Applied GeoSystems, Inc.
A RESNA Company

RESNA
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LETTER REPORT
QUARTERLY GROUND-WATER MONITORING
Second Quarter 1991
at
ARCO Station 374
6407 Telegraph Avenue
Oakland, California

60025.02

09/04/91

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91 SEP 10 AM 11:35

TRANSMITTAL

TO: MS. SUSAN HUGO
ALAMEDA COUNTY DEPARTMENT OF
ENVIRONMENTAL HEALTH
80 SWAN WAY, ROOM 200
OAKLAND, CALIFORNIA 94621

FROM: LOU LEET
TITLE: GEOLOGIC TECHNICIAN

DATE: 9/4/91
PROJECT NUMBER: 60025.02
SUBJECT: ARCO STATION 374 LOCATED AT
6407 TELEGRAPH AVENUE, OAKLAND, CALIFORNIA

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REMARKS: THIS REPORT HAS BEEN FORWARDED TO YOU (VIA CERTIFIED MAIL) AS REQUESTED BY MR. CHUCK CARMEL OF ARCO PRODUCTS COMPANY.

Copies: 1 to AGS project file no. 60025.02

SAN JOSE READER'S FILE

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File Name: TRANSMT.PRJ

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September 4, 1991
0720ccar
60025.02

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

Subject: Second Quarter 1991 Ground-Water 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 second quarter 1991 ground-water monitoring performed by 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 ground-water sampling and analyses to monitor ground-water 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 performed limited 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 ground-water monitoring wells (MW-1, MW-2, MW-4) onsite and one ground-water monitoring well (MW-3) offsite. The results of these investigations are presented in the reports listed in the references attached to this letter report. The locations of the ground-water monitoring wells and pertinent site features are shown on the Generalized Site Plan, Plate 2.

Ground-Water Sampling and Gradient Evaluation

RESNA personnel performed monthly depth-to-water (DTW) measurements on April 25 and May 31, 1991. Quarterly ground-water monitoring and sampling was performed on July 8, 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 ground water from these monitoring wells for laboratory analysis. The ground-water sampling protocol is attached in Appendix A.

The DTW levels, wellhead elevations, and ground-water elevations for this and previous monitoring episodes at the site are summarized in Cumulative Ground-Water Monitoring Data, Table 1. This quarter's DTW ranged from 6.89 to 8.34 feet, indicating the water level has decreased 0.24 to 0.70 feet since last quarter. The ground-water gradients interpreted from the April 25, May 31, and July 8, 1991 monitoring data indicate a ground-water gradient of approximately 0.03 toward the southwest, as shown on the Ground-Water Gradient Maps, Plates 3 through 5, respectively. These interpreted gradients are generally consistent with the previously interpreted ground-water 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 July 8, 1991. No evidence of floating product was noted in the wells; however, product odor was noted in the water samples from wells MW-2, MW-3 and MW-4 during this quarter. No evidence of hydrocarbon product was noted in MW-1 during this quarter. Cumulative results of water levels and subjective analyses data are presented in Table 1.

Monitoring wells MW-1 through MW-4 were purged and sampled on July 8, 1991, in accordance with the attached protocol. Well purge data sheets for the parameters monitored for each well are also attached in Appendix A. Well purge water was disposed by a licensed waste hauler. The Uniform Hazardous Waste Manifest is attached in Appendix A.

Laboratory Analysis

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. 145). 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) method 5030/8015/8020. The

Chain of Custody Records and Laboratory Analysis Reports are attached. Results of these and previous water analyses are summarized in Cumulative Results of Ground-Water Laboratory Analyses, Table 2. A map showing concentrations of TPHg from the July 8, 1991 laboratory data is shown on TPHg Concentration Map, Plate 6; benzene concentration contours are shown on Benzene Concentration Map, Plate 7. All concentrations are shown in parts per billion (ppb).

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

- o nondetectable concentrations of TPHg and BTEX in well MW-1;
- o wells MW-2, MW-3, and MW-4 have been impacted with gasoline hydrocarbons at concentrations of 310 to 2,500 ppb TPHg and benzene concentrations of 76 to 280 ppb; benzene exceeds the Maximum Contaminant Levels (MCLs) as regulated by the California Department of Health Services (DHS) in these three wells; and
- o toluene, ethylbenzene, and total xylenes are present in wells MW-2, MW-3, and MW-4; the toluene concentration in MW-3 (470 ppb) exceeds the State recommended Action Level of 100 ppb.

Conclusions

In MW-1, TPHg and BTEX have been nondetectable since August 1989 with the exception of detectable levels of BTEX reported in December 1990. In general, concentrations of gasoline hydrocarbons in well MW-3 have fluctuated since July 1989 and increased since December 1990; concentrations of gasoline hydrocarbons in wells MW-2 and MW-3 have decreased since October 1989. Petroleum hydrocarbons have migrated offsite in the downgradient (southwest) direction. Additional work will be performed to define the lateral extent of petroleum hydrocarbons in ground water pending approval of encroachment permits from the City of Oakland to install ground-water monitoring wells in city streets. Installation of wells downgradient of the site along Alcatraz Avenue may not be feasible due to heavy traffic use, overhead lines along one side of Alcatraz, and underground utilities along the other side.

Recommendations

RESNA recommends continued monthly water level measurements and quarterly ground-water monitoring at this site, including analyses for TPHg and BTEX. A work plan for an

additional subsurface investigation downgradient of the site was submitted on May 15, 1991 (AGS, May 15, 1991).

Schedule

RESNA will continue monthly water level measurements and quarterly ground-water monitoring and sampling at this site to evaluate trends in gasoline hydrocarbons and changes in ground-water gradient with time. The next quarterly monitoring event is scheduled for September 18, 1991. Routine well maintenance and quality control will be performed as necessary during all site visits. The additional subsurface investigation will be performed after the submitted work plan is approved by the appropriate regulatory agencies.

RESNA recommends that copies of this report be forwarded to:

Ms. Susan Hugo
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 Street, Suite 500
Oakland, California 94612

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

Sincerely,
RESNA

L. J. Leet

Lou Leet
Geologic Technician

Joan E. Tiernan
Registered Civil
Engineer No. 044600

cc: H.C. Winsor, ARCO Products Company

Attachments: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Ground-Water Gradient Map, April 25, 1991
Plate 4, Ground-Water Gradient Map, May 31, 1991
Plate 5, Ground-Water Gradient Map, July 8, 1991
Plate 6, TPHg/Benzene Concentration Map, July 8, 1991

Table 1, Cumulative Ground-Water Monitoring Data
Table 2, Cumulative Results of Laboratory Analyses of Water Samples

Appendix A: Ground-Water Sampling Protocol
Well Purge Data Sheets
Stabilization Graphs
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.

