A Report Prepared for

Texaco Refining and Marketing Inc.
10 Universal City Plaza
Universal City, California 91608

QUARTERLY TECHNICAL REPORT
THIRD QUARTER OF 1990
FORMER TEXACO STATION
2200 EAST 12TH STREET
OAKLAND, CALIFORNIA

HLA Job No. 2251,112.03
November 26, 1990
1990 Report No. 4

by

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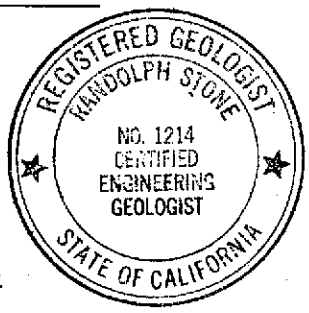

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INTRODUCTION

This quarterly technical report (QTR) presents the results of site investigation and remediation activities conducted by Harding Lawson Associates (HLA) at a service station site formerly owned by Texaco Refining and Marketing Inc. The station, at 2200 East 12th Street, Oakland, California (see Plate 1), is currently owned and operated by Exxon Company U.S.A. This QTR summarizes HLA's work at the site, ongoing since May 1988, and presents results of the recent quarter's work.

SITE DESCRIPTION

The site is on the southeast corner of the intersection of East 12th Street and 22nd Avenue; the surrounding area is occupied by commercial/retail businesses, including a Shell Oil Company (Shell) service station immediately across 22nd Avenue (Plate 2). The site is bordered on the west by East 12th Street, on the north by 22nd Avenue, and on the east by a building occupied by a mattress manufacturer. Adjacent to the site on the south is a parcel owned by M.C.B. Industries and currently used for automobile storage.

The topography is relatively flat, sloping gently southwest toward East 12th Street and the Brooklyn Basin Tidal Canal. The site's surface is approximately 20 feet above Mean Sea Level, and drainage is toward East 12th Street. This area has been exten-

sively developed, and surface runoff is mainly controlled by the municipal storm sewer system.

At the station, leaded and unleaded gasoline are dispensed and automotive repair services are provided. Structures include a building, three fuel pump islands, one underground waste oil tank, and three underground fuel storage tanks (see Site Plan, Plate 3).

HYDROGEOLOGIC SETTING

The East Bay Plain has been divided into seven groundwater subareas, defined by the California Department of Water Resources (DWR) on the basis of areal differences (i.e., faults and geologic conditions). The site lies within the Oakland Upland and Alluvial Plain subarea. The groundwater reservoir is made up of the Alameda and Temescal Formations, along with the Merritt Sand, with an aggregate thickness of more than 1,100 feet. Regionally, groundwater flows west-southwest, toward San Francisco Bay.

Most uses of groundwater in the East Bay Plain are related to irrigation or industrial needs; the majority of domestic water is supplied by the East Bay Municipal Utility District (EBMUD) from surface sources.

Soils at the site to the maximum depth explored (20 feet) generally consist of unconsolidated, stiff, sandy clay (CL), interbedded with occasional silty sand and gravel lenses. During HLA's investigation, groundwater was initially encountered

between 11 and 13 feet below grade and stabilized in the wells at approximately 6.5 feet below grade.

The tops of well casings were surveyed to a temporary datum located at the western end of the dispenser island nearest the underground storage tanks with an assumed elevation of 100.0 feet (HLA datum, see Plate 3). Well monitoring and survey data are presented in Table 1. The general direction of groundwater flow is to the west-northwest, with a gradient of 0.004 foot per foot, as shown on the Groundwater Surface Map, Plate 4. Estimates of the hydraulic conductivity of the slightly confined shallow soils range from 0.4 to 0.5 foot per day.

SUMMARY OF PREVIOUS WORK

Previous Reports

Since May 1988, HLA has investigated soil and groundwater conditions at this site. To date, the investigation and proposed remediation plan have comprised four sequential phases; results and descriptions of proposed work were presented in the following reports:

1.	Sensitive Receptor Study	May 24, 1988
2.	Subsurface Investigation	July 20, 1988
3.	Environmental Assessment	September 19, 1989
4.	Soil and Groundwater Remediation Plan	May 11, 1990

Previous Field Operations

During previous quarters, HLA completed the following field operations:

- Conducted a soil-gas survey on site and in city streets near the site. Probe locations are shown on Plate 5 and soil-gas survey results are presented in Table 2.
- Drilled and sampled 20 shallow soil borings (B-1 through B-20); locations are shown on Plate 3.
- Drilled, constructed, developed, and sampled five on-site monitoring wells (MW-9A through MW-9E) and three off-site wells (MW-9F through MW-9H); locations are shown on Plate 3.
- Ordered chemical analyses on soil and water samples to determine concentrations of petroleum hydrocarbons; results of analyses are presented in Tables 3 and 4, respectively.
- Conducted slug tests in MW-9B and MW-9E to estimate hydraulic conductivity and transmissivity values for the shallow aquifer; slug test results are presented in Table 5.

SUMMARY OF PREVIOUS FINDINGS

Vadose-zone Soil Condition

The area where detectable concentrations of petroleum products were found in vadose-zone soils and soil gas is closely associated with the pump islands on the west side of the station. Soil samples were collected from 11 borings (MW-9E, SB-4, and SB-12 through SB-20) to delineate the extent of hydrocarbons in the vadose zone around the pump island. The distribution of hydrocarbons in the vadose zone is illustrated on Plate 6 and results of chemical analyses on soil samples are presented in Table 3.

Only two samples contained total petroleum hydrocarbons (TPH) at concentrations exceeding 100 parts per million (ppm). These samples were from borings MW-9E and SB-4, on the west and east sides, respectively, of the pump island. The soil sample from a depth of 5.5 feet in MW-9E represents the only significant hydrocarbon concentration (1,900 ppm TPH). We concluded that MW-9E and SB-4 are in two isolated occurrences of vadose-zone soil with TPH concentrations above 100 ppm. Correspondingly high concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) and TPH were detected in soil-gas samples from Probe Locations SG-01 and SG-03.

