



Applied GeoSystems

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

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LETTER REPORT
ON
QUARTERLY GROUND-WATER MONITORING
FOR SECOND 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 wells and pertinent site facilities are shown on the Generalized Site Plan, Plate P-2.

SITE ACTIVITIES JUNE THROUGH AUGUST 1990

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

- Measured depths to ground water and performed subjective evaluations of initial water samples on each well on July 3, July 26, and August 20, 1990.
- Each well without free product was purged, and ground-water samples were collected (MW-1 and MW-6 through MW-13) on July 26, 1990, and submitted for analysis following Chain of Custody protocol.
- Free product was bailed when encountered.
- Prepared a work plan for soil sampling during tank-pit excavation (dated June 26, 1990).
- Initiated monthly monitoring in July 1990.
- Prepared permits for planned soil borings and installation of onsite and offsite ground-water monitoring wells.

SITE ACTIVITIES PLANNED FOR SEPTEMBER THROUGH NOVEMBER 1990

Activities planned for the next quarter:

- Drilling of soil borings and installation of ground-water monitoring wells will be completed.
- A pump test will be performed.
- Monthly monitoring will be continued.
- Quarterly ground-water sampling and analysis will be conducted on October 25, 1990.
- Monthly monitoring and quarterly analytical results will be reported on December 15, 1990.

RESULTS OF SUBJECTIVE EVALUATIONS

On July 3, 1990, floating product (0.01 to 0.05 foot thick) was observed in initial water samples collected from wells MW-2, MW-3, and MW-4. On July 26, 1990, floating product (0.04 to 0.10 foot thick) was observed in these wells. Cumulative results of subjective evaluations are presented in Table 1.

Ground-water levels fell an average of 0.51 foot between February 1990 and April 1990 and rose an average of 0.65 foot between April and July 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, probably as a result of periodic bailing of product from the wells. Product reappeared in well MW-4 in April 1990, after a period of rising water levels, and product disappeared from well MW-8 in April 1990.

GROUND-WATER GRADIENT AND FLOW DIRECTION

The data indicate that ground-water levels vary by as much 3 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 July 3, and July 26, 1990. The water levels are shown on the Ground-Water Elevation Maps, Plates P-4 and P-5. The maps suggest that ground water flows toward the southwest with estimated gradients of 0.016 (approximately 1.6 feet vertical change per 100 feet horizontal).

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 xylenes (BTEX) by EPA Method 602. Samples from wells MW-7 and MW-9 were also analyzed for VOC by EPA Method 624. Samples were analyzed for TPHg, TPHd, and BTEX at Applied Analytical laboratory in Fremont, California (Certificate No. 153), and for VOC 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 analyses of ground-water samples collected on July 26, 1990, showed fluctuating concentrations of petroleum hydrocarbons in water from most of the wells, but overall, no notable change has occurred. Petroleum hydrocarbons were not detected in

ground water from wells MW-9, MW-10, and MW-11, at the northern and eastern site perimeters.

Detectable concentrations of TPHg and TPHd in ground water ranged from 0.13 to 92 ppm and 0.16 to 50 ppm, respectively. Plates P-6 and P-7 present the estimated distribution of dissolved TPHg and TPHd in ground water beneath the site. 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 11 ppm toluene, 3.1 ppm ethylbenzene, and 13 ppm total xylenes were detected in the ground-water samples.

Volatile organic compounds were not detected in ground-water samples from wells MW-7 and MW-9 on the northeastern site perimeter adjacent to the former dry-cleaning facility. 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

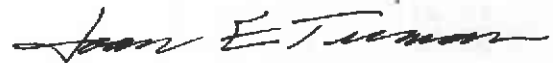
- Mr. Larry Seto, Alameda County Health Agency, Department of Environmental Health, 80 Swan Way, Room 200, Oakland, California 94621.
- Mr. Lester Feldman, California Regional Water Quality Control Board, San Francisco Bay Region, 1800 Harrison Street, Suite 700, Oakland, California 94612.

Please call if you have any questions.

Sincerely,
Applied GeoSystems



Keith McVicker
Assistant Project Geologist



Joan E. Tiernan
Registered Civil Engineer
No. 044600

Enclosures: Table 1, Results of Subjective Evaluation of Water Samples
Table 2, Summary of Ground-Water Elevations
Table 3, Results of Ground Water Analyses
Site Vicinity Map, Plate P-1
Generalized Site Plan, Plate P-2
Hydrograph, Plate P-3
Ground-Water Elevation Map (July 3, 1990), Plate P-4
Ground-Water Elevation Map (July 26, 1990), Plate P-5
Concentration of TPHg in Ground Water, Plate P-6
Concentration of TPHd in Ground Water, Plate P-7
Field Procedures
Chain of Custody Record and Certified Analysis Reports

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

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
MW-2				
04/25/89	9.27	2.16	---	NONE
07/19/89	10.81	1.56	---	NONE
07/27/89	10.18	0.13	---	HEAVY
09/06/89	10.89	0.09	---	SLIGHT
09/22/89	11.56	0.56	---	SLIGHT
11/01/89	10.85	0.09	---	NONE
11/15/89	11.05	0.07	---	NONE
12/06/89	10.23	0.13	---	NONE
02/20/90	8.86	0.29	---	NONE
04/19/90	9.09	0.10	---	NONE
07/03/90	8.75	0.05	---	NONE
07/26/90	8.71	0.10	---	NONE
MW-3				
04/25/89	7.57	0.08	---	NONE
07/19/89	10.33	0.66	---	NONE
07/27/89		covered by soil		
09/06/89	11.22	0.07	---	SLIGHT
09/22/89	11.38	0.28	---	SLIGHT
11/01/89	10.90	0.01	---	NONE
11/15/89	11.18	0.11	---	NONE
12/06/89	10.29	NONE	SLIGHT	NONE
02/20/90	8.73	0.04	---	NONE
continued on page 2				

TABLE 1
RESULTS OF SUBJECTIVE EVALUATION OF WATER SAMPLES
(page 2 of 4)

