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ENVIRONMENTAL ENGINEERING

G. D. GIBSON
SENIOR ENVIRONMENTAL ENGINEER

91 MAR 21 10:09:10

March 20, 1991

Exxon RAS 7-3006
720 High Street
Oakland, California

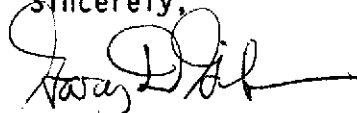
Mr. Larry Seto
Alameda County Environmental Health Department
Hazardous Materials Division
80 Swan Way, Suite 200
Oakland, California 94621

Dear Mr. Seto:

Attached for your review and comment is the Letter Report on Ground-Water Monitoring for Fourth Quarter 1990 for the above referenced Exxon Company, U.S.A. facility in the City of Oakland. This report, by Applied GeoSystems of Fremont, California, reports the results of the monitoring event performed in November, 1990.

Applied GeoSystems is currently designing a remediation system to address both the soil and groundwater problems at this site. Should you have any comments or concerns please contact me at (415) 246-8768. Thank you.

Sincerely,



Gary D. Gibson

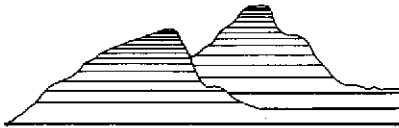
GDG:hs
0326E
Attachments

c - w/attachment:

Mr. V. Chu
Mr. L. Feldman - San Francisco Bay Region Water Quality Control Board

w/o attachment:

Mr. D. J. Bertoch
Mr. P. J. Brininstool
Mr. J. R. Hastings
Mr. R. C. Witham - Applied GeoSystems



Applied GeoSystems

43255 Mission Boulevard, Fremont, CA 94539 (415) 651-1906

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LETTER REPORT
ON
GROUND-WATER MONITORING
FOR FOURTH QUARTER 1990

at
Exxon Station No. 7-3006
720 High Street
Oakland, California

AGS Job No. 87042-9



SITE CONTACTS

Site Name: Exxon Station No. 7-3006
Site Address: 720 High Street
Oakland, California 94601
(415) 533-6066

Owner: Victor Chu

Exxon's Environmental Engineer:

Gary Gibson
Senior Environmental Engineer
Environmental Engineering, Marketing Department
Exxon Company, U.S.A.
2300 Clayton Road
Concord, California 94520
(415) 246-8768

Consultant: Applied GeoSystems (AGS)
42501 Albrae Street, Suite 100
Fremont, California 94538
(415) 651-1906

SITE BACKGROUND

The site is located at 720 High Street, in a predominantly industrial area of Oakland, California (Site Vicinity Map, Plate P-1). It is bounded on the northwest by High Street, on the southwest by Coliseum Way, on the northeast by a former dry-cleaning facility, and on the south by Alameda Avenue. In September 1987, AGS installed ground-water monitoring wells MW-2 through MW-9. In May 1988, monitoring well MW-1 was installed. In November 1989, AGS installed four additional monitoring wells (MW-10 through MW-13). The locations of the borings, wells, and pertinent site facilities are shown on the Generalized Site Plan, Plate P-2.

SITE ACTIVITIES AUGUST THROUGH DECEMBER 1990

Activities conducted at the site during the past quarter (see Attached Field Procedures):

- Acquired permits for drilling of soil borings and installation of additional ground-water monitoring wells on October 29, 1990.
- Drilled borings B-14 through B-30 and installed monitoring wells MW-14 and MW-15 between October 31 and November 2, 1990.
- Developed wells MW-14 and MW-15 on November 23, 1990.
- Measured depths to ground water and performed subjective evaluations of initial water samples from each well on September 19 and November 27, 1990.
- Each well without free product was purged, and ground-water samples were collected (MW-1 and MW-6 through MW-13) on November 27, 1990, and submitted for analysis following chain-of-custody protocol.
- Free product was bailed when encountered on September 19 and November 27, 1990.
- Surveyed newly installed ground-water monitoring wells on December 13, 1990.

SITE ACTIVITIES PLANNED FOR JANUARY THROUGH MARCH 1991

Activities planned for the next quarter:

- Complete report on soil and ground-water delineation.
- Perform soil sampling in conjunction with the excavation of a new tank pit to be performed by station owner's contractor.
- Perform a pump test.
- Design a remediation system for ground water.
- Prepare a Remedial Action Plan for County of Alameda.
- Prepare permit applications for ground-water discharge.

- Continue monthly ground-water monitoring.
- Conduct quarterly ground-water sampling and analysis in February 1991.
- Report monthly monitoring and quarterly analytical results in March 1991.

RESULTS OF SUBJECTIVE EVALUATIONS

On August 20, 1990, floating product (0.01 to 0.02 foot thick) was observed in initial water samples collected from wells MW-2, MW-3, and MW-4. On September 19, 1990, floating product (0.02 to 0.35 foot thick) was observed in these wells. On November 11, 1990, floating product (0.01 to 0.42 foot thick) was observed in wells MW-2, MW-3, MW-4, and MW-8. Cumulative results of subjective evaluations are presented in Table 1.

Ground-water levels fell an average of 1.64 feet between July 1990 and November 1990 (Table 1). A hydrograph was prepared for wells MW-2, MW-3, MW-4, and MW-8, which have periodically contained free product (Plate P-3). The hydrograph shows the product and ground-water elevations in each well to illustrate trends in water levels and product thicknesses. In general, product thicknesses fluctuated until November 1989 and have appeared as thin layers since November 1989. Product thicknesses increased in wells MW-2 through MW-4 during October and November 1990, and product reappeared in well MW-8 in November 1990. Increasing product thicknesses may be related to falling water levels.

GROUND-WATER GRADIENT AND FLOW DIRECTION

The data indicate that ground-water levels vary by as much 2.8 feet across the site (Table 2). The monitoring wells at this site are constructed in various permeable zones; for continuity, the ground-water elevation data from wells constructed in the shallow gravel were used to estimate the difference in water level across the site on August 20, September 19, and November 27, 1990. The water levels are shown on the Ground-Water Elevation Maps, Plates P-4, P-5, and P-6. The maps suggest that ground water flows toward the southwest with an average estimated gradient of 0.017 (approximately 1.7 feet vertical change per 100 feet horizontal). This is consistent with previous flow directions and gradient results.

ANALYTICAL METHODS AND RESULTS OF GROUND-WATER SAMPLES

Ground-water samples were analyzed for TPHg and TPHd by Environmental Protection Agency (EPA) Method 8015 and for benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 602. Because the former waste-oil tank and former dry-cleaning facility are potential sources of solvents, wells MW-7 and MW-9 were also analyzed for volatile organic compounds (VOCs) by EPA Method 601. Samples were analyzed for TPHg,

TPHd, and BTEX at Applied Analytical laboratory in Fremont, California (Certificate No. 1211), and for VOCs by Chromalab, Inc. laboratory in San Ramon, California (Certificate No. E694). Copies of Chain of Custody Records and Analysis Reports are attached.

Results of the ground-water analyses showed fluctuating concentrations of petroleum hydrocarbons in water from most of the wells, but overall, no notable change has occurred since the previous results, except for reappearance of floating product in well MW-8. The compounds TPHg and BTEX were not detected in ground water from wells MW-9, MW-10, and MW-11 at the northern and eastern site perimeters. However, laboratory results also showed low concentrations of these constituents (maximum 0.39 ppm TPHg) in the newly installed well MW-14, along the northeastern property boundary.

Detectable concentrations of TPHg and TPHd in ground water ranged from 0.39 to 69 ppm and 0.12 to 31 ppm, respectively. Plates P-7 and P-8 present the estimated distribution of dissolved TPHg and TPHd in ground water beneath the site. The distributions shown on Plates P-7 and P-8 were prepared in accordance with AGS's previous finding that product in wells MW-2, MW-3, and MW-4 is mainly diesel; whereas, product in MW-8 is mainly diesel with some gasoline (AGS report No. 87042-6R, January 30, 1990). In general, the greatest concentrations of dissolved TPHg and TPHd were detected in ground water from the western part of the site, with floating product concentrated in the southwestern part of the site.

Benzene concentrations ranged from nondetectable to 11 ppm in the ground-water samples. Up to 10 ppm toluene, 3.1 ppm ethylbenzene, and 12 ppm total xylenes were also detected.

Chloromethane (0.0024 ppm) was the only volatile organic compound detected in the ground-water sample from well MW-7 on the northeastern site perimeter next to the former waste-oil tank and adjacent to the former dry-cleaning facility. This is the first occurrence of VOCs in ground water since the quarterly monitoring program was initiated in 1987. No VOCs were detected in the water sample from MW-9. Cumulative results of ground-water analyses are presented in Table 3.

REMEDICATION OF GROUND-WATER

Ground-water wells with floating product have been periodically bailed. Data from the planned pump test will be used to evaluate the hydraulic parameters of the aquifer in conjunction with the proposed ground-water and floating-product extraction system.


RECOMMENDATIONS

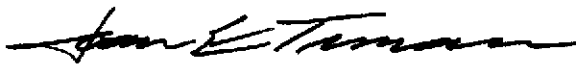
We suggest that copies of this report be sent to

- Mr. Larry Seto, Alameda County Health Agency, Department of Environmental Health, 80 Swan Way, Room 200, Oakland, California 94621.
- Mr. Lester Feldman, California Regional Water Quality Control Board, San Francisco Bay Region, 1800 Harrison Street, Suite 700, Oakland, California 94612.

Please call if you have any questions.