Groundwater Condition

Shallow groundwater in the site vicinity contains detectable quantities of BTEX, as shown in Table 4. As illustrated on Plate 7, the extent of BTEX in the groundwater is well delineated and the plume appears to be extending downgradient, toward utility lines in East 12th Street and 22nd Avenue. The bottom of the storm drain in East 12th Street is approximately 8.5 feet below grade, approximately 2 feet below the water table.

The lateral limits of the plume are delineated by MW-9A, MW-9C, MW-9D, MW-9F, MW-9G and MW-9H; samples from these wells show no detectable hydrocarbon concentrations. Samples from MW-9B and MW-9E exhibited benzene concentrations in groundwater (4 and 15 parts per billion [ppb], respectively) that exceed Maximum

Contaminant Levels (MCLs). No other constituent exceeds the MCLs or Drinking Water Action Levels (DWALs).*

SUMMARY OF PROPOSED REMEDIAL ACTION

The proposed remediation plan is to excavate hydrocarbon-bearing soils from the vadose zone and thereby to prevent additional hydrocarbons from entering the groundwater. The ground surface will be recapped to seal off additional exposure of the soils to hydrocarbons. Groundwater conditions will be monitored quarterly for one year. A more specific description of proposed work is presented in the last section of this report.

WORK PERFORMED DURING THE THIRD QUARTER OF 1990

1. Alameda County Environmental Health Department has been asked to review the remedial plan for approval.

2. Existing Emco-Wheaton traffic boxes in public right-of-way have been replaced with Phoenix Iron Works Model P-2001 traffic boxes, as specified by the City of Oakland.

3. A meeting was conducted to discuss logistics for excavation and on-site treatment of soil prior to disposal, as proposed in the Groundwater Remedial Plan. The following parties participated:

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* The California Department of Health Services issued an action list for chemical contaminants of drinking water. Acceptable drinking water concentrations are specified for four gasoline constituents: benzene, toluene, ethylbenzene, and xylenes (BTEX). MCLs are drinking water standards enforced by law under California Code of Regulations, Title 22. DWALs are recommended levels, but are not enforced by law.

Station Owner - Proprietor
Station Engineer - Exxon USA
Environmental Supervisor - Texaco Marketing and Refining Inc.
Environmental Consultant - HLA
Construction Contractor - Harding Construction Services (HCS)

4. Construction contractor (HCS) solicited a bid for soil excavation and on-site treatment.

5. Contract negotiations have been conducted between HCS and probable subcontractor.

6. Water levels were measured in six monitoring wells (see Table 1).

WORK PROPOSED FOR THE FOURTH QUARTER OF 1990

Remediation will be implemented, as described in the "Groundwater Remediation Plan" dated May 11, 1990. The following tasks are planned:

1. Chemically analyze groundwater samples from all monitoring wells, prior to excavation, to determine baseline groundwater conditions.

2. Properly abandon monitoring well in MW-9E that lies within the area to be excavated.

3. Excavate soil with hydrocarbon concentrations at and above 100 ppm from an area, approximately 17 by 20 feet, between the sidewalk and the canopy covering the western pump islands (Plate 3). The depth of excavation will be approximately 7 feet (1 foot into saturated zone). Confirmation soil samples, taken from the walls and bottom of the excavation, will be tested to check that hydrocarbon concentrations in the remaining soils are below 100 ppm.

4. Backfill the excavation with clean fill, properly compact backfill, pave, and return the station to normal operations.

5. Install a new monitoring well in approximately the same location as MW-9E.

6. Stockpile excavated soils in a working area in the southeastern quadrant of the station property (see Plate 3), and cover them.

7. Aerate the soils containing hydrocarbons on site in compliance with Bay Area Air Quality Management District Regulation 8, Rule 40, with mechanical equipment until hydrocarbon concentrations drop below 100 ppm.

8. Dispose of soil at Class III landfill once all stockpiled soil has been treated (aerated) to acceptable levels (100 ppm).

LIST OF TABLES

LIST OF ILLUSTRATIONS

Table 1. Well Monitoring and Survey Data
2200 East 12th Street
Oakland, California

Well No.	Date	Top of Casing Elevation[1] (feet)	Depth to Groundwater (feet)	Groundwater Surface Elevation[2] (feet)	Incremental Water Elevation Change[3] (feet)	Total Water Elevation Change Since 12/15/88[4] (feet)
MW-9A	10/12/89	100.07	7.25	92.82	--	--
	09/20/90[5]		--	--	--	--
MW-9B	10/12/89	98.41	6.14	92.27	--	--
	09/20/90		6.28	92.13	-0.14	-0.14
MW-9C	10/12/89	99.73	6.99	92.74	--	--
	09/20/90[5]		--	--	--	--
MW-9D	10/12/89	101.46	8.40	93.06	--	--
	09/20/90		8.47	92.99	-0.07	-0.07
MW-9E	10/12/89	98.41	5.70	92.71	--	--
	09/20/90		5.84	92.57	-0.14	-0.14
MW-9F	10/12/89	96.96	6.07	90.89	--	--
	09/20/90		5.97	90.99	+0.10	+0.10
MW-9G	10/12/89	98.51	6.01	92.50	--	--
	09/20/90		6.03	92.48	-0.02	-0.02
MW-9H	10/12/89	97.14	8.35	88.79	--	--
	09/20/90		8.25	88.89	+0.10	+0.20

Notes:

1 Elevation relative to HLA temporary benchmark located at the western corner of the dispenser island nearest the underground storage tanks, with an arbitrary elevation of 100.0 feet (see Plate 3).