Date	Depth to Water (ft)	Floating Product (ft)	Sheen	Emulsion
MW-3				
04/19/90	9.20	0.09	---	NONE
07/03/90	8.50	0.03	---	NONE
07/26/90	8.58	0.04	---	NONE
MW-4				
04/25/89	7.26	0.16	---	NONE
07/19/89	10.32	0.72	---	NONE
07/27/89		covered by soil		
09/06/89	11.40	0.07	---	SLIGHT
09/22/89	11.64	0.19	---	SLIGHT
11/01/89	11.00	NONE	SLIGHT	NONE
11/15/89	11.18	0.10	---	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
07/03/90	8.00	---	---	MODERATE
07/26/90	8.57	0.04	---	NONE
MW-5				
04/25/89	8.06	0.32	---	NONE
07/18/89		well abandoned		
MW-6				
04/25/89	8.02	NONE	NONE	NONE
09/06/89	13.64	0.08	---	SLIGHT
09/22/89	13.79	0.07	---	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

TABLE 1
 RESULTS OF SUBJECTIVE EVALUATION OF WATER SAMPLES
 (page 3 of 4)

Date	Depth to Water (ft)	Floating Product (ft)	Sheen	Emulsion
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
MW-8				
04/25/89	8.31	0.66	---	NONE
07/19/89	10.97	1.25	---	NONE
07/27/89	10.34	0.08	---	HEAVY
09/06/89	11.09	0.17	---	SLIGHT
09/22/89	11.58	0.36	---	SLIGHT
11/01/89	11.03	NONE	NONE	NONE
11/15/89	11.25	0.01	---	NONE
12/06/89	10.30	NONE	SLIGHT	NONE
02/20/90	8.00	0.01	---	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
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

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

Date	Depth to Water (ft)	Floating Product (ft)	Sheen	Emulsion
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
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
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
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

TABLE 2
SUMMARY OF GROUND-WATER ELEVATIONS

Well Number	Depth to Water (ft)	Casing Elevation (ft)	Ground-Water Elevation (ft)
July 3, 1990			
MW-1 [▲]	8.44	12.87	4.43
MW-2*			
MW-3*			
MW-4*			
MW-6 [▲]	8.00	14.27	6.27
MW-7 [▲]	7.45	14.84	7.39
MW-8	7.55	13.45	5.90
MW-9	8.79	14.64	5.85
MW-10	7.88	14.05	6.17
MW-11	8.90	13.55	4.65
MW-12 [▲]	7.41	12.01	4.60
MW-13 [▲]	8.60	14.20	5.60
July 26, 1990			
MW-1 [▲]	8.99	12.87	3.88
MW-2*			
MW-3*			
MW-4*			
MW-6 [▲]	8.70	14.27	5.57
MW-7 [▲]	8.08	14.84	6.76
MW-8	7.86	13.45	5.59
MW-9	8.70	14.64	5.94
MW-10	8.19	14.05	5.86
MW-11	9.36	13.55	4.19
MW-12 [▲]	6.54	12.01	5.47
MW-13 [▲]	7.95	14.20	6.25

* Not calculated due to free product in well.

▲ Wells used for gradient calculation.

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

September 10, 1990
AGS 87042-9

TABLE 3
RESULTS OF GROUND-WATER ANALYSES
(page 1 of 4)

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	--	--
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								
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								
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								

See notes on page 4 of 4.

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

September 10, 1990
AGS 87042-9

TABLE 3
RESULTS OF GROUND-WATER ANALYSES
(page 2 of 4)

Date	Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
9/87	W-25-MW5	26.66	0.56	1.71	1.58	7.15	37.22	--	--
5/88	free product								
7/89	well abandoned								
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	--	--
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
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	--	--

See notes on page 4 of 4.

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

September 10, 1990
AGS 87042-9

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

Date	Sample No.	TPHg ppm	Benzene ppm	Toluene ppm	Ethyl-benzene ppm	Xylenes ppm	TPHd ppm	TOG ppm	VOC ppm
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
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	--	--
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	--	--
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	--	--

