Applied GeoSystems, Inc.
A RESNA Company

RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
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LETTER REPORT
QUARTERLY GROUNDWATER MONITORING
Fourth Quarter 1991
at
ARCO Station 374
6407 Telegraph Avenue
Oakland, California

60025.07

03/05/92

Applied GeoSystems, Inc.
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TRANSMITTAL

92 MAR 11 PM 2:07

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TO: MS. SUSAN HUGO
ACHCSA-DEH
80 SWAN WAY, ROOM 200
OAKLAND, CALIFORNIA 94621

DATE: 3/9/92
PROJECT NUMBER: 60025.07
SUBJECT: ARCO STATION 374, 6407 TELEGRAPH AVENUE, OAKLAND, CALIFORNIA

FROM: JOEL COFFMAN
TITLE: PROJECT GEOLOGIST

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REMARKS: A COPY OF THIS REPORT HAS BEEN FORWARDED TO YOU AT THE REQUEST OF MR. CHUCK CARMEL, ARCO PRODUCTS COMPANY.

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March 5, 1992
1126ccar
60025.07

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

Subject: Fourth Quarter 1991 Groundwater Monitoring Report for ARCO Station 374, 6407 Telegraph Avenue, Oakland, California.

Mr. Carmel:

At the request of ARCO Products Company (ARCO), this letter report summarizes the methods and results of the fourth quarter 1991 groundwater monitoring performed by RESNA Industries, Inc. (RESNA) at and near the above-referenced site. The station is on the northwestern corner of the intersection of Alcatraz and Telegraph Avenues in Oakland, California, as shown on the Site Vicinity Map, Plate 1. ARCO has requested that RESNA perform monthly water level measurements and quarterly groundwater sampling to monitor groundwater flow direction, gradient, and gasoline hydrocarbon concentrations associated with former and new gasoline tanks at the site and to evaluate trends related to fluctuations of these hydrocarbon concentrations.

Prior to the present monitoring, RESNA (formerly Applied GeoSystems [AGS]) performed subsurface environmental investigations related to the former and new underground gasoline-storage tanks at the site. In April 1988, RESNA performed a preliminary assessment which included drilling four exploratory borings (B-1 through B-4) prior to tank replacement activities at the site. In June 1988, RESNA performed soil sampling and observation during removal of four underground storage tanks. Four tank pit monitoring wells were installed at the site during tank replacement activities; two in the former tank pit (W-1 and W-2) and two in the new tank pit (W-3 and W-4). In July 1989, RESNA performed an additional subsurface investigation which included the installation of three groundwater monitoring wells (MW-1, MW-2, and MW-4) onsite and one groundwater monitoring well (MW-3) offsite. In April 1991, RESNA conducted a step-drawdown and aquifer pump and recovery test. The results of these investigations are presented in the reports listed in the references attached to this letter report. The locations of the groundwater monitoring wells and pertinent site features are shown on the Generalized Site Plan, Plate 2.

Groundwater Sampling and Gradient Evaluation

RESNA personnel performed monthly depth-to-water (DTW) measurements on October 17, November 20, and December 27, 1991. Quarterly groundwater sampling was also performed on November 20, 1991. Field work included measuring DTW levels in wells MW-1, MW-2, MW-3, and MW-4; subjectively analyzing water from these wells for the presence of petroleum hydrocarbon sheen and floating product; and purging and sampling groundwater from these monitoring wells for laboratory analysis. The groundwater sampling protocol is attached in Appendix A.

The DTW levels, wellhead elevations, and groundwater elevations for this and previous monitoring episodes at the site are summarized in the Cumulative Groundwater Monitoring Data, Table 1. The groundwater elevations have increased approximately 0.16 to 0.39 feet in wells MW-1 through MW-4 between October and December 1991. The groundwater gradients interpreted from the October and November monitoring data indicate a groundwater gradient of approximately 0.03 toward the southwest, as shown on the Groundwater Gradient Maps, Plates 3 through 5, respectively. These interpreted gradients are generally consistent with the previously interpreted groundwater gradients and flow direction for this site.

Water samples were collected from wells MW-1 through MW-4 for subjective analysis before the monitoring wells were purged and sampled on November 20, 1991. No evidence of floating product was noted in the wells during this quarter. Cumulative results of water level measurements and subjective analyses data are presented in Table 1.

Monitoring wells MW-1 through MW-4 were purged and sampled on November 20, 1991, in accordance with the attached protocol. Purge water was removed by a licensed hazardous waste hauler. The Uniform Hazardous Waste Manifest is attached in Appendix A.

Laboratory Methods

Water samples collected from the wells were delivered under Chain of Custody to Sequoia Analytical in Redwood City, California (Hazardous Waste Testing Laboratory Certification No. 1210). The water samples from wells MW-1 through MW-4 were analyzed for total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) by Environmental Protection Agency (EPA) Methods 5030/8015/8020. The water sample from well MW-4 was also analyzed for the metals cadmium (Cd), chromium (Cr), nickel (Ni), zinc (Zn) using EPA Method 200.7, and for lead (Pb) using EPA Method 239.2.

Laboratory Results

Results of these and previous water analyses are summarized in Table 2, Results of Laboratory Analyses of Water Samples--TPHg, TPHd, BTEX, and TOG, and Table 3, Results of Laboratory Analyses of Water Samples--VOCs and Metals. A map showing concentrations of TPHg from the November 20, 1991, laboratory data is shown on the TPHg Concentration Map, Plate 6. Benzene concentration contours are shown on the Benzene Concentration Map, Plate 7. The Chain of Custody Records and Laboratory Analysis Reports are attached in Appendix A.

Results of this quarter's laboratory analyses of water samples from wells MW-1 through MW-4 indicated the following:

- Concentrations of TPHg ranged from 57 ppb in the sample from well MW-1 to 2,700 ppb in the sample from well MW-4;
- Concentrations of benzene exceeded the State Maximum Contaminant Level (MCL) of 1 ppb in the samples from wells MW-1 (9.2 ppb), MW-2 (46 ppb), MW-3 (180 ppb), and MW-4 (1,200 ppb);
- Concentrations of toluene exceeded the State Recommended Action Level (AL) of 100 ppb in the samples from wells MW-3 (140 ppb) and MW-4 (200 ppb), but did not exceed the AL in the samples from wells MW-1 (3.7 ppb) and MW-2 (6.1 ppb);
- Concentrations of ethylbenzene were below the MCL of 680 ppb in all of the samples from the wells: MW-1 (0.63 ppb), MW-2 (3.0 ppb), MW-3 (43 ppb), and MW-4 (110 ppb);
- Concentrations of total xylenes were below the MCL of 1,750 ppb in all of the samples from the wells: MW-1 (2.5 ppb), MW-2 (8.7 ppb), MW-3 (140 ppb), and MW-4 (320 ppb);
- Concentrations of cadmium, chromium, lead, and nickel in the sample well MW-4 were below the MCLs of 0.010 parts per million (ppm), 0.05 ppm, 0.05 ppm, 0.05 ppm, 5 ppm, and 0.1 ppm, respectively; and
- Concentrations of zinc exceeded the MCL of 0.010 ppm slightly in the sample from well MW-4 (0.019 ppm).

