A Report Prepared for

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

QUARTERLY TECHNICAL REPORT
FOURTH QUARTER OF 1991
FORMER TEXACO STATION
2200 EAST 12TH STREET
OAKLAND, CALIFORNIA

HLA Job No. 2251,175.03
March 6, 1992
1991 Report No. 4

by

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April 30, 1992

Mr. Tom Callaghan
California Regional Water
Quality Control Board
San Francisco Bay Area Region
2101 Webster Street, Ste. 500
Oakland, CA 94612

Dear Mr. Callaghan:

Enclosed is a copy of our Quarterly Technical Report dated March 6, 1992, for our former Texaco Service Station located at 2200 East 12th Street in Oakland, California. This report covers the period of October through December, 1991.

Please call me at (510) 236-1770 if you have any questions.

Best Regards,

R.R. Zielinski
Area Supervisor

RRZ:pap

Enclosure

cc: Mr. Barney Chan
Alameda County Environmental
Health Department
80 Swan Way, Room 200
Oakland, CA 94621

pr: KLD

HP

2200EAST12.TC5

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 (Plate 1), is currently owned and operated by Exxon Company U.S.A. During the fourth quarter, HLA performed sampling and analyses of groundwater from monitoring wells. 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 extensively 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 (Plate 3). During the third quarter of 1991, two 10,000-and one 7,500-gallon capacity single-walled fiberglass USTs were removed and replaced with three 12,000-gallon double-walled fiberglass USTs.

HYDROGEOLOGIC SETTING

The East Bay Plain is 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 interbedded with 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 relative to an arbitrary datum with an assumed elevation of 100.0 feet. The HLA datum was located at the western end of the dispenser island nearest the underground storage tanks (USTs [Plate 3]). Water level measurements and survey data are presented in Table 1. The general direction of groundwater flow is to the west-northwest, with a gradient of about 0.007 foot per foot across the site, 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 remediation plan have been 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 (SB-1 through SB-20); locations are shown on Plate 6.
- 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.
- Obtained 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.
- Replaced Emco-Wheaton traffic boxes in public right-of-way with Phoenix Iron Works Model P-2001 traffic boxes, as specified by the City of Oakland.
- Implemented the remediation plan in fourth quarter 1990 which consisted of excavating hydrocarbon-bearing soils with concentrations greater than 100 parts per million (ppm) from the vadose zone in the vicinity of MW-9E, and quarterly monitoring of the groundwater for dissolved hydrocarbons (Plate 3).

- Abandoned MW-9E (located inside the remediation excavation boundaries) and installed a new monitoring well (MW-9I) in approximately the same location after backfilling the excavation (Plate 3).

During the third quarter 1991, Exxon coordinated removal of the existing USTs, as well as the fuel dispensers and associated piping at the project site. HLA was present to observe the removal of the three existing tanks, and excavations for the USTs, pump island, and product lines. Confirmation soil samples were obtained on behalf of Texaco.

SUMMARY OF FINDINGS

Vadose-zone Soil Condition

The area where detectable concentrations of petroleum products were found in vadose-zone soils is near the pump islands on the west and north sides of the station. Results of chemical analyses on soil samples from borings, remedial excavation, and UST replacement are presented in Tables 3, 6, and 7, respectively.

Three soil samples exhibiting total petroleum hydrocarbons (TPH) concentrations exceeding 100 ppm have been collected from areas that have not been excavated. These samples were from boring SB-4 and fuel line trench samples S-9 and S-11. The soil sample from former well MW-9E contained the highest hydrocarbon concentration detected in our investigation (1,900 ppm TPH) prior to excavation.

In May 1990, HLA submitted a Soil and Groundwater Remediation Plan. The plan was approved by Alameda County Environmental Health Hazardous Materials Division on October 22, 1990. Implementation of the remediation plan in November 1990 consisted of excavating hydrocarbon-bearing soils with concentrations greater than 100 ppm from the vadose zone in the vicinity of MW-9E. Soil samples were taken from the walls and bottom of the excavation to confirm that hydrocarbon concentrations in the remaining soil were below 100 ppm (Table 6). The location of the soil excavation is shown on Plate 3. The excavated soils were aerated and transported to a landfill.

In conjunction with the UST removal in the third quarter of 1991, confirmation samples from the sides and base of the UST excavation contained hydrocarbon concentrations less than 100 ppm. However, soils exhibiting concentrations of TPH in excess of 100 ppm were left in situ near the two northernmost pump islands. Overexcavation was not possible in these locations due to the potential for undermining the footings for the existing canopy poles. Sampling locations and approximate excavation limits are shown on Plate 7 and results of chemical analyses are summarized in Table 7.

Groundwater Condition

Shallow groundwater in the site vicinity contains detectable quantities of benzene, toluene, ethylbenzene, and xylenes (BTEX)

and TPH as gasoline, as shown in Table 4. The extent of organic hydrocarbons in the groundwater is well delineated and the plume (as delineated by January 1991 chemical analyses) 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 indicated no detectable hydrocarbon concentrations except for isolated occurrences in April 1991 in MW-9C and NW-9H, and in MW-9F in October 1991. Samples from MW-9B, MW-9E, and MW-9I have exhibited benzene concentrations in groundwater that exceeded Maximum Contaminant Levels (MCLs). No other constituent analyzed in these two samples exceeded the MCLs or Drinking Water Action Levels (DWALs).*

WORK PERFORMED DURING THE FOURTH QUARTER OF 1991

HLA continued the one year quarterly monitoring program scheduled to follow soil remediation. On October 25, 1991, five

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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.

on-site and three off-site monitoring wells were purged by removing three casing volumes of water or until the well was dry using a 12-volt pump. Groundwater temperature, pH, and conductivity were monitored prior to sampling. Groundwater samples were collected in a clean Teflon bailer with an extraction tip and decanted into 40-ml volatile organic analysis (VOA) vials. The samples were then transported, under chain-of-custody, to National Environmental Testing, Inc. in Santa Rosa, California, where they were analyzed for BTEX (EPA Test Method 602) and TPH as gasoline (EPA Test Method GC FID/5030). The laboratory analysis reports are presented in the Appendix and summarized in Table 4. The results of the analyses are discussed below.

Four of the on-site monitoring wells (MW-9A, MW-9B, MW-9D, and MW-9I) were damaged as a result of the work associated with the UST removal conducted in the third quarter. The steel covers for MW-9A and MW-9B were missing, and the Emco Wheaton boxes were damaged on MW-9D and MW-9I leaving the covers secured by only one bolt. However, the wells themselves were not damaged.

DISCUSSION OF FOURTH QUARTER 1991 TEST RESULTS

Benzene was detected in MW-9B and MW-9F at concentrations of 1.2 and 1.1 parts per billion (ppb), respectively. Petroleum hydrocarbons were not detected in any of the other monitoring wells.

ANTICIPATED ACTIVITIES FOR THE FIRST QUARTER OF 1992

HLA plans to continue the quarterly monitoring program by purging and sampling each of the eight monitoring wells on- and off-site. The groundwater samples will be analyzed for BTEX and TPH as gasoline. Chemical test results will be presented in the first quarter 1992 QTR.