See notes on page 4 of 4

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

September 10, 1990
AGS 87042-9

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

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	--	--

<: Not detected at method detection level

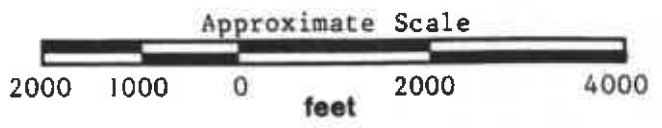
ND: No VOC detected other than BTEX

*: W-11-MW1 = water sample - depth - well number

** : Analyzed by Environmental Protection Agency Method 624 (volatile organic compounds)



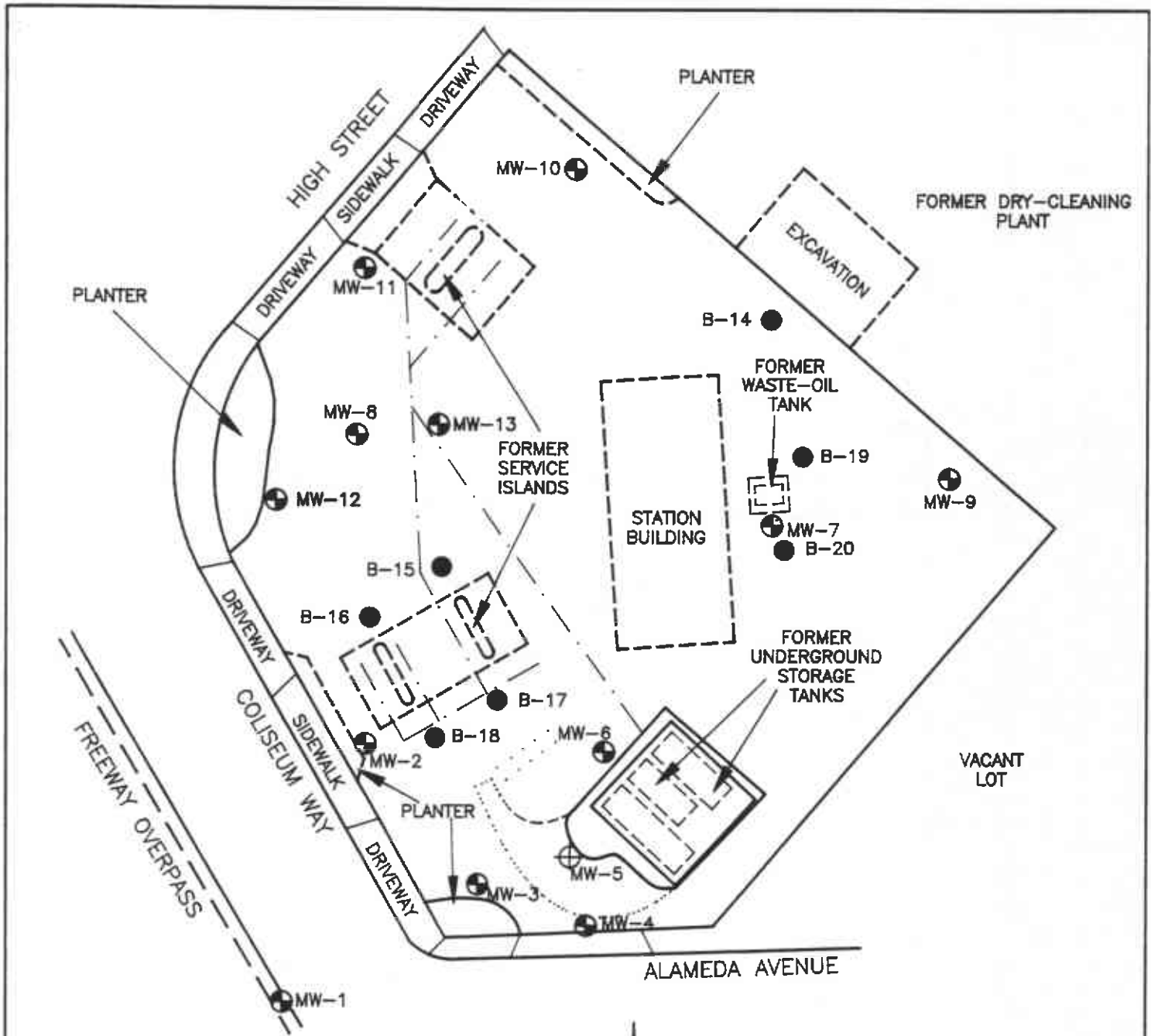