2 Groundwater surface elevation = top of casing elevation - depth to water.

3 Incremental groundwater elevation change = groundwater elevation - previous groundwater elevation.

4 Total groundwater elevation change = groundwater elevation - groundwater elevation on 12/15/88

5 Well was inaccessible due to jammed lock.

Table 2. Results of Soil-gas Survey
2200 East 12th Street
Oakland, California

Conducted on September 20, 1988
Concentrations in micrograms per liter (μg/L)

Sample	Depth (ft)	Benzene	Ethyl-benzene	Toluene	Xylenes	Total Petroleum Hydrocarbons
Air	N/A	<0.8	<0.8	<0.7	<0.8	<0.8
SG-01	5.0	320,000	620	1	2,200	700,000
WS-02	5.0	12,000	<80	<73	<80	25,000
SG-03	4.0	32,000	<8	<28,000	800	96,000
SG-04	5.0	<0.8	<0.8	<0.7	<0.8	<0.8
MW-9A	6.0	<76	<80	<73	<80	<76
SG-05	2.0	<0.8	<0.8	<0.7	<0.8	<0.8
SG-06	--	--	--	--	--	--
SG-07	--	--	--	--	--	--
SG-08	5.0	<0.8	<0.8	<0.7	<0.8	<0.8
SG-09	6.0	<0.8	<0.8	<0.7	<0.8	<0.8
WS-10	6.0	<76	<80	<73	<80	<76
SG-11	4.0	<0.8	<0.8	<0.7	<0.8	<0.8
SG-12	5.0	<0.8	<0.8	<0.7	<0.8	<0.8
SG-13	5.0	<0.8	<0.8	<0.7	<0.8	23
Air	N/A	<0.7	<0.8	<0.8	<0.8	<0.7

-- = Not able to obtain sample

N/A = Not applicable

Air = ambient air sample

Table 3. Results of Soil Analyses
2200 East 12th Street
Oakland, California

Concentrations in milligrams per kilogram (mg/kg)

Sample Number	Depth (ft)	Benzene [1]	Ethyl-benzene [2]	Toluene [3]	Xylenes [3]	TPH as Gasoline [4]
SB-1	4.8	0.30	ND	0.2	ND	ND
B-9-1	5.0	ND	ND	ND	ND	ND
B-9-1	9.0	ND	ND	ND	ND	ND
B-9-1	12.0	ND	ND	ND	ND	ND
B-9-2	5.0	ND	ND	ND	ND	ND
B-9-2	9.0	ND	ND	ND	ND	ND
B-9-2	10.5	ND	ND	ND	ND	ND
B-9-2	13.0	ND	ND	ND	ND	ND
SB-4	4.0	1.0	2.3	0.9	5.8	160
SB-4	9.0	ND	ND	ND	ND	ND
SB-5	4.0	0.33	ND	ND	ND	ND
SB-5	9.0	ND	ND	ND	ND	ND
SB-6	5.0	ND	ND	ND	ND	ND
SB-6	5.5	ND	ND	ND	ND	ND
SB-7	4.0	ND	ND	ND	ND	ND
SB-7	8.5	ND	ND	ND	ND	ND
SB-8	5.5	0.43	ND	ND	ND	ND
SB-8	9.0	ND	ND	ND	ND	ND
SB-9	4.0	ND	ND	ND	ND	ND
SB-9	9.0	ND	0.4	ND	1.1	39
SB10-1	5.0	ND	ND	ND	ND	ND
SB10-2	10.0	ND	ND	ND	ND	ND
SB11-1	5.0	ND	ND	0.1	ND	ND
SB11-2	10.0	ND	ND	ND	ND	ND
SB-12	3.5	0.09	0.07	0.2	0.09	11 (1)
SB-13	4.0	ND	ND	0.1	ND	1.7 (1)
SB-14	4.5	ND	ND	ND	ND	3.5 (1)
SB-15	3.5	0.07	ND	ND	ND	6.3 (1)
SB-16	4.5	0.21	0.08	ND	ND	9.0 (1)
SB-17	5.0	0.093 (.01)	0.139 (.01)	0.043 (.01)	ND (.01)	42 (2)
SB-18	5.0	ND (.01)	0.021 (.01)	0.245 (.01)	0.015 (.01)	5 (2)
SB-19	5.0	ND (.01)	0.022 (.01)	0.078 (.01)	ND (.01)	6 (2)
SB-20	5.0	0.035 (.01)	0.017 (.01)	0.038 (.01)	ND (.01)	7 (2)
MW-9D	6.0	ND	ND	ND	ND	ND
MW-9D	10.5	ND	ND	ND	ND	ND
MW-9E	5.5	ND	18	ND	ND	1,900
MW-9E	9.0	ND	ND	ND	ND	ND
MW-9G	4.0	ND	ND	0.2	ND	ND

ND = Not detected.
1 Detection limit 0.05 mg/kg except as noted in parentheses.
2 Detection limit 0.2 mg/kg except as noted in parentheses.
3 Detection limit 0.1 mg/kg except as noted in parentheses.
4 Detection limit 10 mg/kg except as noted in parentheses.

Table 4. Results of Groundwater Analyses
2200 East 12th Street
Oakland, California

Concentrations in micrograms per liter (μg/L)

Well Number	Date Sampled	EPA TEST METHOD 602 Benzene	Ethylbenzene	Toluene	Xylenes
MW-9A	06/13/88	ND	ND	ND	ND
MW-9A	10/24/88	ND	ND	ND	ND
MW-9A	10/13/89	ND	ND[1]	ND[1]	ND[2]
MW-9B	06/13/88	350	66	7.8	160
MW-9B	10/24/88	84	3.1	ND	3.2
MW-9B	10/13/89	4.1	ND[1]	ND[1]	ND[2]
MW-9C	06/13/88	ND	ND	ND	ND
MW-9C	10/28/88	ND	ND	ND	ND
MW-9C	10/13/89	ND	ND[1]	ND[1]	ND[2]
MW-9D	10/24/88	ND	ND	ND	ND
MW-9D	10/13/89	ND	ND[1]	ND[1]	ND[2]
MW-9E	10/24/88	1.3	ND	ND	ND
MW-9E	10/13/89	15	2.1[1]	ND[1]	ND[2]
MW-9F	12/06/88	ND	ND	ND	ND
MW-9F	10/13/89	ND	ND[1]	ND[1]	ND[2]
MW-9G	12/06/88	0.8	ND	ND	ND
MW-9G	10/13/89	ND	ND[1]	ND[1]	ND[2]
MW-9H	12/06/88	ND	ND	ND	ND
MW-9H	10/13/89	ND	ND[1]	ND[1]	ND[2]
Detection limits		0.5	2.0	1.0	1.0