LIST OF TABLES

LIST OF ILLUSTRATIONS

APPENDIX

Table 1. Water Level Measurements 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 10/12/89[4] (feet)
MW-9A	10/12/89	100.07	7.25	92.82	--	--
	09/20/90		--	--	--	--
	10/19/90		7.23	92.84	+0.02	+0.02
	01/11/91		6.96	93.11	+0.27	+0.29
	04/30/91		6.74	93.33	+0.22	+0.51
	07/29/91		7.22	92.85	-0.48	+0.03
	10/25/91		7.49	92.58	-0.27	-0.24
MW-9B	10/12/89	98.41	6.14	92.27	--	--
	09/20/90		6.28	92.13	-0.14	-0.14
	10/19/90		6.21	92.20	+0.07	-0.07
	01/11/91		6.21	92.20	0	-0.07
	04/30/91		5.74	92.67	+0.47	+0.40
	07/29/91		6.23	92.18	-0.49	-0.09
	10/25/91		6.42	91.99	-0.19	-0.28
MW-9C	10/12/89	99.73	6.99	92.74	--	--
	09/20/90		--	--	--	--
	10/19/90		6.96	92.77	+0.03	+0.03
	01/11/91		6.60	93.13	+0.36	+0.39
	04/30/91		6.32	93.41	+0.28	+0.67
	07/29/91		6.92	92.81	-0.60	+0.07
	10/25/91		7.13	92.60	-0.21	-0.14
MW-9D	10/12/89	101.46	8.40	93.06	--	--
	09/20/90		8.47	92.99	-0.07	-0.07
	10/19/90		8.43	93.03	+0.04	-0.03
	01/11/91		7.97	93.49	+0.46	+0.43
	04/30/91*		--	--	--	--
	07/29/91		8.35	93.11	-0.38	+0.05
	10/25/91		8.54	92.92	-0.19	-0.14
MW-9E	10/12/89	98.41	5.70	92.71	--	--
	09/20/90		5.84	92.57	-0.14	-0.14
	10/19/90		5.78	92.63	+0.06	-0.08
	11/02/90	Well Abandoned				
MW-9F	10/12/89	96.96	6.07	90.89	--	--
	09/20/90		5.97	90.99	+0.10	+0.10
	10/19/90		5.94	91.02	+0.03	+0.13
	01/11/91		5.72	91.24	+0.22	+0.35
	04/30/91		5.74	91.22	+0.20	+0.33
	07/29/91		6.02	90.94	-0.28	+0.05
	10/25/91		6.11	90.85	-0.09	-0.04
MW-9G	10/12/89	98.51	6.01	92.50	--	--
	09/20/90		6.03	92.48	-0.02	-0.02
	10/19/90		5.92	92.59	+0.11	+0.09
	01/11/91		5.72	92.79	+0.20	+0.29
	04/30/91		5.74	93.04	+0.25	+0.54
	07/29/91		5.97	92.54	-0.50	+0.04
	10/25/91		6.16	92.35	-0.19	-0.15

Table 1. (continued)

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 10/12/89[4] (feet)
MW-9H	10/12/89	97.14	8.35	88.79	--	--
	09/20/90		8.25	88.89	+0.10	+0.10
	10/19/90		8.17	88.97	+0.08	+0.18
	01/11/91		7.55	89.59	+0.62	+0.80
	04/30/91		8.02	89.12	+0.47	+0.33
	07/29/91		8.22	88.92	-0.20	+0.13
	10/25/91		8.25	88.89	-0.03	+0.10
MW-9I	11/15/90	98.66	6.01	92.65	--	--
	01/11/91		5.80	92.86	+0.21	--
	04/30/91		5.45	93.21	+0.35	--
	07/29/91		6.07	92.59	-0.62	--
	10/25/91		6.23	92.43	-0.16	--

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 4).

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 10/12/89.

* Access to well blocked by a vehicle that could not be moved.

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 from Soil Borings
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]	TPH as Diesel[4]
SB-1	4.8	0.30	ND	0.2	ND	ND	NT
B-9-1	5.0	ND	ND	ND	ND	ND	NT
B-9-1	9.0	ND	ND	ND	ND	ND	NT
B-9-1	12.0	ND	ND	ND	ND	ND	NT
B-9-2	5.0	ND	ND	ND	ND	ND	NT
B-9-2	9.0	ND	ND	ND	ND	ND	NT
B-9-2	10.5	ND	ND	ND	ND	ND	NT
B-9-2	13.0	ND	ND	ND	ND	ND	NT
SB-4	4.0	1.0	2.3	0.9	5.8	160	NT
SB-4	9.0	ND	ND	ND	ND	ND	NT
SB-5	4.0	0.33	ND	ND	ND	ND	NT
SB-5	9.0	ND	ND	ND	ND	ND	NT
SB-6	5.0	ND	ND	ND	ND	ND	NT
SB-6	5.5	ND	ND	ND	ND	ND	NT
SB-7	4.0	ND	ND	ND	ND	ND	NT
SB-7	8.5	ND	ND	ND	ND	ND	NT
SB-8	5.5	0.43	ND	ND	ND	ND	NT
SB-8	9.0	ND	ND	ND	ND	ND	NT
SB-9	4.0	ND	ND	ND	ND	ND	NT
SB-9	9.0	ND	0.4	ND	1.1	39	NT
SB10-1	5.0	ND	ND	ND	ND	ND	NT
SB10-2	10.0	ND	ND	ND	ND	ND	NT
SB11-1	5.0	ND	ND	0.1	ND	ND	NT
SB11-2	10.0	ND	ND	ND	ND	ND	NT
SB-12	3.5	0.09	0.07	0.2	0.09	11 (1)	NT
SB-13	4.0	ND	ND	0.1	ND	1.7 (1)	NT
SB-14	4.5	ND	ND	ND	ND	3.5 (1)	NT
SB-15	3.5	0.07	ND	ND	ND	6.3 (1)	NT
SB-16	4.5	0.21	0.08	ND	ND	9.0 (1)	NT
SB-17	5.0	0.093 (.01)	0.139 (.01)	0.043 (.01)	ND (.01)	42 (2)	NT
SB-18	5.0	ND (.01)	0.021 (.01)	0.245 (.01)	0.015 (.01)	5 (2)	NT
SB-19	5.0	ND (.01)	0.022 (.01)	0.078 (.01)	ND (.01)	6 (2)	NT
SB-20	5.0	0.035 (.01)	0.017 (.01)	0.038 (.01)	ND (.01)	7 (2)	NT
MW-9D	6.0	ND	ND	ND	ND	ND	NT
MW-9D	10.5	ND	ND	ND	ND	ND	NT
MW-9E	5.5	ND	18	ND	ND	1,900*	NT
MW-9E	9.0	ND	ND	ND	ND	ND	NT
MW-9G	4.0	ND	ND	0.2	ND	ND	NT
MW-9I	15.0	ND	ND (0.05)	ND (0.05)	ND (0.05)	ND (1)	ND

ND = Not detected. NT = Not tested.

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.