Source: U.S. Geological Survey
 Oakland East
 7.5-Minute Quadrangle



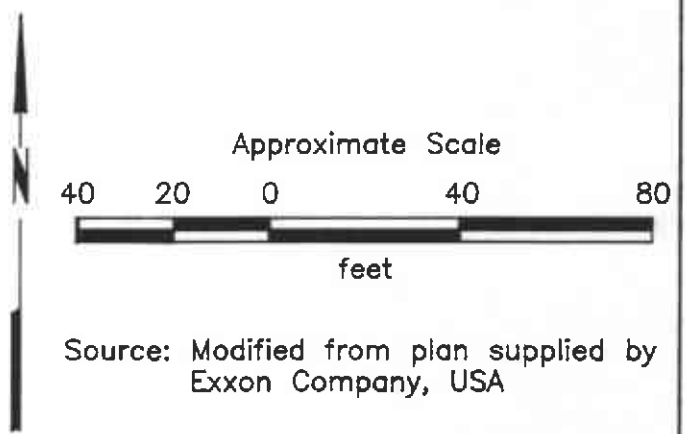
PROJECT NO. 87042-9

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

PLATE
P - 1



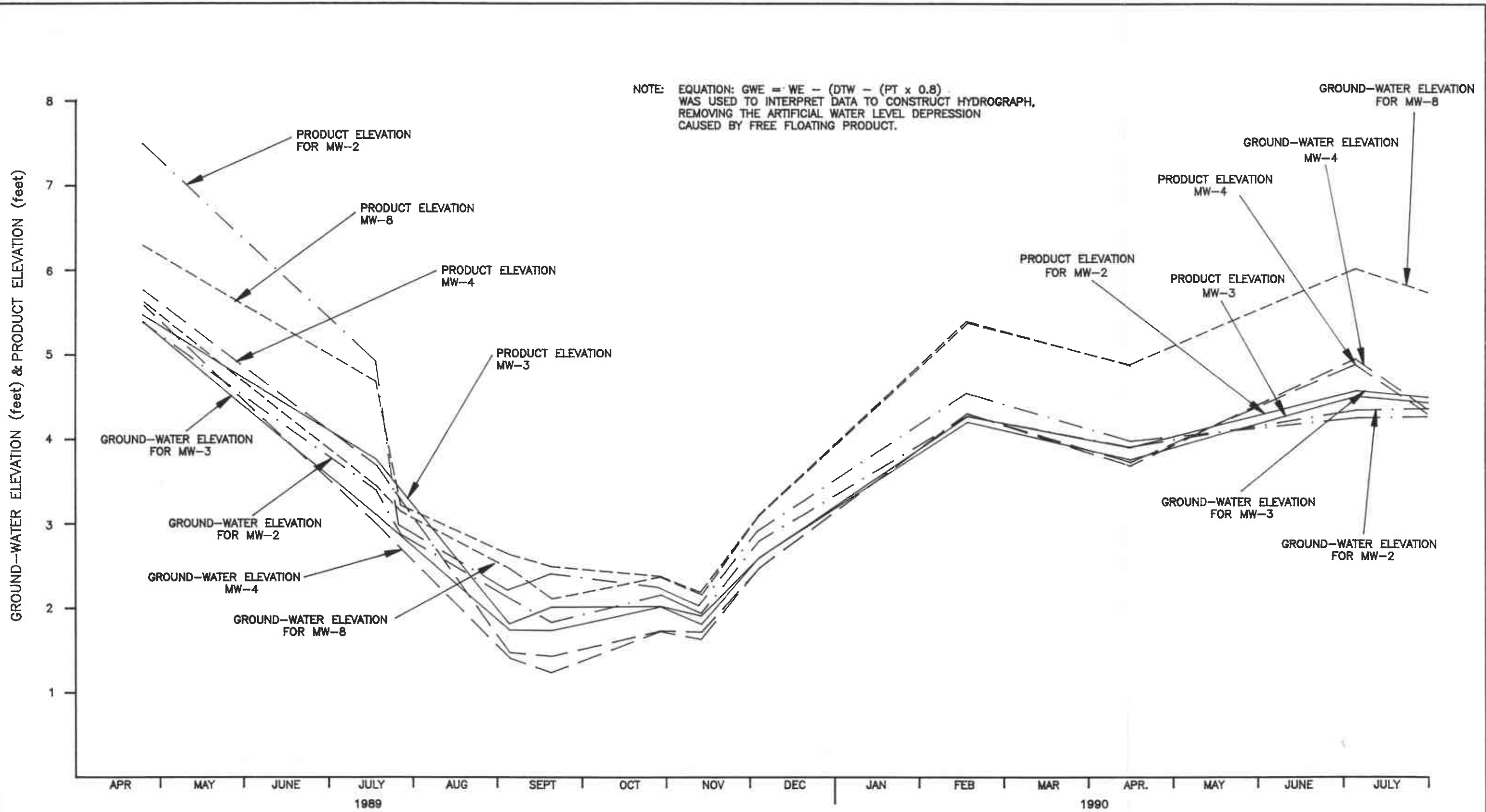
- · — = Product piping trenches
- · · · = Area excavated by Applied GeoSystems in July 1989
- B-20 ● = Soil boring drilled by Applied GeoSystems
- MW-9 ⊕ = Monitoring well installed by Applied GeoSystems
- MW-5 ⊕ = Monitoring well (destroyed) installed by Applied GeoSystems



