. Added:	5.0	5.0	5.0
Conc. Matrix Spike:	5.4	5.8	4.9
***Matrix Spike* % Recovery:**	110	120	98
Conc. Matrix Spike Dup.:	5.1	5.2	5.1
Matrix Spike Duplicate % Recovery:	100	100	100
Relative % Difference:	5.7	11	4.0

SEQUOIA ANALYTICAL

Elizabeth W. Hackl
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

State of California—Health and Welfare Agency
Form Approved OMB No. 2050—0039 (Expires 9-30-91)

and Front of Page 7

Sacramento, California

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

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. C A L 0 0 0 0 1 3 9 9 2 | Manifest Document No. 0 0 0 0 1
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
4. Generator's Phone (415) 571-2434/571-2428

A. State Manifest Document Number 90549527
B. State Generator's ID HYHQ36-015660

5. Transporter 1 Company Name
H & H Ship Service Company
6. US EPA ID Number C A D 0 0 4 7 7 1 1 6 8

C. State Transporter's ID 200505
D. Transporter's Phone (415) 543-4835

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 C A D 0 0 4 7 7 1 1 6 8

G. State Facility's ID C A D 0 0 4 7 7 1 1 6 8
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 No.
a. OIL AND WATER NON-RCRA HAZARDOUS WASTE LIQUID	001	TT	00100		State 134 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 #A0042

K. Handling Codes for Wastes Listed Above
a. 01
b.
c.
d.

15. Special Handling Instructions and Additional Information
JOB #8061
24 Hr. Emergency Contact: H & H #(415) 543-4835
APPROPRIATE PROTECTIVE CLOTHING AND RESPIRATOR.
JOB SITE: ARCO STATION, #276
10600 MacArthur Blvd.
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: [illegible] FOR ARCO | Signature: [signature] | Month Day Year 08 08 91

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: ESTEBAN M. PENALVER | Signature: [signature] | Month Day Year 08 08 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

Do Not Write Below This Line

EPA 8700-22

YELLOW: GENERATOR RETAINS

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

GENERATOR / TRANSPORTER / FACILITY

State of California—Health and Welfare Agency
Form Approved OMB No. 2050—0039 (Expires 9-30-91)
Please print or type. *Form designed for use on elite (12-pitch typewriter).*

See Instructions on Back of Page 6 and Front of Page 7

Toxic Substances Control Division
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: C A L 0 0 0 0 1 3 9 9 2 | Manifest Document No.: 0 0 0 0 2

2. Page 1 of 1

Information in the shaded areas is not required by Federal law.

GENERATOR

3. Generator's Name and Mailing Address
ARCO
P. O. Box 5811, San Mateo, CA 94402
4. Generator's Phone (415) 571-2434/571-2428

A. State Manifest Document Number: 90533208
B. State Generator's ID: H Y H 0 3 6 - 0 1 5 6 6 0
C. State Transporter's ID: 200545
D. Transporter's Phone: (415) 543-4835
E. State Transporter's ID:
F. Transporter's Phone:
G. State Facility's ID: C A D 0 0 4 7 7 1 1 6 8
H. Facility's Phone: (415) 543-4835

5. Transporter 1 Company Name: H & H Ship Service Company
6. US EPA ID Number: C A D 0 0 4 7 7 1 1 6 8
7. Transporter 2 Company Name:
8. US EPA ID Number:
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: C A D 0 0 4 7 7 1 1 6 8

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. OIL AND WATER NON-RCRA HAZARDOUS WASTE LIQUID	0 0 1	T T	0 0 0 5 0	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 #9259
24 Hr. Emergency Contact: H & H #(415) 543-4835
APPROPRIATE PROTECTIVE CLOTHING AND RESPIRATOR.

JOB SITE: ARCO STATION, #0276
10600 MacArthur Blvd.
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: EZEQUIEL CARDENAS | Signature | Month Day Year: 0 9 1 1 9 1

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: JAMES R. MORGAN | Signature | Month Day Year: 0 9 1 1 9 1

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name | Signature | Month Day Year

FACILITY

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

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

DHS 8022 A
EPA 8700—22
(Rev 6-89) Previous editions are obsolete.

Do Not Write Below This Line

Blue: GENERATOR SENDS THIS COPY TO DOHS WITHIN 30 DAYS