Texaco USA
10 Universal City Plaza
PO Box 7811
Universal City CA 91608-7812

90 MAY 15 AM 11:00

ask Arni if I should
handle or not

May 18, 1990

Mr. Rafat Shahid
Alameda County Environmental Health Dept.
Hazardous Materials Division
80 Swan Way, Room 200
Oakland,CA 94621

Dear Mr. Shahid:

Enclosed, please find the Soil and Groundwater Remediation plan for the former Texaco Station located at 2200 East 12th Street, Oakland, California.

If you have any questions, please feel free to contact Gene Freed at (818) 505-2605.

Sincerely,

Kim Gumbiner

Kim Gumbiner
Texaco Environmental Services
Administrative Asst.

Enclosure

6/28/90
Writing for a deposit of $500 from Texaco
sent letter to Mr. Ron Zielinski requesting deposit

A Report Prepared for

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

SOIL AND GROUNDWATER REMEDIATION PLAN
FORMER TEXACO STATION NO. 62488000088
2200 EAST 12TH STREET
OAKLAND, CALIFORNIA

May 11, 1990
1990 Report No. 2

HLA Job No. 2251,112.03

by

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Project Engineer

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Geotechnical Engineer

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TABLE OF CONTENTS

LIST OF TABLES..... iii

LIST OF ILLUSTRATIONS..... iii

I INTRODUCTION..... 1

II BACKGROUND..... 2

A. Previous Investigation..... 2
B. Hydrogeologic Setting..... 2
C. Petroleum Hydrocarbons in Vadose-zone Soil... 3
D. Petroleum Hydrocarbons in Groundwater..... 5
E. Source of Dissolved Hydrocarbons..... 6
F. Aquifer Hydraulic Testing..... 6

III RECOMMENDED CLEAN-UP LEVELS..... 7

A. Soil Clean-up Level..... 7
B. Rationale for Soil Clean-up Level..... 7
C. No Action Groundwater Clean-up Recommendation..... 9

IV REMEDIAL ALTERNATIVES..... 10

V DESCRIPTION AND EVALUATION OF THE SELECTED REMEDIAL ACTION..... 12

A. Soil Remediation..... 12
B. Schedule..... 13

VI TABLES..... 15

VII ILLUSTRATIONS

APPENDICES

A CALIFORNIA DEPARTMENT OF HEALTH SERVICES, REVISED ACTION LIST FOR CHEMICAL CONTAMINANTS OF DRINKING WATER

B BAY AREA AIR QUALITY MANAGEMENT DISTRICT, REGULATION 8, RULE 40

DISTRIBUTION

LIST OF TABLES

Table	1	Results of Soil Analyses
Table	2	Results of Soil-gas Survey Analyses
Table	3	Results of Groundwater Analyses
Table	4	Well Monitoring and Survey Data
Table	5	Slug Test Results
Table	6	Analysis of Alternatives for Soil Remediation

LIST OF ILLUSTRATIONS

Plate	1	Site Location
Plate	2	Site Plan
Plate	3	Soil-gas Probe Locations
Plate	4	Distribution of TPH in Vadose-zone Soil
Plate	5	Distribution of Hydrocarbons in Groundwater
Plate	6	Groundwater Surface Map
Plate	7	Anticipated Remediation Schedule

I INTRODUCTION

In this report, Harding Lawson Associates (HLA) presents a remediation plan for petroleum hydrocarbons in the soil at a service station formerly owned by Texaco Refining and Marketing Inc., at 2200 East 12th Street in Oakland, California (Plate 1).

HLA has been investigating the site since May 1988. We have used the results of our investigation to delineate the distribution of gasoline constituents in vadose-zone soils and the lateral extent of a dissolved gasoline plume in the shallow groundwater. Concentrations of total petroleum hydrocarbons (TPH) as gasoline exceed 100 parts per million (ppm) in vadose-zone soils in an area near the pump islands, on the west side of the station. Small concentrations of petroleum products have been detected in two of seven monitoring wells during the most recent groundwater sampling.

The purpose of the proposed remediation plan is to remove hydrocarbon-bearing soils from the vadose zone and thereby to prevent additional hydrocarbons from entering the groundwater. We propose to recap the surface to seal off additional exposure of the soils to hydrocarbons, and to monitor groundwater conditions quarterly for a one-year period.

Should be monitored for as long as there is detectable product and then min. of 1 yr w/ N.D.s thereafter

II BACKGROUND

A. Previous Investigation

To date, HLA's investigation has been performed in three sequential phases, results of which 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

HLA issues quarterly technical reports to Texaco Refining and Marketing Inc., which describe continuing activities and current findings.

B. Hydrogeologic Setting

According to the California Department of Water Resources (DWR), the East Bay Plain consists of seven groundwater subareas, defined on the basis of areal differences (i.e., faults and geologic conditions). This site lies within the Oakland Upland and Alluvial Plain subarea. Most groundwater used in the East Bay Plain is for irrigation or industrial, rather than domestic, purposes. The majority of domestic water is supplied by the East Bay Municipal Utility District (EBMUD).

The groundwater reservoir is made up of the Alameda and Temescal formations, along with the Merritt Sand; these have an aggregate thickness of more than 1,100 feet. Regional groundwater flow direction is west-southwest, toward San Francisco Bay.

Subsurface exploration of the upper 20 feet at the site indicates that soils generally consist of unconsolidated, stiff, sandy clay (CL), interbedded with occasional silty sand and gravel lenses. During drilling for our investigation, we initially encountered groundwater between 11 and 13 feet below grade. Groundwater stabilized in the wells at approximately 6.5 feet below grade.

Well monitoring and survey data are presented in Table 4. The calculated direction of groundwater flow is predominantly west, with a gradient ranging between 0.02 and 0.008 foot per foot, as shown on the Groundwater Surface Map, Plate 6.

C. Petroleum Hydrocarbons in Vadose-zone Soil

To delineate the distribution of gasoline hydrocarbons in vadose-zone* soils, a total of 23 shallow soil borings were drilled to a depth of approximately 8 feet between May 1988 and October 1989 (Plate 2). In September 1988, 14 soil-gas samples were collected at locations shown on Plate 3. All soil-gas samples and selected soil samples were tested for levels of benzene, toluene, ethylbenzene, and xylenes (BTEX) and TPH as gasoline (Tables 1 and 2).

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.

---

* "Vadose-zone" refers to soils found between the ground surface and the top of the water table.

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. Only two samples contained TPH at concentrations exceeding 100 ppm. These samples were from borings MW-9E and SB-4, respectively on the west and east sides 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 where TPH concentrations exceeded 100 ppm. The distribution of hydrocarbons in the vadose zone is illustrated on Plate 4, and results of chemical analyses on soil samples are presented in Table 1.

Relatively high concentrations of BTEX and TPH were detected in soil-gas samples from probe locations SG-1 and SG-3. The distribution of hydrocarbons in soil gas is shown on Plate 3, and results of chemical analyses on soil-gas samples are presented in Table 2. The soil gas concentrations at SG-1 appear to be related to the presence of residual levels of petroleum hydrocarbons that have migrated with the groundwater (see next subsection). The soil gas concentrations at SG-3 appear to be anomalous because the soil borings and monitoring wells near this probe indicate the absence of petroleum hydrocarbons.

D. Petroleum Hydrocarbons in Groundwater

Eight groundwater monitoring wells were installed between June 1988 and November 1988 (Plate 5). Shallow groundwater in the site vicinity contains detectable quantities of dissolved BTEX; the distribution of BTEX is shown on Plate 5 and results of chemical analyses on groundwater samples are presented in Table 3. A groundwater sample from soil-gas probe location WS-2 also contained concentrations of benzene and TPH. Laterally, the extent of BTEX dissolved in groundwater is well delineated. The BTEX plume appears to extend downgradient toward the intersection of East 12th Street and 22nd Avenue.

The highest concentrations of BTEX have been observed in MW-9B. Between June 1988 and October 1989, combined concentrations of BTEX dropped from 584 to 4 parts per billion (ppb). In October 1989, samples from MW-9B and MW-9E exhibited benzene concentrations in groundwater (4 and 15 ppb, respectively) in excess of Maximum Contaminant Levels (MCLs).* No other constituent exceeds the MCLs or Drinking Water Action Levels (DWALs).

---

* The DOHS issued a revised action list for chemical contaminants of drinking water in a letter dated April 19, 1989 (Appendix A). 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. Drinking Water Action Levels (DWALs) are recommended levels, but are not enforced by law.