PROJECT NO. 87042-9

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

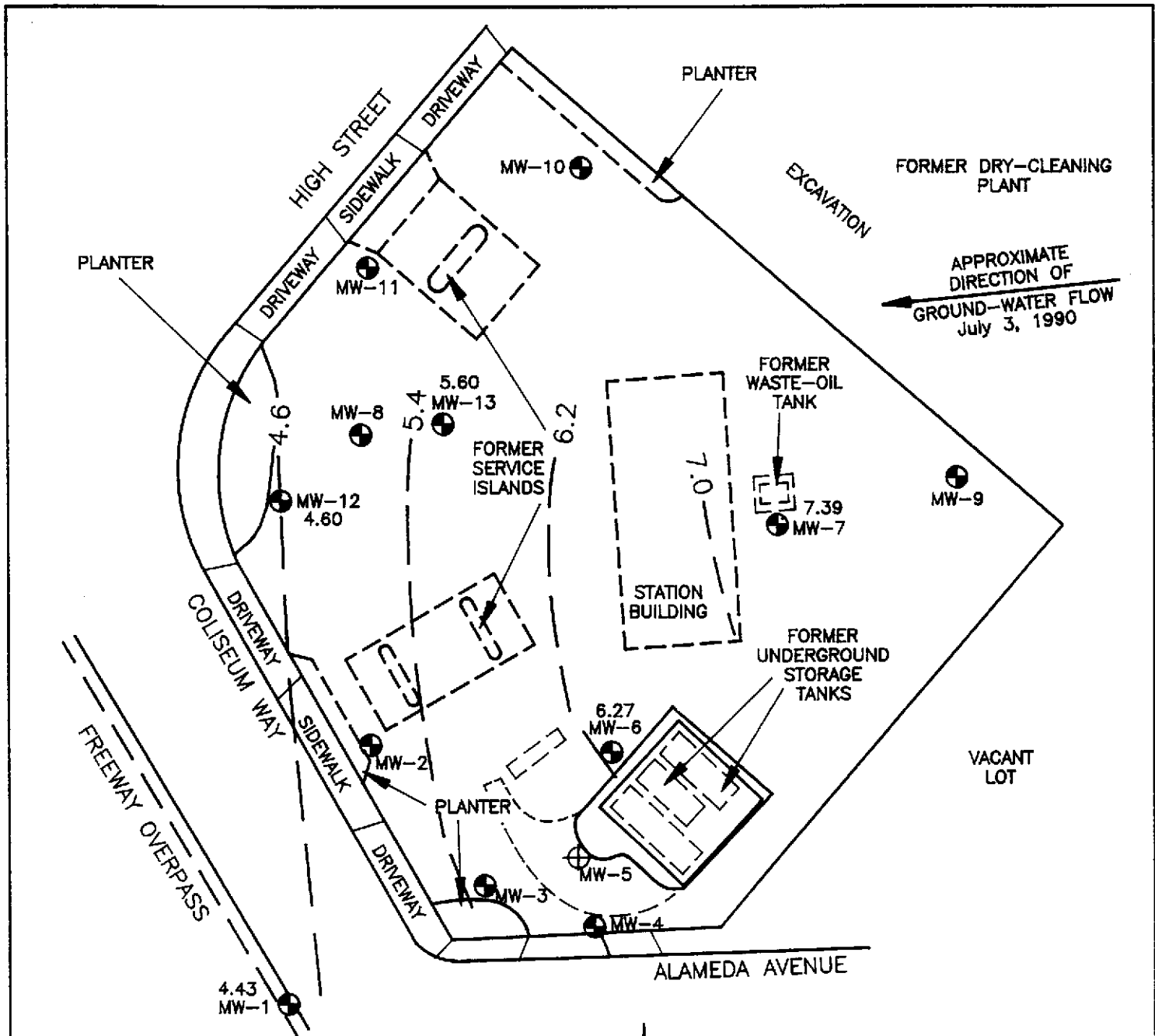
**PLATE
P - 2**



PROJECT NO. **87042-9**

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

PLATE
P - 3

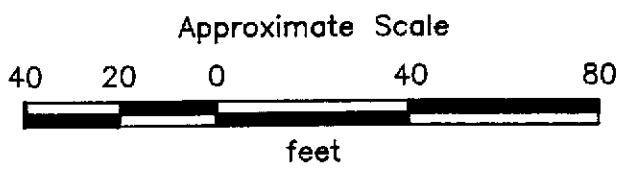


7.0 --- = Line of equal elevation of ground water in feet above mean sea level

--- = Area excavated

MW-9 ⊕ = Monitoring well installed by Applied GeoSystems

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



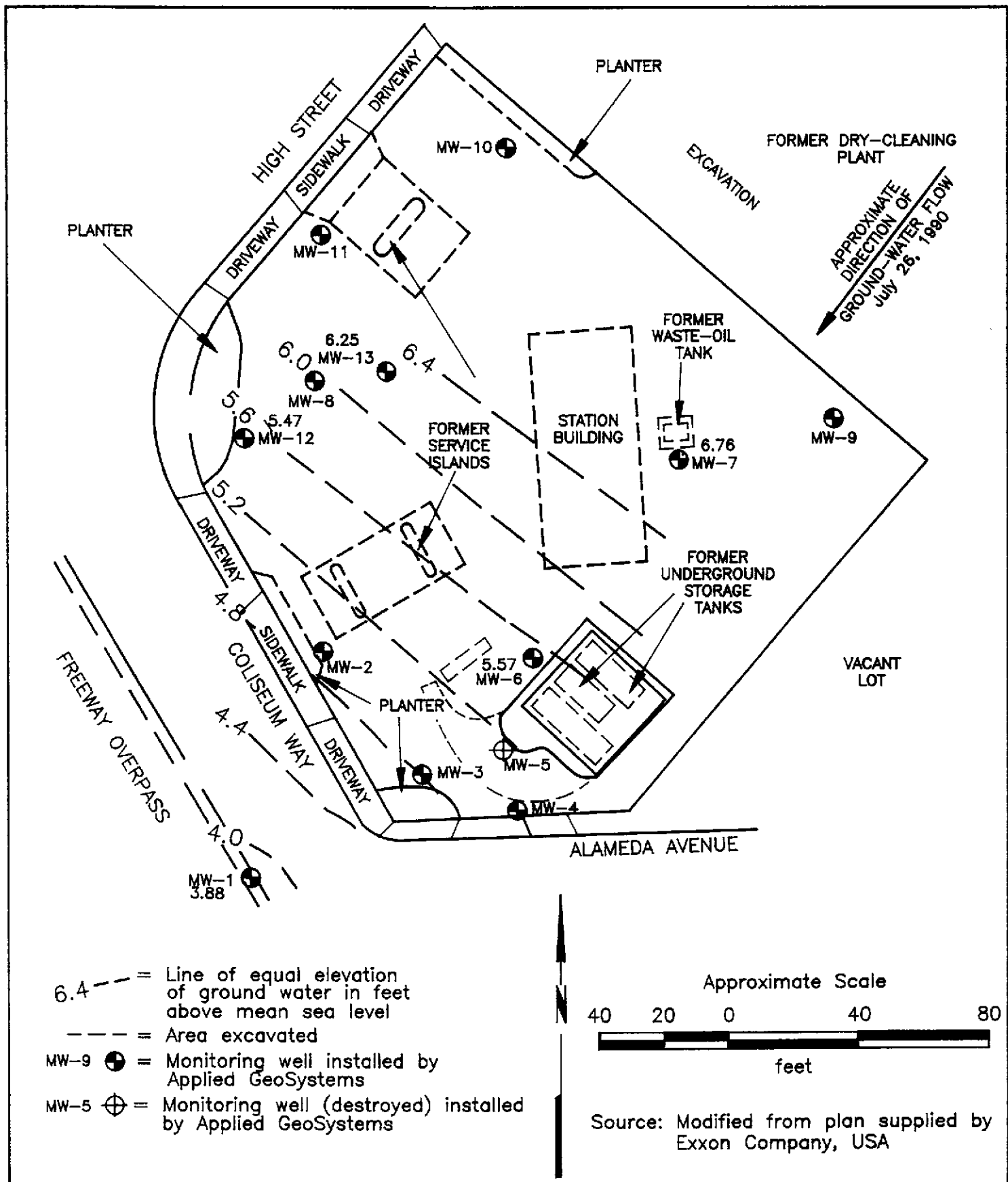
Source: Modified from plan supplied by Exxon Company, USA



PROJECT NO. 87042-9

GROUND-WATER ELEVATION MAP
July 3, 1990
Exxon Station No. 7-3006
720 High Street
Oakland, California

PLATE
P - 4



- 6.4 - - - = Line of equal elevation of ground water in feet above mean sea level
- - - = Area excavated
- MW-9 ⊕ = Monitoring well installed by Applied GeoSystems
- MW-5 ⊕ = Monitoring well (destroyed) installed by Applied GeoSystems