* Removed in fourth quarter 1990 remedial excavation

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	Ethyl-benzene	Toluene	Xylenes	TPH as (Gasoline)
MW-9A	06/13/88	ND	ND	ND	ND	NT
	10/24/88	ND	ND	ND	ND	NT
	10/13/89	ND	ND[1]	ND[1]	ND[2]	NT
	10/19/90	ND	ND[1]	ND[1]	ND[1]	ND
	01/11/91	ND	ND[1]	ND[1]	ND[1]	ND
	04/30/91	ND	ND[1]	ND[1]	ND[1]	ND
	07/29/91	ND	ND[1]	ND[1]	ND[1]	ND
	10/25/91	ND	ND[1]	ND[1]	ND[1]	ND
MW-9B	06/13/88	350	66	7.8	160	NT
	10/24/88	84	3.1	ND	3.2	NT
	10/13/89	4.1	ND[1]	ND[1]	ND[2]	NT
	10/19/90	27	2.3	ND[1]	ND[1]	62
	01/11/91	4.3	1.1	ND[1]	1.0	100
	04/30/91	68	3.9	1.0	ND[1]	170
	07/29/91	1.6	ND[1]	ND[1]	ND[1]	100
	10/25/91	1.2	ND[1]	ND[1]	ND[1]	ND
MW-9C	06/13/88	ND	ND	ND	ND	NT
	10/28/88	ND	ND	ND	ND	NT
	10/13/89	ND	ND[1]	ND[1]	ND[2]	NT
	10/19/90	ND	ND[1]	ND[1]	ND[1]	ND
	01/11/91	ND	ND[1]	ND[1]	ND[1]	ND
	04/30/91	100	ND[1]	1.6	ND[1]	240
	07/29/91	ND	ND[1]	ND[1]	ND[1]	ND
	10/25/91	ND	ND[1]	ND[1]	ND[1]	ND
MW-9D	10/24/88	ND	ND	ND	ND	NT
	10/13/89	ND	ND[1]	ND[1]	ND[2]	NT
	10/19/90	ND	ND[1]	ND[1]	ND[1]	ND
	01/11/91	ND	ND[1]	ND[1]	ND[1]	ND
	07/29/91	ND	ND[1]	ND[1]	ND[1]	ND
	10/25/91	ND	ND[1]	ND[1]	ND[1]	ND
MW-9E	10/24/88	1.3	ND	ND	ND	NT
	10/13/89	15	2.1[1]	ND[1]	ND[2]	NT
	10/19/90	4.0	0.9[1]	ND[1]	ND[1]	ND
	11/02/90	WELL ABANDONED				
MW-9F	12/06/88	ND	ND	ND	ND	NT
	10/13/89	ND	ND[1]	ND[1]	ND[2]	NT
	10/19/90	ND	ND[1]	ND[1]	ND[1]	ND
	01/11/91	ND	ND[1]	ND[1]	ND[1]	ND
	04/30/91	ND	ND[1]	ND[1]	ND[1]	ND
	07/29/91	ND	ND[1]	ND[1]	ND[1]	ND
	10/25/91	1.1	ND[1]	ND[1]	ND[1]	ND

Table 4. (continued)

Well Number	Date Sampled	EPA TEST METHOD 602 Benzene	Ethyl-benzene	Toluene	Xylenes	TPH as (Gasoline)
MW-9G	12/06/88	0.8	ND	ND	ND	NT
	10/13/89	ND	ND[1]	ND[1]	ND[2]	NT
	10/19/90	ND	ND[1]	ND[1]	ND[1]	ND
	01/11/91	ND	ND[1]	ND[1]	ND[1]	ND
	04/30/91	ND	ND[1]	ND[1]	ND[1]	ND
	07/29/91	ND	ND[1]	ND[1]	ND[1]	ND
	10/25/91	ND	ND[1]	ND[1]	ND[1]	ND
MW-9H	12/06/88	ND	ND	ND	ND	NT
	10/13/89	ND	ND[1]	ND[1]	ND[2]	NT
	10/19/90	ND	ND[1]	ND[1]	ND[1]	ND
	01/11/91	ND	ND[1]	ND[1]	ND[1]	ND
	04/30/91	ND	ND[1]	ND[1]	0.5	ND
	07/29/91	ND	ND[1]	ND[1]	ND[1]	ND
	10/25/91	ND	ND[1]	ND[1]	ND[1]	ND
MW-9I	11/15/90	4.0	1.1[1]	1.2[1]	2.2[1]	55
	01/11/91	6.1	ND[1]	ND[1]	ND[1]	ND
	04/30/91	100	4.2	3.5	4.4	460
	07/29/91	ND	ND[1]	ND[1]	ND[1]	150
	10/25/91	ND	ND[1]	ND[1]	ND[1]	ND
Detection limits		0.5	2.0	1.0	1.0	50

ND = Not detected NT = Not Tested

[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

Table 6. Results of Soil Analysis from Remediation Excavation
2200 East 12th Street
Oakland, California

Concentrations in milligrams per kilogram (mg/kg)

Sample Number	Depth (ft)	Benzene[1]	Ethyl-benzene[1]	Toluene[1]	Xylenes[1]	TPH as Gasoline[2]	TPH as Diesel[2]
S-1	5-W	0.66	0.77	0.038	0.076	9.5	1.4
S-2	5-W	0.32	1.5	0.15	0.17	40	6.1
S-3	6-W	0.49	0.15	0.028	0.16	2.3	ND
S-4	5-W	1.2	1.7	0.056	0.052	16	1.3
S-5	5-W	2.8	12	1.5	ND	290*	22
S-6	6-W	0.28	0.52	0.028	0.21	7.7	10
S-7	7-B	0.30	0.68	0.070	0.36	17	1.4
S-8	7-W	0.068	0.20	0.19	0.27	52	2.2

W = Sample taken from wall of excavation
B = Sample taken from base of excavation
ND = Not detected.
1 Detection Limit 0.0050 mg/kg.
2 Detection Limit 1.0 mg/kg.
* Excavation extended beyond this sample both horizontally and vertically. Hydrocarbon concentrations less than 100 ppm are confirmed in samples S-7 and S-8

Table 7. Results of Soil Analyses from Tank Pull Excavation
2200 East 12th Street
Oakland, California

Concentrations in milligrams per kilogram (mg/kg)

Sample Number	Date	Depth (ft)	Benzene[1]	Ethyl-benzene[1]	Toluene[1]	Xylenes[1]	TPH as Gasoline[2]	TPH as Diesel[2]	TPH as Motor Oil[3]
S-1	09/04/91	7 - S	0.062	0.024	0.009	0.020	9.1	4.9**	ND
S-2	09/04/91	8 - S	ND	ND	ND	ND	ND	ND	ND
S-3	09/04/91	8 - S	ND	ND	ND	ND	ND	ND	ND
S-4	09/04/91	11 - S	ND	ND	ND	0.0028	ND	ND	ND
S-5	09/04/91	12 - S	ND	ND	ND	0.0052	ND	ND	ND
S-6	09/04/91	11 - S	ND (50)	1.9	ND (50)	3.1	140*	14**	ND
S-7	09/04/91	3 - B	0.220	0.160	0.025	0.120	9.2	23**	ND
S-8	09/04/91	6 - B	NT	NT	NT	NT	NT	NT	NT
S-9	09/04/91	3 - B	ND (25)	0.036	0.060	0.550	110***	48**	33
S-10	09/04/91	4 - B	NT	NT	NT	NT	NT	NT	NT
S-11	09/04/91	3 - B	0.400	1.100	0.180	2.600	130***	40**	89
S-12	09/04/91	4 - B	NT	NT	NT	NT	NT	NT	NT