E. Source of Dissolved Hydrocarbons

It is mostly likely that the presence of fuel hydrocarbons in shallow groundwater resulted from surface spillage. We understand that a tank system integrity test conducted in 1988 indicated that the fuel dispensing system was tight. Other possible contributing factors include overfilling during product delivery and line or tank leakage prior to 1988.

F. Aquifer Hydraulic Testing

HLA performed hydraulic testing in MW-9B and MW-9E in February 1989; hydraulic conductivity is estimated at 0.42 and 0.52 foot per day, respectively. A volume (slug) of water was removed from each well, using a centrifugal suction pump. A pressure transducer, placed near the bottom of the wells, was used to measure water-level recovery following slug withdrawal. The output of the transducer was recorded with a data logger for subsequent analysis. The most permeable stratum adjacent to the screen in the saturated zone was classified as hydraulically confined or unconfined. Slug test results are presented in Table 5.

III RECOMMENDED CLEAN-UP LEVELS

This section describes recommended clean-up levels for petroleum hydrocarbons in surface soils and groundwater at the East 12th Street site, and presents rationales for selecting these clean-up levels. Proposed areas for soil remediation and approximate depths of excavation are also discussed.

A. Soil Clean-up Level

We recommend that soils containing concentrations of TPH greater than 100 mg/kg in the vicinity of MW-9E, specifically between the sidewalk and the canopy covering the western pump islands, be excavated. The proposed excavation area (shown on Plate 2) is readily accessible to a backhoe without removing the canopy; we propose to excavate down to the water table, approximately 6 feet below grade. The defined area is approximate, and we will conduct confirmation sampling.

OK

The volume of soil involved (indicated by shading on Plate 2) is estimated to be 75 cubic yards (CY). Assuming a contingency factor of 30 percent to account for uncertainties inherent in our investigation, we estimate the maximum total volume of soil to be excavated at 100 CY.

B. Rationale for Soil Clean-up Level

Current site conditions enable Texaco to remove hydrocarbons in the vadose zone that could leach into groundwater. The proposed excavation will remove soils containing more than 1,000 ppm TPH, as well as accessible soils containing more than 100 ppm.

Given the relatively low concentrations of hydrocarbons in groundwater under current conditions, groundwater quality should be adequately protected by removal of the hydrocarbon source shown on Plate 4.

Currently, the groundwater at this site may be in contact with soil containing TPH at levels up to 1,900 ppm. This contact produces combined BTEX concentrations in groundwater at MW-9E of 17.5 ppb. Because the hydrocarbon plume in groundwater encompasses the location of vadose-zone hydrocarbons (Plate 4 and 5) and extends immediately downgradient of it, we conclude that these vadose-zone soils are the cause of BTEX in the groundwater. Therefore, we believe that removal of hydrocarbon-laden soils will lead to the reduction of concentrations of BTEX in groundwater.

The excavation area shown on Plate 2 includes the soils most heavily affected by petroleum hydrocarbons. We believe that the excavation can be performed without removing the pump islands, canopy, or fuel lines.

The presence of TPH in a soil sample at a concentration of 160 ppm from SB-4 has been well defined as a small and isolated occurrence. We do not recommend excavating that area for two reasons.

1. SB-4 is within 4 feet of fuel lines; we believe that the risk of rupturing a fuel line poses a greater threat to groundwater quality than leaving soil with relatively low levels of hydrocarbons in place.

2. The ground surface is completely paved over SB-4, thereby minimizing the potential for hydrocarbons to

migrate from the soil to the groundwater via percolating surfacewater.

C. No Action Groundwater Clean-up Recommendation

Plate 5 shows the distribution of hydrocarbons (combined BTEX) in groundwater. HLA believes that these concentrations are very low (below drinking water standards with only two exceptions) and are generally decreasing with time. We believe that no active groundwater remediation is needed on site on the basis of these data.

The primary exposure pathway of petroleum hydrocarbons at this site to humans is through ingestion of groundwater. Our Sensitive Receptor Study report indicate no registered drinking water wells within 1/4 mile of the site. Therefore, human health appears to be adequately protected from the primary expose pathway. The only other potential use of groundwater from this shallow zone is for industrial purposes. However, the hydraulic conductivity of this zone is so small that it cannot be used for such purposes.

With the removal of the hydrocarbon source at MW-9E, we believe that continued decreasing concentrations of fuel product in groundwater will result through natural degradation. We further believe that the low concentration of petroleum hydrocarbons will absorb into the low permeability materials and not migrate significantly beyond their present limits.

IV REMEDIAL ALTERNATIVES

In evaluating remedial alternatives for this site, HLA used the following criteria:

- Remediation should be cost-effective, acceptable to regulatory agencies, and should minimize the risks to human health and the environment
- Site remediation should involve proven technologies that do not require extensive monitoring and maintenance
- The remedial scheme should minimize disruption to station operations and reduce space requirements for treatment.

For soil remediation, we considered the following four alternatives:

A1. Excavation of soils containing hydrocarbons at or above clean-up levels, and disposal of removed soils in Class I and Class II landfills

A2. Excavation of soils containing hydrocarbons at or above clean-up levels, aeration of excavated soils on site, and disposal at a Class III landfill

A3. Excavation of soils containing hydrocarbons at or above clean-up levels, aeration of excavated soils on site, and backfilling excavation with treated soil

A4. In-situ volatilization of hydrocarbons from soil, using a soil venting system.

The results of our evaluation, including cost, effectiveness, space and time requirements for treatment, and a rating of long-term liability, are summarized in Table 6. By comparing these factors, we have selected Alternative A2 as the best alternative for soil remediation at this site.

The cost estimates in Table 6 are based on HLA's experience with similar projects, as well as on discussions with vendors and contractors who perform remediation. These cost estimates are preliminary and presented on an "order-of-magnitude" basis. Several factors used to develop the estimates can vary significantly, such as actual volume and distribution of soil to be treated, unit costs to remediate soil, and the type of disposal facility (Class II or Class III) that will accept the treated soil. These costs do not include the loss of revenue during station downtime.

The soil remediation scheme includes quarterly groundwater monitoring for a one year period to confirm the decreasing concentration of petroleum hydrocarbons at MW-9B and MW-9E.

V DESCRIPTION AND EVALUATION OF THE SELECTED REMEDIAL ACTION

A. Soil Remediation

1. General Project Description

The selected soil remediation plan entails excavating soil with hydrocarbon concentrations at and above 100 ppm from an area of approximately 17 by 20 feet between the sidewalk and the canopy covering the western pump islands (Plate 2). The depth of excavation will be approximately 6 feet (depth of water table). Confirmation samples, taken from the walls and bottom of the excavation, will be used to document that hydrocarbon concentrations in the remaining soils are below 100 ppm. ~75 yd^3

Once excavation is completed, the excavated area will be backfilled with properly compacted clean material, and paved, to return the station to normal operations. A new monitoring well will be installed in the same location as MW-9E. Excavated soils will be piled in a working area approximately 90 feet by 30 feet on the eastern corner of the station property (see Plate 2), and covered.

A portion of the soils will be spread one foot thick over the available space in compliance with Bay Area Air Quality Management District Regulation 8, Rule 40 (see Appendix B), and agitated with mechanical equipment daily until hydrocarbon concentrations drop below 100 ppm. That soil will be placed in a separate pile and another portion from the contaminated stockpile will be spread for aeration. Once all stockpiled soil has been

treated (aerated) to acceptable levels (100 ppm), it will be hauled to a Class III landfill.

2. Technical Advantages and Disadvantages

Table 6 lists advantages and disadvantages of the selected soil remediation alternative A2. These are more fully described below.

Effectiveness: Excavation of soil containing hydrocarbon concentrations at or above 100 ppm will result in immediate effectiveness. However, this scheme will have no effect on areas containing hydrocarbons at concentrations of less than 100 ppm.

Space and Time Requirements: To implement this scheme, a relatively large treatment area will be required; however duration of treatment will be relatively short.

Long-term Liability: Soils containing 1,000 ppm or more hydrocarbons may be classified as hazardous and represent a potential future liability. Under the recommended remediation plan, contaminated soils will be treated on site to hydrocarbon levels below 100 ppm, thus removing this potential liability.

Complexity: The recommended remediation plan will be moderately labor-intensive during the treatment period.