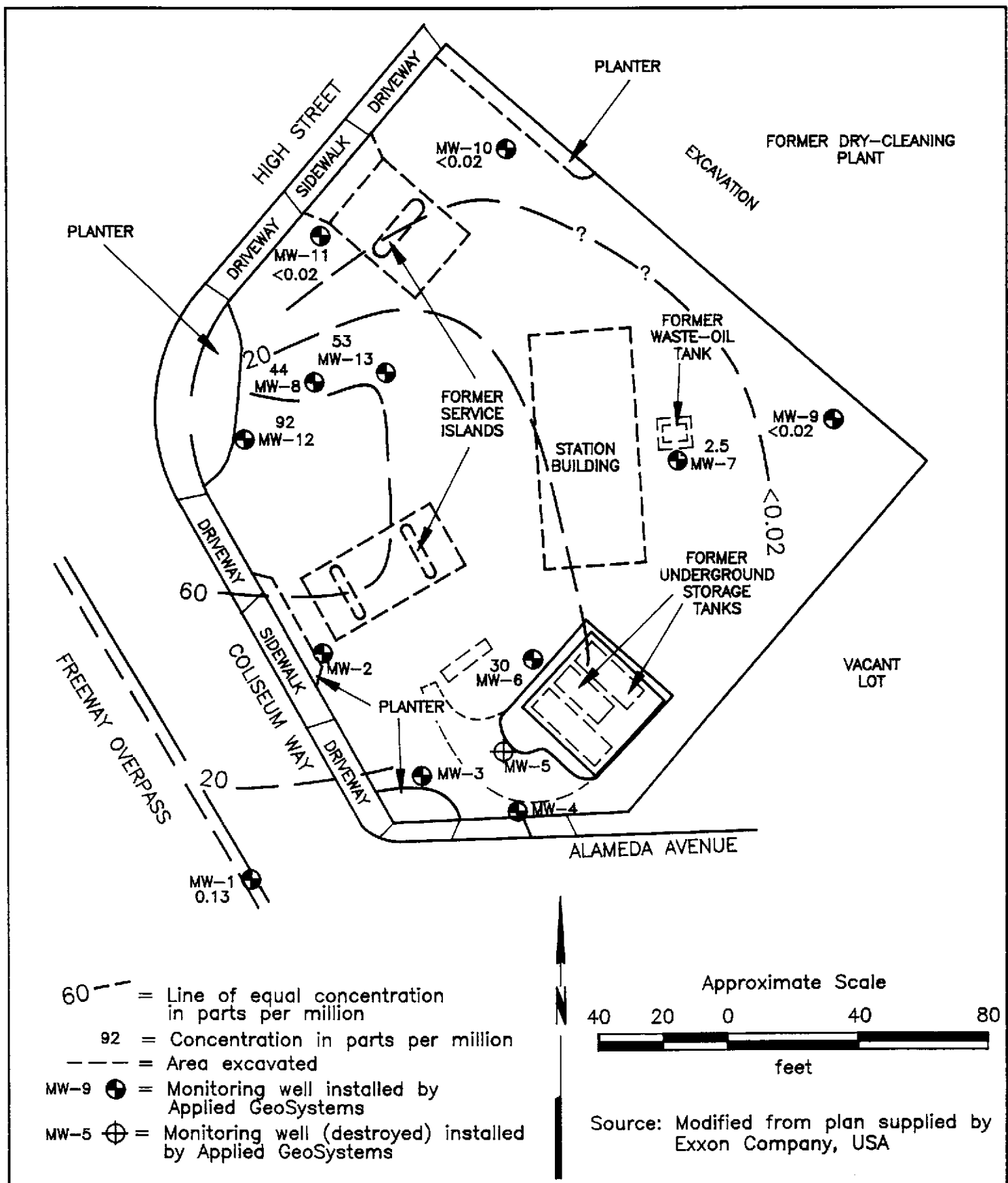
Source: Modified from plan supplied by Exxon Company, USA



PROJECT NO. 87042-9

GROUND-WATER ELEVATION MAP
July 26, 1990
Exxon Station No. 7-3006
720 High Street
Oakland, California