Conclusions and Recommendations

Concentrations of TPHg and BTEX have generally increased during the quarter in samples from wells MW-1 and MW-2, were similar to previous sampling in the sample from well MW-3, and decreased in the sample from well MW-4. The groundwater gradient is generally consistent with previous interpretations. Petroleum hydrocarbons appear to have migrated offsite in the downgradient (southwest) direction.

Schedule

Monthly groundwater monitoring and quarterly groundwater sampling will continue at this site to evaluate trends in gasoline hydrocarbons and changes in groundwater gradient with time. The next quarterly monitoring event is scheduled for March 1992. Additional work will be performed to define the lateral extent of petroleum hydrocarbons in groundwater pending approval of encroachment permits from the City of Oakland to install groundwater monitoring wells in city streets.

RESNA recommends that copies of this report be forwarded to:

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

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

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

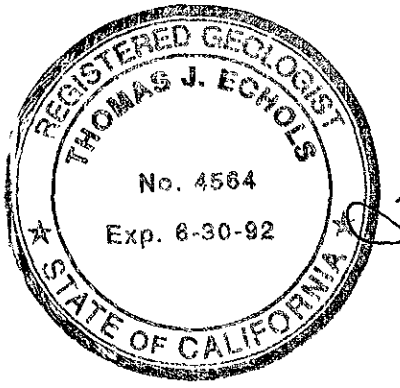
Sincerely,
RESNA

L. L. Leet

Lou Leet
Staff Geologist

Joel Coffman

Joel Coffman
Project Geologist



Thomas J. Echols
Senior Geologist
C.R.G. No. 4564

cc: H.C. Winsor, ARCO Products Company

Attachments: 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 20, 1991
Plate 5, Groundwater Gradient Map, December 27, 1991
Plate 6, TPHg Concentrations In Groundwater, November 20, 1991
Plate 7, Benzene Concentrations In Groundwater, November 20, 1991

Table 1, Cumulative Groundwater Monitoring Data
Table 2, 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

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

REFERENCES

Applied GeoSystems. May 15, 1991. Work Plan for Subsurface Investigations and Remediation at ARCO Station 374, 6407 Telegraph Avenue, Oakland, California. AGS 60025-3.

Applied GeoSystems. April 16, 1991. Letter Report, Quarterly Ground-Water Monitoring First Quarter 1991 at ARCO Station 374, 6407 Telegraph Avenue, Oakland, California. AGS 60025-2.

Applied GeoSystems. February 20, 1991. Letter Report, Quarterly Ground-Water Monitoring Fourth Quarter 1990 at ARCO Station 374, 6407 Telegraph Avenue, Oakland, California. AGS 60025-1.

Applied GeoSystems. August 30, 1990. Letter Report, Quarterly Ground-Water Monitoring Third Quarter 1990 at ARCO Station 374, 6407 Telegraph Avenue, Oakland, California. AGS 60025-1.

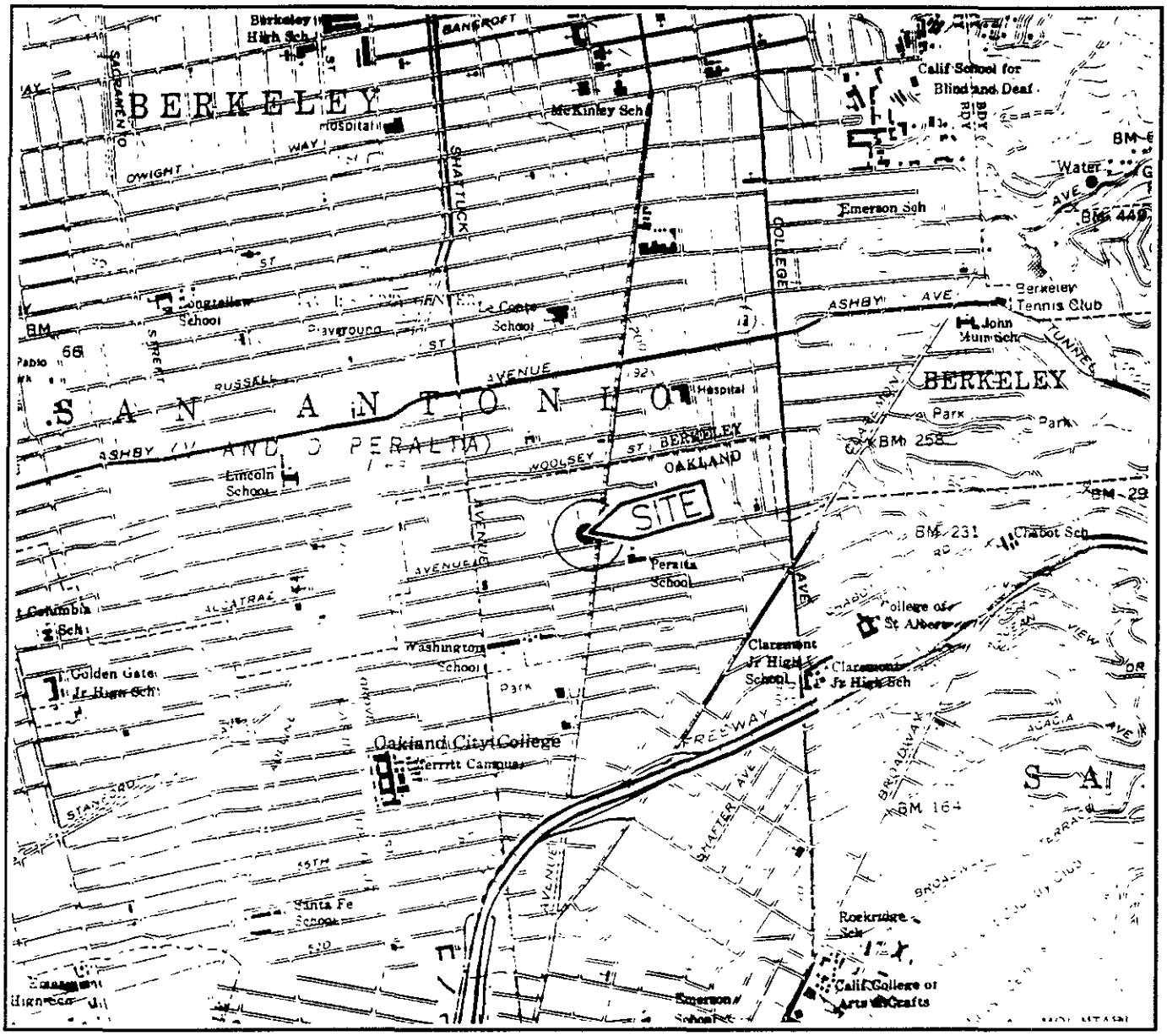
Applied GeoSystems. August 1, 1989. Report Environmental Investigation Related to Underground Tank Removal at ARCO Service Station No. 374, Telegraph Avenue and Alcatraz Avenue, Oakland, California. Job 18039-2.