Cost: The recommended plan is the least costly of alternatives evaluated.

B. Schedule

We anticipate that the proposed soil remediation measure can be initiated within one month after approval is obtained from the

appropriate regulatory agency to proceed with the work outlined herein (see Anticipated Remediation Schedule, Plate 7).

Table 1. Results of Soil Analyses
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 (1.0)
SB-13	4.0	ND	ND	0.1	ND	1.7
(1.0)						
SB-14	4.5	ND	ND	ND	ND	3.5
(1.0)						
SB-15	3.5	0.07	ND	ND	ND	6.3
(1.0)						
SB-16	4.5	0.21	0.08	ND	ND	9.0
(1.0)						
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 2. Results of Soil-gas Survey Analyses
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 Groundwater Analyses
Concentrations in micrograms per liter (µg/L)

EPA TEST METHOD 602

Well Number	Date Sampled	Benzene	Ethylbenzene	Toluene	Xylenes
MW-9A	06/13/88	ND	ND	ND	ND
	10/24/88	ND	ND	ND	ND
	10/13/89	ND	ND[1]	ND[1]	ND[2]
MW-9B	06/13/88	350	66	7.8	160
	10/24/88	84	3.1	ND	3.2
	10/13/89	4.1	ND[1]	ND[1]	ND[2]
MW-9C	06/13/88	ND	ND	ND	ND
	10/28/88	ND	ND	ND	ND
	10/13/89	ND	ND[1]	ND[1]	ND[2]
MW-9D	10/24/88	ND	ND	ND	ND
	10/13/89	ND	ND[1]	ND[1]	ND[2]
MW-9E	10/24/88	1.3	ND	ND	ND
	10/13/89	15	2.1[1]	ND[1]	ND[2]
MW-9F	12/06/88	ND	ND	ND	ND
	10/13/89	ND	ND[1]	ND[1]	ND[2]
MW-9G	12/06/88	0.8	ND	ND	ND
	10/13/89	ND	ND[1]	ND[1]	ND[2]
MW-9H	12/06/88	ND	ND	ND	ND
	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 4. Well Monitoring and Survey Data

Well No.	Top of Casing Elevation* (feet)	Depth to Groundwater** (feet)	Groundwater Surface Elevation+ (feet)
MW-9A	100.07	7.25	92.82
MW-9B	98.41	6.14	92.27
MW-9C	99.73	6.99	92.74
MW-9D	101.46	8.40	93.06
MW-9E	98.41	5.70	92.71
MW-9F	96.96	6.07	90.89
MW-9G	98.51	6.01	92.50
MW-9H	97.14	8.35	88.79

Notes:

* Elevation relative to HLA temporary benchmark at the western corner of the dispenser island nearest the underground storage tanks, with an arbitrary elevation of 100.0 feet (see Plate 2).

** Depth to groundwater on October 12, 1989.

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

Table 5. Slug Test Results

Well Number	Lithology of Most Permeable Stratum	Classification of Stratum	Thickness of Stratum (feet)	Estimated Hydraulic Conductivity of Stratum (feet/day)
MW-9B	clayey sand	confined	2.5	0.42
MW-9E	sandy clay with gravel	confined	13.0	0.52

Table 6. Analysis of Alternatives for Soil Remediation

Treatment Effectiveness

	Alternative			
	A1	A2	A3	A4
>1,000 ppm	Immediate	Immediate	Immediate	Gradual
> 100 ppm	Immediate	Immediate	Immediate	Gradual
< 100 ppm	(Natural Degradation)	(Natural Degradation)	(Natural Degradation)	Gradual
Station Downtime	1 week	1 week	26 weeks	1 week
Space Requirements	None	30' x 90'	30' x 90'	~20' x 20'
Duration of Soil Aeration	None	6 - 12 weeks	26 weeks	1 - 2 years
Long-term Liability	Low	Low	Low	Low
Complexity	Low	Moderate	High	High
Cost*	$106,000	$66,000	$102,000	$102,000

Alternatives

A1. Excavation of soils containing hydrocarbons at or above clean-up levels, and disposal at Class I and Class II landfills

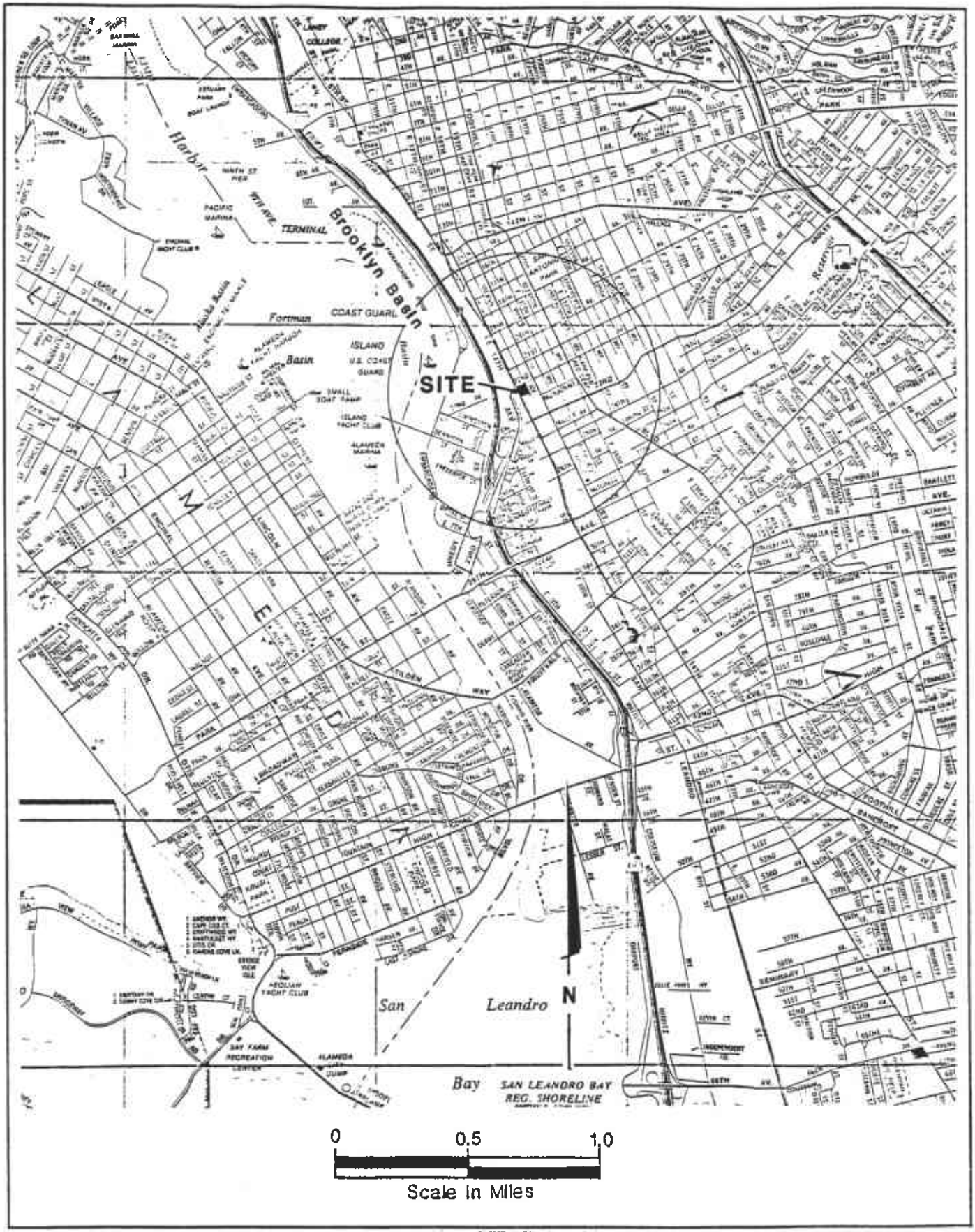
A2. Excavation of soils containing hydrocarbons at or above clean-up levels, aeration of excavated soils on site, and disposal at a Class III landfill

A3. Excavation of soils containing hydrocarbons at or above clean-up levels, aeration of excavated soils on site, and backfilling excavation with treated soil

A4. In-situ volatilization of hydrocarbons from soil with soil venting system.

* Cost estimates are within ± 40% and include costs related solely to the remediation of soils on-site.