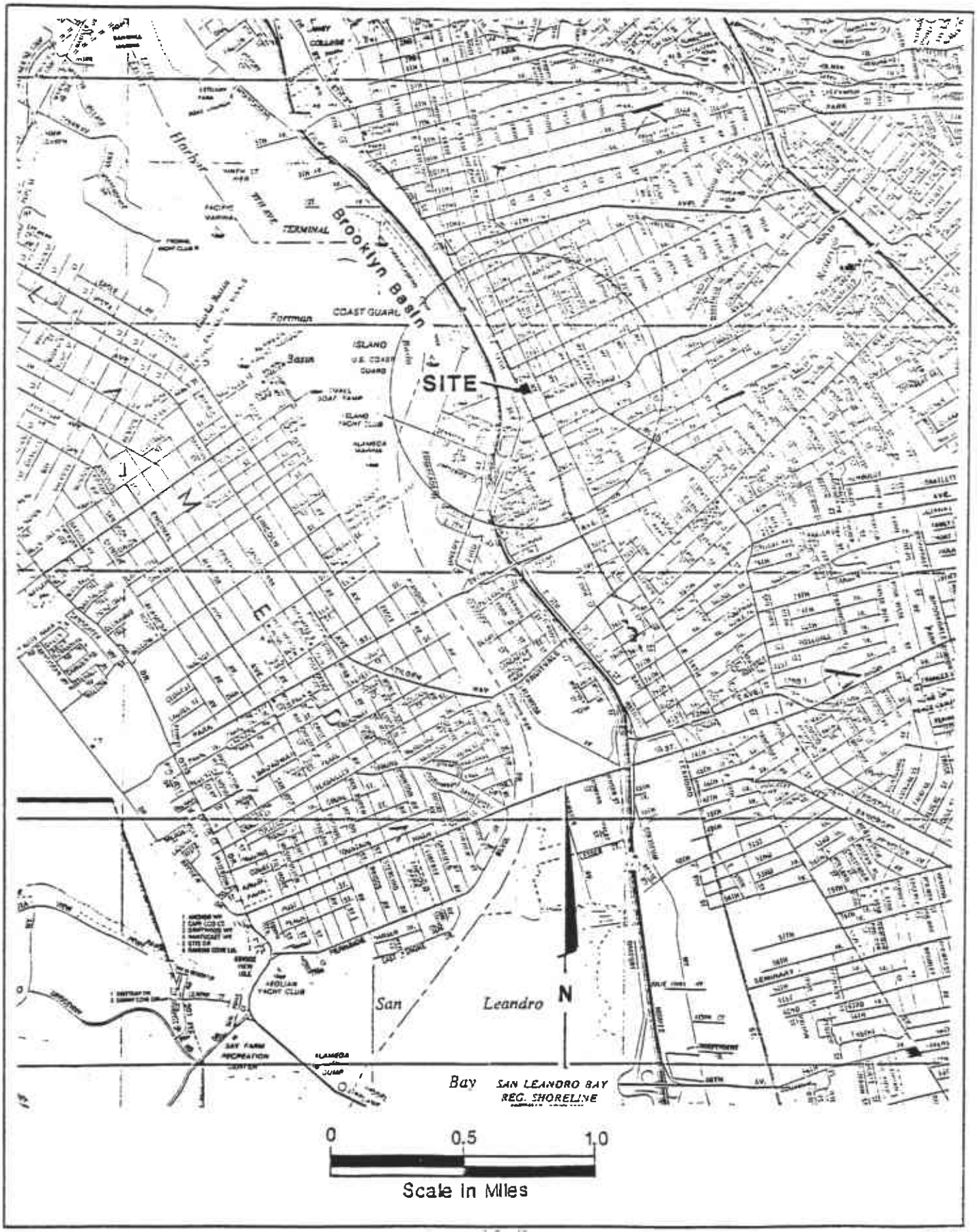
Table 7. (continued)

Sample Number	Date	Depth (ft)	Benzene[1]	Ethyl-benzene[1]	Toluene[1]	Xylenes[1]	TPH as Gasoline[2]	TPH as Diesel[2]	TPH as Motor Oil[3]
S-13	09/10/91	14.5 - B	ND	ND	0.0075	ND	ND	ND	ND
S-14	09/10/91	14.5 - B	ND	ND	ND	ND	ND	ND	ND
S-15	09/10/91	14.5 - B	ND	ND	ND	ND	ND	ND	17
S-16	09/11/91	12 - B	0.070	ND	0.030	0.0068	ND	ND	ND
S-17	09/11/91	13 - B	0.0066	ND	0.020	ND	ND	ND	ND
S-18	09/11/91	12 - B	ND (25)	0.112	0.046	0.350	17	3.6	ND

1 Detection limit 0.0025 mg/kg.
2 Detection limit 1 mg/kg.
3 Detection limit 10/mg/kg
* Excavation extended beyond sample point. Reduced concentrations observed in S-13.
** The positive result for the petroleum hydrocarbons as diesel analysis on this sample appears to be a lighter hydrocarbon than diesel.
*** Overexcavation in the pump island areas was not possible due to possible undermining of canopy footings. excavations to obtain samples S-16, S-17 and S-18 were performed in isolated areas and solely for purposes of sampling.

S - Sidewall of excavation
B - Bottom of Excavation

105649

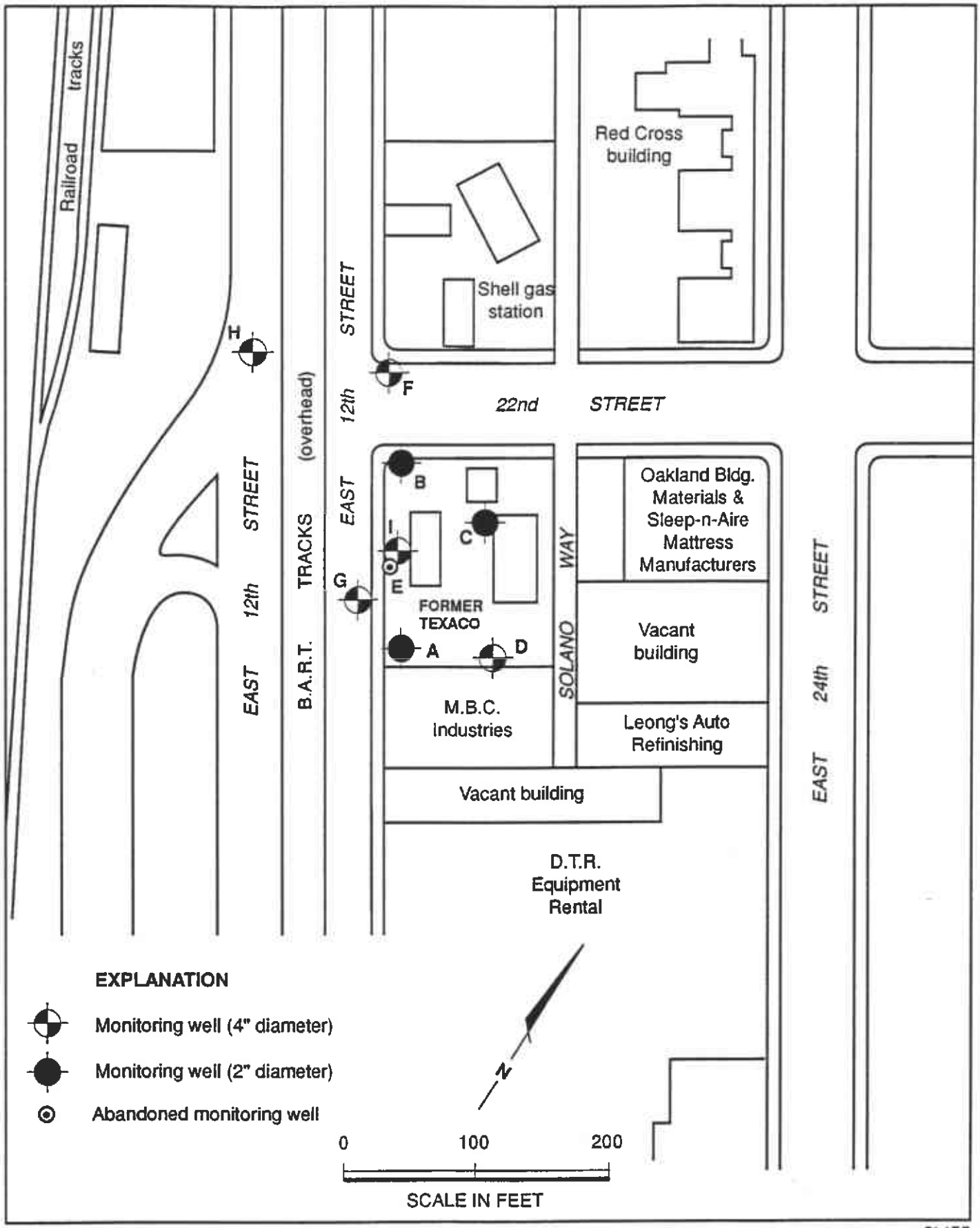


Harding Lawson Associates
Engineers and Geoscientists

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

PLATE
1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	2251,175.03	MKW	08/13/91		