ND = Not detected
1 Detection limit = 0.5
2 Detection limit = 3.0

Table 5. Slug Test Results
2200 East 12th Street
Oakland, California

Well Number	Lithology of Tested Zone	Thickness of Zone (feet)	Estimated Hydraulic Conductivity of Zone (feet/day)
MW-9B	Clayey sand	2.5	0.42
MW-9E	Sandy clay with gravel	13.0	0.52

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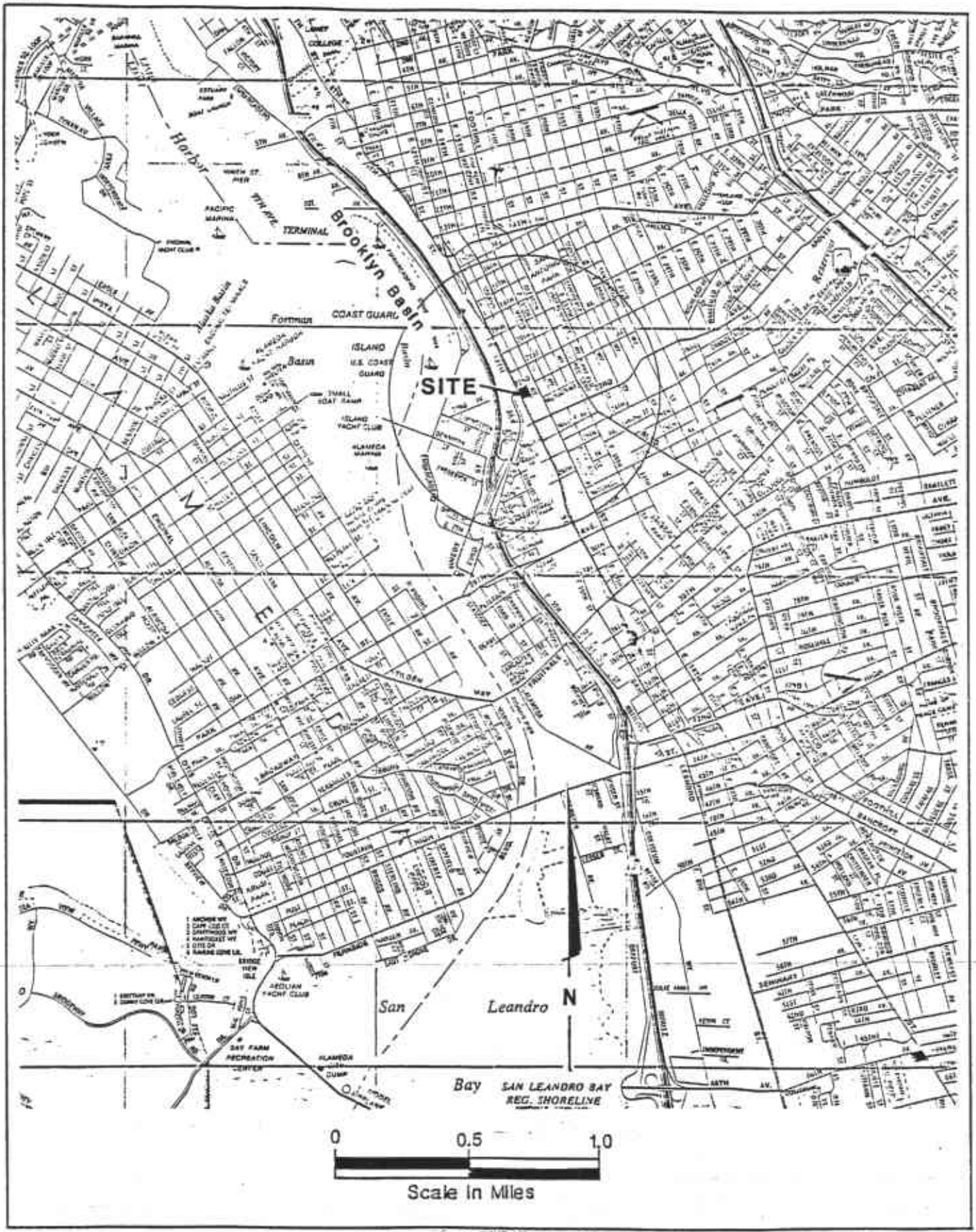

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Site Location
Former Texaco Service Station
2200 East 12th Street
Oakland, California