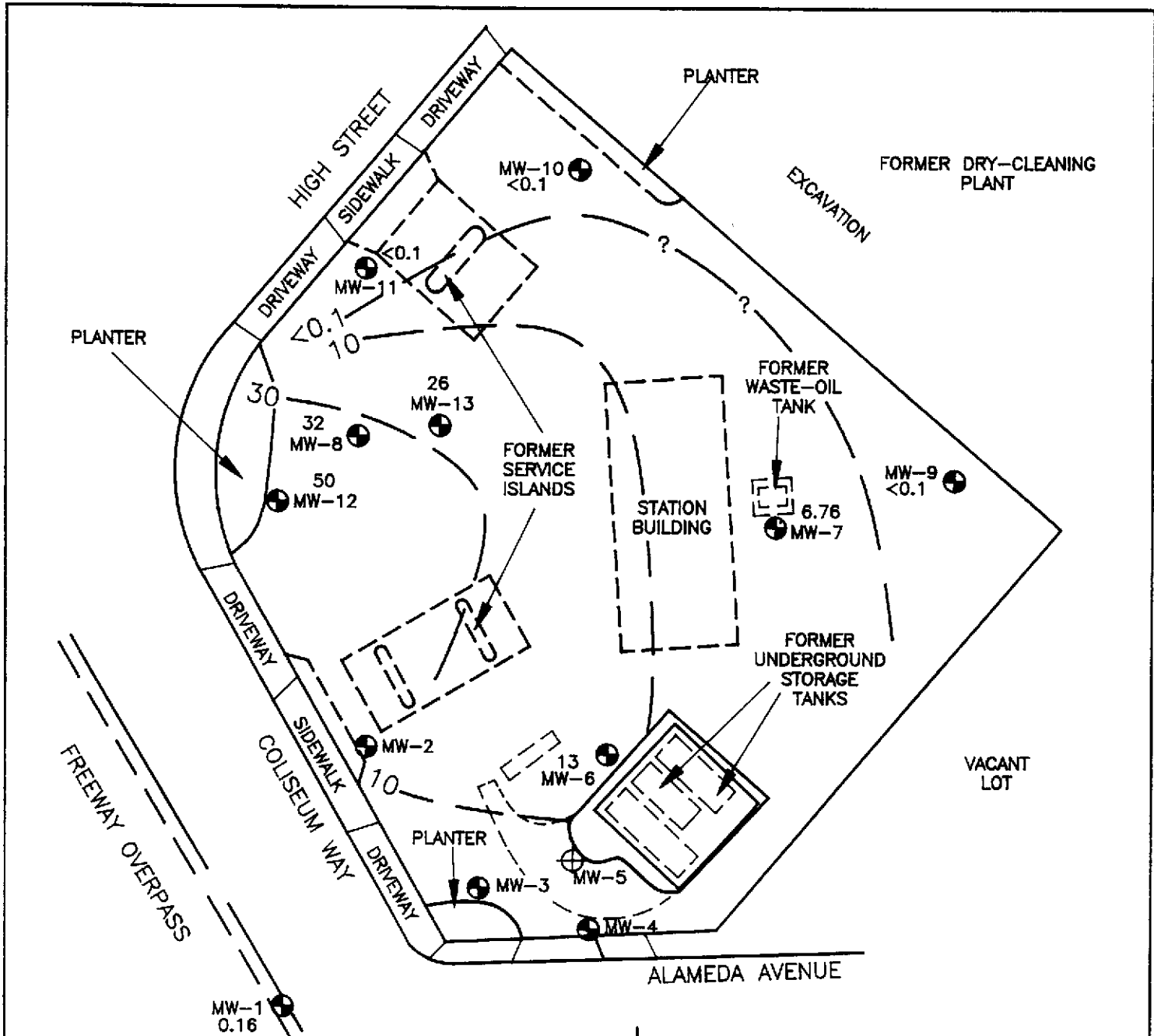
PLATE
P - 5



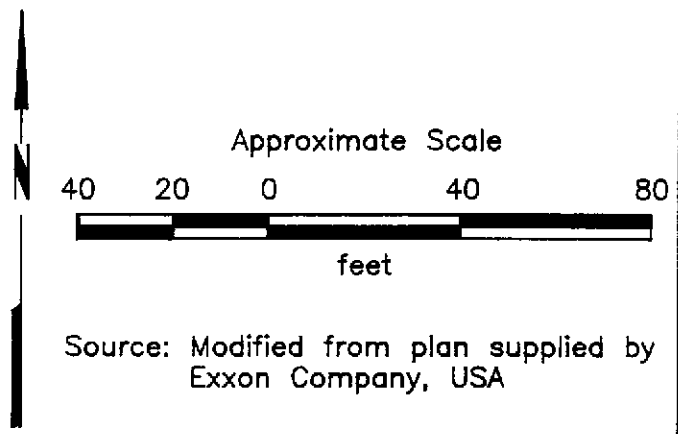
PROJECT NO. 87042-9

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

**PLATE
 P - 6**



- 30 --- = Line of equal concentration in parts per million
- 50 = Concentration in parts per million
- = Area excavated
- MW-9 ⊕ = Monitoring well installed by Applied GeoSystems
- MW-5 ⊕ = Monitoring well (destroyed) installed by Applied GeoSystems



PROJECT NO. 87042-9

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

**PLATE
 P - 7**

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.



CHAIN-OF-CUSTODY RECORD

PROJECT NO: **87042-9**
 PROJECT NAME: **EXXON High Street Oakland.**
 SAMPLE ID(S) (Signature):

DATE MM/DD/YY	TIME	No. of Containers	ANALYSIS						Preserved?	REMARKS	LABORATORY I.D. NUMBER
			TPH Gasoline (8015)	BTEX (802/8020)	TPH Diesel (8015)	VOC					
7-26-80		6	✓	✓	✓				ACI + 100		
		6	✓	✓	✓						
		9	✓	✓	✓	✓					
		6	✓	✓	✓						
		9	✓	✓	✓	✓					
		6	✓	✓	✓						
		6	✓	✓	✓						
		6	✓	✓	✓						
		6	✓	✓	✓						

RELEASER (Signature): *[Signature]*
 DATE / TIME: 7-27-80 8:30
 RECEIVED BY (Signature): *[Signature]*
 DATE / TIME: 7-27-80 4:30

LABORATORY: **AGS**
 Turn Around: **2 WEEKS**

RESULTS TO:
Applied GeoSystems
 42501 Albrae Street
 Suite 100
 Fremont, California 94639
 (415) 651-1906
 Proj. Mgr.: *Kath McVicker*

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: Mr. Keith McVicker
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87042-9

Date Sampled: 07-26-90
Date Received: 07-27-90
BTEX Analyzed: 07-31-90
TPHg Analyzed: 07-31-90
TPHd Analyzed: 08-02-90
Matrix: Water

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100

SAMPLE Laboratory Identification

W-11-MW1 W1007783	6.0	ND	ND	ND	130	160
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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

August 7, 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

Attention: Mr. Keith McVicker
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87042-9

Date Sampled: 07-26-90
Date Received: 07-27-90
BTEX Analyzed: 07-31-90
TPHg Analyzed: 07-31-90
TPHd Analyzed: 08-03-90
Matrix: Water

1020lab.frm

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100

SAMPLE

Laboratory Identification

W-30-MW6	5500	1400	1200	3100	30000	13000
W1007784						

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

August 7, 1990

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Keith McVicker
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87042-9

Date Sampled: 07-26-90
Date Received: 07-27-90
BTEX Analyzed: 08-01-90
TPHg Analyzed: 08-01-90
TPHd Analyzed: 08-06-90
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:	2.5	2.5	2.5	2.5	100	100

SAMPLE Laboratory Identification

W-17-MW7 W1007785	380	13	16	35	2500	910
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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

August 7, 1990

Date Reported

APPLIED ANALYTICAL

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Keith McVicker
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87042-9

Date Sampled: 07-26-90
Date Received: 07-27-90
BTEX Analyzed: 08-01-90
TPHg Analyzed: 08-01-90
TPHd Analyzed: 08-02-90
Matrix: Water

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	25	25	25	25	1000	100

SAMPLE

Laboratory Identification

W-23-MW8 W1007786	4000	1500	2000	6300	44000	32000
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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.

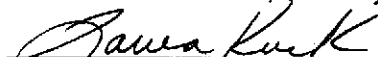
NR = Analysis not requested.

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

August 7, 1990

Date Reported

APPLIED ANALYTICAL

Environmental Laboratories

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

ANALYSIS REPORT

1020lab.frm

Attention: Mr. Keith McVicker
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87042-9

Date Sampled: 07-26-90
Date Received: 07-30-90
BTEX Analyzed: 08-01-90
TPHg Analyzed: 08-01-90
TPHd Analyzed: 08-03-90
Matrix: Water

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100

SAMPLE

Laboratory Identification

W-10-MW9 W1007787	ND	ND	ND	ND	ND	ND
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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.

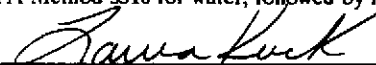
NR = Analysis not requested.

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

August 7, 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: Mr. Keith McVicker
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87042-9

Date Sampled: 07-26-90
Date Received: 07-30-90
BTEX Analyzed: 08-01-90
TPHg Analyzed: 08-01-90
TPHd Analyzed: 08-06-90
Matrix: Water

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	0.50	0.50	0.50	0.50	20	100

SAMPLE Laboratory Identification

W-11-MW10 W1007788	ND	ND	ND	ND	ND	ND
W-12-MW11 W1007789	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.