105648

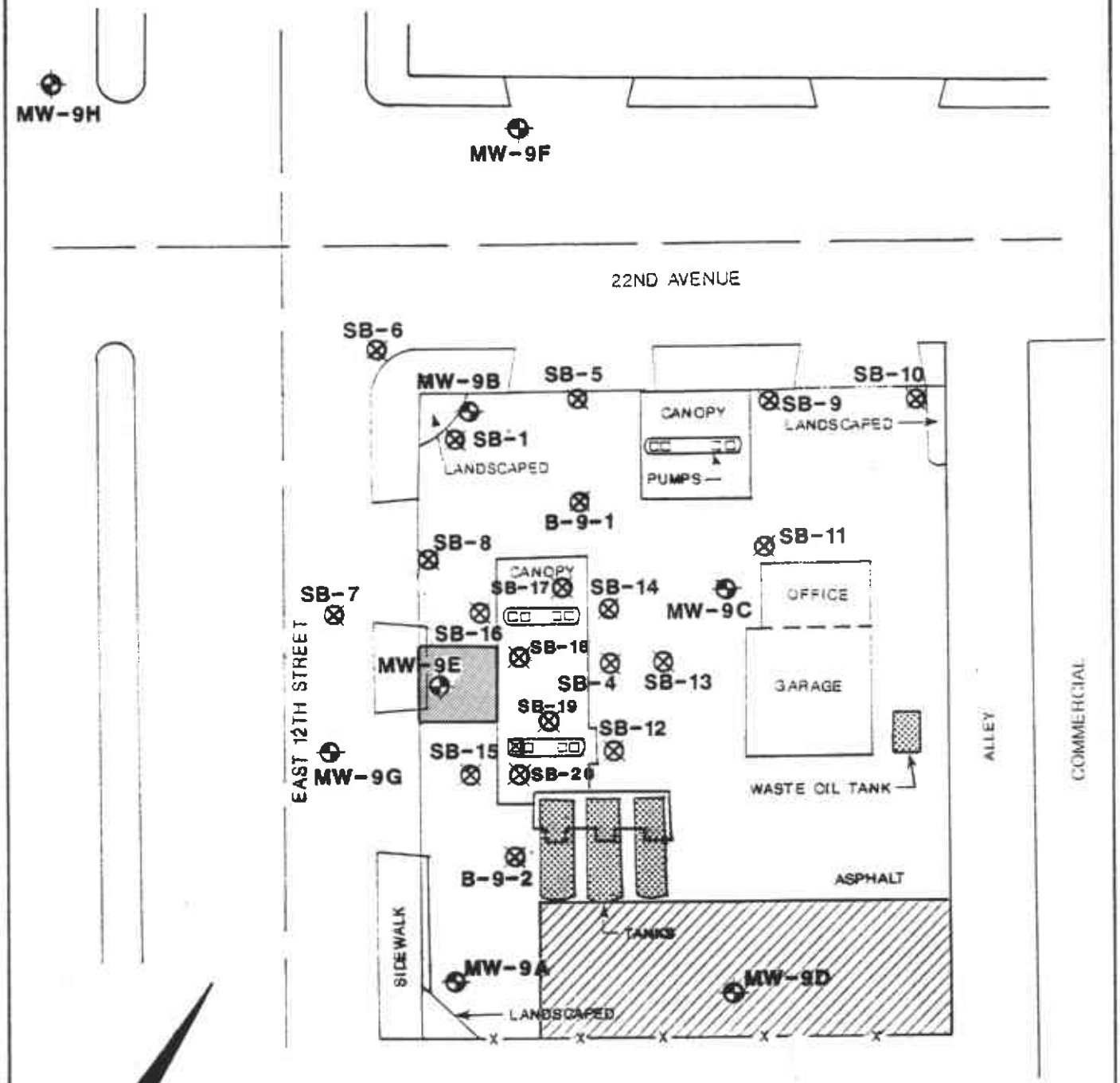


Harding Lawson Associates
Engineers and Geoscientists

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

PLATE
1

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



EXPLANATION

- Treatment area
- Excavation area
- MW-9A — Monitoring well location and number
- B-2 — Boring location and number
- Bench mark (HLA datum El.=100 feet)

23 borings

0 30
Scale in feet

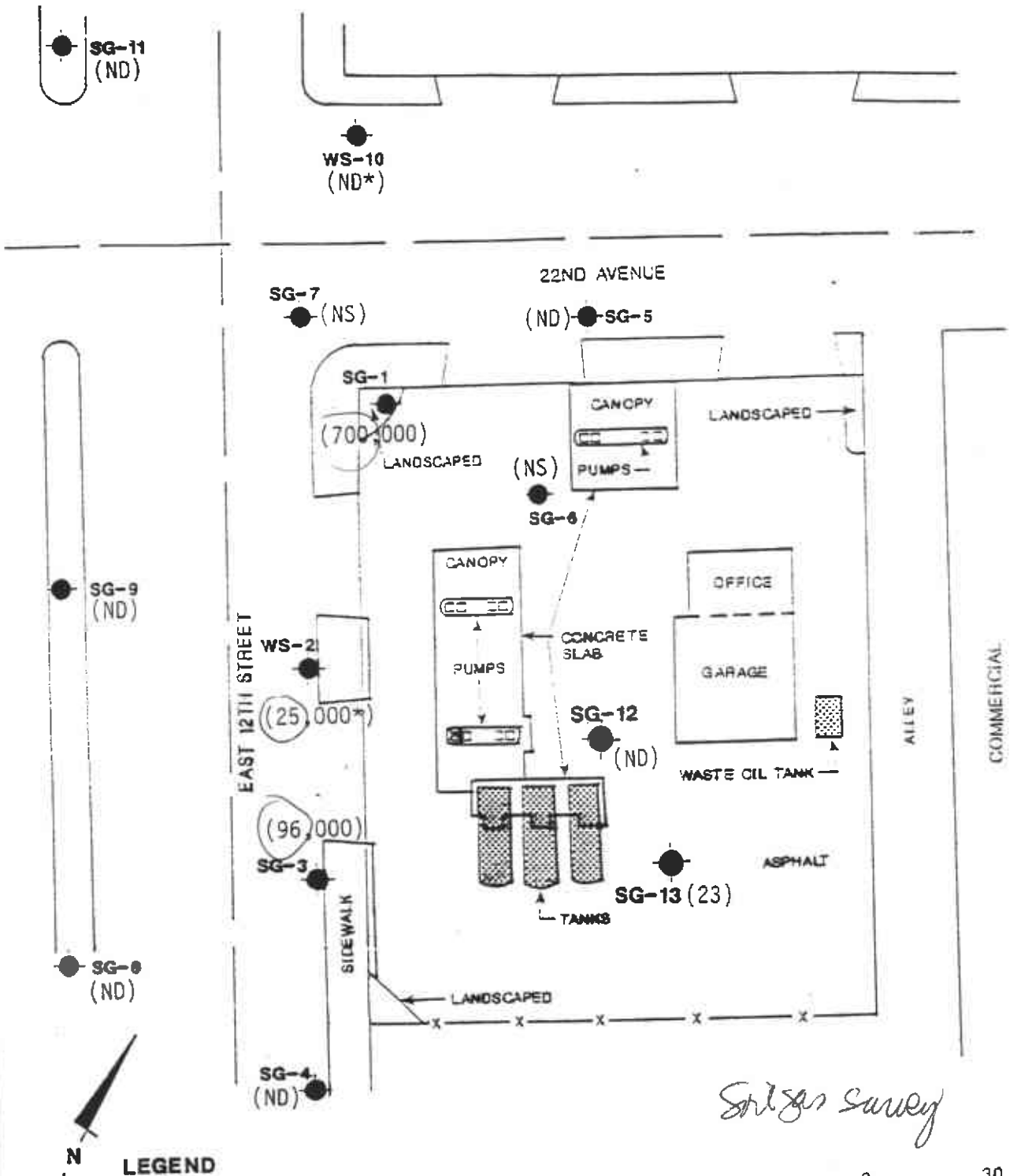
Harding Lawson Associates
Engineers and Geoscientists