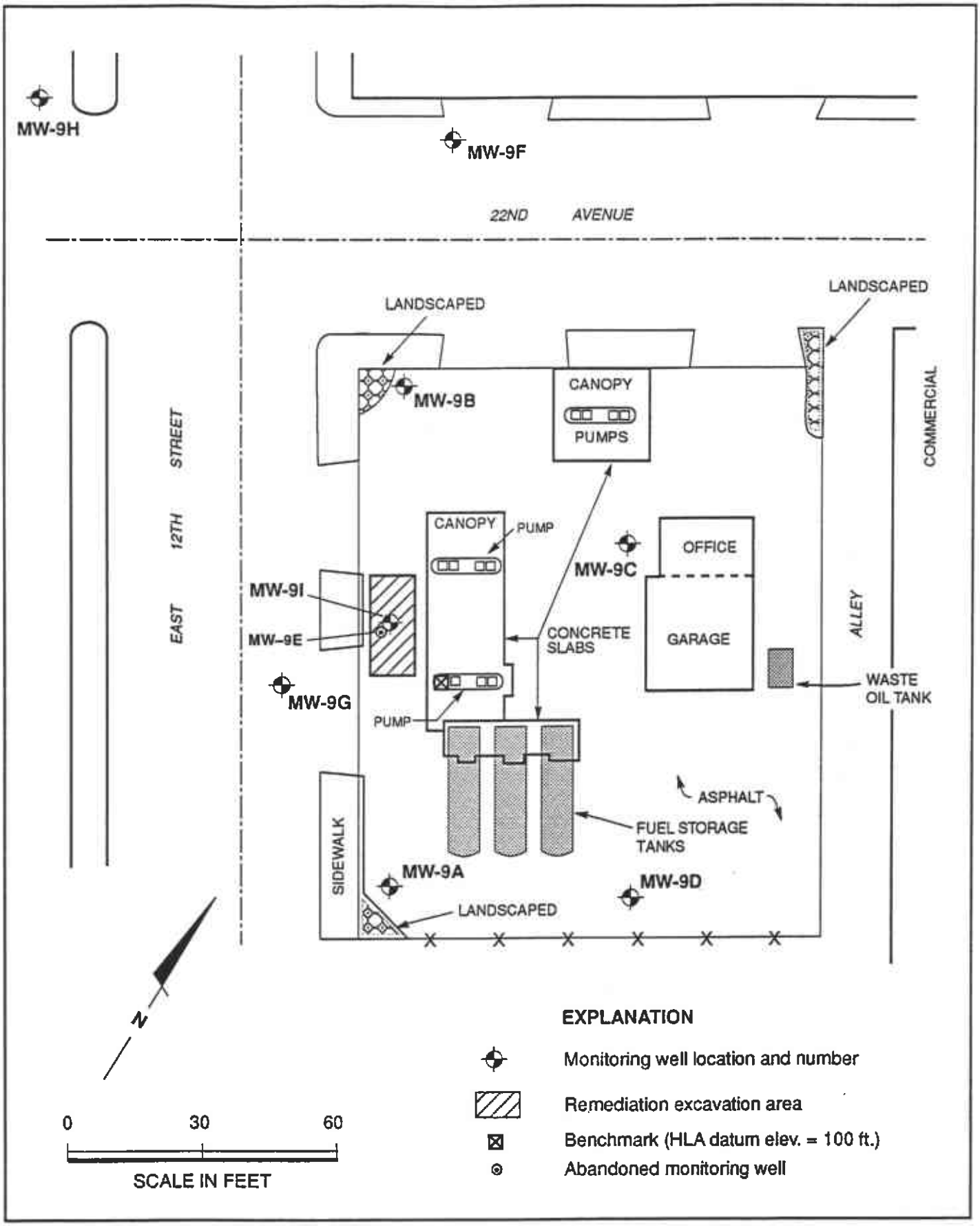


Harding Lawson Associates
Engineering and Environmental Services

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

PLATE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
RHC	2251,175.03	HKW	08/13/91	