PLATE
1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	2251,112,03		6/89		

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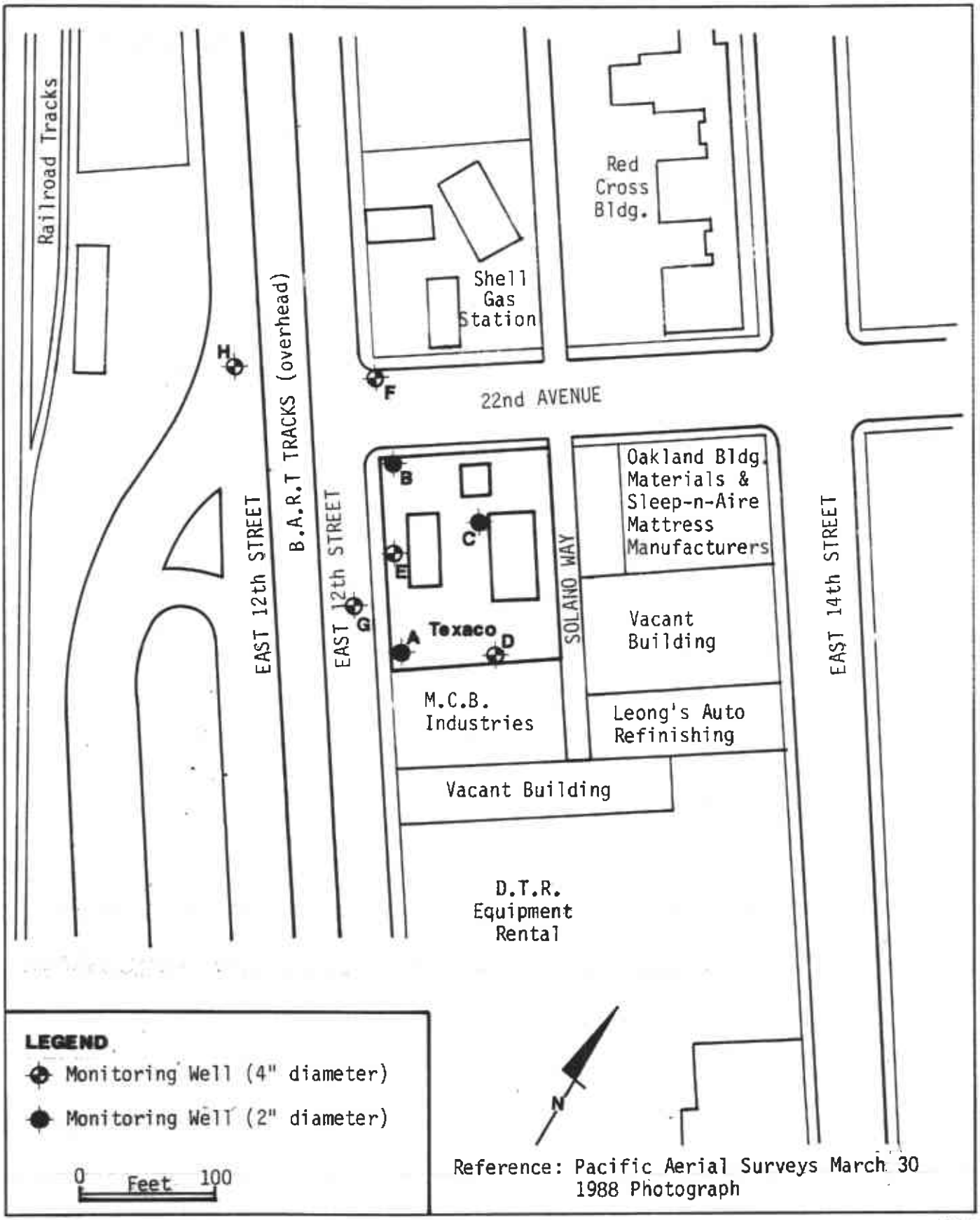

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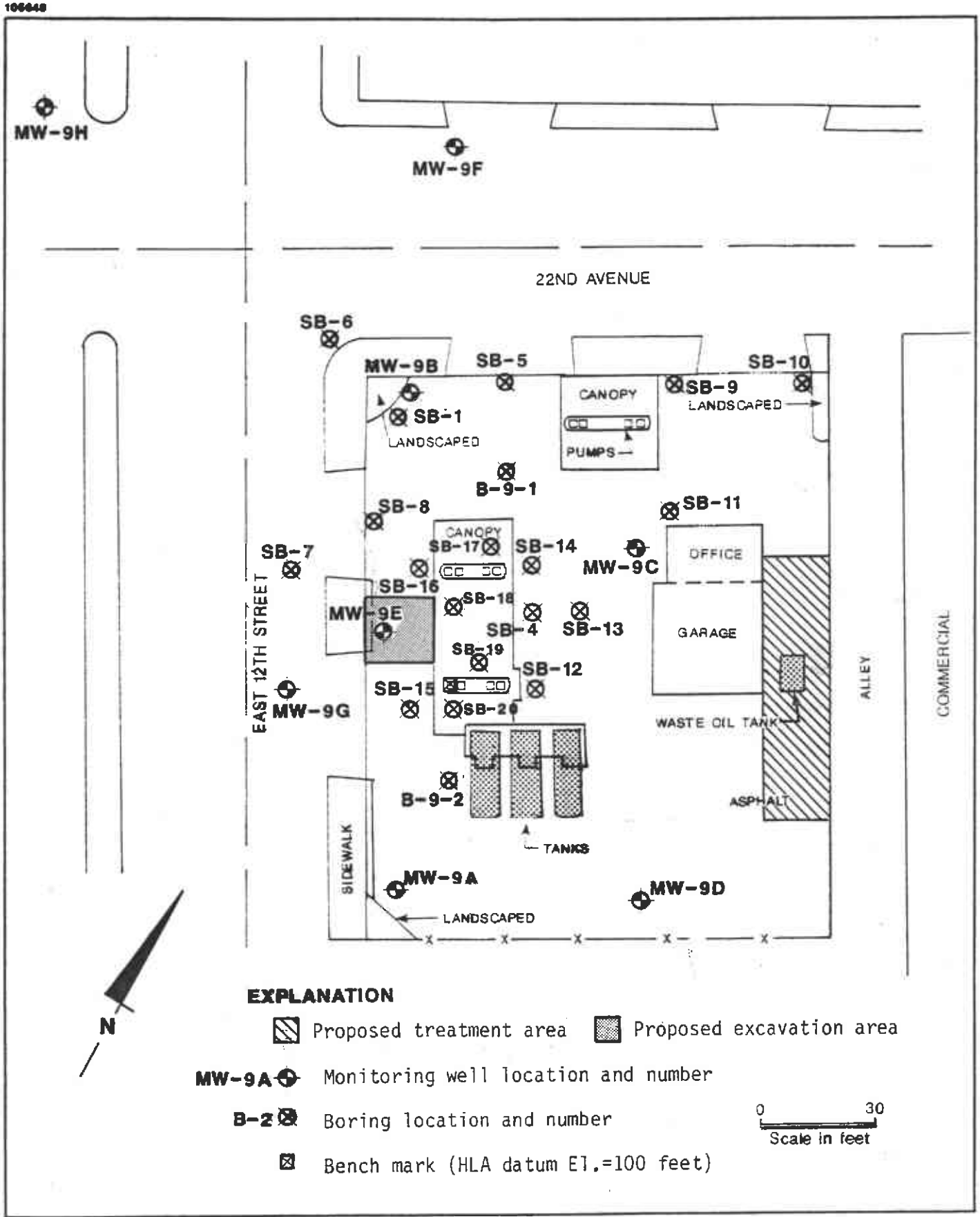
Vicinity Plan
Former Texaco Service Station
2200 East 12th Street
Oakland, California