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

PLATE **2**

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

105449



LEGEND

Soil-gas probe location

(23) TPH concentration in micrograms/liter

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

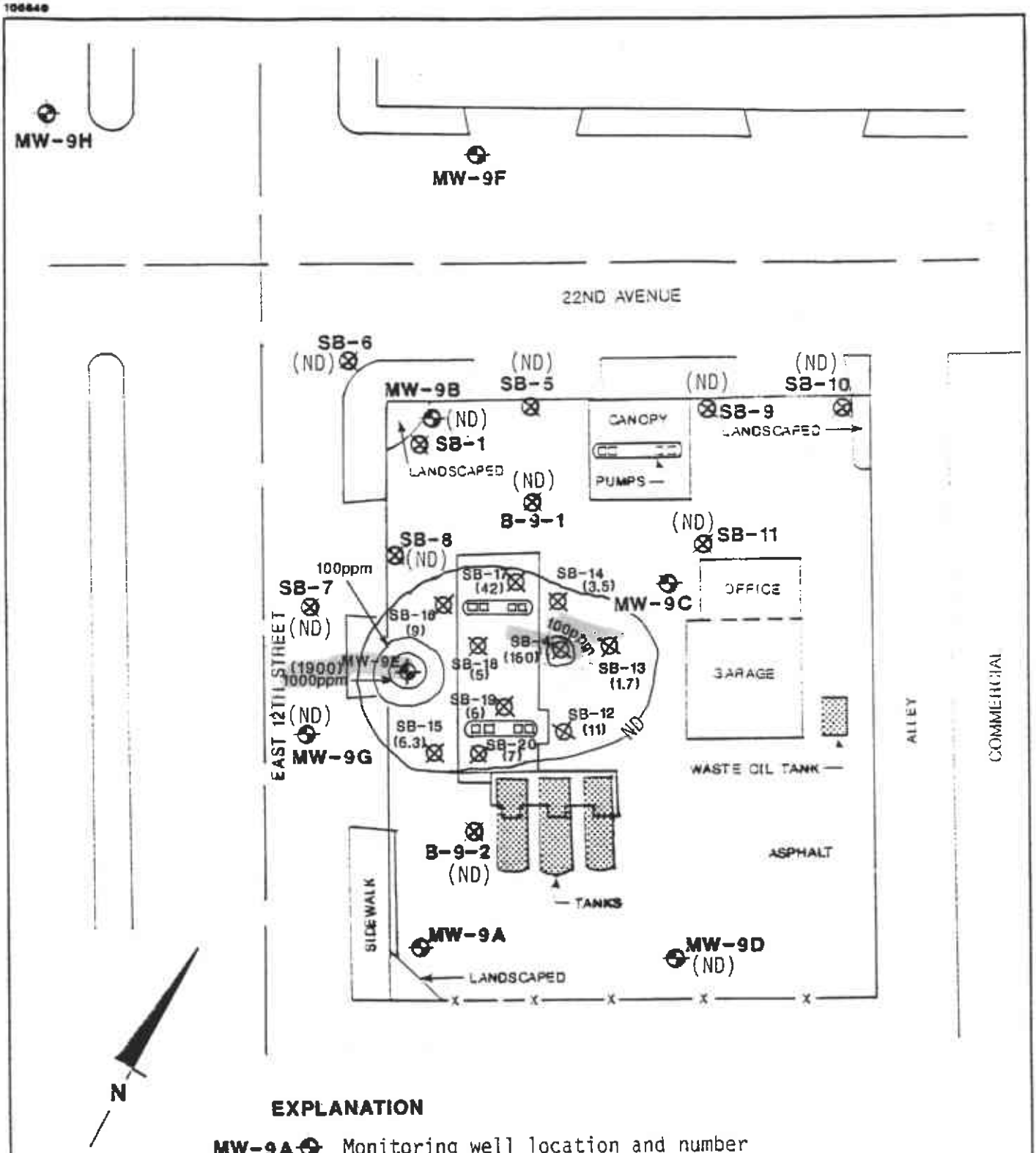
Bench mark (HLA datum El.=100 feet)