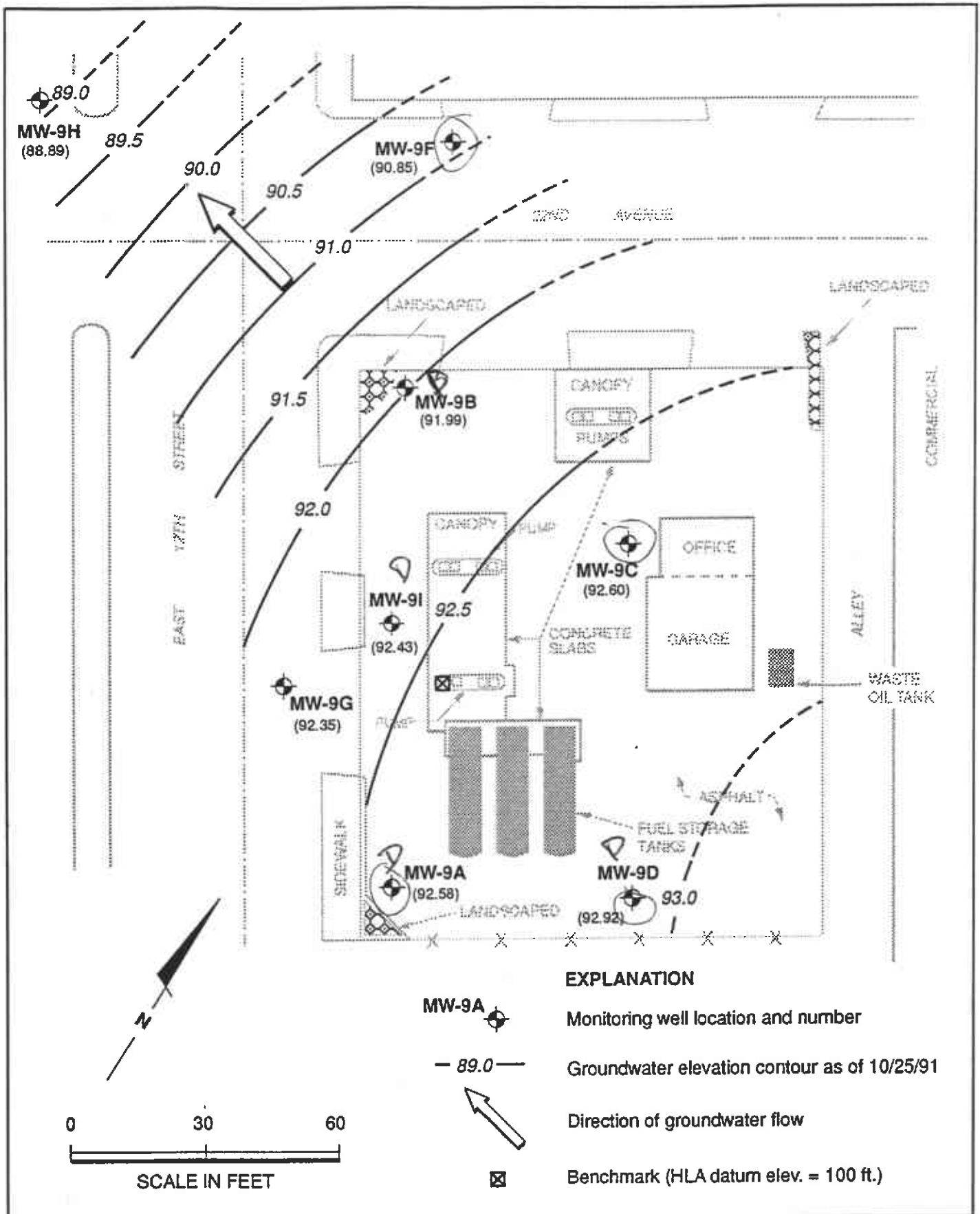


Harding Lawson Associates
Engineering and Environmental Services

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

PLATE **3**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
EH/RHC	2251,175.03	HKW	02/10/92	

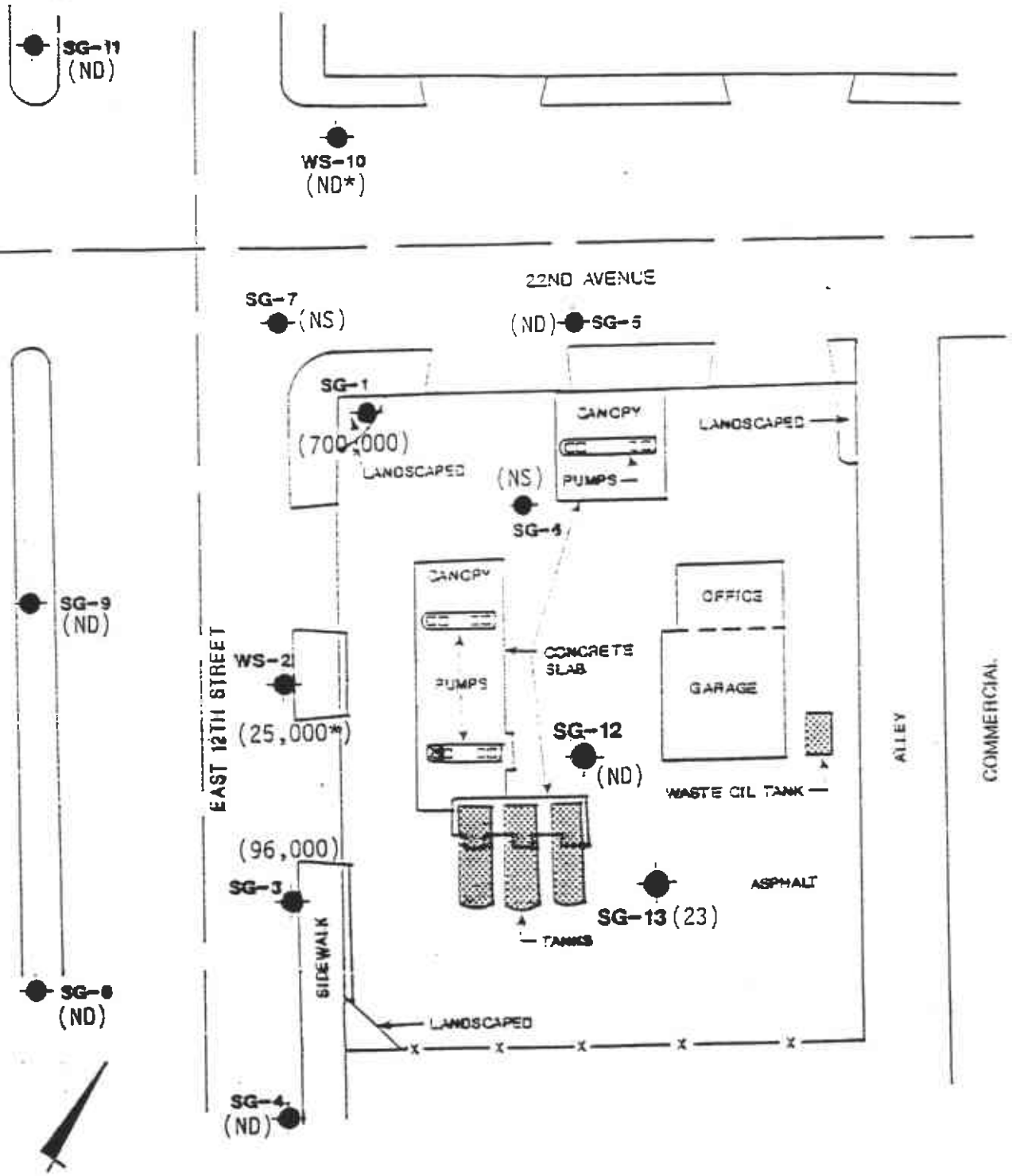


Harding Lawson Associates
Engineering and Environmental Services

Groundwater Surface Map
Former Texaco Service Station
2200 East 12th Street
Oakland, California

PLATE **4**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
EH/RHC	2251,175.03	MKW	03/05/92	



LEGEND

Soil-gas probe location

(23) TPH concentration in micrograms/liter

* Water sample (NS) Not sampled (ND) Not Detected

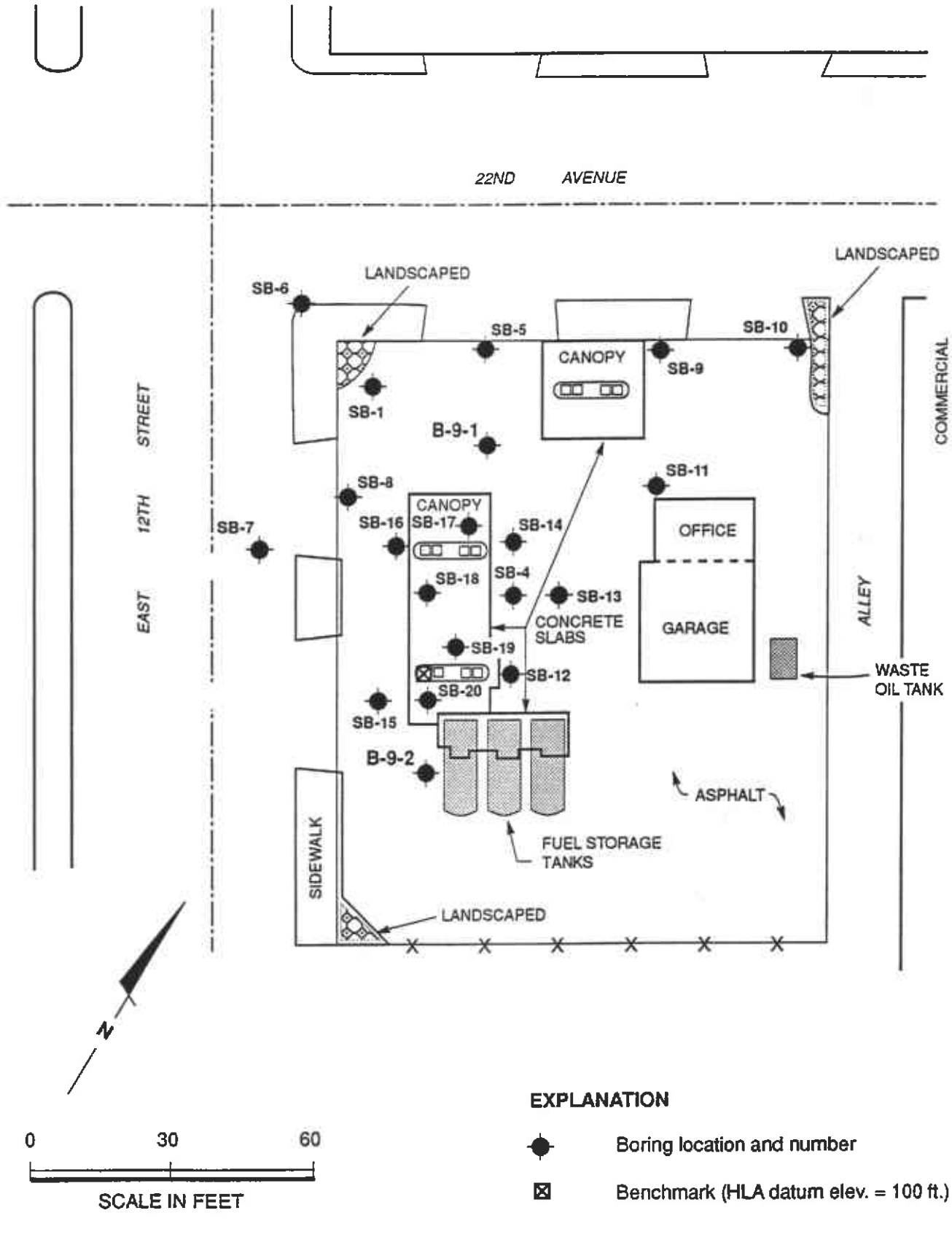
Bench mark (HLA datum El.=100 feet)