Applied GeoSystems. June 15, 1988. Limited Environmental Site Assessment at ARCO Service Station No. 374, Telegraph Avenue and Alcatraz Avenue, Oakland, California. Job 18039-1.

RESNA. September 4, 1991. Letter Report, Quarterly Ground-Water Monitoring Second Quarter 1991 at ARCO Station 374, 6407 Telegraph Avenue, Oakland, California. AGS 60025-2.

RESNA. November 21, 1991. Letter Report, Quarterly Groundwater Monitoring Third Quarter 1991 at ARCO Station 374, 6407 Telegraph Avenue, Oakland, California. AGS 60025-2.

RESNA/Applied GeoSystems. July 31, 1991. Report of pumping and Recovery Test Results at ARCO 374, 6407 Telegraph Avenue, Oakland, California. 60025.04



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

N

LEGEND

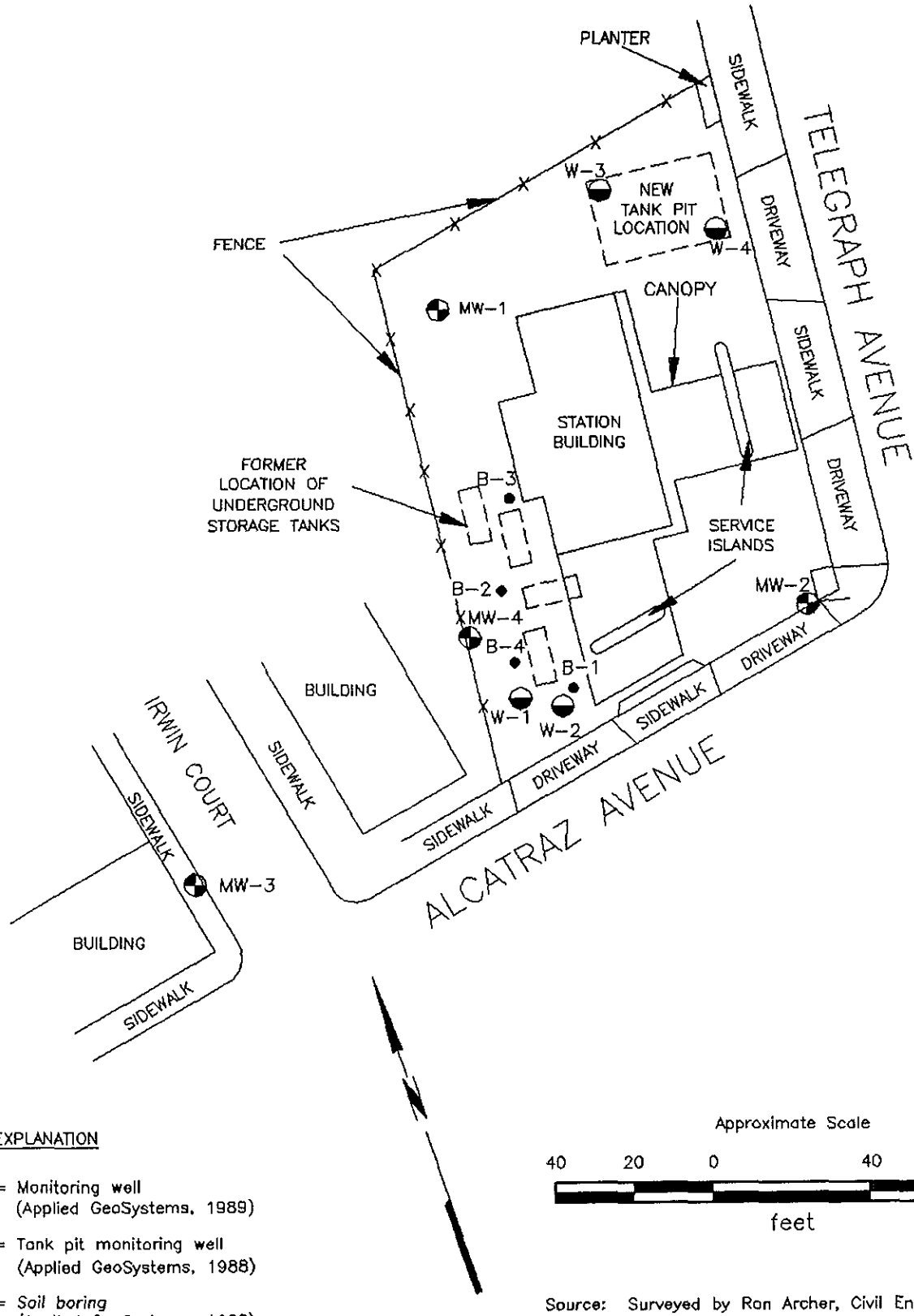
(•) = Site Location

Approximate Scale

2000 1000 0 2000 4000

feet

RESNA	**SITE VICINITY MAP** **ARCO Station 374** **6407 Telegraph Avenue** **Oakland, California**	**PLATE** **1**
PROJECT 60025.07		



EXPLANATION

MW-4 = Monitoring well (Applied GeoSystems, 1989)

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

B-4 = *Soil boring* (Applied GeoSystems, 1988)