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Laboratory Representative

August 7, 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: Mr. Keith McVicker
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87042-9

Date Sampled: 07-26-90
Date Received: 07-30-90
BTEX Analyzed: 08-01-90
TPHg Analyzed: 08-01-90
TPHd Analyzed: 08-06-90
Matrix: Water

	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPHg	TPHd
	ppb	ppb	ppb	ppb	ppb	ppb
Detection Limit:	50	50	50	50	2000	100

SAMPLE

Laboratory Identification

W-8-MW12	11000	11000	3100	13000	92000	50000
W1007790						

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.

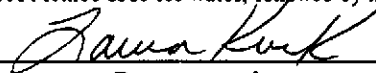
NR = Analysis not requested.

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

August 7, 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: Mr. Keith McVicker
Applied GeoSystems
42501 Albrae Street
Fremont, CA 94538
Project: AGS 87042-9

Date Sampled: 07-26-90
Date Received: 07-30-90
BTEX Analyzed: 08-01-90
TPHg Analyzed: 08-01-90
TPHd Analyzed: 08-02-90
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	1000	100

SAMPLE Laboratory Identification

W-10-MW13 W1007791	4500	3100	2200	7800	53000	26000
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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

August 7, 1990

Date Reported

CHROMALAB, INC.

Analytical Laboratory
Specializing in GC-GC/MS
August 17, 1990
APPLIED GEOSYSTEMS, INC.

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

ChromaLab File #0890022A
Attn: Keith McVicker

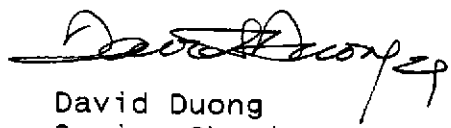
Date Sampled: July 26, 1990
Date of Analysis: August 10, 1990

Date Submitted: Aug. 3, 1990

Project No: 87042-9 Project: EXXON - HIGH STREET
Sample I.D.: W-17-MW7
Method of Analysis: 624 Detection Limit: 4 µg/L

COMPOUND NAME	µg/L	Spike Recovery	
CHLOROMETHANE	N.D.	---	---
VINYL CHLORIDE	N.D.	---	---
BROMOMETHANE	N.D.	---	---
CHLOROETHANE	N.D.	---	---
TRICHLOROFLUOROMETHANE	N.D.	---	---
1,1-DICHLOROETHENE	N.D.	---	---
METHYLENE CHLORIDE	N.D.	---	---
1,2-DICHLOROETHENE (TOTAL)	N.D.	87.6%	90.6%
1,1-DICHLOROETHANE	N.D.	---	---
CHLOROFORM	N.D.	---	---
1,1,1-TRICHLOROETHANE	N.D.	---	---
CARBON TETRACHLORIDE	N.D.	---	---
BENZENE	450	---	---
1,2-DICHLOROETHANE	N.D.	---	---
TRICHLOROETHENE	N.D.	---	---
1,2-DICHLOROPROPANE	N.D.	---	---
BROMODICHLOROMETHANE	N.D.	81.5%	93.2%
2-CHLOROETHYLVINYLETHER	N.D.	---	---
TRANS-1,3-DICHLOROPROPENE	N.D.	---	---
TOLUENE	16	108.1%	103.3%
CIS-1,3-DICHLOROPROPENE	N.D.	---	---
1,1,2-TRICHLOROETHANE	N.D.	---	---
TETRACHLOROETHENE	N.D.	---	---
DIBROMOCHLOROMETHANE	N.D.	---	---
CHLOROBENZENE	N.D.	---	---
ETHYL BENZENE	11	---	---
BROMOFORM	N.D.	---	---
1,1,2,2-TETRACHLOROETHANE	N.D.	---	---
1,3-DICHLOROBENZENE	N.D.	---	---
1,4-DICHLOROBENZENE	N.D.	95.2%	101.8%
1,2-DICHLOROBENZENE	N.D.	---	---
TOTAL XYLENES	24	---	---

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

August 17, 1990
APPLIED GEOSYSTEMS, INC.

ChromaLab File #0890022B
Attn: Keith McVicker

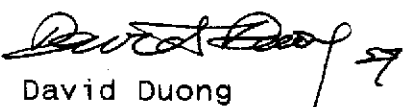
Date Sampled: July 26, 1990
Date of Analysis: August 10, 1990

Date Submitted: Aug. 3, 1990

Project No: 87042-9 Project: EXXON - HIGH STREET
Sample I.D.: W-10-MW9
Method of Analysis: 624 Detection Limit: 4 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.	---	---
METHYLENE CHLORIDE	N.D.	---	---
1,2-DICHLOROETHENE (TOTAL)	N.D.	87.6%	90.6%
1,1-DICHLOROETHANE	N.D.	---	---
CHLOROFORM	N.D.	---	---
1,1,1-TRICHLOROETHANE	N.D.	---	---
CARBON TETRACHLORIDE	N.D.	---	---
BENZENE	N.D.	---	---
1,2-DICHLOROETHANE	N.D.	---	---
TRICHLOROETHENE	N.D.	---	---
1,2-DICHLOROPROPANE	N.D.	---	---
BROMODICHLOROMETHANE	N.D.	81.5%	93.2%
2-CHLOROETHYL VINYLETHER	N.D.	---	---
TRANS-1,3-DICHLOROPROPENE	N.D.	---	---
TOLUENE	N.D.	108.1%	103.3%
CIS-1,3-DICHLOROPROPENE	N.D.	---	---
1,1,2-TRICHLOROETHANE	N.D.	---	---
TETRACHLOROETHENE	N.D.	---	---
DIBROMOCHLOROMETHANE	N.D.	---	---
CHLOROBENZENE	N.D.	---	---
ETHYL BENZENE	N.D.	---	---
BROMOFORM	N.D.	---	---
1,1,2,2-TETRACHLOROETHANE	N.D.	---	---
1,3-DICHLOROBENZENE	N.D.	---	---
1,4-DICHLOROBENZENE	N.D.	95.2%	101.8%
1,2-DICHLOROBENZENE	N.D.	---	---
TOTAL XYLENES	N.D.	---	---

ChromaLab, Inc.


David Duong
Senior Chemist


Eric Tam
Lab Director