Harding Lawson Associates
Engineers and Geoscientists

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

PLATE **5**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
YC	2251,175.03	MKW	08/13/91		

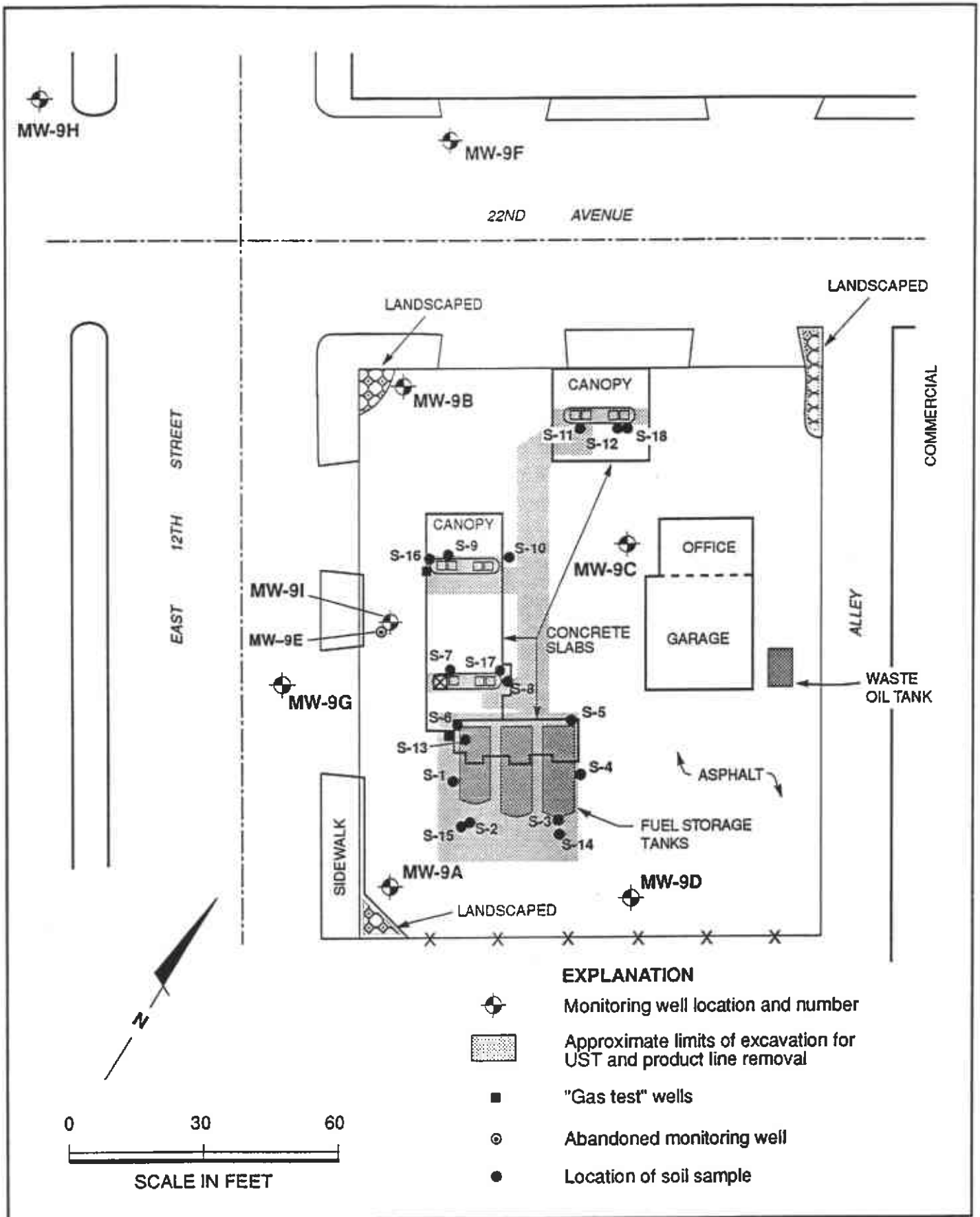


Harding Lawson Associates
Engineering and Environmental Services

Soil Boring Locations
Former Texaco Service Station
2200 East 12th Street
Oakland, California

PLATE 6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
EH/RHC	2251,175.03		11/22/91	



Harding Lawson Associates
Engineering and Environmental Services

UST Removal
Former Texaco Service Station
2200 East 12th Street
Oakland, California

PLATE **7**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
EH/RHC	2251,175.03		12/17/91	

APPENDIX

LABORATORY TEST RESULTS (FOURTH QUARTER 1991)

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Pacific, Inc.
435 Tesconi Circle
Santa Rosa, CA 95401
Tel: (707) 526-7200
Fax: (707) 526-9623

HARDING ASSOC.

NOV 18 1991

Marlene Watson
Harding Lawson Associates
1355 Willow Way, Ste. 109
Concord, CA 94520

Date: 11/14/1991
NET Client Acct No: 34140
NET Pacific Log No: 91.0339
Received: 10/29/1991

Client Reference Information

TEXACO, E 12th St., Job: 2251,~~177~~ 175.03

Sample analysis in support of the project referenced above has been completed and results are presented on following pages. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Approved by:

Jules Skamarack
Laboratory Manager

JS:rct
Enclosure(s)

NET Pacific, Inc

Client No: 34140 Date: 11/14/1991
Client Name: Harding Lawson Associates
NET Log No: 91.0339 Page: 2

Ref: TEXACO, E 12th St., Job: 2251,177.03

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-9A 10/25/1991 103488	MW-9B 10/25/1991 103489	Units
TPH (Gas/BTXE,Liquid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			11-06-91	11-06-91	
DILUTION FACTOR*			1	1	
as Gasoline	5030	0.05	ND	ND	mg/L
METHOD 8020 (GC,Liquid)			--	--	
DATE ANALYZED			11-06-91	11-06-91	
DILUTION FACTOR*			1	1	
Benzene	8020	0.5	ND	1.2	ug/L
Ethylbenzene	8020	0.5	ND	ND	ug/L
Toluene	8020	0.5	ND	ND	ug/L
Xylenes (Total)	8020	0.5	ND	ND	ug/L