Approximate Scale

40 20 0 40 80

feet

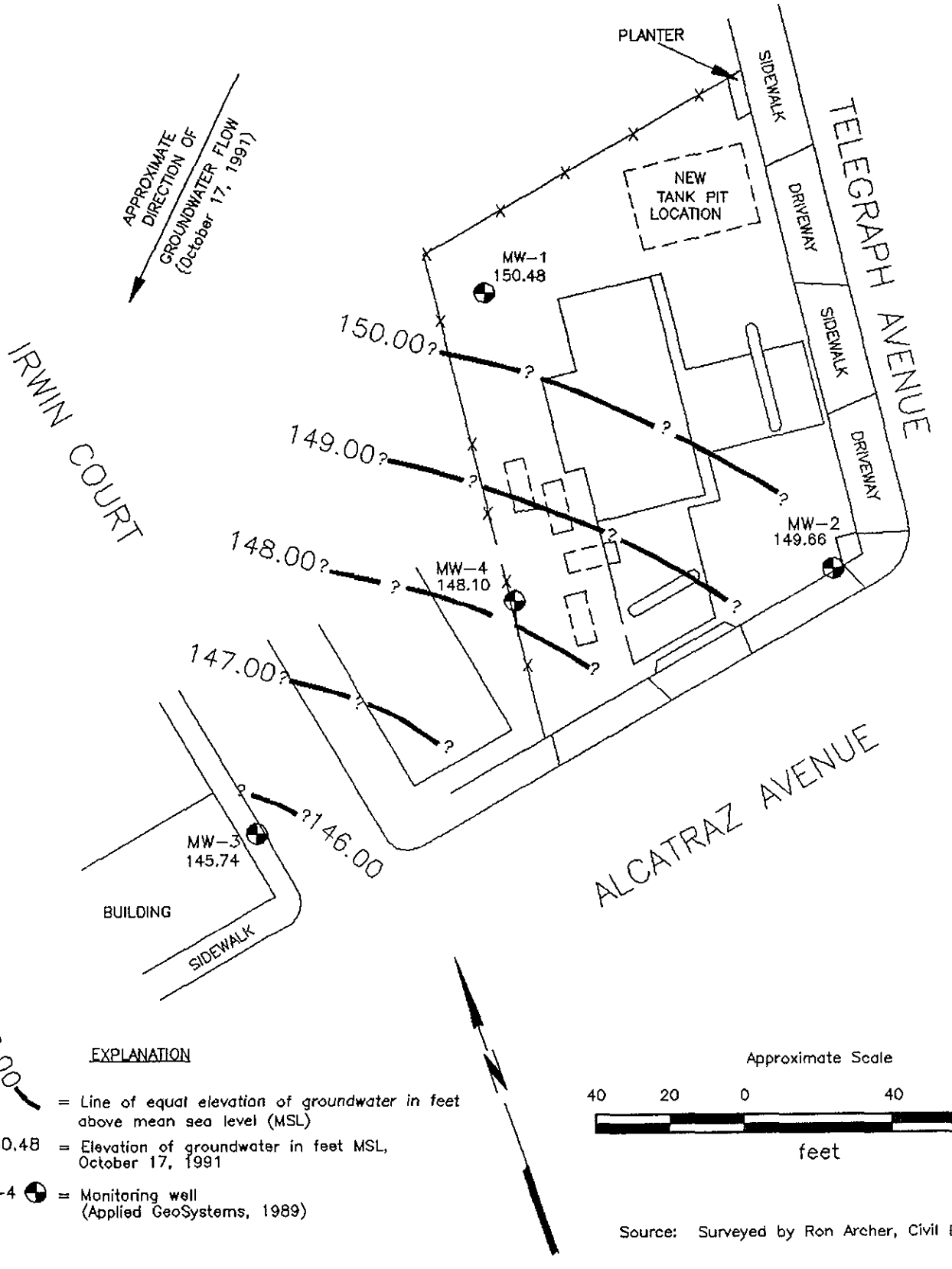
Source: Surveyed by Ron Archer, Civil Engineer, Inc.

RESNA

PROJECT 60025.07

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

PLATE 2



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

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

MW-4 = Monitoring well (Applied GeoSystems, 1989)

Approximate Scale

40 20 0 40 80

feet

Source: Surveyed by Ron Archer, Civil Engineer, Inc.