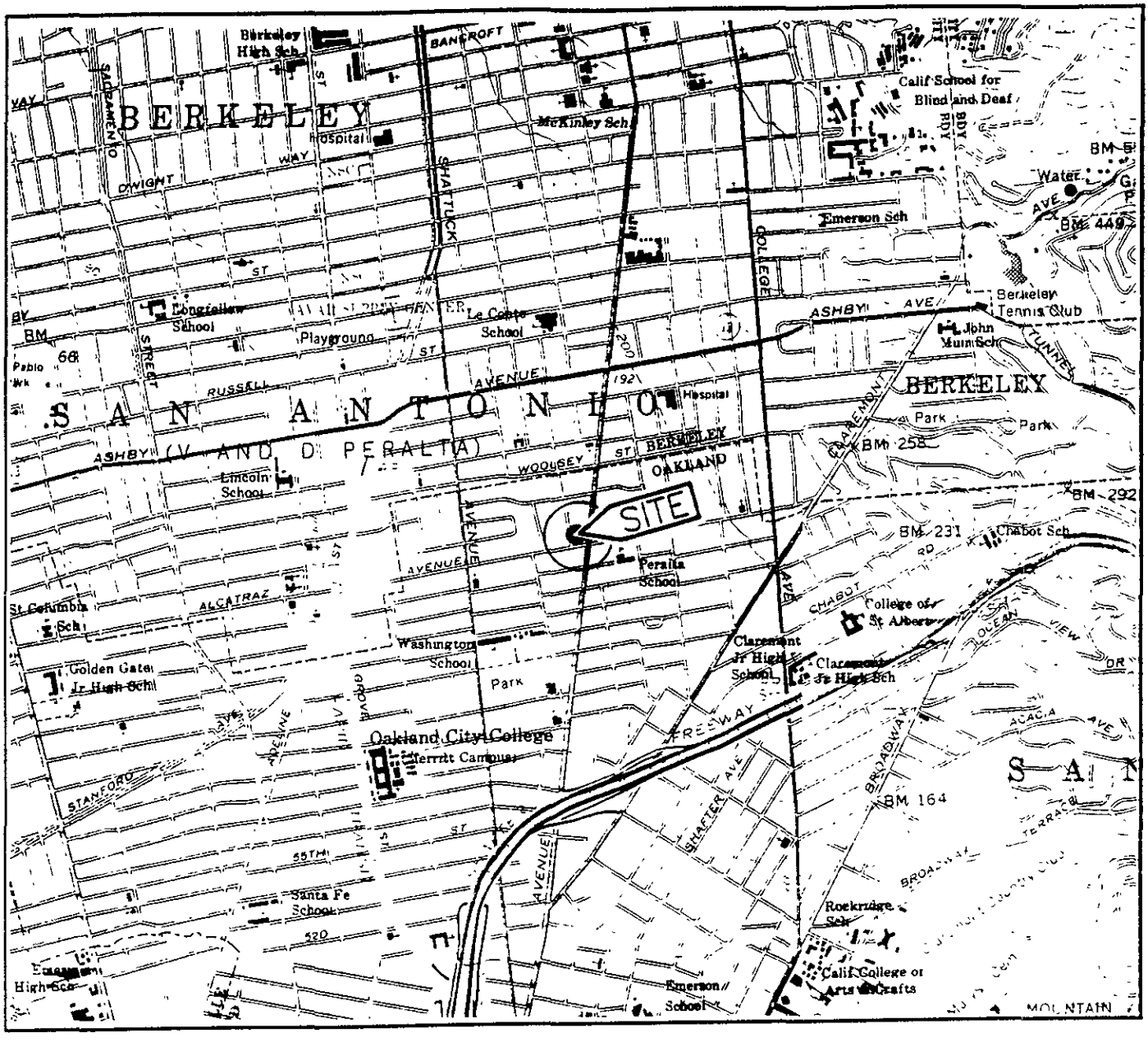
Applied GeoSystems. April 16, 1991. "Letter Report, Quarterly Ground-Water Monitoring First Quarter 1991 at ARCO Station 374, 6407 Telegraph Avenue, Oakland, California". AGS 60025-2.

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.