Sincerely,
Applied GeoSystems


for
Keith McVicker
Project Geologist



Joan E. Tiernan
Registered Civil Engineer
No. 044600

Enclosures: Results of Subjective Evaluation of Water Samples, Table 1.
Summary of Ground-Water Elevations, Table 2.
Results of Ground Water Analyses, Table 3.
Site Vicinity Map, Plate P-1
Generalized Site Plan, Plate P-2
Hydrograph, Plate P-3
Ground-Water Elevation Map (August 20, 1990), Plate P-4
Ground-Water Elevation Map (September 19, 1990), Plate P-5
Ground-Water Elevation Map (November 27, 1990), Plate P-6
Concentration of TPHg in Ground Water, Plate P-7
Concentration of TPHd in Ground Water, Plate P-8
Field Procedures
Chain of Custody Record and Certified Analysis Reports

TABLE 1
RESULTS OF SUBJECTIVE EVALUATION OF WATER SAMPLES
(page 1 of 5)

Date	Depth to Water (ft)	Floating Product (ft)	Sheen	Emulsion
MW-1				
04/25/89	7.55	NONE	NONE	NONE
04/27/89	10.16	NONE	SLIGHT	NONE
09/06/89	10.88	NONE	V. SLIGHT	NONE
09/22/89	11.06	NONE	NONE	NONE
11/01/89	10.82	NONE	NONE	NONE
11/15/89	11.07	NONE	NONE	NONE
12/06/89	10.33	NONE	NONE	NONE
02/20/90	8.81	NONE	NONE	NONE
04/19/90	9.33	NONE	NONE	NONE
07/03/90	8.44	NONE	NONE	NONE
07/26/90	8.99	NONE	NONE	NONE
08/20/90	9.50	NONE	NONE	NONE
09/19/90	9.99	NONE	NONE	NONE
11/27/90	10.62	NONE	NONE	NONE
MW-2				
04/25/89	9.27	2.16	NONE	NONE
07/19/89	10.81	1.56	NONE	NONE
07/27/89	10.18	0.13	NONE	HEAVY
09/06/89	10.89	0.09	NONE	SLIGHT
09/22/89	11.56	0.56	NONE	SLIGHT
11/01/89	10.85	0.09	NONE	NONE
11/15/89	11.05	0.07	NONE	NONE
12/06/89	10.23	0.13	NONE	NONE
02/20/90	8.86	0.29	NONE	NONE
04/19/90	9.09	0.10	NONE	NONE
07/03/90	8.75	0.05	NONE	NONE
07/26/90	8.71	0.10	NONE	NONE
08/20/90	9.25	0.02	NONE	NONE
09/19/90	9.79	0.02	NONE	NONE
11/27/90	10.40	0.07	NONE	NONE

TABLE 1
 RESULTS OF SUBJECTIVE EVALUATION OF WATER SAMPLES
 (page 2 of 5)

Date	Depth to Water (ft)	Floating Product (ft)	Sheen	Emulsion
MW-3				
04/25/89	7.57	0.08	NONE	NONE
07/19/89	10.33	0.66	NONE	NONE
07/27/89		covered by soil		
09/06/89	11.22	0.07	NONE	SLIGHT
09/22/89	11.38	0.28	NONE	SLIGHT
11/01/89	10.90	0.01	NONE	NONE
11/15/89	11.18	0.11	NONE	NONE
12/06/89	10.29	NONE	SLIGHT	NONE
02/20/90	8.73	0.04	NONE	NONE
04/19/90	9.20	0.09	NONE	NONE
07/03/90	8.50	0.03	NONE	NONE
07/26/90	8.58	0.04	NONE	NONE
08/20/90	9.21	0.01	NONE	NONE
09/19/90	10.02	0.35	NONE	NONE
11/27/90	10.72	0.42	NONE	NONE
MW-4				
04/25/89	7.26	0.16	NONE	NONE
07/19/89	10.32	0.72	NONE	NONE
07/27/89		covered by soil		
09/06/89	11.40	0.07	NONE	SLIGHT
09/22/89	11.64	0.19	NONE	SLIGHT
11/01/89	11.00	NONE	SLIGHT	NONE
11/15/89	11.18	0.10	NONE	NONE
12/06/89	10.25	NONE	SLIGHT	NONE
02/20/90	8.40	NONE	NONE	NONE
04/19/90	9.04	0.03	NONE	NONE
07/03/90	8.00	---	NONE	MODERATE
07/26/90	8.57	0.04	NONE	NONE
08/20/90	9.08	0.01	NONE	NONE
09/19/90	9.76	0.03	NONE	NONE
11/27/90	10.83	0.09	NONE	NONE
MW-5				
04/25/89	8.06	0.32	NONE	NONE
07/18/89		well destroyed		

TABLE 1
RESULTS OF SUBJECTIVE EVALUATION OF WATER SAMPLES
(page 3 of 5)

Date	Depth to Water (ft)	Floating Product (ft)	Sheen	Emulsion
MW-6				
04/25/89	8.02	NONE	NONE	NONE
09/06/89	13.64	0.08	NONE	SLIGHT
09/22/89	13.79	0.07	NONE	SLIGHT
11/01/89	12.78	NONE	SLIGHT	NONE
11/15/89	12.91	NONE	SLIGHT	NONE
12/06/89	11.84	NONE	NONE	NONE
02/20/90	9.08	NONE	NONE	NONE
04/19/90	9.72	NONE	NONE	NONE
07/03/90	8.00	NONE	NONE	NONE
07/26/90	8.70	NONE	NONE	NONE
08/20/90	9.62	NONE	NONE	NONE
09/19/90	10.25	NONE	MODERATE	NONE
11/27/90	10.82	NONE	SLIGHT	NONE
MW-7				
04/25/89	8.66	NONE	NONE	NONE
09/06/89	11.72	NONE	SLIGHT	NONE
09/22/89	11.89	NONE	NONE	NONE
12/06/89	10.46	NONE	NONE	NONE
02/20/90	8.44	NONE	NONE	NONE
04/19/90	9.54	NONE	NONE	NONE
07/03/90	7.45	NONE	NONE	NONE
07/26/90	8.08	NONE	NONE	NONE
08/20/90	8.82	NONE	NONE	NONE
09/19/90	9.01	NONE	NONE	NONE
11/27/90	9.54	NONE	NONE	NONE
MW-8				
04/25/89	8.31	0.66	NONE	NONE
07/19/89	10.97	1.25	NONE	NONE
07/27/89	10.34	0.08	NONE	HEAVY
09/06/89	11.09	0.17	NONE	SLIGHT
09/22/89	11.58	0.36	NONE	SLIGHT
11/01/89	11.03	NONE	NONE	NONE
11/15/89	11.25	0.01	NONE	NONE

Continued on page 4 of 5.

TABLE 1
 RESULTS OF SUBJECTIVE EVALUATION OF WATER SAMPLES
 (page 4 of 5)

Date	Depth to Water (ft)	Floating Product (ft)	Sheen	Emulsion
MW-8				
12/06/89	10.30	NONE	SLIGHT	NONE
02/20/90	8.00	0.01	NONE	NONE
04/19/90	8.50	NONE	NONE	NONE
07/03/90	7.55	NONE	NONE	NONE
07/26/90	7.86	NONE	NONE	NONE
08/20/90	8.92	NONE	NONE	NONE
09/19/90	9.55	NONE	NONE	NONE
11/27/90	10.29	0.01	NONE	NONE
MW-9				
04/25/89	8.25	NONE	NONE	NONE
09/06/89		covered by soil		
09/22/89		covered by soil		
12/06/89	10.12	NONE	NONE	NONE
02/20/90	9.38	NONE	NONE	NONE
04/19/90	9.40	NONE	NONE	NONE
07/03/90	8.79	NONE	NONE	NONE
07/26/90	8.70	NONE	NONE	NONE
08/20/90	9.09	NONE	NONE	NONE
09/19/90	9.52	NONE	NONE	NONE
11/27/90	9.89	NONE	NONE	NONE
MW-10				
12/06/89	10.46	NONE	NONE	NONE
02/20/90	8.12	NONE	NONE	NONE
04/19/90	8.54	NONE	NONE	NONE
07/03/90	7.88	NONE	NONE	NONE
07/26/90	8.19	NONE	NONE	NONE
08/20/90	10.33	NONE	NONE	NONE
09/19/90	9.49	NONE	NONE	NONE
11/27/90	9.89	NONE	NONE	NONE

TABLE 1
 RESULTS OF SUBJECTIVE EVALUATION OF WATER SAMPLES
 (page 5 of 5)

Date	Depth to Water (ft)	Floating Product (ft)	Sheen	Emulsion
MW-11				
12/06/89	10.62	NONE	NONE	NONE
02/20/90	9.20	NONE	NONE	NONE
04/19/90	9.80	NONE	NONE	NONE
07/03/90	8.90	NONE	NONE	NONE
07/26/90	9.36	NONE	NONE	NONE
08/20/90	9.90	NONE	NONE	NONE
09/19/90	10.39	NONE	NONE	NONE
11/27/90	10.97	NONE	NONE	NONE
MW-12				
12/06/89	8.00	NONE	NONE	NONE
02/20/90	6.33	NONE	NONE	NONE
04/19/90	7.18	NONE	NONE	NONE
07/03/90	7.41	NONE	NONE	NONE
07/26/90	6.54	NONE	NONE	NONE
08/20/90	7.23	NONE	NONE	NONE
09/19/90	7.77	NONE	NONE	NONE
11/27/90	8.15	NONE	NONE	NONE
MW-13				
12/06/89	9.35	NONE	NONE	NONE
02/20/90	7.73	NONE	NONE	NONE
04/19/90	8.68	NONE	NONE	NONE
07/03/90	8.00	NONE	NONE	NONE
07/26/90	7.95	NONE	NONE	NONE
08/20/90	8.66	NONE	NONE	NONE
09/19/90	9.13	NONE	NONE	NONE
11/27/90	9.49	NONE	NONE	NONE
MW-14				
11/27/90	9.88	NONE	NONE	NONE
MW-15				
11/27/90	8.67	NONE	NONE	NONE