NET Pacific, Inc

Client No: 34140
Client Name: Harding Lawson Associates
NET Log No: 91.0339

Date: 11/14/1991
Page: 3

Ref: TEXACO, E 12th St., Job: 2251,177.03

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results MW-9C 10/25/1991 103490	MW-9D 10/25/1991 103491	Units
TPH (Gas/BTXE,Liquid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			11-06-91	11-06-91	
DILUTION FACTOR*			1	1	
as Gasoline	5030	0.05	ND	ND	mg/L
METHOD 8020 (GC,Liquid)			--	--	
DATE ANALYZED			11-06-91	11-06-91	
DILUTION FACTOR*			1	1	
Benzene	8020	0.5	ND	ND	ug/L
Ethylbenzene	8020	0.5	ND	ND	ug/L
Toluene	8020	0.5	ND	ND	ug/L
Xylenes (Total)	8020	0.5	ND	ND	ug/L

Ref: TEXACO, E 12th St., Job: 2251,177.03

			Descriptor, Lab No. and Results		
			MW-9F 10/25/1991	MW-9G 10/25/1991	
Parameter	Method	Reporting Limit	103492	103493	Units
TPH (Gas/BTXE,Liquid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			11-06-91	11-06-91	
DILUTION FACTOR*			1	1	
as Gasoline	5030	0.05	ND	ND	mg/L
METHOD 8020 (GC,Liquid)			--	--	
DATE ANALYZED			11-06-91	11-06-91	
DILUTION FACTOR*			1	1	
Benzene	8020	0.5	1.1	ND	ug/L
Ethylbenzene	8020	0.5	ND	ND	ug/L
Toluene	8020	0.5	ND	ND	ug/L
Xylenes (Total)	8020	0.5	ND	ND	ug/L

NET Pacific, Inc

Client No: 34140
Client Name: Harding Lawson Associates
NET Log No: 91.0339

Date: 11/14/1991
Page: 5

Ref: TEXACO, E 12th St., Job: 2251,177.03

			Descriptor, Lab No. and Results		
			MW-9H 10/25/1991	MW-9I 10/25/1991	
Parameter	Method	Reporting Limit	103494	103495	Units
TPH (Gas/BTXE,Liquid)					
METHOD 5030 (GC,FID)			--	--	
DATE ANALYZED			11-06-91	11-06-91	
DILUTION FACTOR*			1	1	
as Gasoline	5030	0.05	ND	ND	mg/L
METHOD 8020 (GC,Liquid)			--	--	
DATE ANALYZED			11-06-91	11-06-91	
DILUTION FACTOR*			1	1	
Benzene	8020	0.5	ND	ND	ug/L
Ethylbenzene	8020	0.5	ND	ND	ug/L
Toluene	8020	0.5	ND	ND	ug/L
Xylenes (Total)	8020	0.5	ND	ND	ug/L

NET Pacific, Inc

Client No: 34140 Date: 11/14/1991
Client Name: Harding Lawson Associates
NET Log No: 91.0339 Page: 6

Ref: TEXACO, E 12th St., Job: 2251,177.03

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Gasoline	0.05	ug/L	116	ND	118	99	18
Benzene	0.5	ug/L	116	ND	96	78	21
Toluene	0.5	ug/L	116	ND	104	85	20

COMMENT: Blank Results were ND on other analytes tested.

NET Pacific, Inc

KEY TO ABBREVIATIONS and METHOD REFERENCES

<	:	Less than; When appearing in results column indicates analyte not detected at the value following. This datum supercedes the listed Reporting Limit.
*	:	Reporting Limits are a function of the dilution factor for any given sample. To obtain the actual reporting limits for this sample, multiply the stated Reporting Limits by the dilution factor (but do not multiply reported values).
ICVS	:	Initial Calibration Verification Standard (External Standard).
mean	:	Average; sum of measurements divided by number of measurements.
mg/Kg (ppm)	:	Concentration in units of milligrams of analyte per kilogram of sample, (parts per million).
mg/L	:	Concentration in units of milligrams of analyte per liter of sample.
mL/L/hr	:	Milliliters per liter per hour.
MPN/100 mL	:	Most probable number of bacteria per one hundred milliliters of sample.
N/A	:	Not applicable.
NA	:	Not analyzed.
ND	:	Not detected; the analyte concentration is less than applicable listed reporting limit.
NTU	:	Nephelometric turbidity units.
RPD	:	Relative percent difference, 100 [Value 1 - Value 2]/mean value.
SNA	:	Standard not available.
ug/Kg (ppb)	:	Concentration in units of micrograms of analyte per kilogram of sample, (parts per billion).
ug/L	:	Concentration in units of micrograms of analyte per liter of sample.
umhos/cm	:	Micromhos per centimeter.

Method References

Methods 100 through 493: see "Methods for Chemical Analysis of Water & Wastes", U.S. EPA, 600/4-79-020, rev. 1983.

Methods 601 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants" U.S. EPA, 40 CFR, Part 136, rev. 1988.

Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", U.S. EPA SW-846, 3rd edition, 1986.

SM: see "Standard Methods for the Examination of Water & Wastewater, 17th Edition, APHA, 1989.

[redacted]ing L[redacted]n Associates
1355 Willow Way, Suite 109
Concord, California 94520
415/687-9660
Telecopy: 415/687-9673

CHAIN OF CUSTODY FORM

Lab: NET (1797)

Samplers: ~~SBH / JEM~~ STEVE H. HANSEN

Job Number: 2251,177.03

Name/Location: TEXACO E. 12th STREET JAMES E. McCOY

Project Manager: MARLENE WATSON

Recorder: (Signature Required)

SOURCE CODE	MATRIX: Water	Sediment	Soil	Oil	#CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	HCl	SAMPLE NUMBER OR LAB NUMBER: Yr	Wk	Seq	DATE: Yr	Mo	Dy	Time
23	X							3	MW-	9	A	91	10	25	
23	X							3	MW-	9	B	91	10	25	
23	X							3	MW-	9	C	91	10	25	
23	X							3	MW-	9	D	91	10	25	
23	X							3	MW-	9	F	91	10	25	
23	X							3	MW-	9	G	91	10	25	
23	X							3	MW-	9	H	91	10	25	
23	X							3	MW-	9	I	91	10	25	

STATION DESCRIPTION/ NOTES

STANDARD TURNAROUND

ANALYSIS REQUESTED

EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	ICP METALS	EPA 8015M/TPH	TPHg BTEX
						X
						X
						X
						X
						X
						X
						X
						X

LAB NUMBER: Yr	Wk	Seq	DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS
						CUSTODY SEALED 10/28/91 17:30 J.W.

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
		10/28/91 12:00
RELINQUISHED BY: (Signature) 10/28 17:30	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
DISPATCHED BY: (Signature) DATE/TIME	RECEIVED FOR LAB BY: (Signature)	DATE/TIME 10/29/91 0800
METHOD OF SHIPMENT UPS		

Laboratory Copy White — Project Office Copy Yellow — Field or Office Copy Pink

6533

DISTRIBUTION

4 copies: Texaco Refining and Marketing Inc.
108 Cutting Boulevard
Richmond, California 94804

Attention: Mr. R. R. Zielinski

MKW/MAS/pkp 031892T/R53

QUALITY CONTROL REVIEWER

Sven W. Edlund
Project Environmental Specialist