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

N

Approximate Scale

2000 1000 0 2000 4000

feet

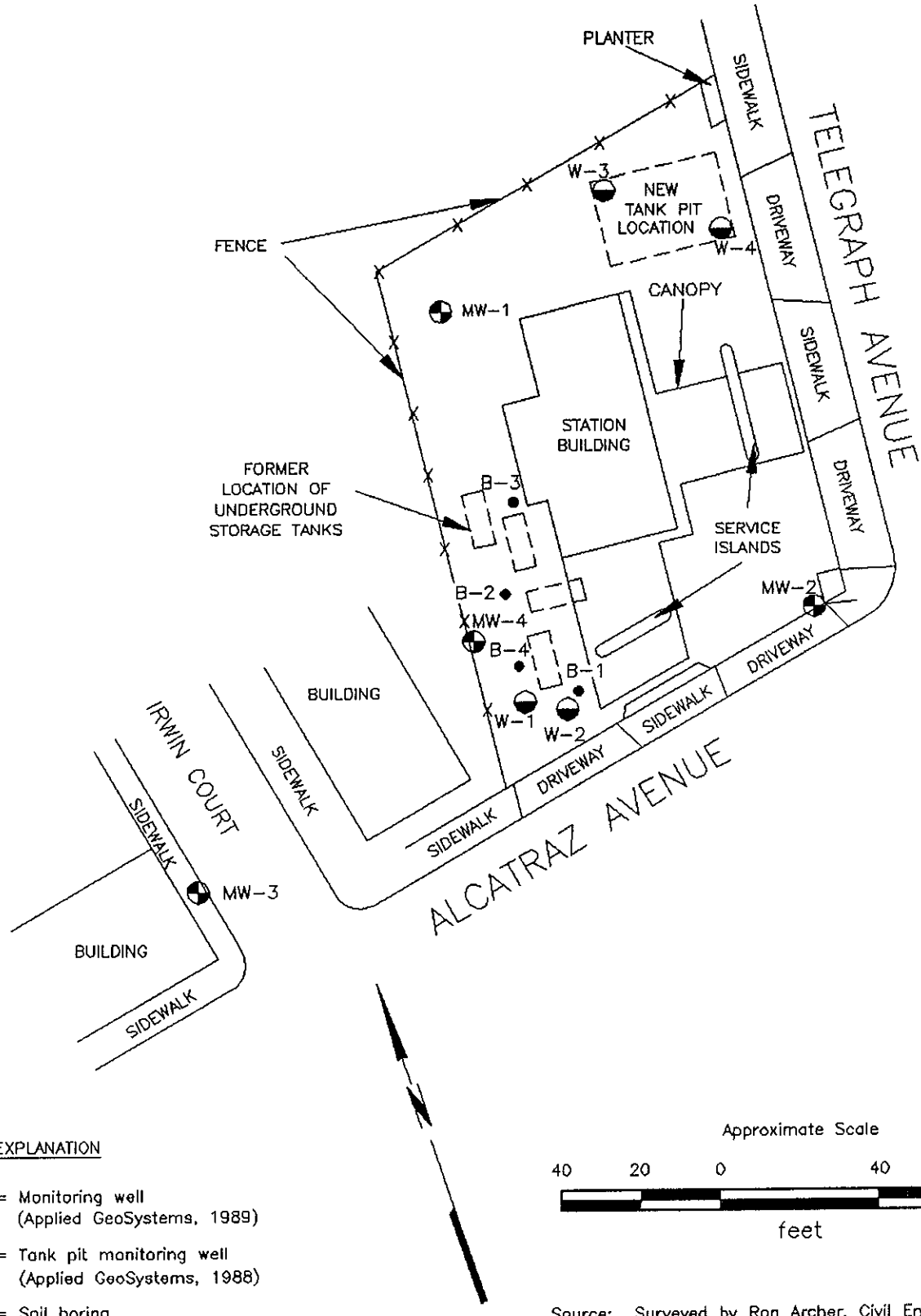
Applied GeoSystems

PROJECT 60025-2

SITE VICINITY MAP
ARCO Station 374
6407 Telegraph Avenue
Oakland, California

PLATE

1



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

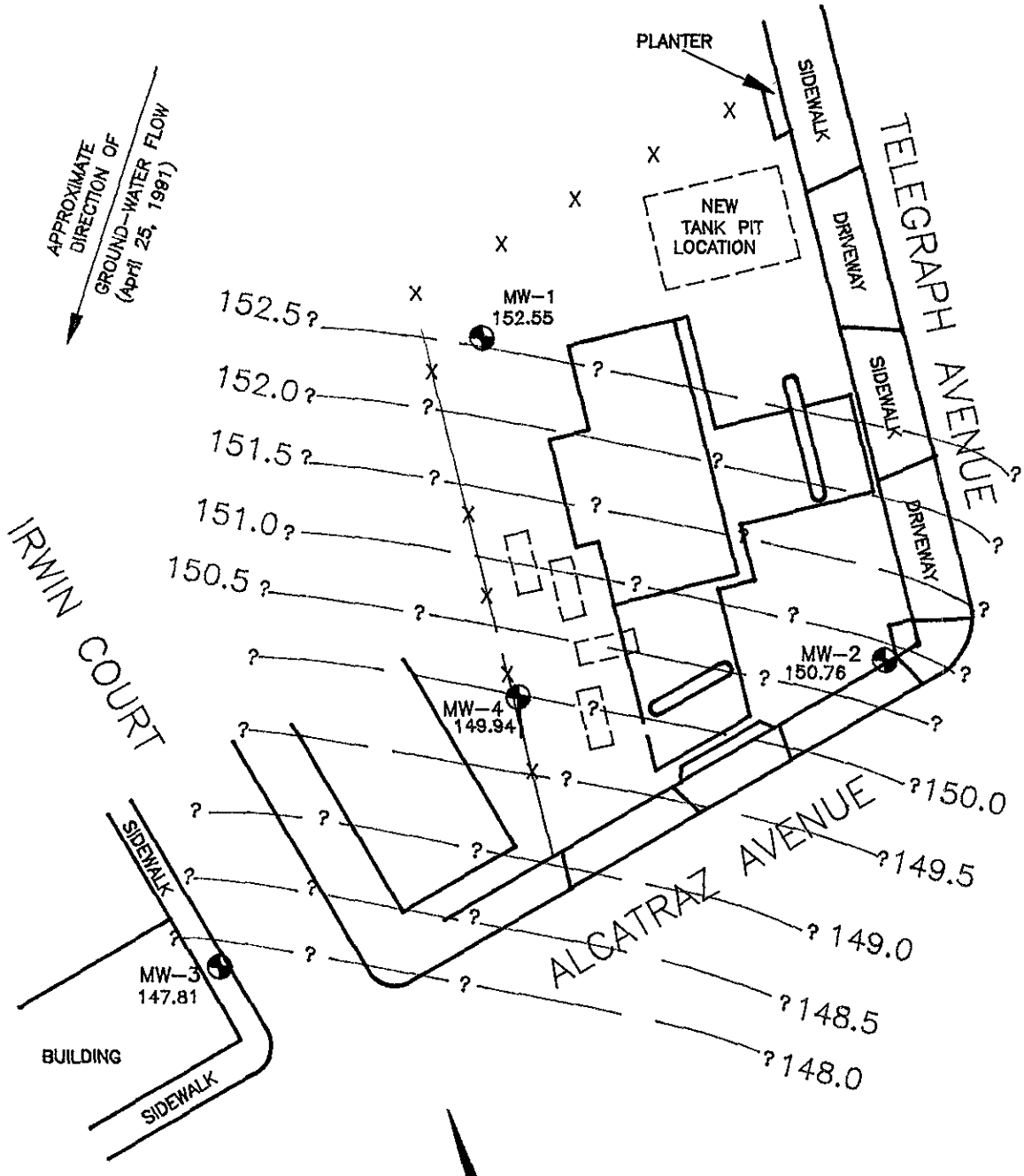
Source: Surveyed by Ron Archer, Civil Engineer, Inc.

Applied GeoSystems

PROJECT 60025-2

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

PLATE 2



152.0 — = Line of equal elevation of ground water above mean sea level (MSL)

152.55 = Elevation of ground water in feet (MSL), April 25, 1991

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

EXPLANATION

Approximate Scale

40 20 0 40 80

feet

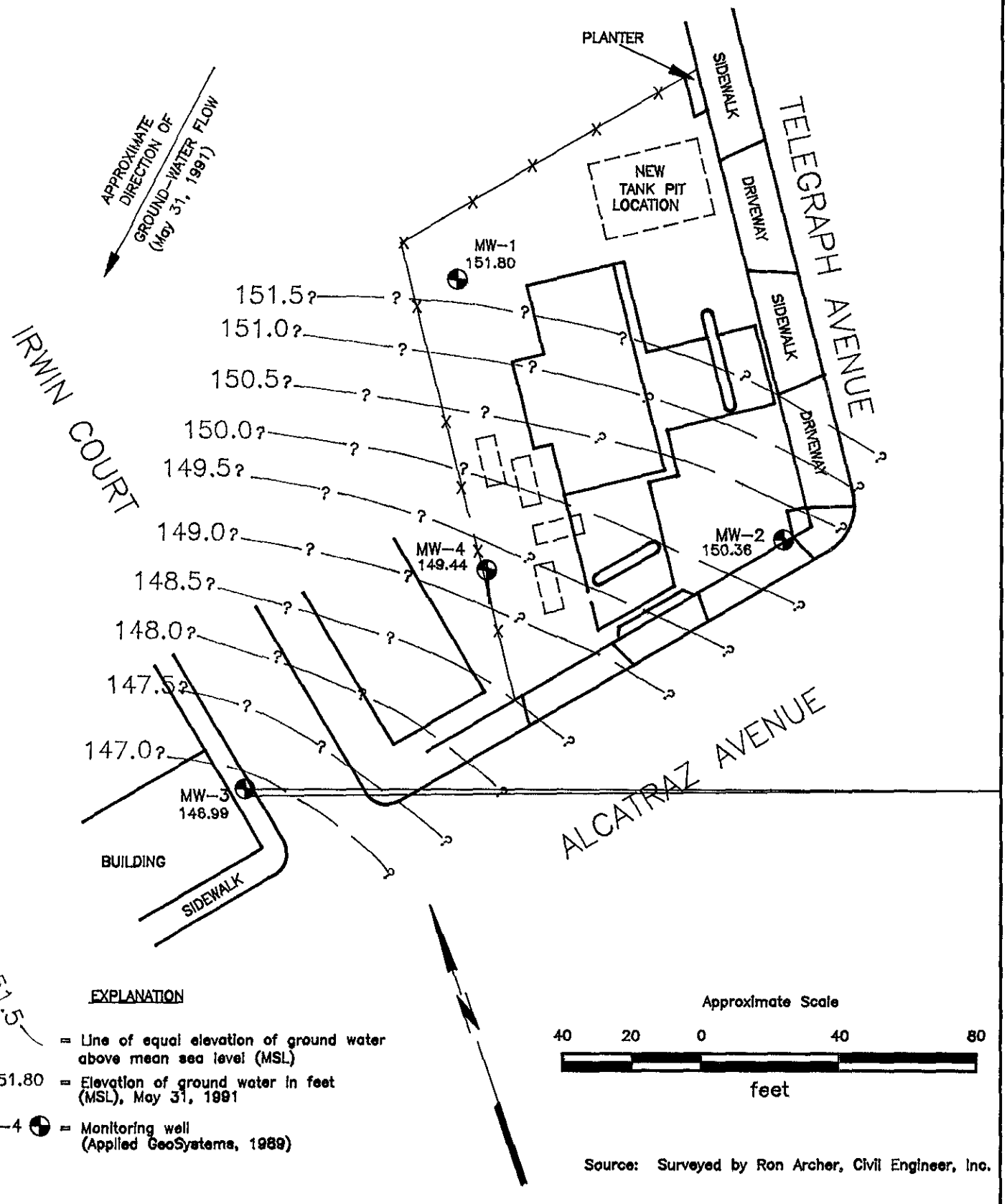
Source: Surveyed by Ron Archer, Civil Engineer, Inc.

Applied GeoSystems

PROJECT 60025-2

GROUND-WATER GRADIENT MAP
ARCO Station 374
6407 Telegraph Avenue
Oakland, California