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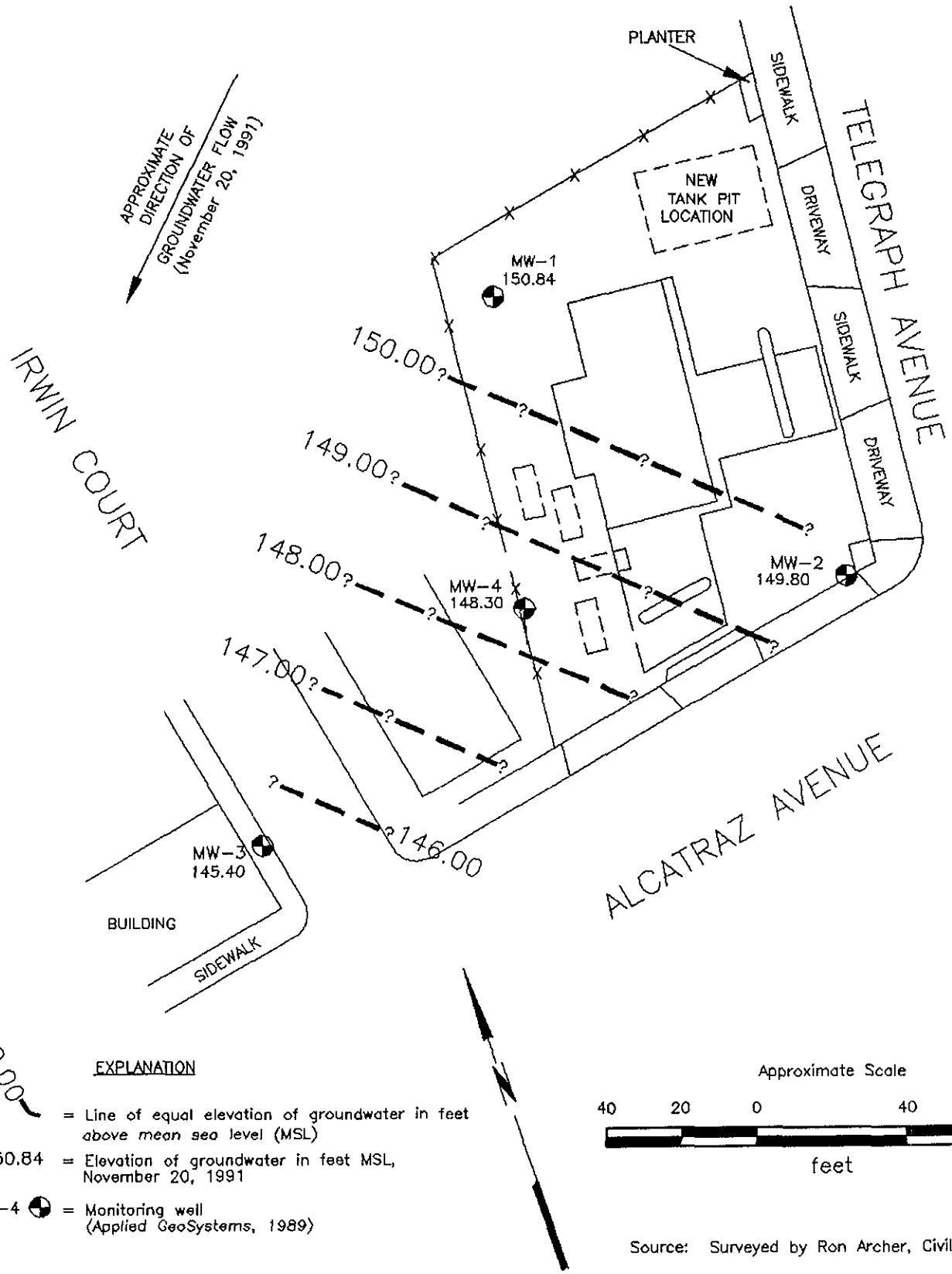
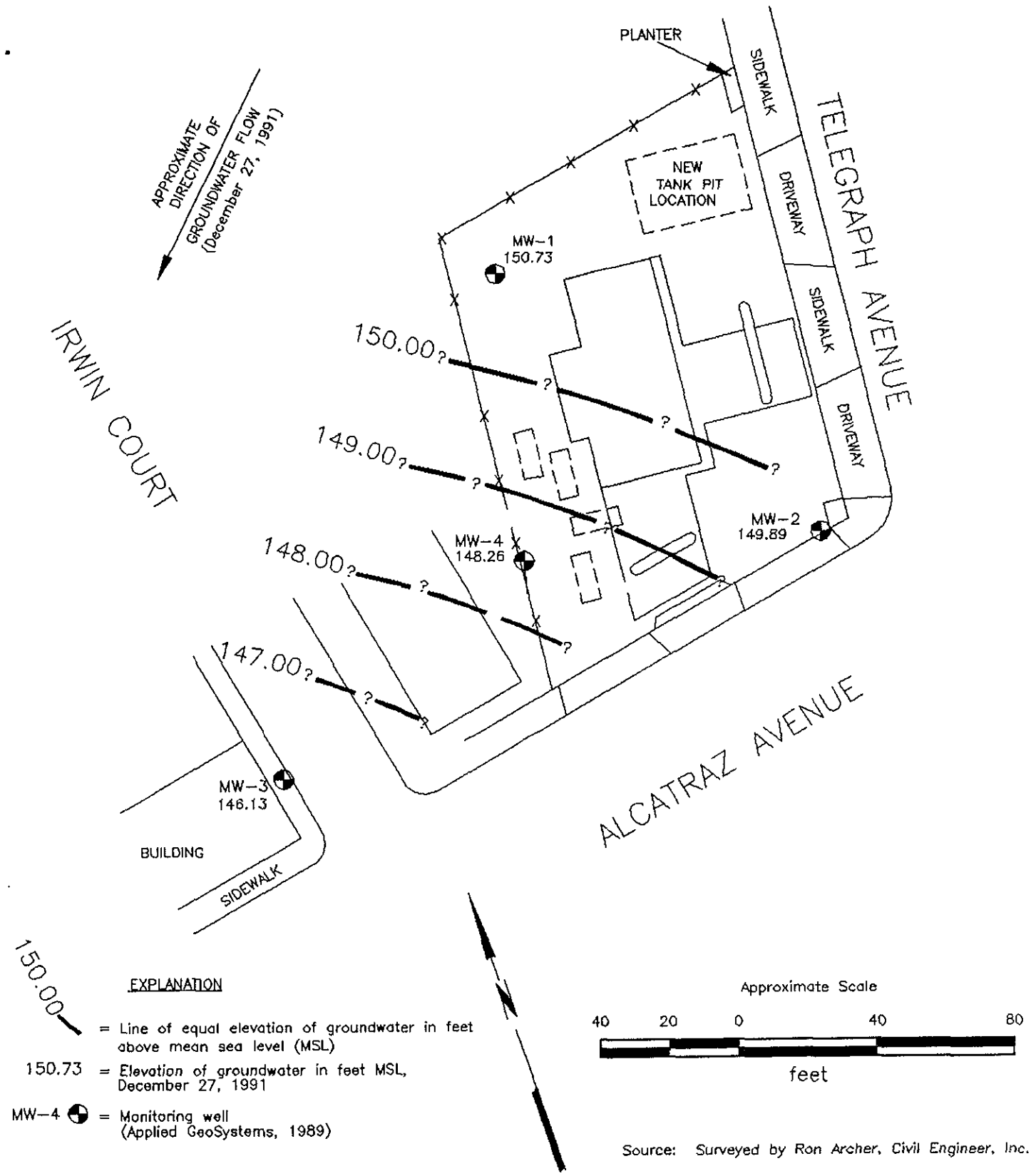
PROJECT 60025.07