PLATE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
YC	2251,112.03		1/89		



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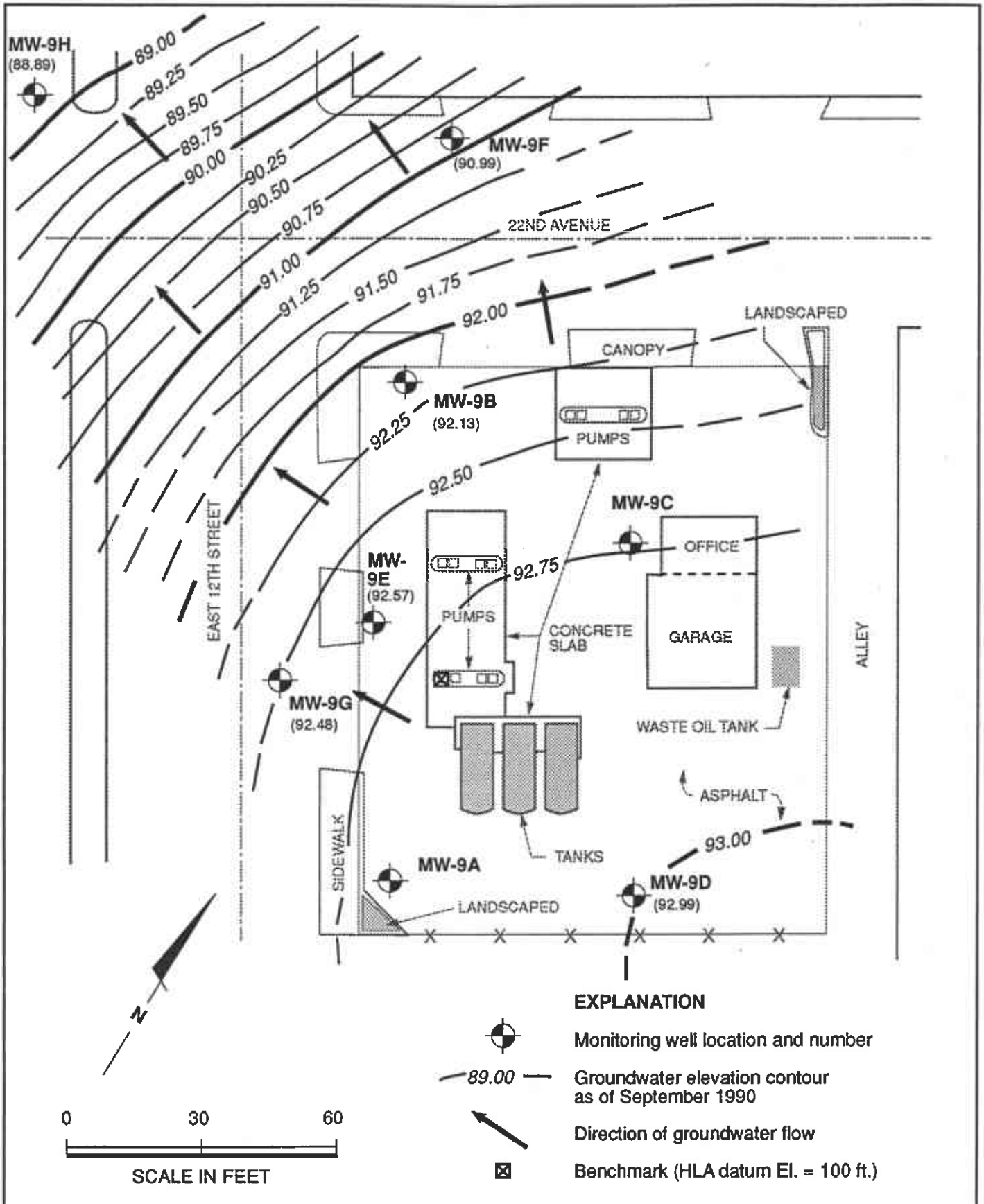
Site Plan
Former Texaco Service Station
2200 East 12th Street
Oakland, California

PLATE **3**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
YC	2251,112.03	G	6/89	1/90	



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Groundwater Surface Map (9/90)
Former Texaco Service Station
2200 East 12th Street
Oakland, California

PLATE **4**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
EH/RHC	2251,112.03		10/90	