TABLE 2
SUMMARY OF GROUND-WATER ELEVATIONS

Well Number	Depth to Water (ft)	Casing Elevation (ft)	Ground-Water Elevation (ft)
August 20, 1990			
MW-1	9.50	12.87	3.37
MW-6	9.62	14.27	4.65
MW-7	8.82	14.84	6.02
MW-12	7.23	12.01	4.78
MW-13	8.66	14.20	5.54
September 19, 1990			
MW-1	9.99	12.87	2.88
MW-6	10.25	14.27	4.02
MW-7	9.01	14.84	5.83
MW-12	7.77	12.01	4.24
MW-13	9.13	14.20	5.07
November 27, 1990			
MW-1	10.62	12.87	2.25
MW-6	10.82	14.27	3.45
MW-7	9.54	14.84	5.30
MW-12	8.15	12.01	3.86
MW-13	9.49	14.20	4.71
MW-14	9.88	15.18	5.30
MW-15	8.67	13.73	5.06

TABLE 3
RESULTS OF GROUND-WATER ANALYSES
(page 1 of 5)

Date	Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
5/88	W-11-MW1*	0.240	0.090	0.005	0.015	0.025	--	--	ND
12/89	W-11-MW1	0.63	0.012	0.0056	0.0037	0.025	0.24	--	--
4/90	W-9-MW1	<0.020	<0.00050	<0.00050	<0.00050	<0.00050	<0.10	--	--
7/90	W-11-MW1	0.13	0.006	<0.00050	<0.00050	<0.00050	0.16	--	--
11/90	W-10-MW1	<0.050	0.0007	<0.00050	<0.00050	<0.00050	<0.10	--	--
9/87	W-25-MW2	1.445	0.233	0.81	0.056	0.209	--	--	--
5/88	free product								
12/89	free product								
4/90	free product								
7/90	free product								
11/90	free product								
9/87	W-25-MW3	2.101	0.360	1.062	0.068	0.298	0.66	--	--
5/88	W-14-MW3	8.7	3.98	0.28	0.24	0.65	--	--	--
12/89	free product encountered during purging								
4/90	free product								
7/90	free product								
11/90	free product								

See notes on page 5 of 5.

Quarterly Ground-Water Monitoring
Exxon Station No. 7-3006, Oakland, California

March 13, 1991
AGS 87042-9

TABLE 3
RESULTS OF GROUND-WATER ANALYSES
(page 2 of 5)

Date	Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
9/87	W-25-MW4	0.925	0.070	0.007	0.010	0.016	0.74	--	--
5/88	free product								
12/89	free product encountered during purging								
4/90	free product								
7/90	emulsion								
11/90	free product								
9/87	W-25-MW5	26.66	0.56	1.71	1.58	7.15	37.22	--	--
5/88	free product								
7/89	well destroyed								
5/88	W-15-MW6	29.3	12.82	0.55	1.44	5.50	--	--	--
12/89	W-18-MW6	9.0	0.37	0.013	0.0026	0.43	4.8	--	--
4/90	W-30-MW6	27	3.0	0.12	0.49	2.1	26	--	--
7/90	W-30-MW6	30	5.5	1.4	1.2	3.1	13	--	--
11/90	W-10-MW6	15	4.4	0.12	0.8	2.3	7.6	--	--

See notes on page 5 of 5.

TABLE 3
RESULTS OF GROUND-WATER ANALYSES
(page 3 of 5)

Date	Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
9/87	W-25-MW7	1.531	0.258	0.002	<0.002	0.042	2.79	--	ND
5/88	W-15-MW7	--	0.300**	<0.010**	<0.010**	<0.010**	0.190	--	ND
12/89	W-11-MW7	1.70	0.22	0.0053	0.0050	0.0086	2.5	<5	ND
4/90	W-10-MW7	2.7	0.22	0.0086	0.0070	0.020	3.5	--	ND
7/90	W-17-MW7	2.5	0.38	0.013	0.016	0.035	0.91	--	ND
11/90	W-9-MW7	2.3	0.63	0.016	0.032	0.029	1.3	--	0.0024■
9/87	W-25-MW8	1.325	0.081	0.074	0.042	0.182	--	--	--
5/88	free product								
12/89	W-11-MW8	42	2.6	0.63	0.21	3.7	34	--	--
4/90	W-14-MW8	49	2.1	0.82	1.1	4.8	53	--	--
7/90	W-23-MW8	44	4.0	1.5	2.0	6.3	32	--	--
11/90	free product								
5/88	W-14-MW9	<0.05	<0.0005	0.001	<0.001	<0.001	--	--	ND
12/89	W-14-MW9	0.1	0.0018	0.0037	0.0014	0.0088	0.11	<5	ND
4/90	W-10-MW9	<0.020	<0.00050	<0.00050	<0.00050	<0.00050	<0.10	--	ND
7/90	W-10-MW9	<0.020	<0.00050	<0.00050	<0.00050	<0.00050	<0.10	--	ND
11/90	W-9-MW9	<0.050	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	--	ND

See notes on page 5 of 5.

TABLE 3
RESULTS OF GROUND-WATER ANALYSES
(page 4 of 5)

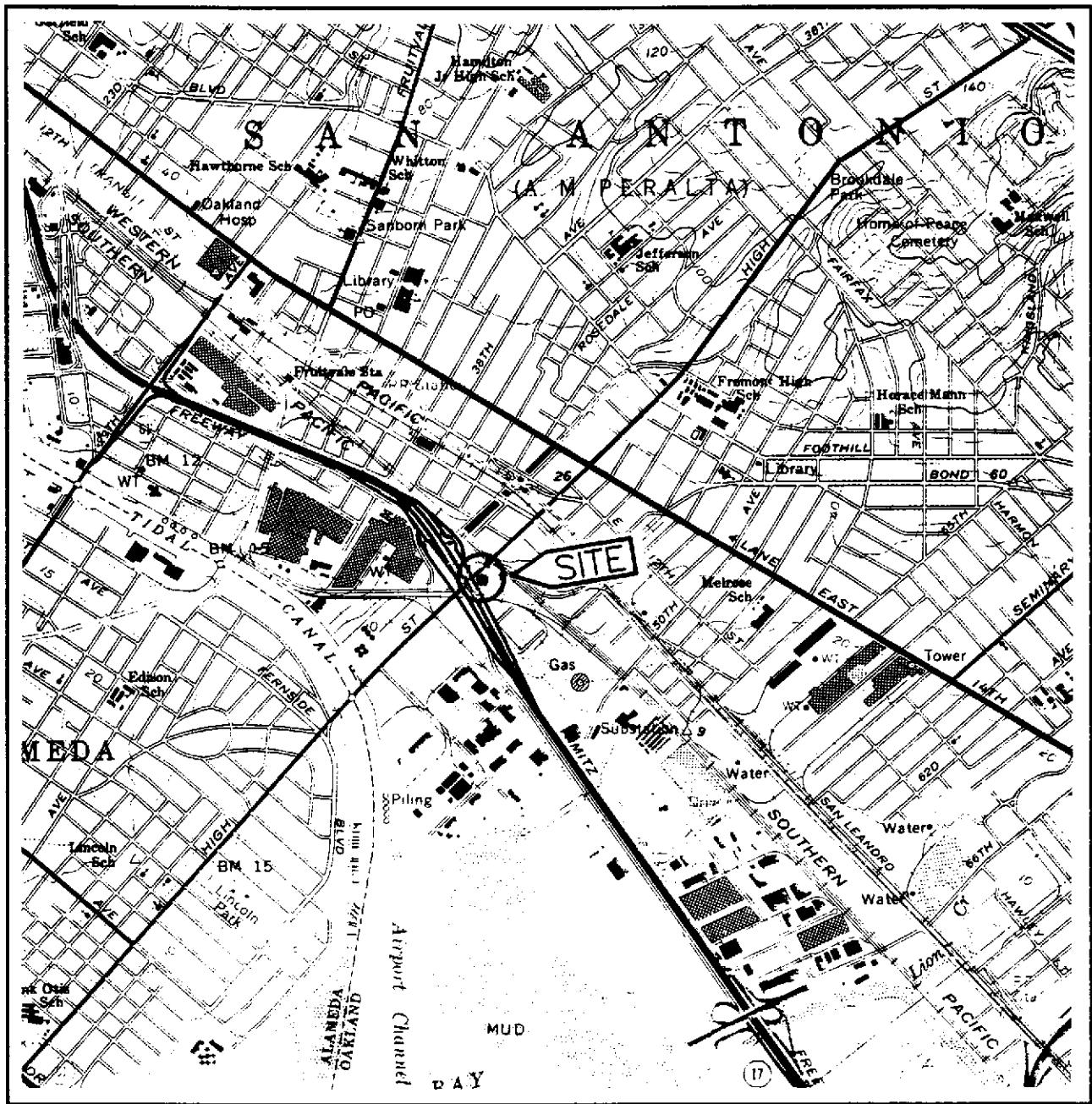
Date	Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
12/89	W-12-MW10	0.32	0.0037	0.014	0.0056	0.032	<0.10	--	--
4/90	W-9-MW10	<0.020	<0.00050	<0.00050	<0.00050	<0.00050	<0.10	--	ND
7/90	W-11-MW10	<0.020	<0.00050	<0.00050	<0.00050	<0.00050	<0.10	--	--
11/90	W-9-MW10	<0.050	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	--	--
12/89	W-11-MW11	0.078	0.0059	0.00063	<0.0005	48	<0.10	--	--
4/90	W-12-MW11	<0.020	<0.00050	<0.00050	<0.00050	<0.00050	<0.10	--	--
7/90	W-12-MW11	<0.020	<0.00050	<0.00050	<0.00050	<0.00050	<0.10	--	--
11/90	W-10-MW11	<0.050	<0.0005	<0.0005	<0.0005	<0.0005	<0.10	--	--
12/89	W-8-MW12	85	6.7	6.3	1.8	7.8	40	--	--
4/90	W-7-MW12	110	6.6	7.4	1.8	11	97	--	--
7/90	W-8-MW12	92	11	11	3.1	13	50	--	--
11/90	W-8-MW12	69	11	10	3.1	12	31	--	--

See notes on page 5 of 5.