Harding Lawson Associates
Engineers and Geoscientists

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

PLATE
3

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



EXPLANATION

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

B-2 ⊗ Boring location and number

ND Non detectable

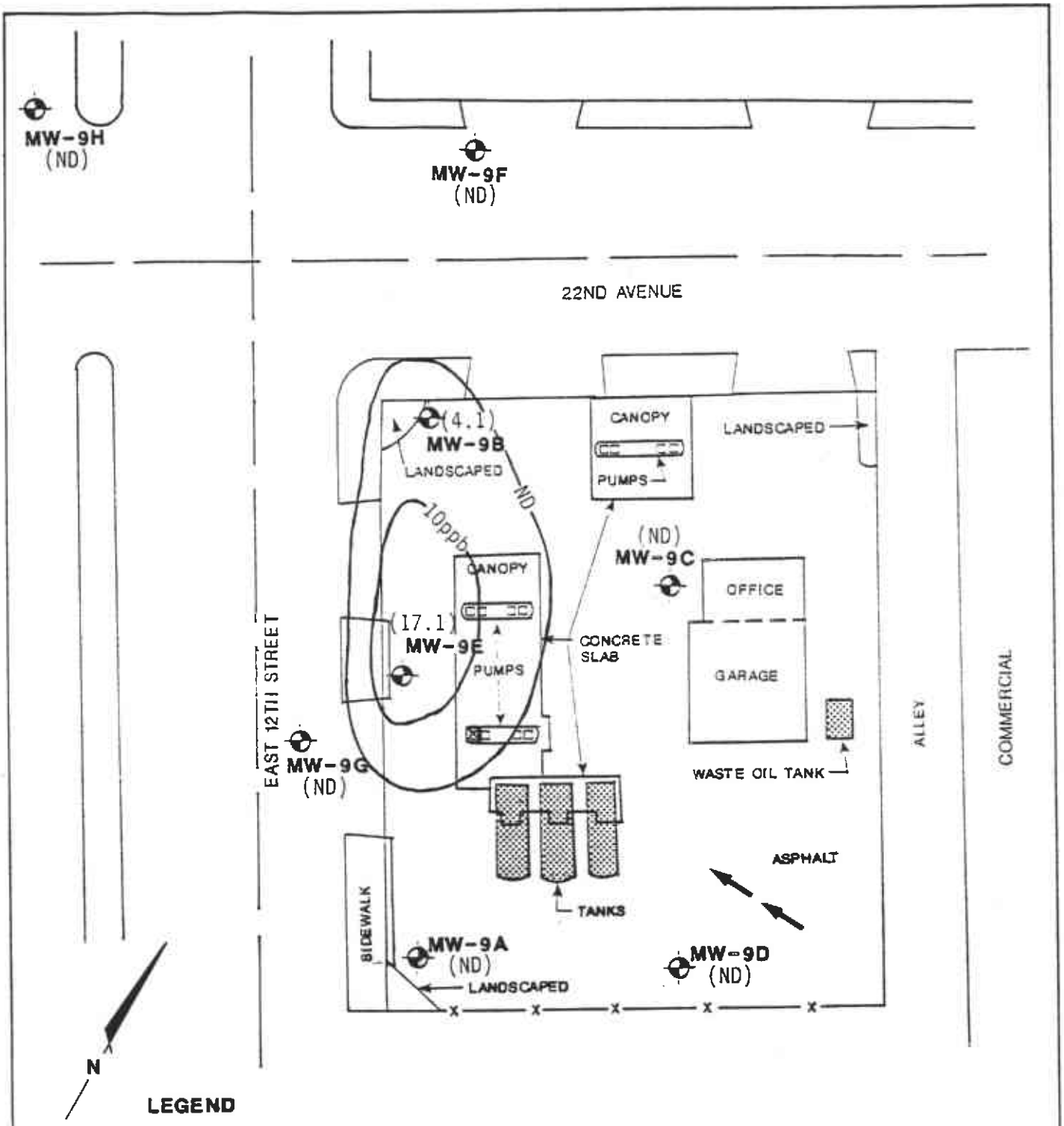
0 30
Scale in feet

Harding Lawson Associates
Engineers and Geoscientists

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

PLATE **4**

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

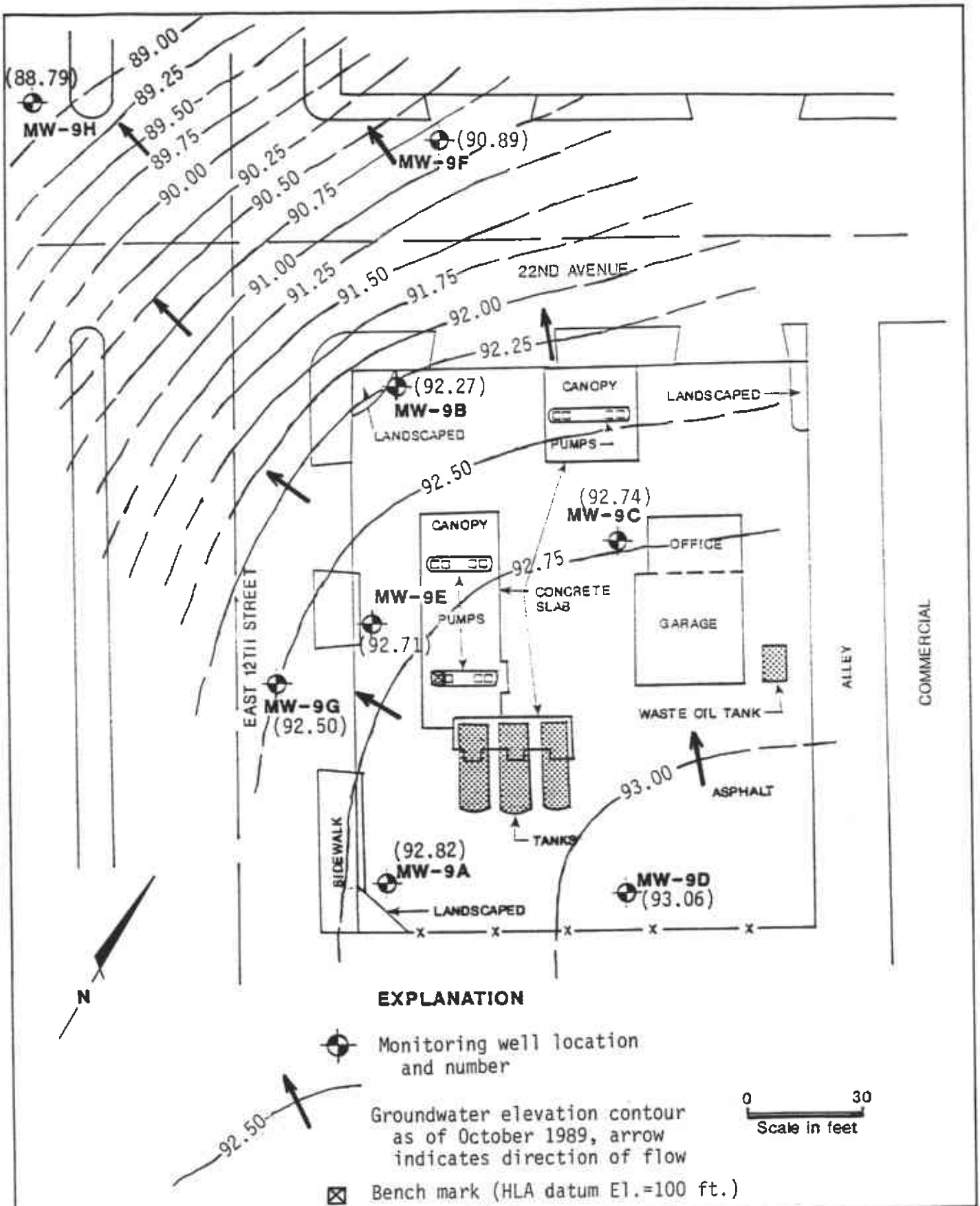


Harding Lawson Associates
Engineering and Environmental Services

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

PLATE **5**

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



Harding Lawson Associates
Engineering and Environmental Services

Groundwater Surface Map (10/89)
Former Texaco Service Station
2200 East 12th Street
Oakland, California

PLATE **6**

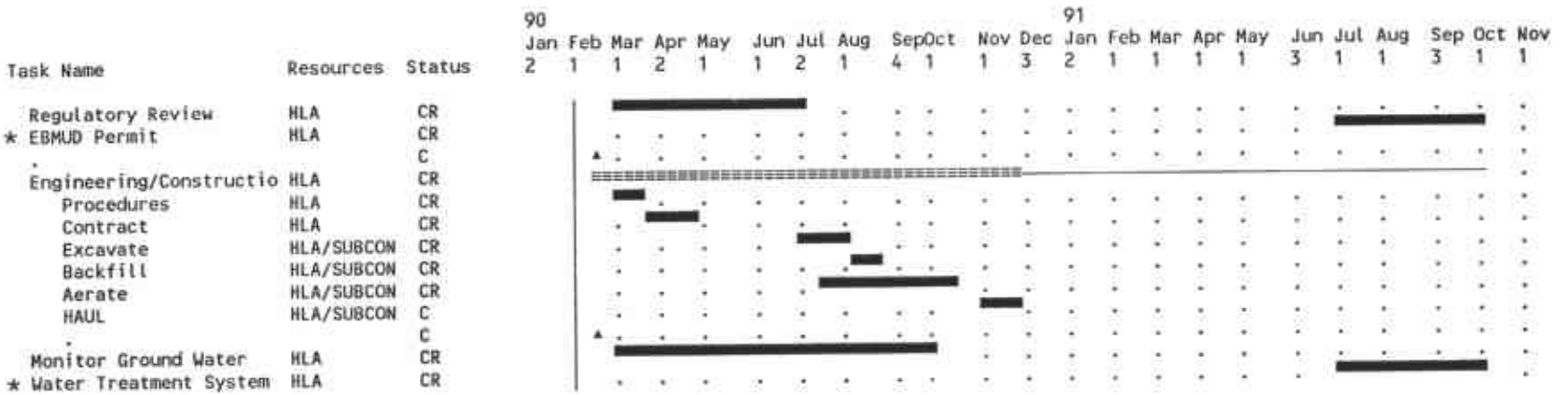
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
YC	2251,112.03		11/89	

Harding Lawson Associates
Engineering and Environmental Services

DRAWN KH | JOB NUMBER 2251.112.03 | APPROVED | DATE 2/90 | REVISED DATE

Anticipated Remediation Schedule
Former Texaco Service Station
2200 East 12th Street
Oakland, California

PLATE **7**



TIME LINE Gantt Chart Report, Strip 1

* Contingent on results of ground-water monitoring analysis

APPENDIX A

CALIFORNIA DEPARTMENT OF HEALTH SERVICES REVISED ACTION LIST FOR CHEMICAL CONTAMINANTS OF DRINKING WATER

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY
GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF HEALTH SERVICES
2151 BERKELEY WAY
BERKELEY, CALIFORNIA 94704

April 19, 1989

TO: ALL INTERESTED PARTIES

LIST OF ACTION LEVELS FOR CONTAMINANTS OF DRINKING WATER

For your information and reference, I am forwarding a copy of this Department's most recently revised action level list for chemical contaminants of drinking water. The recently adopted maximum contaminant levels (MCLs) have been deleted. This list also reflects changes in the action levels of some of the contaminants.

A list of the recently adopted MCLs is also enclosed for your reference.

For further information concerning these lists, you may contact me at the technical staff office of the Public Water Supply Branch in Berkeley (415) 540-2172.

Sincerely,

for David P. Spath, Ph.D., Chief
Chemical Standards and
Technology Unit
Public Water Supply Branch

Enclosures

Herbicides			
	CIPC (isopropyl N (3-chlorophenyl) carbamate)	350.0	
	Glyphosate	700.0	
	Alachlor	Limit of Quantification (0.2)	
Purgeable Halocarbons			
	Methylene Chloride	40.0	
	Tetrachloroethylene	5.0	
	1,1-Dichloroethane	5.0	
	Trichlorofluoromethane (Freon 11)	150.0	
	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	1,200.0	
	Cis-1,2-Dichloroethylene	6.0	
	Trans-1,2-Dichloroethylene	10.0	
Purgeable Aromatics			
	1,2-Dichlorobenzene	130.0	(10)*
	1,3-Dichlorobenzene	130.0	(20)*

(Action Level for 1,2-Dichlorobenzene and 1,3-Dichlorobenzene is either for a single isomer or for the sum of the 2 isomers)

	Toluene	100.0

(Action Level for Xylene is either for a single isomer or the sum of the 3 isomers)

Phenols		
	2,4-dimethylphenol	(400.0)*
	Phenol	(1.0)* (For Chlorinated Systems)
Aldehydes		
	Formaldehyde	30.0