PLATE 3

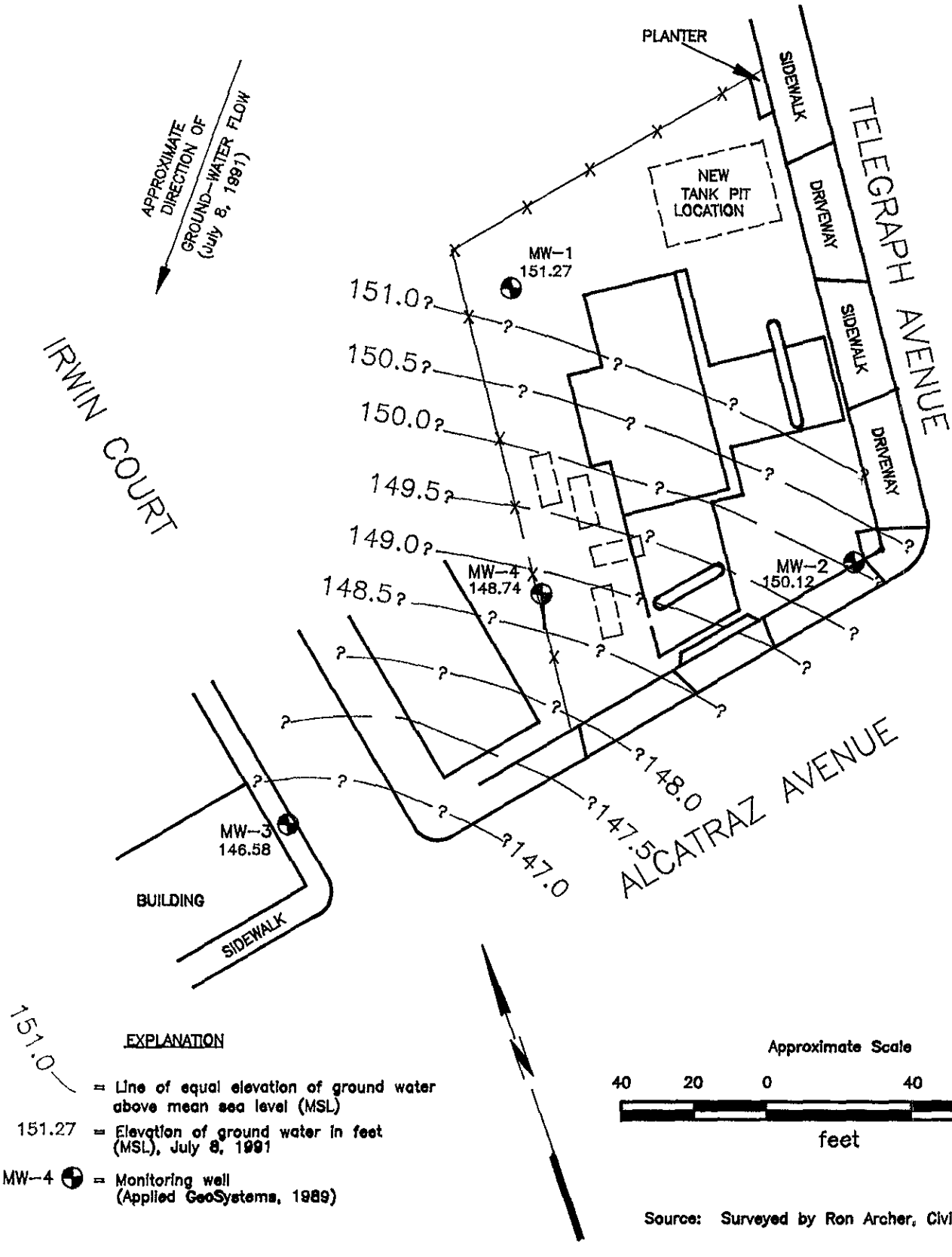


Applied GeoSystems

PROJECT 60025-2

GROUND-WATER GRADIENT MAP
ARCO Station 374
6407 Telegraph Avenue
Oakland, California

PLATE 4



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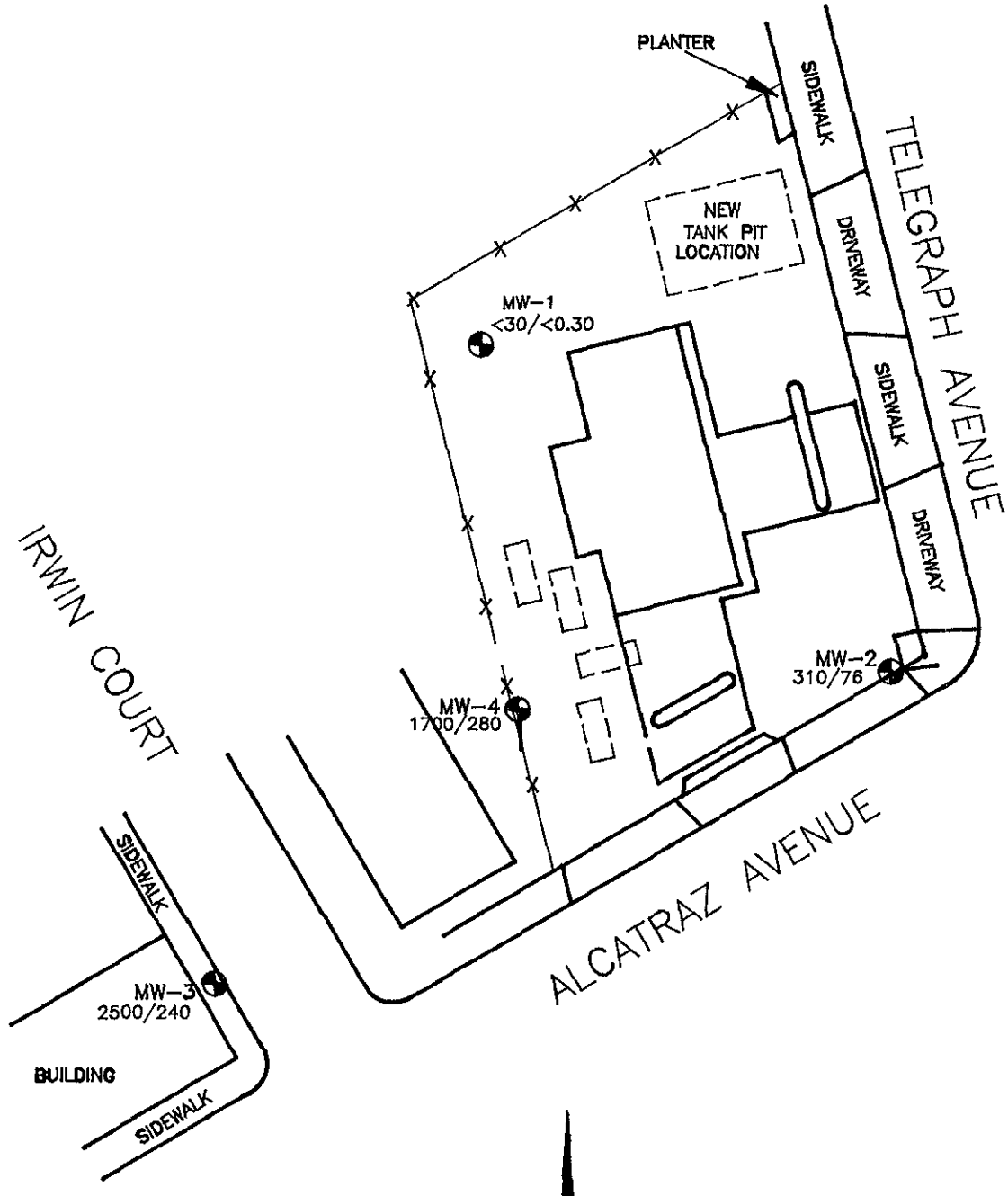
PROJECT 60025-2

GROUND-WATER GRADIENT MAP
ARCO Station 374
6407 Telegraph Avenue
Oakland, California

PLATE 5



EXPLANATION

2500/280 = Concentration of TPHg/Benzene in ground water in ppb, July 8, 1991

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

N

Approximate Scale

40 20 0 40 80

feet

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

Applied GeoSystems

PROJECT 60025-2

TPHg/BENZENE CONCENTRATION IN GROUND WATER
ARCO Station 374
6407 Telegraph Avenue
Oakland, California

PLATE
6

TABLE 1
CUMULATIVE GROUND-WATER 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	NM
05/31/91		7.64	151.80	Odor
07/08/91		8.17	151.27	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	Odor
12/06/90		7.15	151.31	Odor
12/19/90		7.38	151.08	Odor
01/29/01		8.41	150.05	Odor
02/20/91		8.26	150.20	Odor
04/25/91		7.70	150.76	NM
05/31/91		8.10	150.36	Odor
07/08/91		8.34	150.12	Odor
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	Odor
08/07/90		7.66	146.52	Odor
12/06/90		7.75	146.43	Odor
12/19/90		7.58	146.60	Odor
01/29/91		7.60	146.58	Odor
02/20/91		7.51	146.67	Odor
04/25/91		6.37	147.81	Odor
05/31/91		7.19	146.99	Odor
07/08/91		7.60	146.58	Odor