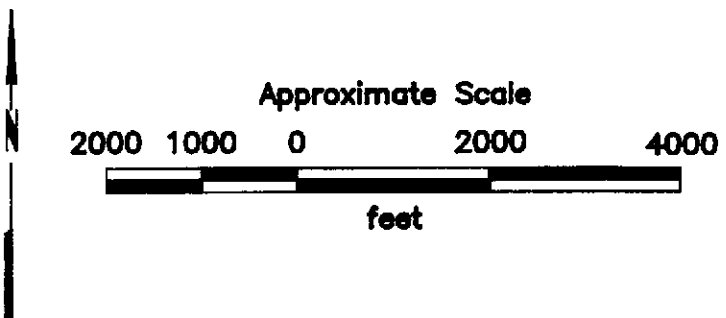
TABLE 3
RESULTS OF GROUND-WATER ANALYSES
(page 5 of 5)

Date	Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
12/89	W-10-MW13	52	2.1	2.0	1.4	6.1	31	--	--
4/90	W-9-MW13	59	1.8	1.5	1.4	7.2	54	--	--
7/90	W-10-MW13	53	4.5	3.1	2.2	7.8	26	--	--
11/90	W-9-MW13	20	4.5	1.1	0.88	3.3	1.6	--	--
11/90	W-9-MW14	0.39	<0.0005	<0.0005	0.0036	0.0037	0.12	--	--
11/90	W-8-MW15	2.7	0.21	0.0055	0.6	0.25	0.34	--	--

<: Not detected at method detection limit
 ■: Chloromethane
 ND: No VOC detected other than BTEX
 *: W-11-MW1 = water sample - depth - well number
 **: Analyzed by Environmental Protection Agency Method 624 (volatile organic compounds)



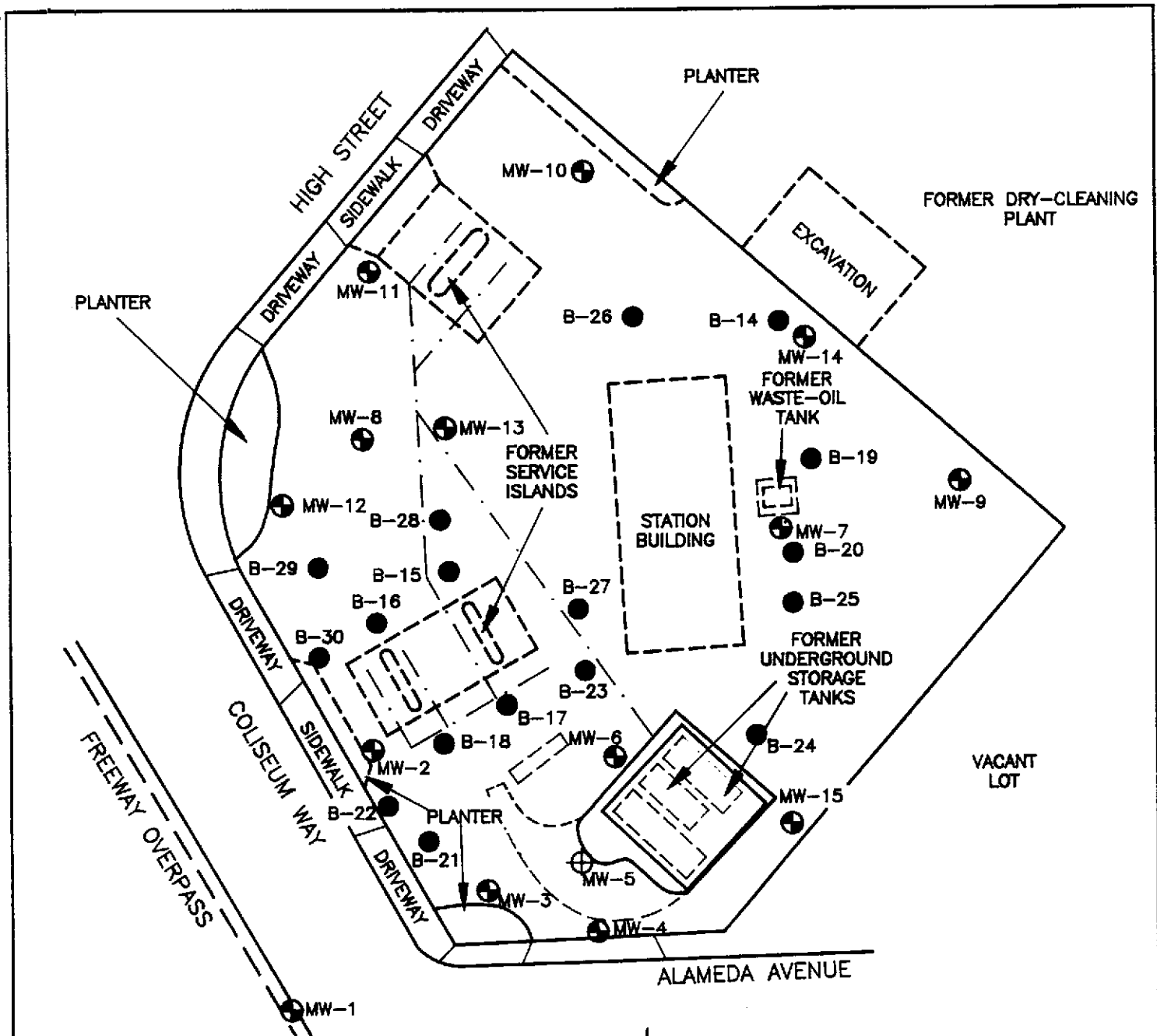
Source: U.S. Geological Survey
 7.5-Minute Quadrangle
 Oakland East, California



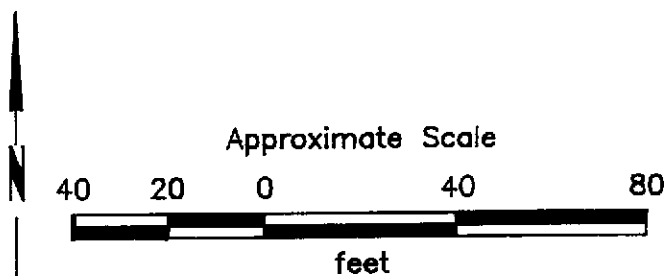
PROJECT NO. 87042-9

SITE VICINITY MAP
 Exxon Station No. 7-3006
 720 High Street
 Oakland, California

PLATE
P - 1



- — — = Product piping trenches
- - - - = Area excavated by Applied GeoSystems in July 1989
- B-20 ● = Soil boring drilled by Applied GeoSystems
- MW-9 ⊕ = Monitoring well installed by Applied GeoSystems
- MW-5 ⊕ = Monitoring well (destroyed) installed by Applied GeoSystems



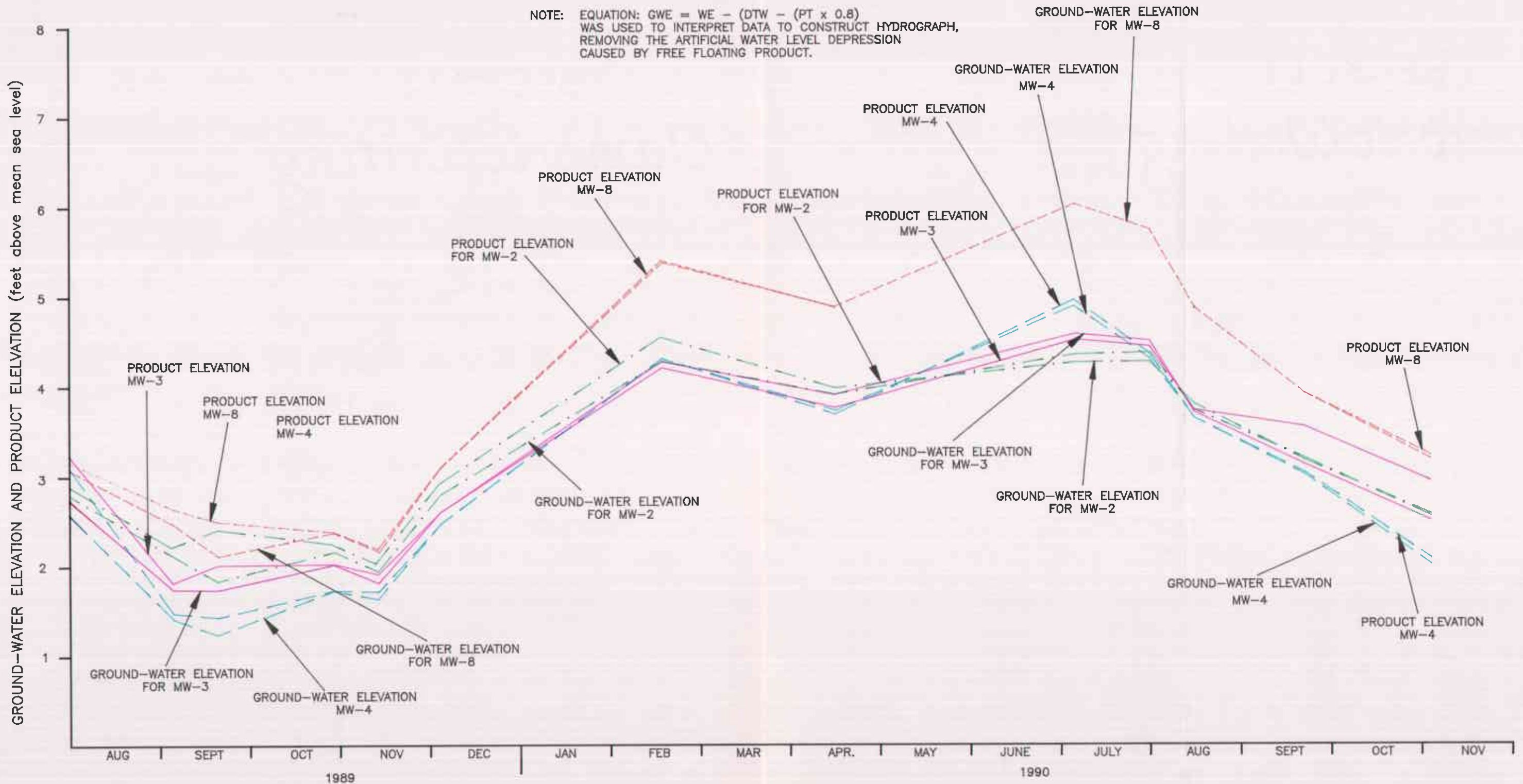
Source: Modified from plan supplied by Exxon Company, USA