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

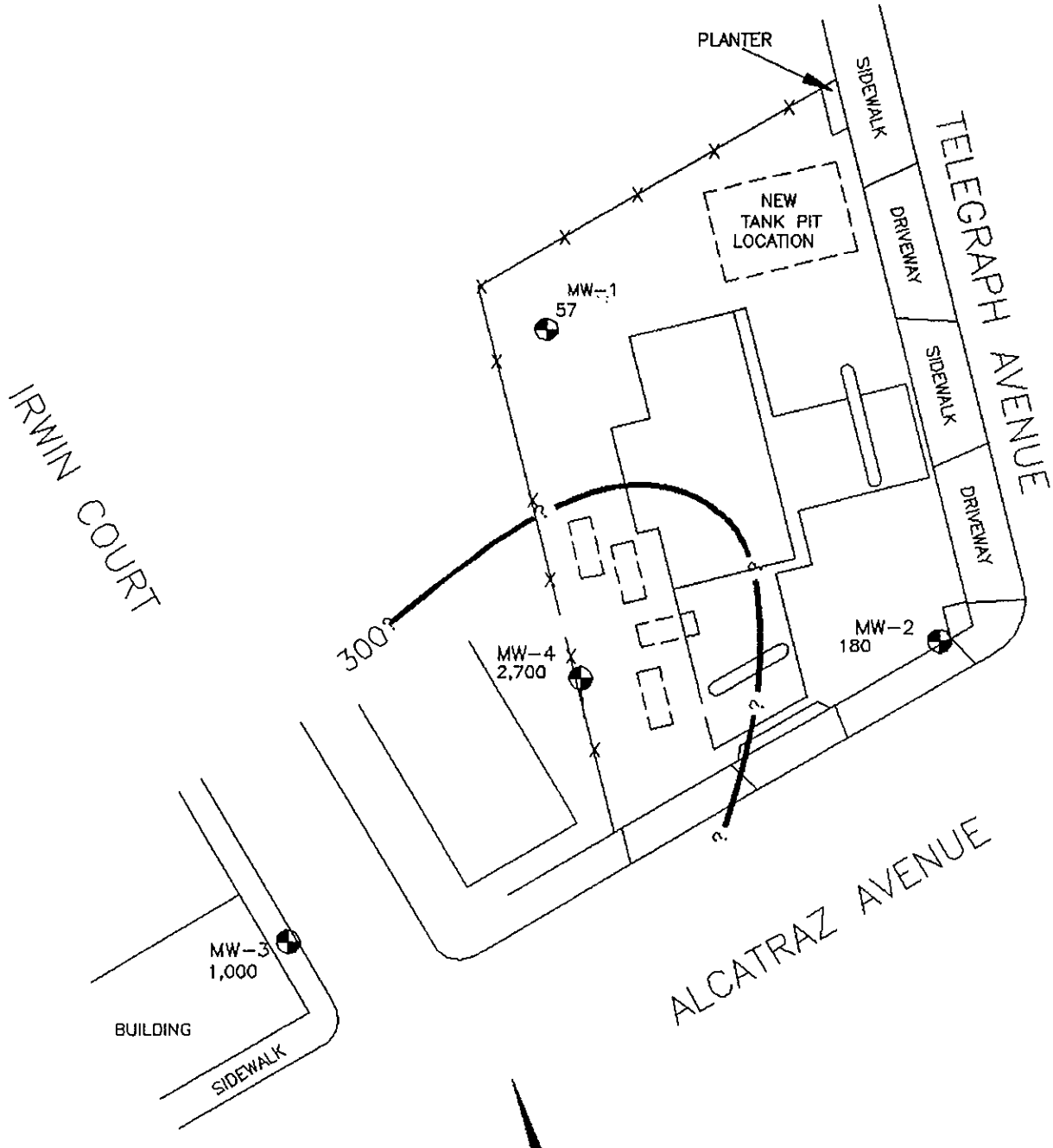
PLATE
3



RESNA	**GROUNDWATER GRADIENT MAP** **ARCO Station 374** **6407 Telegraph Avenue** **Oakland, California**	**PLATE** **4**
PROJECT **60025.07**		



RESNA	**GROUNDWATER GRADIENT MAP** **ARCO Station 374** **6407 Telegraph Avenue** **Oakland, California**	**PLATE** **5**
PROJECT **60025.07**		



EXPLANATION

300 = Line of equal concentration of TPHg in groundwater, in ppb

2,700 = Concentration of TPHg in groundwater, in ppb, November 20, 1991

MW-4 = Monitoring well (Applied GeoSystems, 1989)

Approximate Scale

40 20 0 40 80

feet

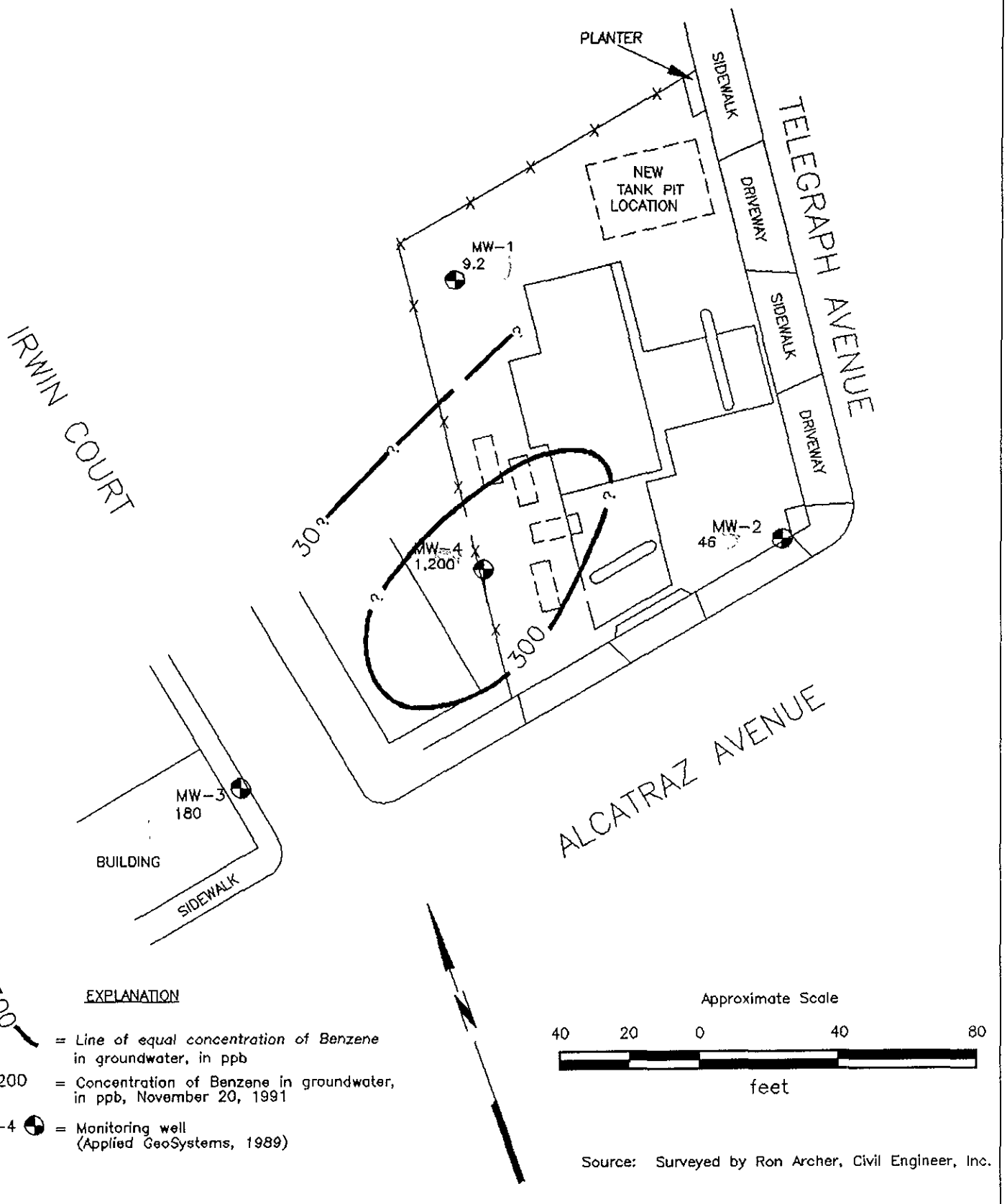
Source: Surveyed by Ron Archer, Civil Engineer, Inc.

RESNA

PROJECT 60025.07

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

PLATE
6



RESNA	**BENZENE CONCENTRATIONS IN GROUNDWATER ARCO Station 374 6407 Telegraph Avenue Oakland, California**	**PLATE 7**
PROJECT 60025.07		

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

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-1				
07/20/89		8.04	151.40	None
08/30/89		8.47	150.97	None
10/04/89	159.44	8.50	150.94	None
01/10/90		6.74	152.70	None
08/07/90		6.87	152.57	None
12/06/90		7.35	152.09	None
12/19/90		7.22	152.22	None
01/29/91		8.28	151.16	None
02/20/91		7.98	151.46	None
04/25/91		6.89	152.55	None
05/31/91		7.64	151.80	None
07/08/91		8.17	151.27	None
08/09/91		8.58	150.86	None
09/25/91		8.82	150.62	None
10/17/91		8.96	150.48	None
11/20/91		8.60	150.84	None
12/27/91		8.71	150.73	None
MW-2				
07/20/89		8.15	150.31	None
08/30/89		8.42	150.04	None
10/04/89	158.46	8.40	150.06	None
01/10/90		6.12	152.34	None
08/07/90		6.35	152.11	None
12/06/90		7.15	151.31	None
12/19/90		7.38	151.08	None
01/29/01		8.41	150.05	None
02/20/91		8.26	150.20	None
04/25/91		7.70	150.76	NM
05/31/91		8.10	150.36	None
07/08/91		8.34	150.12	None
08/09/91		8.51	149.95	None
09/25/91		8.66	149.80	None
10/17/91		8.80	149.66	None
11/20/91		8.66	149.80	None
12/27/91		8.57	149.89	Sheen
MW-3				
07/20/89		7.58	146.60	None
08/30/89		8.00	146.18	None
10/04/89	154.18	7.73	146.45	Emulsion
01/10/90		7.78	146.40	None
08/07/90		7.66	146.52	None