See notes on page 2 of 2

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

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
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	Odor
08/07/90		6.87	150.21	Odor
12/06/90		8.02*	149.06*	Product Sheen
12/19/90		7.69	149.39	Odor
01/29/91		8.39	148.69	Odor/Sheen
02/20/91		8.16	148.92	Odor
04/25/91		7.14	149.94	Odor
05/31/91		7.64	149.44	Odor
07/08/91		8.34	148.74	Odor

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

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES
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
MW-2							
07/21/89	4200	NA	280	210	38	24	NA
08/30/89	4200	NA	160	260	45	240	NA
10/04/89	4300	NA	860	300	29	330	NA
01/10/90	8000	NA	890	710	120	760	NA
08/07/90	6000	NA	880	76	25	80	NA
12/06/90	1600	NA	330	69	18	63	NA
02/20/91	1300	NA	160	46	13	48	NA
07/08/91	310	NA	76	18	7.7	24	NA
MW-3							
07/21/89	430	NA	9	4.8	<0.50	50	NA
08/30/89	1200	NA	85	46	8.4	55	NA
10/04/89	7000	NA	580	900	120	670	NA
01/10/90	940	NA	130	59	21	73	NA
08/07/90	2300	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	<5000
07/08/91	2,500	NA	240	470	74	320	NA
MW-4							
07/21/89	8700	NA	720	360	120	640	NA
08/30/89	7300	NA	630	220	72	320	NA
10/04/89	21000	NA	2300	1300	280	1300	NA
01/10/90	4300	NA	470	250	63	430	NA
08/07/90	69000	28000	8700	4200	540	4600	<5000
12/06/90	NA	NA	NA	NA	NA	NA	NA
02/20/91	5200	<100	690	200	95	580	<5000
07/08/91	1,700	NA	280	68	37	170	NA

See notes on page 2 of 2

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF WATER SAMPLES
ARCO Service Station 374
Oakland, California
(Page 2 of 2)

Date/Well	HALOGENATED VOLATILE ORGANICS
MW-4	
07/31/90	Nondetectable for thirty one compounds tested (<1.0)
02/20/91	Chloromethane* 3.4; nondetectable for twenty eight other compounds tested (<0.5)

MCL:	B=1	—	E=680	X=1,750
AL:	—	T=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.
Halogenated Volatile Organics measured by EPA method 601/8010.
<: 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.

APPENDIX A

GROUND-WATER 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 ground-water 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 ground-water 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 ground-water monitoring wells, the wells were purged until stabilization of the temperature, pH, and conductivity was obtained. Approximately 1 well casing volume 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 74% 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 H & H Ship Service Company. The Uniform Hazardous Waste Manifest is attached.

WELL PURGE DATA SHEET

Project Name: ARCO 374 Job No. 60025-2

Date: 07/08/91 Page 1 of 2

Well No. MW-1 Time Started 13:18

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromhos)
13:18	Begin pumping well MW-1			
13:23	5	65.2	6.70	6.51
13:27	10	65.7	6.59	6.53
13:31	15	65.2	6.54	7.65
13:35	20	64.7	6.54	7.34
13:39	25	64.7	6.51	7.31
13:43	30	64.6	6.50	7.52
13:47	35	64.6	6.56	7.52
13:56	40	64.6	6.61	7.63
14:02	45	64.6	6.66	7.70
14:08	46.5	Stop pumping well dry.		

Notes: No odor.

Depth to Bottom (feet) : 25.55
Depth to Water - initial (feet) : 8.17
Depth to Water - final (feet) : 9.10
% recovery : 95 %
Time Sampled : 18:45
Gallons per Well Casing Volume : 11.44
Gallons Purged : 46.5
Well Casing Volumes Purged : 4
Approximate Pumping Rate (gpm) : 1.03

RESNA

WELL PURGE DATA SHEET

Project Name: ARCO 374 Job No. 60025-2

Date: 07/08/91 Page 1 of 1

Well No. MW-2 Time Started 16:00

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromhos)
16:00	Begin pumping well MW-2			
16:04	5	68.7	6.88	6.92
16:08	10	68.4	6.86	6.90
16:12	15	68.8	6.82	6.95
16:16	20	68.5	6.81	7.21
16:20	25	68.7	6.82	7.56
16:24	30	68.5	6.97	7.82
16:28	35	68.6	6.78	7.80
16:32	40	68.6	6.75	7.66
16:36	45	68.9	6.78	7.80
16:40	50	68.4	6.77	7.77
16:43	Well dry, stop pumping.			

Notes: Slight odor

Depth to Bottom (feet) : 28.
Depth to Water - initial (feet) : 8.34
Depth to Water - final (feet) : 9.22
% recovery : 96 %
Time Sampled : 19:05
Gallons per Well Casing Volume : 12.98
Gallons Purged : 52
Well Casing Volumes Purged : 4
Approximate Pumping Rate (gpm) : 1.21

RESNA

WELL PURGE DATA SHEET

Project Name: ARCO 374 Job No. 60025-2

Date: 07/08/91 Page 1 of 1

Well No. MW-3 Time Started 14:26

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromhos)
14:26	Begin pumping well MW-3			
14:30	5	65.4	6.45	6.54
14:33	10	65.4	6.46	6.68
14:37	15	65.2	6.44	6.62
14:41	20	65.0	6.51	6.57
14:45	25	65.1	6.60	6.84
14:52	30	64.9	6.55	7.05
14:58	35	65.2	6.52	7.13
15:02	Well dry, stop pumping.			

Notes: Strong odor.

Depth to Bottom (feet) : 26.0
Depth to Water - initial (feet) : 7.6
Depth to Water - final (feet) : 12.36
% recovery : 74 %
Time Sampled : 18:55
Gallons per Well Casing Volume : 12.14
Gallons Purged : 38
Well Casing Volumes Purged : 3.1
Approximate Pumping Rate (gpm) : 1.05

RESNA

WELL PURGE DATA SHEET

Project Name: ARCO 374 Job No. 60025-2

Date: 07/08/91 Page 1 of 1

Well No. MW-4 Time Started 17:34

Time (hr)	Gallons (cum.)	Temp. (F)	pH	Conduct. (micromhos)
17:34	Begin pumping well MW-4			
17:34	5	66.0	6.97	6.58
17:43	10	66.0	6.74	6.4
17:46	15	65.9	6.60	6.64
17:50	20	65.5	6.68	7.09
17:54	25	65.4	6.66	7.11
17:58	30	65.3	6.66	7.20
18:02	35	65.3	6.61	7.59
18:06	40	65.1	6.61	7.32
18:10	45	65.3	6.65	7.18
18:15	50	65.3	6.65	6.84
18:17	Stop pumping.			

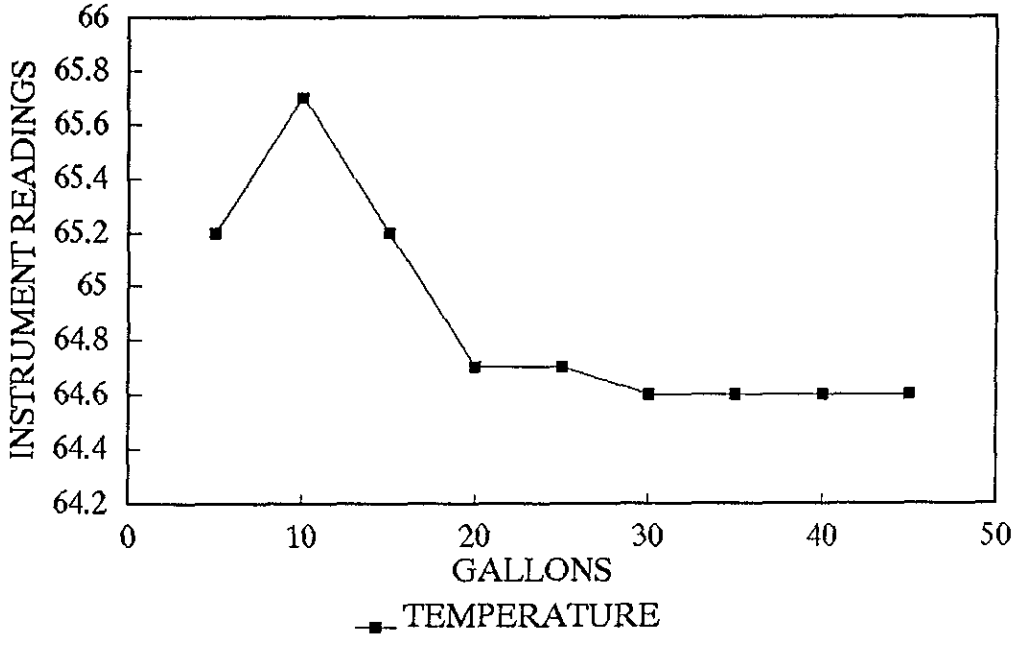
Notes: Moderate odor.