PROJECT NO. 87042-9

**GENERALIZED SITE PLAN
Exxon Station No. 7-3006
720 High Street
Oakland, California**

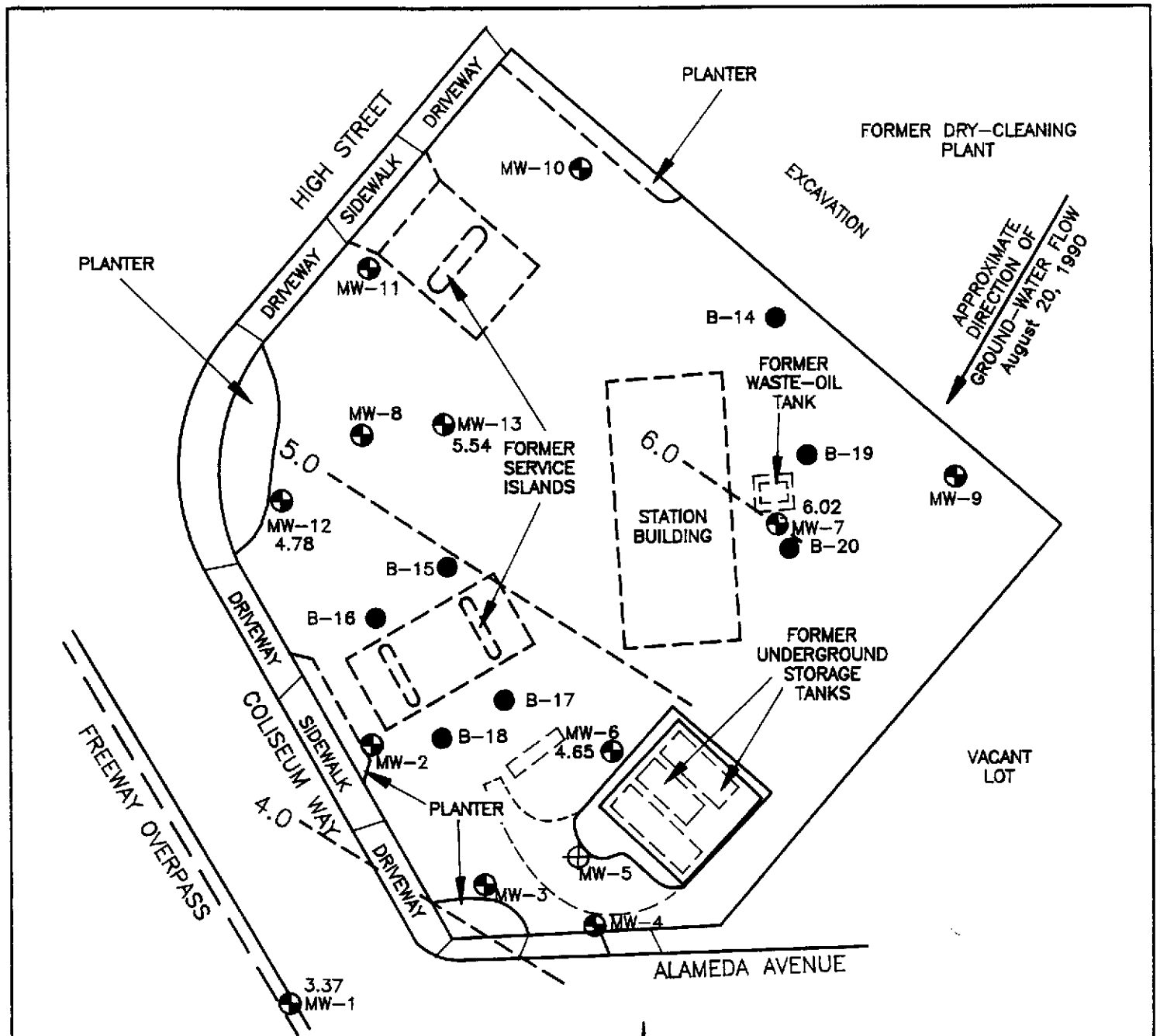
**PLATE
P - 2**



PROJECT NO. **87042-9**

HYDROGRAPH
Exxon Station No. 7-3006
720 High Street
Oakland, California

PLATE
P - 3



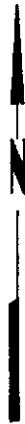
6.0 --- = Line of equal elevation of ground water in feet above mean sea level

--- = Area excavated

B-20 ● = Soil boring drilled by Applied GeoSystems

MW-9 ⊕ = Monitoring well installed by Applied GeoSystems

MW-5 ⊕ = Monitoring well (destroyed) installed by Applied GeoSystems



Approximate Scale



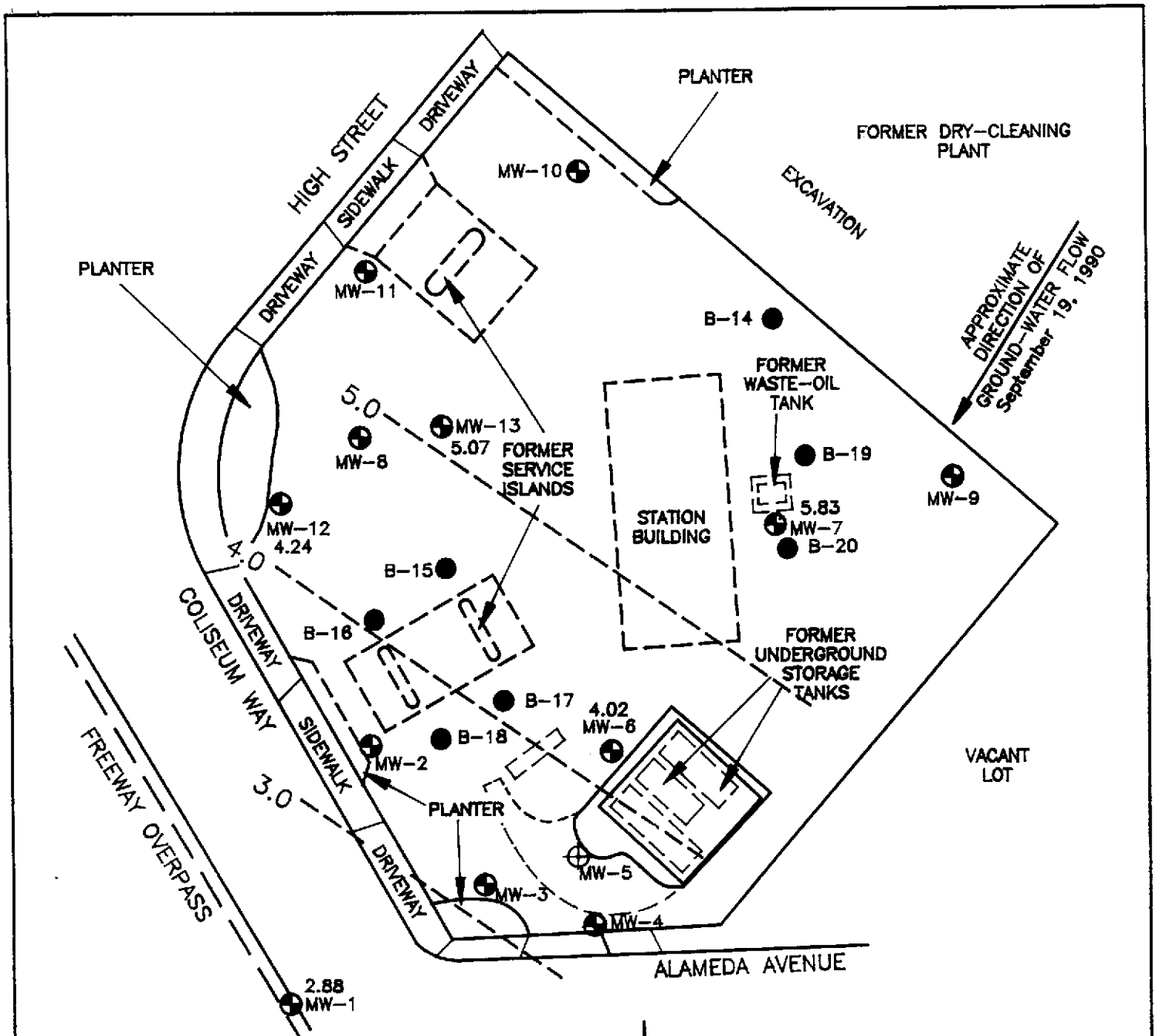
Source: Modified from plan supplied by Exxon Company, USA



GROUND-WATER ELEVATION MAP
August 20, 1990
Exxon Station No. 7-3008
720 High Street
Oakland, California