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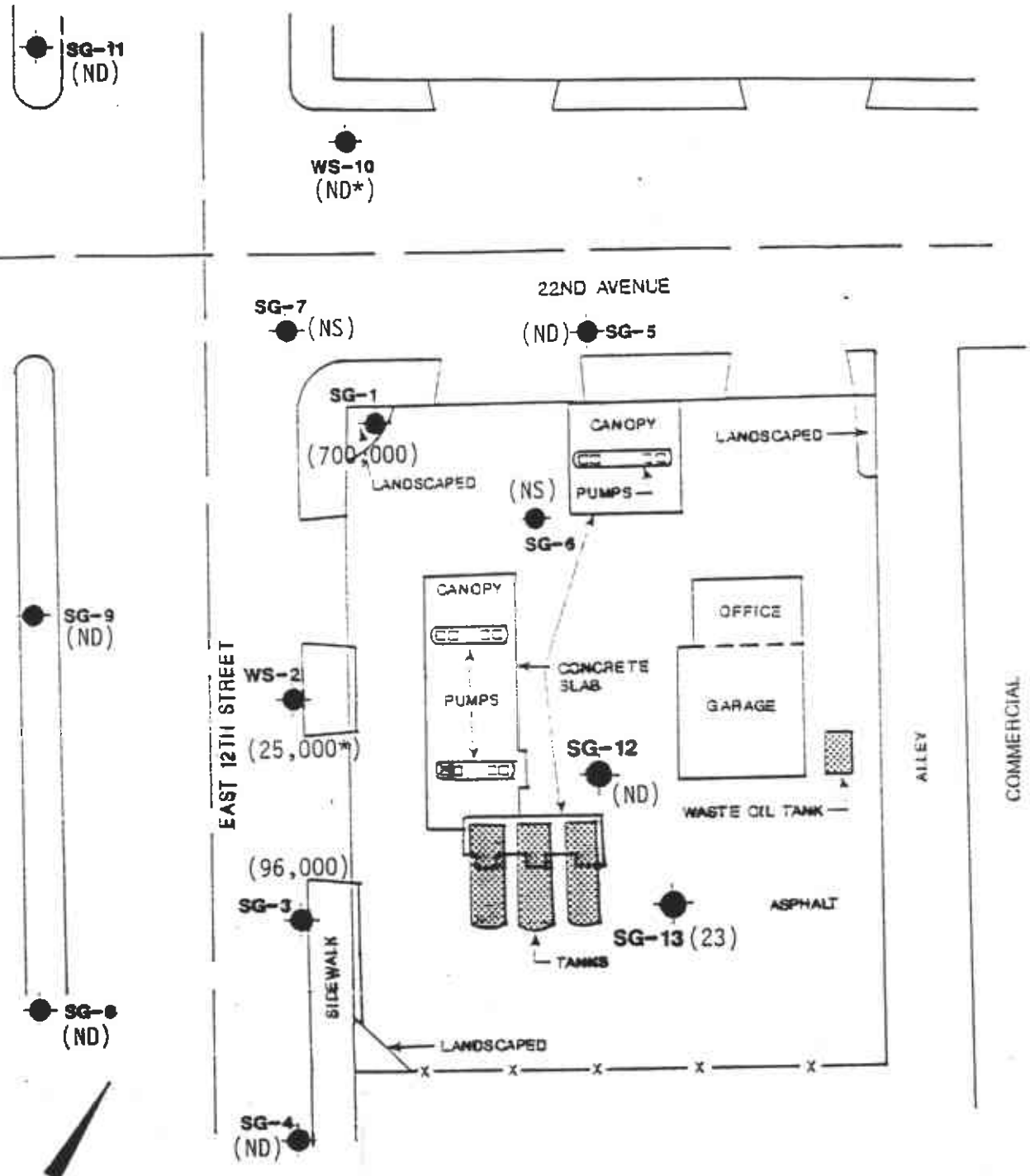

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Soil-gas Probe Locations
Former Texaco Service Station
2200 East 12th Street
Oakland, California

PLATE
5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
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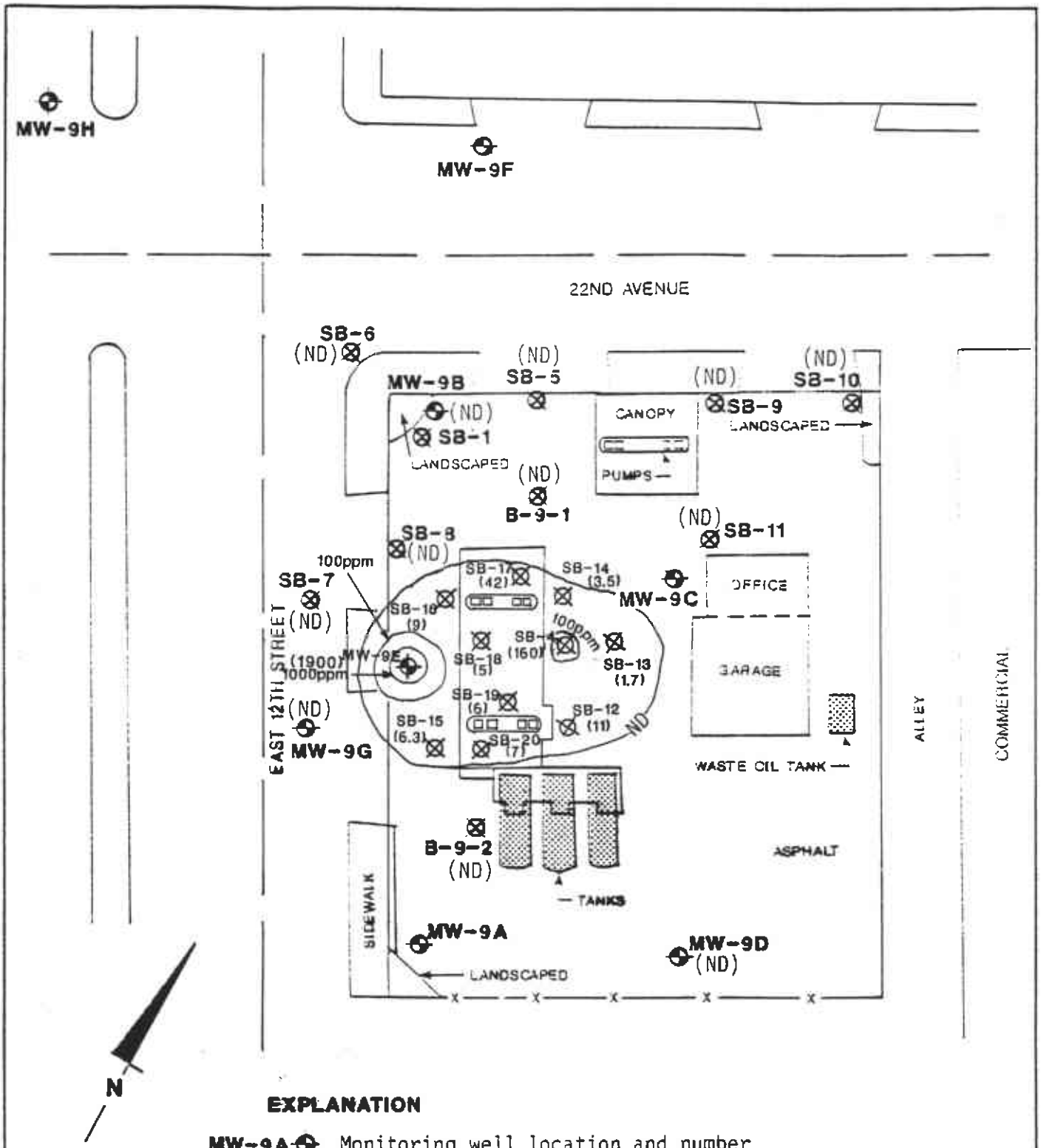