Depth to Bottom (feet) : 27.0
Depth to Water - initial (feet) : 8.34
Depth to Water - final (feet) : 12.60
% recovery : 77 %
Time Sampled : 19:15
Gallons per Well Casing Volume : 12.31
Gallons Purged : 51
Well Casing Volumes Purged : 4
Approximate Pumping Rate (gpm) : 1.19

RESNA

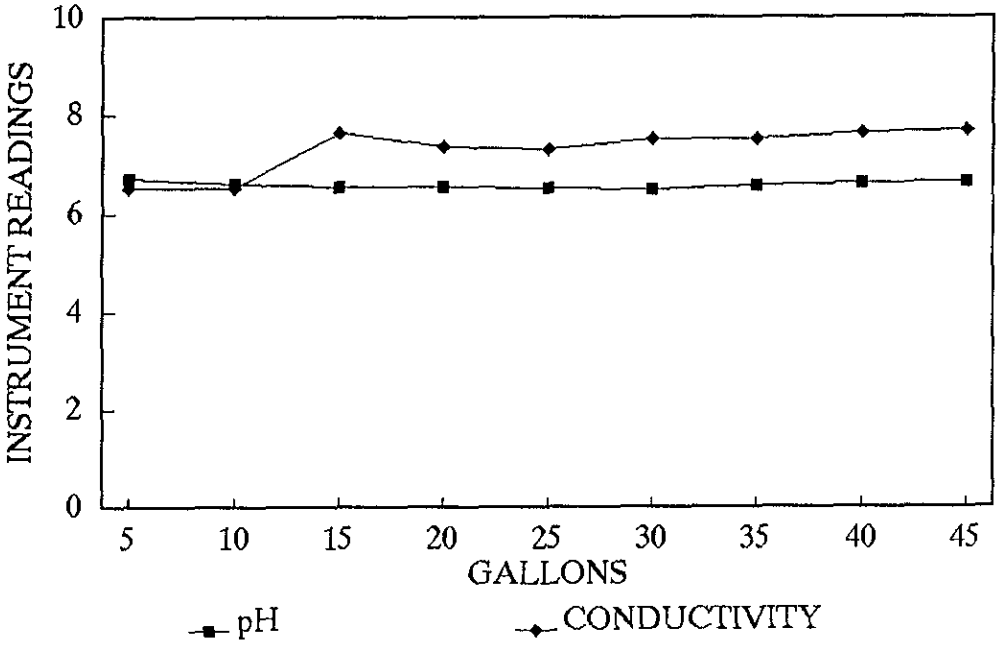
ARCO 374 STABILIZATION GRAPH

Ground–Water Monitoring Well MW–1 (July 8, 1991)



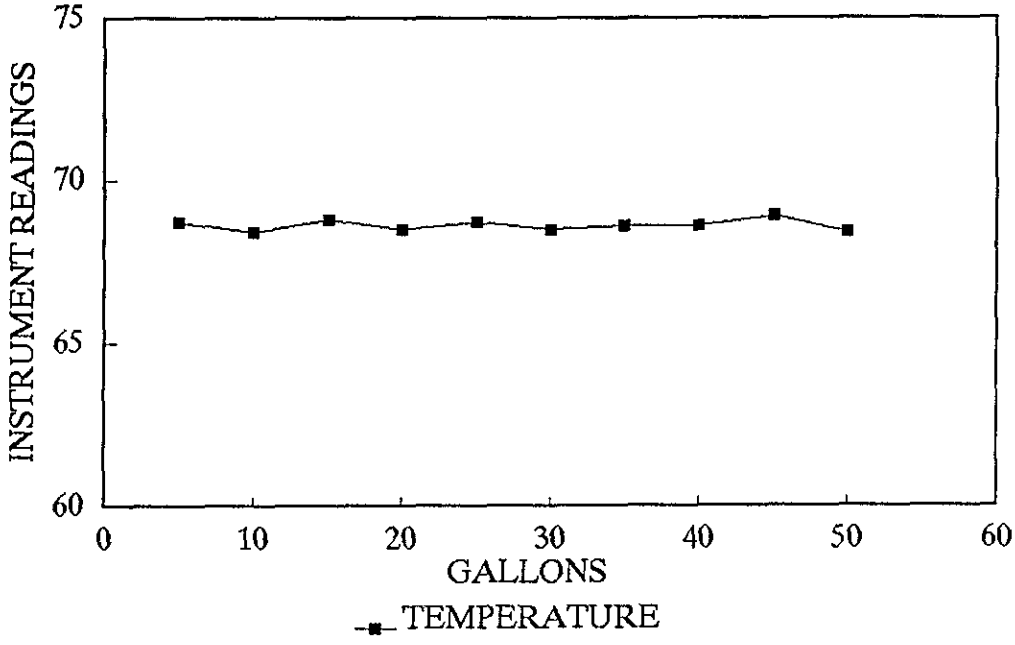
ARCO 374 STABILIZATION GRAPH

Ground–Water Monitoring Well MW–1 (July 8, 1991)



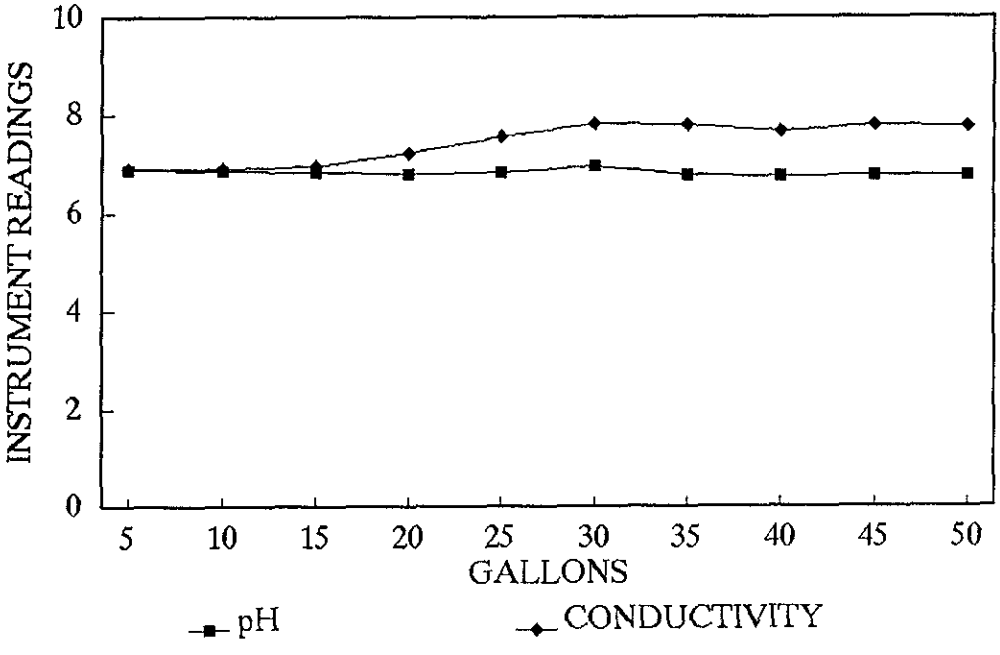
ARCO 374 STABILIZATION GRAPH

Ground–Water Monitoring Well MW–2 (July 8, 1991)