PLATE
P - 4

PROJECT NO. 87042-9



5.0 --- = Line of equal elevation of ground water in feet above mean sea level

--- = Area excavated

B-20 ● = Soil boring drilled by Applied GeoSystems

MW-9 ⊕ = Monitoring well installed by Applied GeoSystems

MW-5 ⊕ = Monitoring well (destroyed) installed by Applied GeoSystems

Approximate Scale



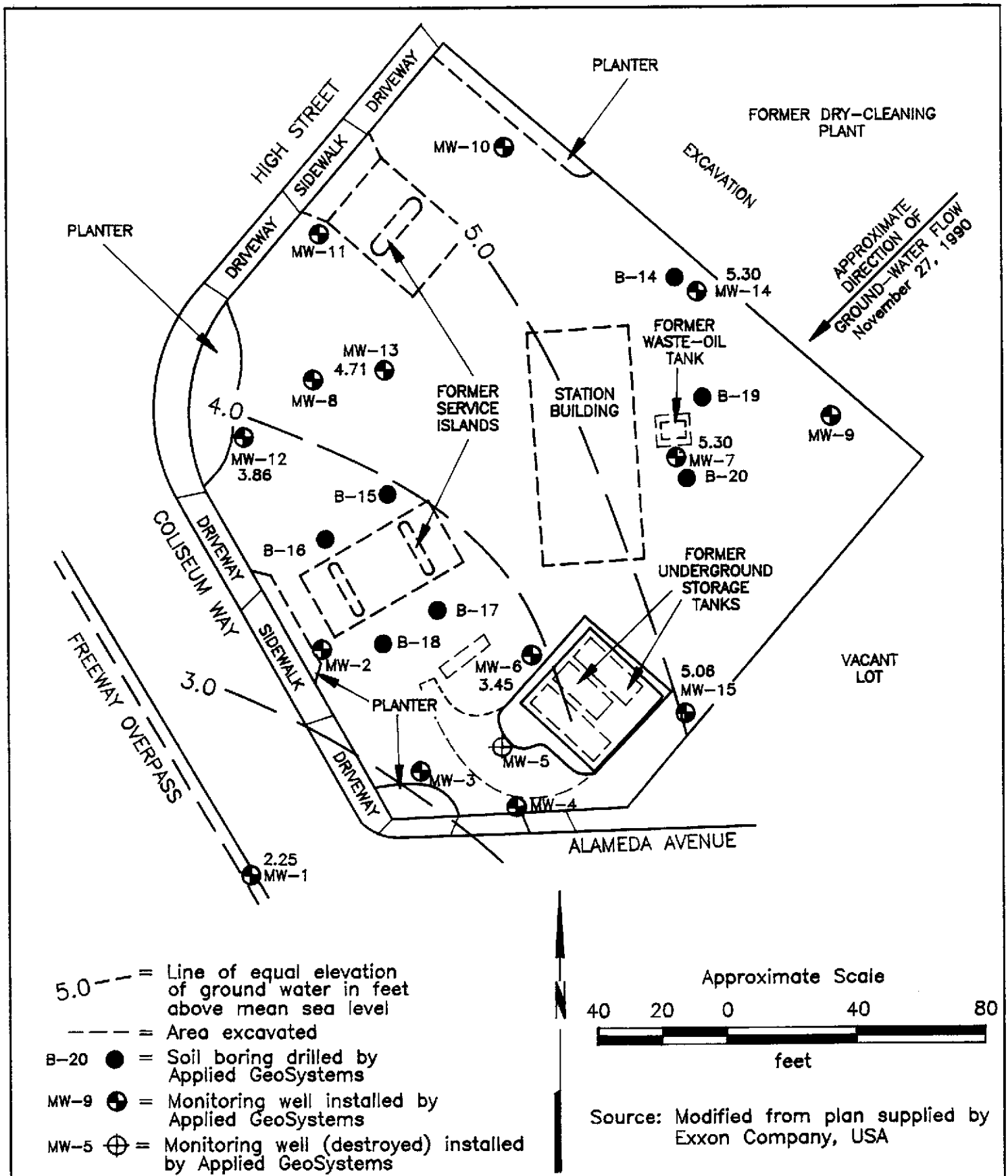
Source: Modified from plan supplied by Exxon Company, USA



GROUND-WATER ELEVATION MAP
September 19, 1990
Exxon Station No. 7-3006
720 High Street
Oakland, California

PLATE
P - 5

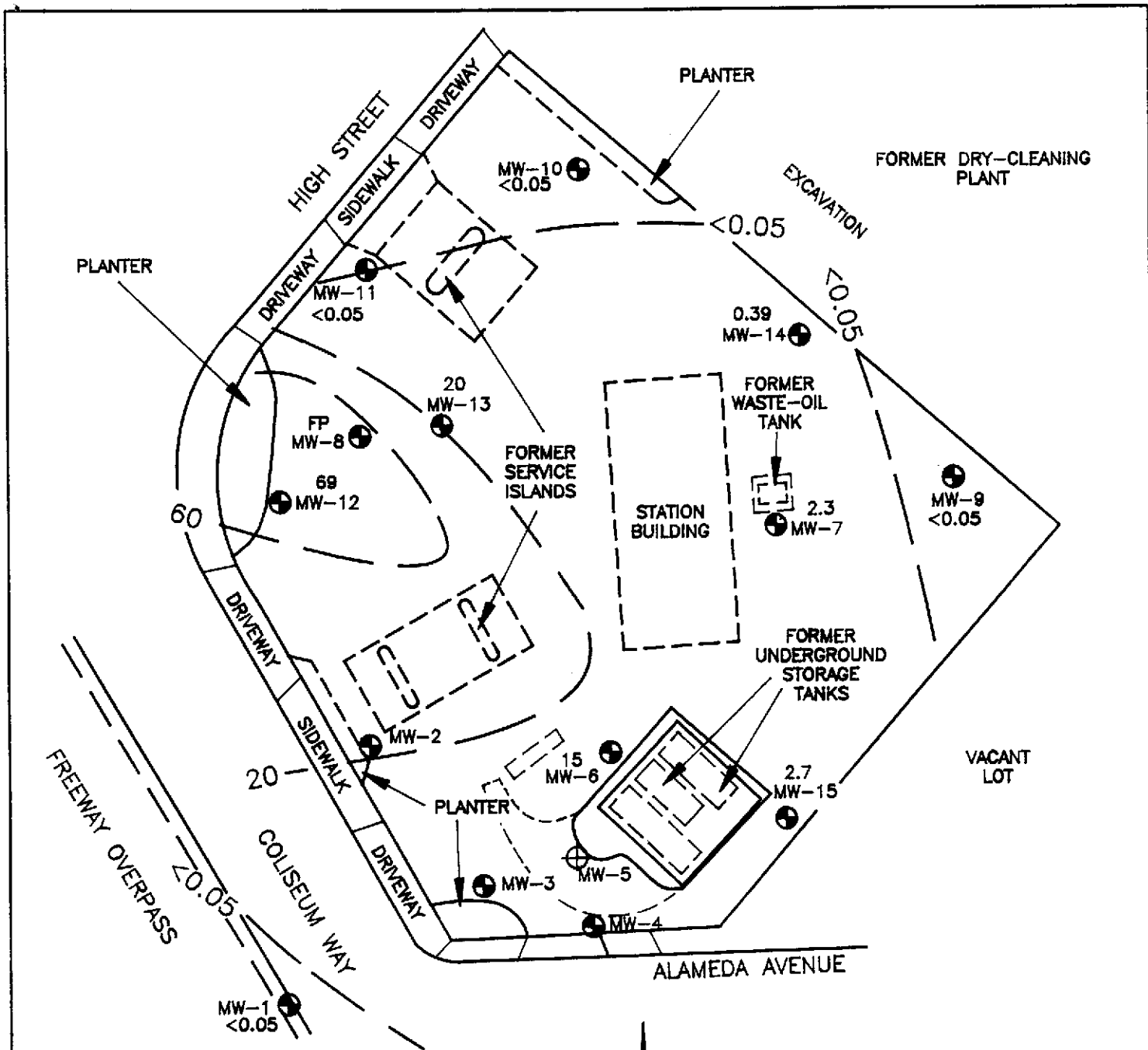
PROJECT NO. 87042-9



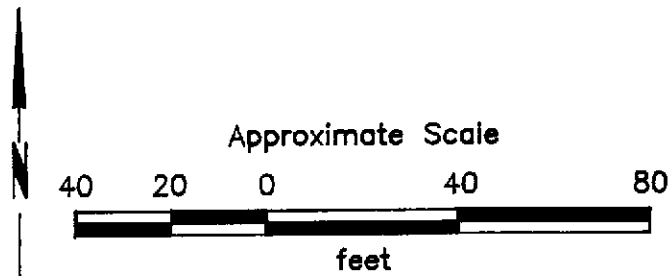
PROJECT NO. 87042-9

GROUND-WATER ELEVATION MAP
November 27, 1990
Exxon Station No. 7-3008
720 High Street
Oakland, California

PLATE
P - 6



- 60 --- = Line of equal concentration in parts per million
- 69 = Concentration in parts per million
- FP = Floating product
- = Area excavated
- MW-9 ⊕ = Monitoring well installed by Applied GeoSystems
- MW-5 ⊕ = Monitoring well (destroyed) installed by Applied GeoSystems
- TPHg = Total petroleum hydrocarbons as gasoline