See notes on page 2 of 2

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

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-3 (continued)				
12/06/90		7.75	146.43	None
12/19/90		7.58	146.60	None
01/29/91	154.18	7.60	146.58	None
02/20/91		7.51	146.67	None
04/25/91		6.37	147.81	None
05/31/91		7.19	146.99	None
07/08/91		7.60	146.58	None
08/09/91		7.94	146.24	None
09/25/91		8.23	145.95	None
10/17/91		8.44	145.74	None
11/20/91		8.78	145.40	None
12/27/91		8.05	146.13	Sheen
MW-4				
07/20/89		8.09	148.99	None
08/30/89		8.45	148.63	Sheen
10/04/89	157.08	8.57	148.51	Sheen/Emulsion
01/10/90		7.26	149.82	None
08/07/90		6.87	150.21	None
12/06/90		8.02*	149.06*	Product Sheen
12/19/90		7.69	149.39	None
01/29/91		8.39	148.69	Sheen
02/20/91		8.16	148.92	None
04/25/91		7.14	149.94	None
05/31/91		7.64	149.44	None
07/08/91		8.34	148.74	None
08/09/91		8.60	148.48	None
09/25/91		8.80	148.28	None
10/17/91		8.98	148.10	None
11/20/91		8.78	148.30	None
12/27/91		8.82	148.26	Sheen

Elevations and DTW measured in feet.
* = Floating Product.

TABLE 2
RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES–TPHg, TPHd, BTEX, AND TOG
ARCO Service Station 374
Oakland, California
(Page 1 of 2)

Date/Well	TPHg	TPHd	B	T	E	X	TOG
MW-1							
07/21/89	33	NA	0.77	1.6	1.5	5.0	NA
08/30/89	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
10/04/89	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
01/10/90	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
08/07/90	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
12/06/90	<50	NA	3.6	2.7	0.60	5.80	NA
02/20/91	<50	NA	<0.50	<0.50	<0.50	<0.50	NA
07/08/91	<30	NA	<0.30	<0.30	<0.30	<0.30	NA
09/25/91	<30	NA	0.57	0.57	0.54	1.7	NA
11/20/91	57	NA	9.2	3.7	0.63	2.5	NA
MW-2							
07/21/89	4,200	NA	280	210	38	24	NA
08/30/89	4,200	NA	160	260	45	240	NA
10/04/89	4,300	NA	860	300	29	330	NA
01/10/90	8,000	NA	890	710	120	760	NA
08/07/90	6,000	NA	880	76	25	80	NA
12/06/90	1,600	NA	330	69	18	63	NA
02/20/91	1,300	NA	160	46	13	48	NA
07/08/91	310	NA	76	18	7.7	24	NA
09/25/91	83	NA	17	0.69	2.2	4.1	NA
11/20/91	180	NA	46	6.1	3.0	8.7	NA
MW-3							
07/21/89	430	NA	9	4.8	<0.50	50	NA
08/30/89	1,200	NA	85	46	8.4	55	NA
10/04/89	7,000	NA	580	900	120	670	NA
01/10/90	940	NA	130	59	21	73	NA
08/07/90	2,300	NA	180	64	59	120	NA
12/06/90	460	350	52	55	14	39	NA
02/20/91	470	<100	36	30	9.3	31	<5,000
07/08/91	2,500	NA	240	470	74	320	NA
09/25/91	1,100	NA	120	110	34	120	NA
11/20/91	1,000	NA	180	140	43	140	NA
MW-4							
07/21/89	8,700	NA	720	360	120	640	NA
08/30/89	7,300	NA	630	220	72	320	NA
10/04/89	21,000	NA	2,300	1,300	280	1,300	NA
01/10/90	4,300	NA	470	250	63	430	NA
08/07/90	69,000	28,000	8,700	4,200	540	4,600	<5,000
12/06/90		Not sampled–product sheen					
02/20/91	5,200	<100	690	200	95	580	<5,000
07/08/91	1,700	NA	280	68	37	170	NA

See notes on page 2 of 2

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

Date/Well	TPHg	TPHd	B	T	E	X	TOG
MW-4 Continued							
09/25/91	6,300	NA	2,100	290	210	590	NA
11/20/91	2,700	NA	1,200	200	110	320	NA
MCL:	—	—	1	—	680	1,750	—
AL:	—	—	—	100	—	—	—

Results in micrograms per liter (ug/L) = parts per billion (ppb).
TPHg: Total petroleum hydrocarbons as gasoline by EPA method 5030/8015.
TPHd: Total petroleum hydrocarbons as diesel by EPA method 3510/8015.
BTEX: B: Benzene, T: Toluene, E: Ethylbenzene, T: Total Xylene isomers; measured by EPA method 8020/602.
TOG: Total oil and grease measured by Standard Method 5520 B/F.
<: Results reported as less than the detection limit.
NA: Not analyzed
*: Unregulated by California DHS, October 24, 1990.
MCL: State Maximum Contaminant Level.
AL: State recommended Action Level.

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES--VOCs and Metals
ARCO Service Station 374
Oakland, California

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

VOC results in micrograms per liter (ug/L) = parts per billion (ppb).
Metal results in milligrams per liter (mg/L) = parts per million (ppm).
Halogenated Volatile Organics measured by EPA method 601/8010.

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. These groundwater depths were subtracted from wellhead elevations measured in 1989 by Ron Archer, Civil Engineer, Inc., of Pleasanton, California, a licensed land surveyor, 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 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 measurable floating hydrocarbon product and sheen.

Before water samples were collected from the groundwater monitoring wells, the wells were purged until stabilization of the temperature, pH, and conductivity was obtained. Approximately 3 to 4 well casing volumes of water was purged before these characteristics stabilized or the well was pumped dry. 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 volumes removed.

After purging, each well was allowed to recharge to at least 80% of the original water level when possible; recharge in wells MW-3 and MW-4 was very slow, but the wells recovered to at least 65% of the approximate initial water level. Water samples were then collected with an Environmental Protection Agency (EPA) approved 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, 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. Purged water was removed by a licensed hazardous waste hauler; the Uniform Hazardous Waste Manifest is attached.