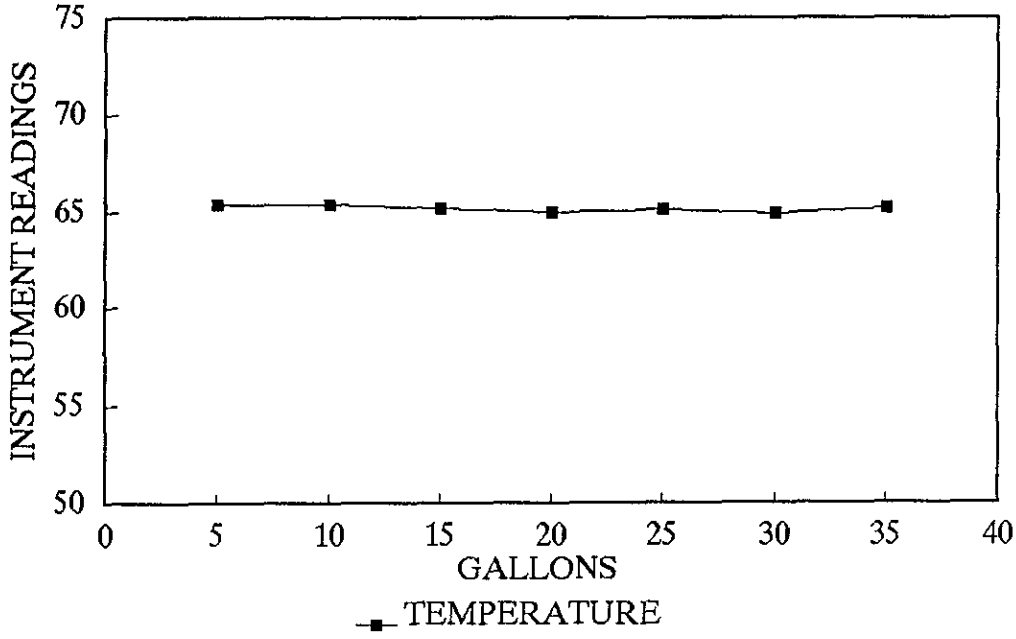
ARCO 374 STABILIZATION GRAPH

Ground–Water Monitoring Well MW–2 (July 8, 1991)



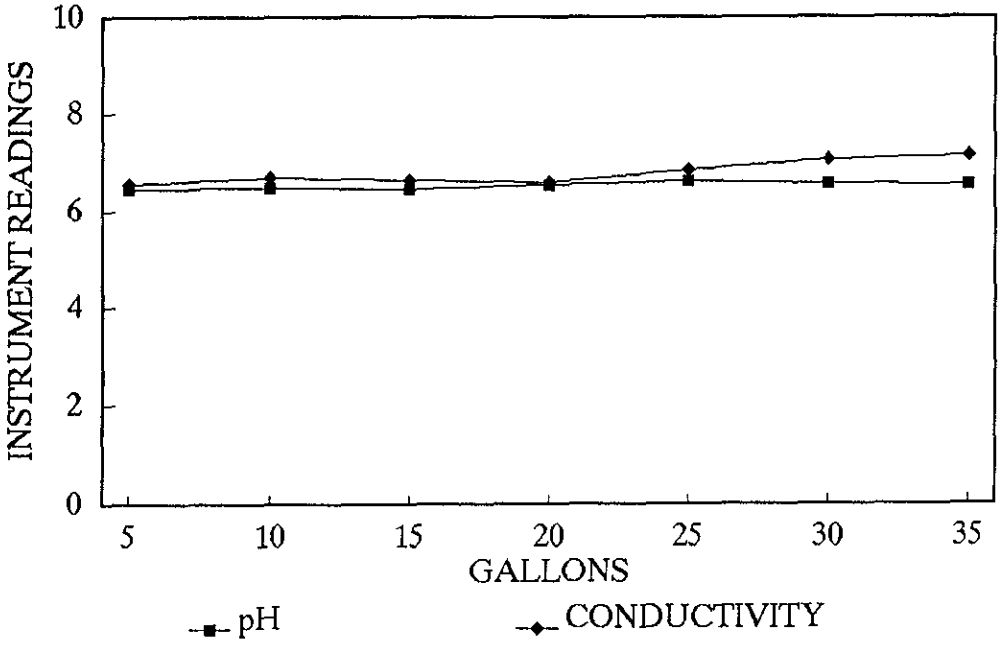
ARCO 374 STABILIZATION GRAPH

Ground–Water Monitoring Well MW–3 (July 8, 1991)



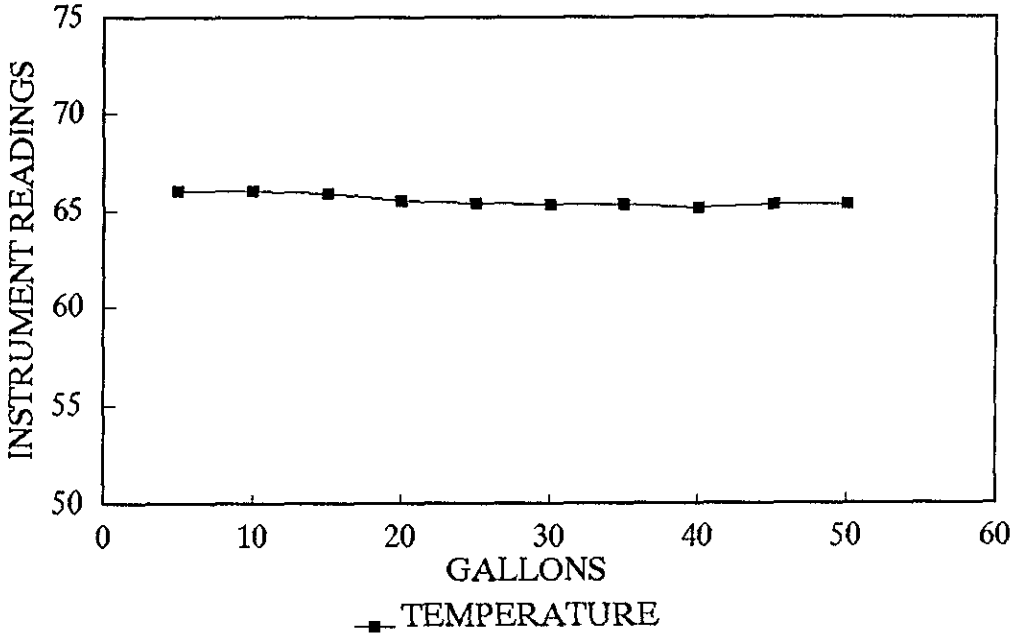
ARCO 374 STABILIZATION GRAPH

Ground–Water Monitoring Well MW–3 (July 8, 1991)



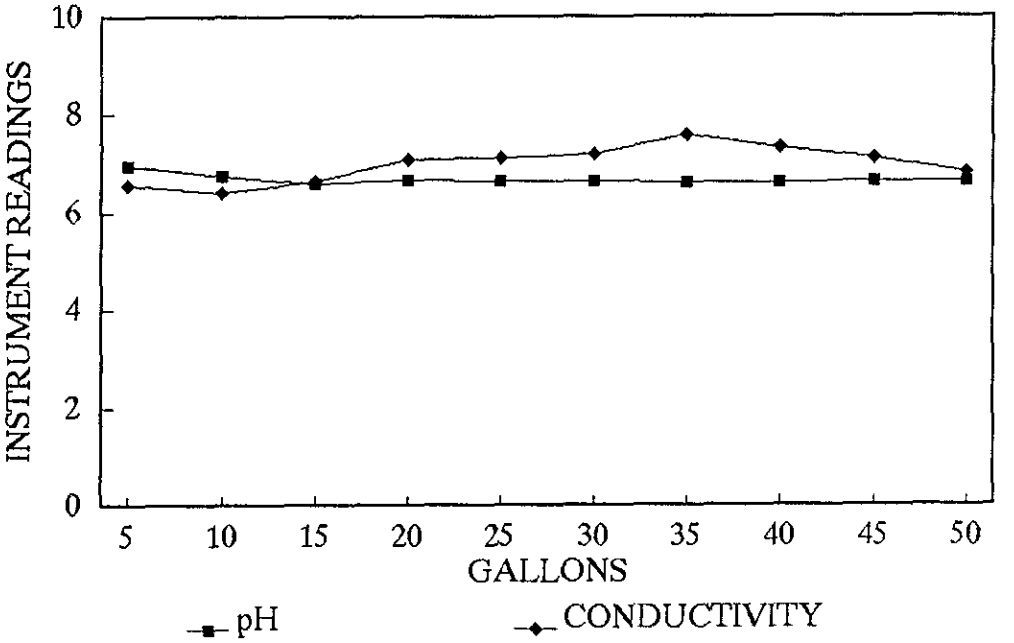
ARCO 374 STABILIZATION GRAPH

Ground–Water Monitoring Well MW–4 (July 8, 1991)