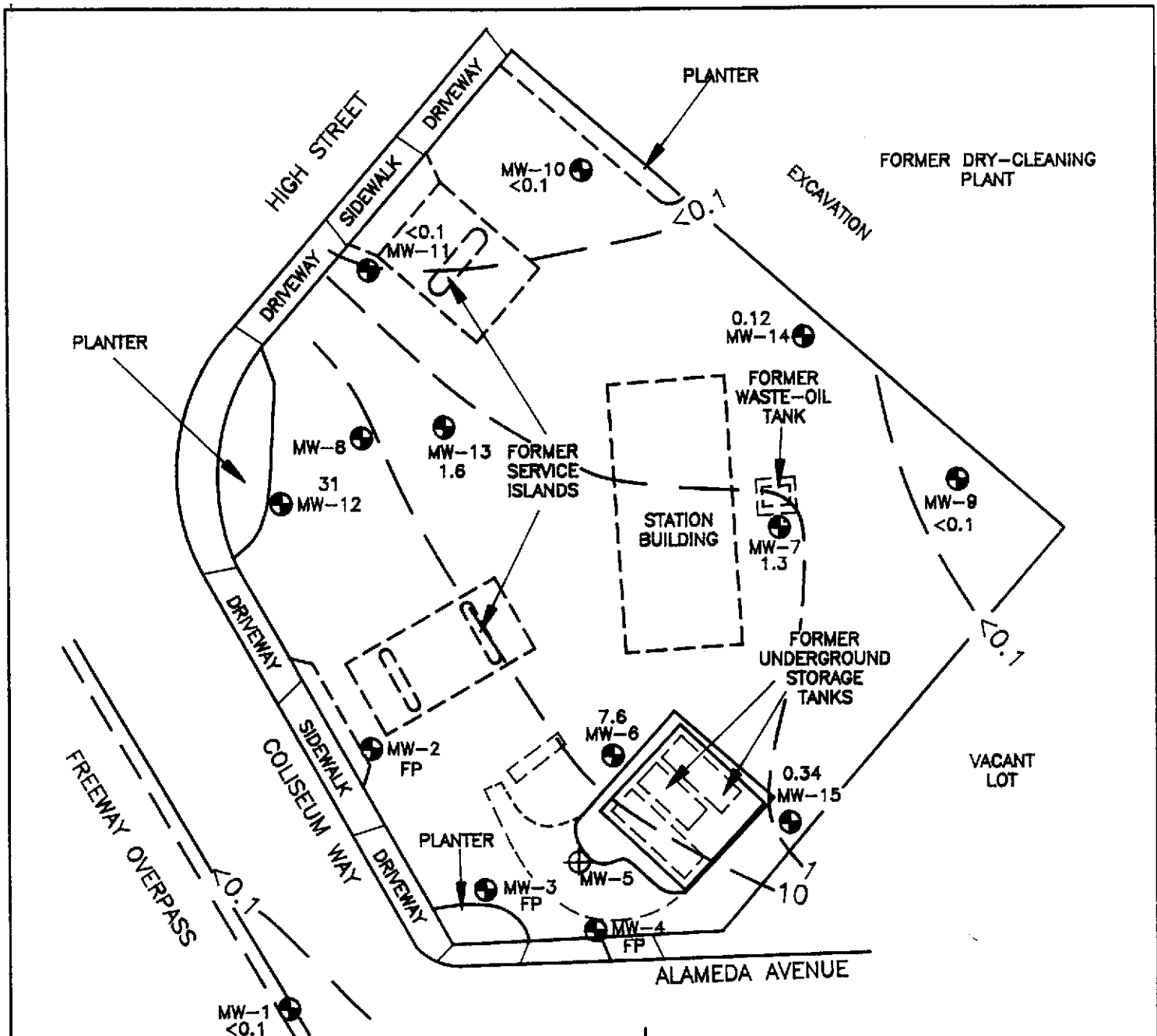
Source: Modified from plan supplied by Exxon Company, USA



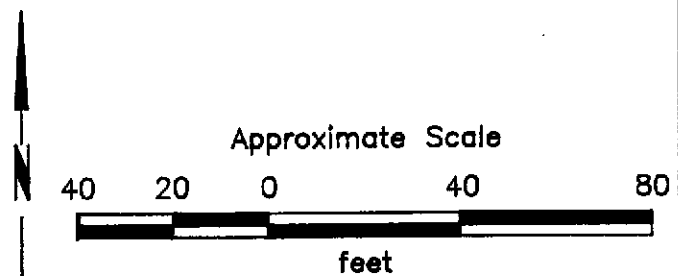
PROJECT NO. 87042-9

**CONCENTRATION OF TPHg
IN GROUND WATER
Exxon Station No. 7-3006
720 High Street
Oakland, California**

**PLATE
P - 7**



- 10 --- = Line of equal concentration in parts per million
- 31 = Concentration in parts per million
- FP = Floating product
- = Area excavated
- MW-9 ⊕ = Monitoring well installed by Applied GeoSystems
- MW-5 ⊕ = Monitoring well (destroyed) installed by Applied GeoSystems
- TPHd = Total petroleum hydrocarbons as diesel



Source: Modified from plan supplied by Exxon Company, USA



PROJECT NO. 87042-9

**CONCENTRATION OF TPHd
IN GROUND WATER
Exxon Station No. 7-3006
720 High Street
Oakland, California**

**PLATE
P - 8**

FIELD PROCEDURES

Monitoring and Subjective Analysis of Ground Water

The depth to static water level was measured to the nearest 0.01 foot with a Solinst electronic water-level indicator. In wells with free product, an Oil Recovery Systems oil-water interface probe was used to measure the depth of the product and the depth of the product-water interface. Ground-water samples were then collected for subjective analysis from each well by gently lowering approximately half the length of a Teflon bailer past the air-water interface. The bailer was washed with Alconox (a commercial biodegradable detergent) and rinsed with deionized water before each use. The samples were retrieved and examined for evidence of floating product, sheen, and emulsion.

Ground-Water Sampling for Laboratory Analyses

Before collecting ground-water samples, the wells were purged of approximately 3 well volumes of water or until temperature, pH, and conductivity stabilized. A water sample was collected from each well after the well had recharged to more than 80 percent of the static level. A disposable bailer certified clean by the manufacturer was used for collecting each water sample. Half the length of the bailer was lowered past the air-water interface to retrieve the water sample. The bailer was retrieved and the water samples slowly decanted into laboratory-cleaned sample containers. For TPHg, BTEX, and VOC analyses, 40-milliliter, volatile organic analysis glass sample vials with Teflon-lined caps were used. Hydrochloric acid was added to the samples as a preservative. For TPHd analyses, 1-liter glass bottles were used. The sample vials were promptly capped, labeled, and placed in iced storage for transport to a State-certified analytical laboratory for testing. A Chain of Custody Record was initiated in the field and chain-of-custody protocol was observed throughout subsequent handling of the samples.

The purged ground water and product were stored onsite in sealed, properly labeled, 17E, 55-gallon, liquid-waste drums approved for this use by the Department of Transportation. The water was removed from the site by H & H Environmental of San Francisco, California, on January 23, 1991.

CHAIN-OF-CUSTODY RECORD

PROJECT NO		PROJECT NAME		ANALYSIS										REMARKS	LABORATORY I.D. NUMBER		
P.O. NO		SAMPLES (Signature)		No. of Containers	TPH Gasoline (6015)	BTEX (602/6020)	TPH Diesel (6015)	VOC (601)	Organic Lead							Preserved?	
87042-9		Exxon - Dadeland															
		Law R. W.															
DATE	TIME																
MM/DD/YY																	
11/27/90		W - 9 - MW 9	5	/	/	/	/	/	/	/	/	/	/	no HCL in VOC or TPHD			
		W - 9 - MW 10	3	/	/	/	/	/	/	/	/	/	/	no HCL in TPHD			
		W - 10 - MW 11	3	/	/	/	/	/	/	/	/	/	/	"			
		W - 10 - MW 1	3	/	/	/	/	/	/	/	/	/	/	"			
		W - 9 - MW 14	3	/	/	/	/	/	/	/	/	/	/	"			
		W - 8 - MW 15	3	/	/	/	/	/	/	/	/	/	/	"			
		W - 9 - MW 7	5	/	/	/	/	/	/	/	/	/	/	no HCL in TPHD or VOC			
		W - 10 - MW 6	3	/	/	/	/	/	/	/	/	/	/	no HCL in TPHD			
		W - 8 - MW 12	3	/	/	/	/	/	/	/	/	/	/	"			
		W - 9 - MW 13	3	/	/	/	/	/	/	/	/	/	/	"			
		S - 112790 - SPI ABCD	4	/	/	/	/	/	/	/	/	/	/	ZCF composite			

RECEIVED BY (Signature)	DATE / TIME	RECEIVED BY (Signature)
Law R. W.		
RECEIVED BY (Signature)	DATE / TIME	RECEIVED BY (Signature)
RECEIVED BY (Signature)	DATE / TIME	RECEIVED BY (Signature)

Laboratory:
Applied Analytical

SEND RESULTS TO:
Applied GeoSystems
42501 Albrae Street
Suite 100
Fremont, California 94639
(415) 651-1906
Proj. Mgr.: Joellen Kruszman

Turn Around: 2 wks

11/27/90
1910

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention: Ms. JoEllen Kuszmaul
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87042-9

Date Sampled: 11-27-90
Date Received: 11-27-90
BTEX Analyzed: 12-05-90
TPHg Analyzed: 12-05-90
TPHd Analyzed: 12-07/10-90
Matrix: Water

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>
Detection Limit:	0.5	0.5	0.5	0.5	50	100

SAMPLE

Laboratory Identification

W-9-MW9 W1011383	ND	ND	ND	ND	ND	ND
W-9-MW10 W1011384	ND	ND	ND	ND	ND	ND

ppb = parts per billion = $\mu\text{g/L}$ = micrograms per liter.

ND = Not detected. Compound(s) may be present at concentrations below the detection limit.

NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX— Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg—Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd—Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.