*Taste & Odor Threshold

State of California
Department of Health Services

Drinking Water Action Levels Recommended by the Department of Health Services

April 1989

Chemical	Action Level parts per billion (ppb)	
Pesticides		
Chlorinated Hydrocarbon		
Aldrin	Limit of Quantification (0.05)	
a-Benzene Hexachloride (a-BHC)	0.7	
b-Benzene Hexachloride (b-BHC)	0.3	
Chlordane	0.1	
Dieldrin	Limit of Quantification (0.05)	
Heptachlor	0.01	
Heptachlor Epoxide	0.01	
Pentachlorophenol	30.0	
Organophosphate		
Dimethoate	140.0	
Diazinon	14.0	
Ethion	35.0	
Malathion	160.0	
Methyl Parathion	30.0	
Parathion	30.0	
Trithion	7.0	
Carbamate		
Aldicarb	10.0	
Baygon	90.0	
Carbaryl	60.0	
Phthalamide		
Captan	350.0	
Amides		
Diphenamide	40.0	
Fumigants		
Dibromochloropropane	1.0	
1,2-Dichloropropane	5.0	
Chloropicrin	50.0	(37.0)*
Miscellaneous		
Terrachlor (Pentachloronitrobenzene)	0.9	

*Taste & Odor Threshold

Department of Health Services
Recently Adopted Maximum
Contaminant Levels For Contaminants
In Drinking Water

April 1989

California Code of Regulations
Title 22

Constituent	Maximum Contaminant Level
	mg/l
Inorganic (Section 64435)	
Aluminum	1.
	pCi/l
Radioactivity (Section 64441)	
Uranium	20
	mg/l
Organic (Section 64444.5)	
Atrazine	0.003
Bentazon	0.018
Benzene	0.001
Carbon Tetrachloride	0.0005
1,4-Dichlorobenzene	0.005
1,2-Dichloroethane	0.0005
1,1-Dichloroethylene	0.006
1,3-Dichloropropene	0.0005
Ethylbenzene	0.680
Ethylene Dibromide	0.00002
Molinate	0.02
Monochlorobenzene	0.030
Simazine	0.01
1,1,2,2-Tetrachloroethane	0.001

Thiobencarb	0.07
1,1,1-Trichloroethane	0.200
1,1,2-Trichloroethane	0.032
Trichloroethylene	0.005
Vinyl Chloride	0.0005
Xylenes	1.750*

*MCL is for either single isomer or the sum of the isomers.

APPENDIX B

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
REGULATION 8, RULE 40

REGULATION 8
ORGANIC COMPOUNDS
RULE 40
AERATION OF CONTAMINATED SOIL
AND
REMOVAL OF UNDERGROUND STORAGE TANKS

INDEX

8-40-100 GENERAL

8-40-101 Description
8-40-110 Exemption, Storage Piles
8-40-111 Exemption, Excavated Hole
8-40-112 Exemption, Sampling
8-40-113 Exemption, Non-volatile Hydrocarbons
8-40-114 Exemption, Soil Excavation During Pipeline Leak Repairs
8-40-115 Exemption, Soil Excavation Unrelated to Underground Storage Tank Activities

8-40-200 DEFINITIONS

8-40-201 Active Storage Pile
8-40-202 Aeration
8-40-203 Aeration Depth
8-40-204 Aeration Volume
8-40-205 Contaminated Soil
8-40-206 Organic Compound
8-40-207 Organic Content
8-40-208 Vapor Free
8-40-209 Ventilation
8-40-210 Emergency Excavation

8-40-300 STANDARDS

8-40-301 Uncontrolled Aeration
8-40-302 Controlled Aeration
8-40-303 Storage Piles
8-40-310 Underground Storage Tanks - Removal or Replacement
8-40-311 Vapor Freeing
8-40-312 Ventilation

8-40-400 ADMINISTRATIVE REQUIREMENTS

8-40-401 Reporting, Removal or Replacement of Tanks
8-40-402 Reporting, Excavation of Soil
8-40-403 Reporting, Aeration of Contaminated Soil
8-40-404 Reporting, Soil Excavation During Pipeline Leak Repairs
8-40-405 Reporting, Soil Excavations Unrelated to Underground Storage Tank Activities

8-40-500 MONITORING AND RECORDS (Not Included)

8-40-600 MANUAL OF PROCEDURES

8-40-601 Soil Sampling
8-40-602 Measurement of Organic Content
8-40-603 Determination of Emissions

REGULATION 8
ORGANIC COMPOUNDS
RULE 40
AERATION OF CONTAMINATED SOIL
AND
REMOVAL OF UNDERGROUND STORAGE TANKS
(Adopted July 16, 1986)

8-40-100 GENERAL

8-40-101 **Description:** The purpose of this Rule is to limit the emission of organic compounds from soil that has been contaminated by organic chemical or petroleum chemical leaks or spills; to describe an acceptable soil aeration procedure; and to describe an acceptable procedure for controlling emissions from underground storage tanks during removal or replacement. (Amended February 15, 1989)

8-40-110 **Exemption, Storage Piles:** Calculations of aeration volume under Section 8-40-204 shall not include storage piles that are covered per Section 8-40-303; nor shall they include active storage piles.

8-40-111 **Exemption, Excavated Hole:** The exposed surfaces of an excavated hole shall not be included in calculations of aerated volume under Section 8-40-204.

8-40-112 **Exemption, Sampling:** Contaminated soil exposed for the sole purpose of sampling shall not be considered to be aerated. Removal of soil for sampling shall not qualify a pile as "active."

8-40-113 **Exemption, Non-volatile Hydrocarbons:** The requirements of all sections of this Rule shall not apply if the soil is contaminated solely by a known organic chemical or petroleum liquid, and that chemical or liquid has an initial boiling point of 302^{O}F or higher, provided that the soil is not heated. (Amended February 15, 1989)

8-40-114 **Exemption, Soil Excavation During Pipeline Leak Repairs:** The requirements of Section 8-40-402 shall not apply if soil is being excavated in order to repair leaking pipelines and if no more than 5 cubic yards are generated, and provided the requirements in Section 8-40-404 are satisfied. (Adopted February 15, 1989)

8-40-115 **Exemption, Soil Excavation Unrelated to Underground Storage Tank Activities:** The requirements of Section 8-40-402 shall not apply where contaminated soil is discovered during excavations unrelated to underground storage tank activites, and provided the requirements in Section 8-40-405 are satisfied. (Adopted February 15, 1989)

8-40-200 DEFINITIONS

8-40-201 **Active Storage Pile:** A pile of contaminated soil to which soil is currently being added or from which soil is currently being removed. Activity must have occurred or be anticipated to occur within one hour to be current.

8-40-202 **Aeration:** Exposure of excavated contaminated soil to the air.

8-40-203 **Aeration Depth:** The smaller of the following: the actual average depth of contaminated soil; or 0.15 meters (0.5 feet) multiplied by the daily frequency with which soil is turned. (Amended February 15, 1989)

8-40-204 **Aeration Volume:** The volume of soil being aerated shall be calculated as follows: the exposed surface area (in square feet or square meters) shall be multiplied by the aeration depth. The exposed surface area includes the pile of excavated soil unless the pile is covered per Section 8-40-303. (Amended February 15, 1989)

8-40-205 **Contaminated Soil:** Soil which has an organic content, as measured using the procedure in Section 8-40-602, exceeding 50 ppm(wt).

8-40-206 **Organic Compound:** Any compound of carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate.

8-40-207 **Organic Content:** The concentration of organic compounds measured in the composite sample collected and analyzed using the procedures in Sections 8-40-601 and 8-40-602.

8-40-208 **Vapor Free:** The process of purging gases from a tank using dry ice to replace organic vapors with an inert atmosphere.

8-40-209 **Ventilation:** The process of purging gases from a tank by blowing or drawing another gas through the tank.

8-40-210 **Emergency Removal or Replacement or Excavation:** A removal or replacement of a tank or an excavation of soil carried out pursuant to an order of a state or local government agency issued because the contaminated soil poses an imminent threat to public health and safety. (Adopted February 15, 1989)

8-40-300 STANDARDS

8-40-301 **Uncontrolled Aeration:** A person shall not aerate contaminated soil at a rate in excess of that specified in Table 1 for the degree of organic content. The limitations in Table 1 apply to the entire facility, and indicate the volume of contaminated soil that may be added, on any one day, to soil that is already aerating.