ARCO 374 STABILIZATION GRAPH

Ground–Water Monitoring Well MW–1 (July 8, 1991)



ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 374-91-5A

Chain of Custody

ARCO Facility no. 374	City (Facility) OAKLAND	Project manager (Consultant) JOEL 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 APPLIED GEOSYSTEMS	Address (Consultant) 3315 ALMADEN EXPRESSWAY SUITE 34 SAN JOSE CA		Contract number 91-073

Method of shipment: SEQUOIA COURIER

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 ☐		
W-Rinsate	2			X		X	HCl	7-8-91	13:00	HOLD				1637		1603			A-D			
W-9.0'-MW1	4			X		X	HCl		18:45		X		✓			64			↓			
W-12'-MW3	4			X		X	X		18:55		X					65						
W-9'-MW2	4			X		X	X		19:05		X					646						
W-13'-MW4	4			X		X	X		19:15		X											

Special detection Limit/reporting

Special QA/QC

Remarks: JOB NO: 60025.02

Lab number

Turnaround time

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

Condition of sample:

Temperature received: Cool

	Date	Time		Date	Time
Relinquished by sampler: E. Cardona.	7/14/91	12:45PM	Received by: Kevin Van Slambrook		
Relinquished by: Kevin Van Slambrook	7/14/91	1:45PM	Received by:		
Relinquished by:	7-9	145	Received by laboratory: KADell		

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

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. 374-91-5A

Chain of Custody

ARCO Facility no. 374	City (Facility) OAKLAND	Project manager (Consultant) JOEL 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 APPLIED GEOSYSTEMS	Address (Consultant) 3315 ALMADEN EXPRESSWAY SUITE 34 SAN JOSE CA		Contract number 07-073

Method of shipment: SEQUOIA COURIER

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 ☐		
W-Rinsate	2			X		X	HCl	7-8-91	13:00	HOLD				1657		1663			A-D			
W-9.0'-MW1	4			X		X	HCl		18:45		X		✓			64			↓			
W-12'-MW3	4			X		X	X		18:55		X					65						
W-9'-MW2	4			X		X	X		19:05		X					66						
W-13'-MW4	4			X		X	X		19:15		X											

Special detection Limit/reporting

Special QA/QC

Remarks: JOB NO: 60025.02

Lab number

Turnaround time

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

Condition of sample		Temperature received: Cool	
Relinquished by sampler: E. Cardona	Date: 7JUL91	Time: 12:45PM	Received by: Klein Van Slambrook
Relinquished by: Klein Van Slambrook	Date: 7JUL91	Time: 1:45PM	Received by:
Relinquished by:	Date: 7-9	Time: 145	Received by laboratory: RDC

Date: | Time:

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

600 25.02

SEQUOIA ANALYTICAL

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

Applied GeoSystems
3315 Almaden Expressway, Ste 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 July 9,1991. The requested analyses are listed below:

1071163	Water, MW-1	7/8/91	EPA 5030/8015/8020
1071164	Water, MW-3	7/8/91	EPA 5030/8015/8020
1071165	Water, MW-2	7/8/91	EPA 5030/8015/8020
1071166	Water, MW-4	7/8/91	EPA 5030/8015/8020

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

Very truly yours,

SEQUOIA ANALYTICAL

Elizabeth W. Hackl
Project Manager

SEQUOIA ANALYTICAL

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

Applied GeoSystems	Client Project ID:	ARCO 374, Oakland	Sampled:	Jul 8, 1991
3315 Almaden Expressway, Ste 34	Matrix Descript:	Water	Received:	Jul 9, 1991
San Jose, CA 95118	Analysis Method:	EPA 5030/8015/8020	Analyzed:	7/ 10-12 /91
Attention: Joel Coffman	First Sample #:	107-1163	Reported:	Jul 16, 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)
107-1163	MW-1	N.D.	N.D.	N.D.	N.D.	N.D.
107-1164	MW-3	2,500	240	470	74	320
107-1165	MW-2	310	76	18	7.7	24
107-1166	MW-4	1,700	280	68	37	170
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

Applied GeoSystems
3315 Almaden Expressway, Ste 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 374, Oakland
QC Sample Group: 1071163-64, 66
Reported: Jul 16, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	L. Laikhtman	L. Laikhtman	L. Laikhtman	L. Laikhtman
Reporting Units:	ng	ng	ng	ng
Date Analyzed:	Jul 10, 1991	Jul 10, 1991	Jul 10, 1991	Jul 10, 1991
QC Sample #:	GBLK071091 MS/MSD	GBLK071091 MS/MSD	GBLK071091 MS/MSD	GBLK071091 MS/MSD
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	100	100	100	300
Conc. Matrix Spike:	110	110	110	320
Matrix Spike % Recovery:	110	110	110	110
Conc. Matrix Spike Dup.:	100	100	100	300
Matrix Spike Duplicate % Recovery:	100	100	100	100
Relative % Difference:	9.5	9.5	9.5	6.5

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

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

Applied GeoSystems
3315 Almaden Expressway, Ste 34
San Jose, CA 95118
Attention: Joel Coffman

Client Project ID: ARCO 374, Oakland
QC Sample Group: 107-1165
Reported: Jul 16, 1991

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl-benzene	Xylenes
Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Analyst:	L. Laikhtman	L. Laikhtman	L. Laikhtman	L. Laikhtman
Reporting Units:	ng	ng	ng	ng
Date Analyzed:	Jul 12, 1991	Jul 12, 1991	Jul 12, 1991	Jul 12, 1991
QC Sample #:	GBLK071291 MS/MSD	GBLK071291 MS/MSD	GBLK071291 MS/MSD	GBLK071291 MS/MSD
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	100	100	100	300
Conc. Matrix Spike:	100	100	100	300
Matrix Spike % Recovery:	100	100	100	100
Conc. Matrix Spike Dup.:	100	100	100	300
Matrix Spike Duplicate % Recovery:	100	100	100	100
Relative % Difference:	0.0	0.0	0.0	0.0

Quality Assurance Statement: All standard operating procedures and quality control requirements have been met.

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

Please print or type. (12-pitch typewriter)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of
CAL000013206		

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

5. Transporter 1 Company Name	6. US EPA ID Number
H & H Ship Service Company	CAD004771168

7. Transporter 2 Company Name	8. US EPA ID Number

9. Designated Facility Name and Site Address	10. US EPA ID Number
H & H Ship Service Company 220 China Basin Street San Francisco, CA 94107	CAD004771168

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	001	T	00220	G	State: 134 EPA/Other:
b.					State: EPA/Other:
c.					State: EPA/Other:
d.					State: EPA/Other:

J. Additional Descriptions for Materials Listed Above	K. Handling Codes for Wastes Listed Above
FUEL, OIL AND WATER PROFILE #A1041	a. 01 b. c. d.

15. Special Handling Instructions and Additional Information
JOB #[illegible] JOB SITE. ARCO STATION #374
[illegible] Emergency Contact H & H #(415) 543-4835 5407 Telegraph Avenue
APPROPRIATE PROTECTIVE CLOTHING AND RESPIRATOR Oakland, California

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

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

Printed/Typed Name	Signature	Month	Day	Year
[illegible]	[illegible] ARCO	07	10	[illegible]

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
ROBERT J. HANSEN	[illegible]	07	10	[illegible]

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

HS 8022 A
EPA 8700—22
(Rev. 6-88) Previous editions are obsolete.

Do Not Write Below This Line

YELLOW: GENERATOR RETAINS

GENERATOR

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