Laboratory Representative

December 11, 1990

Date Reported

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention: Ms. JoEllen Kuszmaul
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87042-9

Date Sampled: 11-27-90
Date Received: 11-27-90
BTEX Analyzed: 12-05-90
TPHg Analyzed: 12-05-90
TPHd Analyzed: 12-06/10-90
Matrix: Water

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>
Detection Limit:	0.5	0.5	0.5	0.5	50	100

SAMPLE

Laboratory Identification

W-10-MW11 W1011385	ND	ND	ND	ND	ND	ND
W-10-MW1 W1011380	0.7	ND	ND	ND	ND	ND
W-9-MW14 W1011388	ND	ND	3.6	3.7	390	120
W-8-MW15 W1011389	210	5.5	600	250	2700	340
W-9-MW7 W1011382	630	16	32	29	2300	1300

ppb = parts per billion = $\mu\text{g/L}$ = micrograms per liter.

ND = Not detected. Compound(s) may be present at concentrations below the detection limit.

NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX— Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg—Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd—Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.



Laboratory Representative

December 11, 1990

Date Reported

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention: Ms. JoEllen Kuszmaul
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87042-9

Date Sampled: 11-27-90
Date Received: 11-27-90
BTEX Analyzed: 12-05-90
TPHg Analyzed: 12-05-90
TPHd Analyzed: 12-06-90
Matrix: Water

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>
Detection Limit:	25	25	25	25	2500	100

SAMPLE

Laboratory Identification

W-10-MW6 W1011381	4400	120	800	2300	15000	7600
W-9-MW13 W1011387	4500	1100	880	3300	20000	1600

ppb = parts per billion = $\mu\text{g/L}$ = micrograms per liter.

ND = Not detected. Compound(s) may be present at concentrations below the detection limit.

NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX— Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg—Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd—Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.



Laboratory Representative

December 11, 1990

Date Reported

APPLIED ANALYTICAL

Environmental Laboratories

42501 Albrae St., Suite 100
Fremont, CA 94538
Bus: (415) 623-0775
Fax: (415) 651-8647

ANALYSIS REPORT

1020lab.frm

Attention: Ms. JoEllen Kuszmaul
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87042-9

Date Sampled: 11-27-90
Date Received: 11-27-90
BTEX Analyzed: 12-05-90
TPHg Analyzed: 12-05-90
TPHd Analyzed: 12-07-90
Matrix: Water

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>	<u>ppb</u>
Detection Limit:	100	100	100	100	10000	100

SAMPLE

Laboratory Identification

W-8-MW12 W1011386	11000	10000	3100	12000	69000	31000
----------------------	-------	-------	------	-------	-------	-------

ppb = parts per billion = $\mu\text{g/L}$ = micrograms per liter.

ND = Not detected. Compound(s) may be present at concentrations below the detection limit.

NR = Analysis not requested.

ANALYTICAL PROCEDURES

BTEX-- Benzene, toluene, ethylbenzene, and total xylene isomers (BTEX) are measured by extraction using EPA Method 5030 followed by analysis using EPA Method 8020/602, which utilizes a gas chromatograph (GC) equipped with a photoionization detector (PID) and a flame-ionization detector (FID) in series.

TPHg--Total petroleum hydrocarbons as gasoline (low-to-medium boiling points) are measured by extraction using EPA Method 5030, followed by analysis using modified EPA Method 8015, which utilizes a GC equipped with an FID.

TPHd--Total petroleum hydrocarbons as diesel (high boiling points) are measured by extraction using EPA Method 3550 for soils and EPA Method 3510 for water, followed by modified EPA Method 8015 with direct sample injection into a GC equipped with an FID.



Laboratory Representative


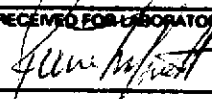
December 11, 1990

Date Reported

CHAIN-OF-CUSTODY RECORD

CHROMALAB FILE # 1290015

PROJ. NO.		PROJECT NAME		No. of Containers	ANALYSIS						REMARKS	LABORATORY I.D. NUMBER
P.O. NO.		SAMPLERS (Signature)			TPH Gasoline (8015)	BTEX (802/8020)	TPH Diesel (8015)	601	09 Pb	Preserved?		
DATE	TIME											
MM/DD/YY												
11/27/90		W-9-MW9		2			X					
↓		W-9-MW7		2			X					
↓		S-112790-SPI (ABCS)		4			X					

RELINQUISHED BY (Signature): 	DATE / TIME	RECEIVED BY (Signature):	Laboratory:	SEND RESULTS TO: Applied GeoSystems 42501 Albrae Street Fremont, CA 94538 (415) 651-1906
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED BY (Signature):		
RELINQUISHED BY (Signature):	DATE / TIME	RECEIVED FOR LABORATORY BY (Signature):  12:5:90 14:30		
			Turn Around: <i>NORMAL</i>	Proj. Mgr.: <i>J. Ellen Kuszmaul</i>

CHROMALAB, INC.

Analytical Laboratory
Specializing in GC-GC/MS

- Environmental Analysis
- Hazardous Waste (#E694)
- Drinking Water (#955)
- Waste Water
- Consultation

December 12, 1990

ChromaLab File # 1290015 A


Client: Applied GeoSystem
Date Sampled: Nov. 27 1990
Date of Analysis: Dec. 10, 1990

Attn: JoEllen Kuszmaul
Date Submitted: Dec. 05, 1990

Project Name: Exxon-Oakland Project No.: 87042-9
Sample I.D.: W-9-MW9
Method of Analysis: EPA 601 Detection Limit: 0.5 ug/L

COMPOUND NAME	ug/L	Spike Recovery
CHLOROMETHANE	N.D.	---
VINYL CHLORIDE	N.D.	---
BROMOMETHANE	N.D.	---
CHLOROETHANE	N.D.	---
TRICHLOROFLUOROMETHANE	N.D.	---
1,1-DICHLOROETHENE	N.D.	102.5% 96.5%
METHYLENE CHLORIDE	N.D.	---
1,2-DICHLOROETHENE (TOTAL)	N.D.	---
1,1-DICHLOROETHANE	N.D.	---
CHLOROFORM	N.D.	---
1,1,1-TRICHLOROETHANE	N.D.	---
CARBON TETRACHLORIDE	N.D.	99.7% 93.5%
1,2-DICHLOROETHANE	N.D.	---
TRICHLOROETHENE	N.D.	---
1,2-DICHLOROPROPANE	N.D.	---
BROMODICHLOROMETHANE	N.D.	---
2-CHLOROETHYL VINYLETHER	N.D.	---
TRANS-1,3-DICHLOROPROPENE	N.D.	98.2% 96.1%
CIS-1,3-DICHLOROPROPENE	N.D.	---
1,1,2-TRICHLOROETHANE	N.D.	---
TETRACHLOROETHENE	N.D.	---
DIBROMOCHLOROMETHANE	N.D.	---
CHLOROBENZENE	N.D.	101.5% 96.4%
BROMOFORM	N.D.	---
1,1,2,2-TETRACHLOROETHANE	N.D.	---
1,3-DICHLOROBENZENE	N.D.	---
1,4-DICHLOROBENZENE	N.D.	---
1,2-DICHLOROBENZENE	N.D.	---

ChromaLab, Inc.


David Duong
Senior Chemist


Eric Tam
Lab Director

CHROMALAB, INC.

Analytical Laboratory
Specializing in GC-GC/MS

- Environmental Analysis
- Hazardous Waste (#E694)
- Drinking Water (#955)
- Waste Water
- Consultation

December 12, 1990

ChromaLab File # 1290015 3

Client: Applied GeoSystem

Attn: JoEllen Kuszmaul

Date Sampled: Nov. 27 1990

Date Submitted: Dec. 05, 1990

Date of Analysis: Dec. 10, 1990

Project Name: Exxon-Oakland

Project No.: 87042-9

Sample I.D.: W-9-MW7

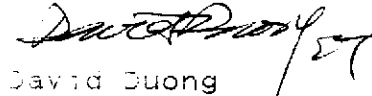
Method of Analysis: EPA 601

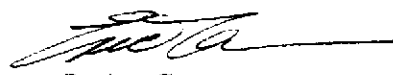
Detection Limit: 0.5 ug/L*

COMPOUND NAME	ug/L	Spike Recovery
CHLOROMETHANE	2.4	---
VINYL CHLORIDE	N.D.	---
BROMOMETHANE	N.D.	---
CHLOROETHANE	N.D.	---
TRICHLOROFLUOROMETHANE	N.D.	---
1,1-DICHLOROETHENE	N.D.	102.5% 96.5%
METHYLENE CHLORIDE	N.D.	---
1,2-DICHLOROETHENE (TOTAL)	N.D.	---
1,1-DICHLOROETHANE	N.D.	---
CHLOROFORM	N.D.	---
1,1,1-TRICHLOROETHANE	N.D.	---
CARBON TETRACHLORIDE	N.D.	99.7% 93.5%
1,2-DICHLOROETHANE	N.D.	---
TRICHLOROETHENE	N.D.	---
1,2-DICHLOROPROPANE	N.D.	---
BROMODICHLOROMETHANE	N.D.	---
2-CHLOROETHYL VINYLETHER	N.D.	---
TRANS-1,3-DICHLOROPROPENE	N.D.	98.2% 96.1%
CIS-1,3-DICHLOROPROPENE	N.D.	---
1,1,2-TRICHLOROETHANE	N.D.	---
TETRACHLOROETHENE	N.D.	---
DIBROMOCHLOROMETHANE	N.D.	---
CHLOROBENZENE	N.D.	101.5% 96.4%
BROMOFORM	N.D.	---
1,1,2,2-TETRACHLOROETHANE	N.D.	---
1,3-DICHLOROBENZENE	N.D.	---
1,4-DICHLOROBENZENE	N.D.	---
1,2-DICHLOROBENZENE	N.D.	---

*Gasoline is suspected to be in this sample.

ChromaLab, Inc.


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Eric Tam
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