EXPLANATION

MW-9A ⊕ Monitoring well location and number
(120) TPH as gasoline (mg/kg) in soil above water table

B-2 ⊗ Boring location and number

ND Non detectable

0 30
Scale in feet

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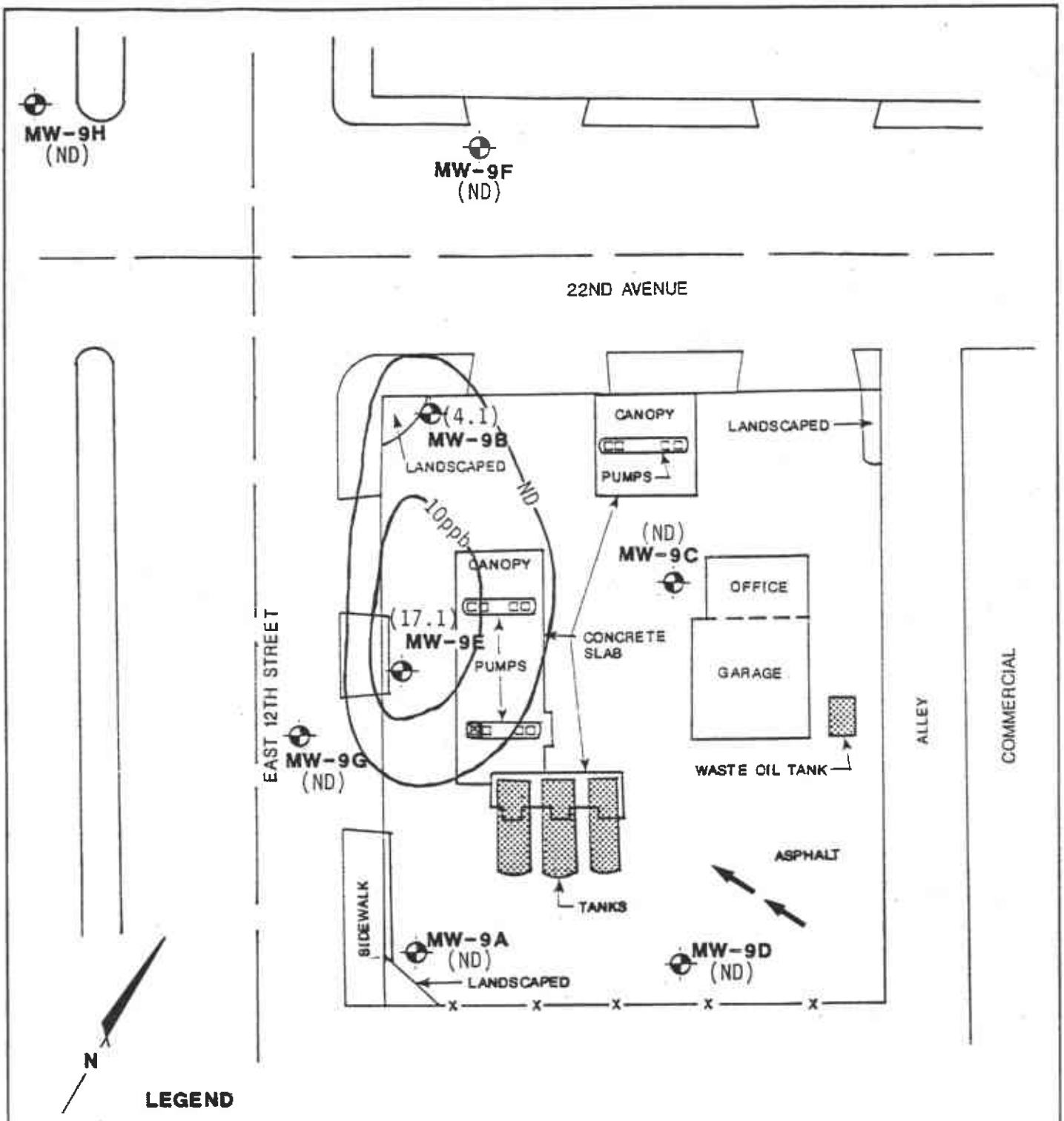
Distribution of TPH in Vadose-zone Soil
Former Texaco Service Station
2200 East 12th Street
Oakland, California

PLATE **6**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
YC	2251,112.03		6/89	1/90	



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Distribution of Hydrocarbons in Groundwater
Former Texaco Service Station
2200 East 12th Street
Oakland, California

PLATE **7**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
YC	2251,112.03		11/89	

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