Table 1
Allowable Rate of Uncontrolled Aeration

ORGANIC CONTENT ppm(weight)	RATE OF UNCONTROLLED AERATION Cubic meters/day	Cubic yards/day
<50	Exempt	Exempt
50 - 99	459.0	600
100 - 499	91.8	120
500 - 999	45.9	60
1000 - 1999	22.9	30
2000 - 2999	11.5	15
3000 - 3999	7.6	10
4000 - 4999	5.7	8
>5000	0.08	0.1

(Amended February 15, 1989)

8-40-302 **Controlled Aeration:** Soil may be aerated at rates exceeding the limitations of 8-40-301 provided emissions of organic compounds to the atmosphere are reduced by at least 90% by weight.

8-40-303 **Storage Piles:** Contaminated soil which is not being aerated shall be covered except when soil is being added or removed. Any uncovered contaminated soil will be considered to be aerated. The soil may be covered with a layer of uncontaminated soil no less than six inches deep; or it may be covered with a tarp or other covering, provided no head space where vapors may accumulate is formed and provided the covering is in good condition and is secured adequately so as to minimize emissions to the atmosphere. (Amended February 15, 1989)

8-40-310 **Underground Storage Tanks - Removal or Replacement:** Any person wishing to permanently remove or replace an underground storage tank which previously contained organic compounds shall follow the following procedure:

310.1 All piping shall be drained or flushed into the tank or other container.

310.2 All liquids and sludges shall be removed, to the extent possible, from the tank. A hand pump shall be used to remove the bottom few inches of product if necessary.

310.3 Vapors shall be removed from the tank using one of the following three methods:

3.1 The tank may be filled with water, displacing vapors and hydrocarbon liquids. Water used for this purpose must be collected and/or disposed of in a manner approved by the APCO.

3.2 Vapor freeing.

3.3 Ventilation.

(Amended February 15, 1989)

8-40-311 **Vapor Freeing:** No person shall vapor free a tank containing more than 0.001 gallons of liquid organic compounds per gallon of tank capacity unless emissions of organic compounds to the atmosphere are reduced by at least 90%.

8-40-312 **Ventilation:** No person shall ventilate a tank containing more than 0.001 gallons of liquid organic compounds per gallon of tank capacity unless emissions of organic compounds to the atmosphere are reduced by at least 90%.

8-40-400 ADMINISTRATIVE REQUIREMENTS

8-40-401 **Reporting, Removal or Replacement of Tanks:** The person responsible for the removal or replacement of tanks which are subject to the provisions of Sections 8-40-310 shall provide written notice to the APCO of intention to remove or replace tanks. The written notice shall be postmarked at least 5 days prior to commencement of such removal or replacement. In the case of emergency removal or replacement of tanks, notice shall be provided as early as possible prior to the commencement of such emergency removal or replacement, to be followed by written verification. The written notice of intention shall include:

401.1 Names and addresses of persons performing and responsible for the tank removal or replacement

401.2 Location of site at which tank removal or replacement will occur

401.3 Scheduled starting date of tank removal or replacement. The scheduled starting date may be delayed for no more than 5 working days, provided the APCO is notified by telephone as early as possible prior to the new starting date.

401.4 Procedures to be employed to meet the requirements of Sections 8-40-310.

401.5 If applicable, name, title and authority of the state or local government representative who has ordered a tank removal or replacement which is subject to emergency procedures.

(Adopted, February 15, 1989)

8-40-402 **Reporting, Excavation of Soil:** The person responsible for the excavation of soil subject to the provisions of Sections 8-40-301 or 302 shall provide written notice to the APCO of intention to excavate. The written notice shall be postmarked at least 5 days prior to commencement of such excavation. In the case of emergency excavations, notice shall be provided as early as possible prior to the commencement of such emergency excavation, to be followed by written verification. Written notice of intention to excavate may be submitted to the APCO at the same time written notice of intention to remove or replace tanks is submitted provided that such notification precedes the commencement of either tank removal or replacement or soil excavation by at least 5 days as indicated by postmark. The written notice of intention shall include:

402.1 Names and addresses of persons performing and responsible for excavation.

402.2 Location of site at which excavation will occur.

402.3 Scheduled starting date of excavation. The scheduled starting date may be delayed for no more than 5 working days, provided the APCO is notified by telephone as early as possible prior to the new starting date.

402.4 Procedures to be employed to meet the requirements of Sections 8-40-301 or 302.

402.5 If applicable, name, title and authority of the state or local government representative who has ordered an excavation which is subject to emergency procedures. (Adopted February 15, 1989)

8-40-403 Reporting, Aeration of Contaminated Soil: The person responsible for aeration of any contaminated soil shall provide the District, by telephone, with the following information. This shall be provided no less than 24 hours prior to the spreading or heating of any contaminated soil. The District shall again be notified within 24 hours of a change in one or more of the following parameters.

403.1 Estimated total quantity of soil to be aerated.

403.2 Estimated quantity of soil to be aerated per day.

403.3 Estimated average degree of contamination, or total organic content of soil.

403.4 Chemical composition of contaminating organic compounds (i.e., gasoline, methylene chloride, etc.).

403.5 A description of the basis on which these estimates were derived (soil analysis test reports, etc.).

(Amended, Renumbered February 15, 1989)

8-40-404 Reporting, Soil Excavation During Pipeline Leak Repairs: The person responsible for the excavation of no more than 5 cubic yards of soil generated by a pipeline leak repair shall provide written notice to the APCO as early as possible, but not later than 10 working days, after excavation is completed. The written notice shall include:

404.1 Names and addresses of persons performing and responsible for excavation.

404.2 Location of site at which excavation occurred.

404.3 Date of excavation.

404.4 Quantity of soil excavated.

404.5 Estimated average degree of contamination, or total organic content of soil.

(Adopted February 15, 1989)

8-40-405 Reporting, Soil Excavations Unrelated to Underground Storage Tank Activities: The person responsible for soil excavations unrelated to underground storage tank activities where contaminated soil is discovered shall provide notice as early as possible upon detection of such contaminated soil, to be followed by written verification. The written verification shall include:

405.1 Names and addresses of persons performing and responsible for excavation.

405.2 Location of site at which excavation occurred.

405.3 Date of excavation.

405.4 Quantity of soil excavated.

405.5 Estimated average degree of contamination, or total organic content of soil.

(Adopted February 15, 1989)

8-40-600 MANUAL OF PROCEDURES

8-40-601 Soil Sampling: One composite sample shall be collected and analyzed for every 50 cubic yards of excavated contaminated soil to be aerated. At least one composite sample shall be collected from each inactive, uncovered storage pile within 24 hours of excavation. Samples are not required if the soil is uncontaminated.

601.1 Each composite sample shall consist of four separate soil samples taken using the procedures described below. The soil samples shall remain separate until they are combined in the laboratory just prior to analysis.

601.2 Each 50 cubic yard pile for which a composite sample is required shall be considered to have four equal sectors. One sample shall be taken from the center of each sector. Samples shall be taken from at least three inches below the surface of the pile. Samples shall be taken using one of the following methods:

1.1 Samples shall be taken using a driven-tube type sampler, capped and sealed with inert materials, and extruded in the lab in order to reduce the loss of volatile materials; or

1.2 Samples shall be taken using a clean brass tube (at least three inches long) driven into the soil with a suitable instrument. The ends of the brass tube shall then be covered with aluminum foil, then plastic end caps, and finally wrapped with a suitable tape. The samples shall then be immediately placed on ice, or dry ice, for transport to a laboratory.

(Amended February 15, 1989)

8-40-602 **Measurement of Organic Content:** Organic content of soil shall be determined by the Regional Water Quality Control Board's Revised Analytical Methods, Attachment 2, 11/8/85, any other method approved by the APCO, or EPA Reference Method 8010 or 8015. (Amended February 15, 1989)

8-40-603 **Determination of Emissions:** Emissions of organic compounds as specified in Sections 8-40-302, 8-40-311 and 8-40-312, shall be measured as prescribed in the Manual of Procedures, Volume IV, ST-7. (Amended February 15, 1989)

DISTRIBUTION

3 copies: Texaco Refining and Marketing Inc.
10 Universal City Plaza
Universal City, California 91608
Attention: Mr. E. E. Freed

1 copy: Texaco Refining and Marketing Inc.
100 Cutting Boulevard
Richmond, California 94804
Attention: Mr. R. R. Zielinski

MAS/RS/ly 031268L/R34

QUALITY CONTROL REVIEWER

Randolph Stone

Randolph Stone
Associate Hydrogeologist