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 374-91-5

Chain of Custody

ARCO Facility no: 374 60025.07	City (Facility): OAKLAND	Project manager (Consultant): JOEL COFFMAN	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 (DN JOSE	Address (Consultant): 3315 ALMADEN EXPRESSWAY SUITE 34, SAN JOSE		Contract number: 07-073

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 GAS	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 5
W-9-MW1		3		✓		✓	✓	11/20/91	15:50		X			1	1	4 8 1					
W-9-MW2		3		✓		✓	✓		16:00		X					8 2					
W-11-MW3		3		✓		✓	✓		15:00		X					~~8 3~~	8 4				
W-14-MW3		3		✓		✓	✓		16:15		X					~~8 3~~	8 3				
W-11-MW4		1		✓		✓	✓		16:10							~~8 3~~	8 4				Cadmium, Chromium, Lead, Nickel + Zinc

Special detection Limit/reporting

Method of shipment: Sequoia Courier

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: 11-21-91	Time: 2:36	Received by: Don Droege
Relinquished by: Don Droege	Date: 11-21-91	Time: 4:55	Received by:
Relinquished by:	Date:	Time:	Received by laboratory:	Date: 11/21/91	Time: 4:55

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 95118
Attention: Joel Coffman

Project: ARCO 374, Oakland

Enclosed are the results from 4 water samples received at Sequoia Analytical on November 21,1991. The requested analyses are listed below:

SAMPLE #	SAMPLE DESCRIPTION	DATE OF COLLECTION	TEST METHOD
1114181	Water, MW-1	11/20/91	EPA 5030/8015/8020
1114182	Water, MW-2	11/20/91	EPA 5030/8015/8020
1114183	Water, MW-3	11/20/91	EPA 5030/8015/8020
1114184	Water, MW-4	11/20/91	Cd, Cr, Pb, Ni, Zn 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

Christine Middleton

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 374, Oakland	Sampled:	Nov 20, 1991
3315 Almaden Expwy., Suite 34	Matrix Descript:	Water	Received:	Nov 21, 1991
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Dec 4, 1991
Attention: Joel Coffman	First Sample #:	111-4181	Reported:	Dec 9, 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)
111-4181	MW-1	57	9.2	3.7	0.63	2.5
111-4182	MW-2	180	46	6.1	3.0	8.7
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

1114181.RRR <1>

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 374, Oakland	Sampled:	Nov 20, 1991
3315 Almaden Expwy., Suite 34	Matrix Descript:	Water	Received:	Nov 21, 1991
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Dec 4, 1991
Attention: Joel Coffman	First Sample #:	111-4183	Reported:	Dec 9, 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)
111-4183	MW-3	1,000	180	140	43	140
111-4184	MW-4	2,700	1,200	200	110	320
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

1114181.RRR <2>

SEQUOIA ANALYTICAL

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

RESNA	Client Project ID:	ARCO 374, Oakland	Sampled:	Nov 20, 1991
3315 Almaden Expwy., Suite 34	Sample Descript:	Water, MW-4	Received:	Nov 21, 1991
San Jose, CA 95118			Analyzed:	Dec 5, 1991
Attention: Joel Coffman	Lab Number:	111-4184	Reported:	Dec 9, 1991

LABORATORY ANALYSIS

Analyte	Detection Limit mg/L	Sample Results mg/L
Cadmium	0.010	N.D.
Chromium	0.010	N.D.
Lead	0.0050	N.D.
Nickel	0.050	N.D.
Zinc	0.010	0.019

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

SEQUOIA ANALYTICAL

Maria Lee
Project Manager

1114181.RRR <3>

SEQUOIA ANALYTICAL

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

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 374, Oakland
QC Sample Group: 1114181-84
Reported: Dec 9, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-Benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	R. Halsne	R. Halsne	R. Halsne	R. Halsne
Reporting Units:	ppb	ppb	ppb	ppb
Date Analyzed:	Dec 4, 1991	Dec 4, 1991	Dec 4, 1991	Dec 4, 1991
QC Sample #:	Matrix	Matrix	Matrix	Matrix
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	20	20	20	60
Conc. Matrix Spike:	23	22	22	65
Matrix Spike % Recovery:	115	110	110	108
Conc. Matrix Spike Dup.:	22	22	22	65
Matrix Spike Duplicate % Recovery:	110	110	110	108
Relative % Difference:	4.4	0.0	0.0	0.0

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

SEQUOIA ANALYTICAL

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

RESNA
3315 Almaden Expwy., Suite 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 374, Oakland

QC Sample Group: 111-4184

Reported: Dec 9, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Cadmium	Chromium	Lead	Nickel	Zinc
Method:	EPA 200.7	EPA 200.7	EPA 239.2	EPA 200.7	EPA 200.7
Analyst:	N. Herrera	N. Herrera	M. Mistry	N. Herrera	N. Herrera
Reporting Units:	mg/L	mg/L	mg/L	mg/L	mg/L
Date Analyzed:	Dec 5, 1991	Dec 5, 1991	Dec 5, 1991	Dec 5, 1991	Dec 5, 1991
QC Sample #:	112-0531	112-0531	111-4619	112-0531	112-0531
Sample Conc.:	N.D.	N.D.	0.030	N.D.	6.0
Spike Conc. Added:	5.0	5.0	1.0	5.0	5.0
Conc. Matrix Spike:	4.6	4.5	0.81	4.5	10
Matrix Spike % Recovery:	92	90	78	90	80
Conc. Matrix Spike Dup.:	4.6	4.6	0.83	4.5	10
Matrix Spike Duplicate % Recovery:	92	92	80	90	80
Relative % Difference:	0.0	2.2	2.4	0.0	0.0

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

1114181.RRR <5>

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

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. C A L 0 0 0 0 1 3 2 0 6 | Manifest Document No. 0 0 0 0 4 | 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: 91507455
B. State Generator's ID: N Y H O 3 6 - 0 1 5 6 6 0

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: 200557
D. Transporter's Phone: (415) 543-4635

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 Number
a. OIL AND WATER NON-RCRA HAZARDOUS WASTE LIQUID	0 0 1	T T	0 0 1 7 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 #A0941

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

15. Special Handling Instructions and Additional Information
JOB #9707
24 Hr. Emergency Contact: H & H #(415) 543-4835
APPROPRIATE PROTECTIVE CLOTHING AND RESPIRATOR.
JOB SITE: ARCO STATION, #0374
6407 Telegraph
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
Agent for Arco / Gequiel Cumba		1 1	2 7	9 1

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
EDWARD G. MILAND	Edward G. Miland	1 1	2 7	9 1

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

DO NOT WRITE BELOW THIS LINE.

DHS 8022A (12/90)
EP[illegible]700—22

Blue: GENERATOR SENDS THIS COPY TO DHS WITHIN 30 DAYS
To: P.O. Box 300, Sacramento, CA 95812-0400