

A Report Prepared for

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

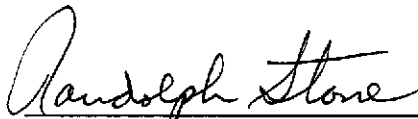
QUARTERLY TECHNICAL REPORT
SECOND QUARTER OF 1990
FORMER TEXACO STATION
2225 TELEGRAPH AVENUE
OAKLAND, CALIFORNIA

HLA Job No. 2251,125.03
September 7, 1990
1990 Report No. 2

by



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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 2225 Telegraph Avenue, 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 southwest corner of the intersection of Telegraph and West Grand Avenues (Plate 2). The surrounding area contains commercial/retail businesses, including a Chevron service station immediately across Telegraph Avenue and a Beacon service station northeast of the site. Adjacent to the site on the south is the First Baptist Church of Oakland. There is an apartment building, currently occupied, immediately west of the site.

Surface elevation at the site is approximately 20 feet above mean sea level. The land surface slopes gently southeast, toward Lake Merritt and the Oakland/Alameda Inner Harbor, an area of tidal flats that has been filled. This area has been extensively developed, and surface runoff is mainly controlled by the municipal storm sewer system.

As shown on Plate 3, structures at the service station include a building, three fuel pump islands, one underground waste oil tank, and three underground fuel storage tanks. Leaded and unleaded gasoline are dispensed from these tanks; automotive repair services are also provided.

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 other 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) from surface sources.

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. According to maps for the area, surface materials at the site are from the Temescal Formation, an alluvial fan deposit. Approximately 1,000 feet west of the site is an outcrop of the Merritt Sand. Direction of regional groundwater flow is west-southwest, toward San Francisco Bay.

Subsurface materials at the site, down to the maximum depth explored of 20 feet, generally consist of stiff, silty clay (CL),

underlain by a dense layer of silty sand that ranges from 3 to 8 feet in thickness. According to slug test results, the hydraulic conductivity of the shallow, saturated sand aquifer beneath the site ranges from 1.2 to 5.9 feet per day (Table 1).

Groundwater is currently encountered at approximately 13 feet below grade; well monitoring and survey data are presented in Table 2. The estimated direction of groundwater flow is to the southwest, with a gradient of 0.005 foot per foot, as shown on the Groundwater Surface Map, Plate 4.

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 proposed work were presented in the following reports:

- | | |
|---------------------------------|-------------------|
| 1. Sensitive Receptor Study | May 24, 1988 |
| 2. Subsurface Investigation | July 20, 1988 |
| 3. Environmental Assessment | June 22, 1989 |
| 4. Groundwater Remediation Plan | November 30, 1989 |

Previous Field Operations

Boring locations are shown on Plate 3. Because of restricted subsurface access on Telegraph and West Grand Avenues, no off-site exploration was conducted north or east of the site. These restrictions were imposed by the City of Oakland and the

Bay Area Rapid Transit District (BART), whose tunnel is in this area (see Plate 2). The investigation process has included the following field operations:

- Conducted a soil-gas survey on site and in city streets near the site. Probe locations are shown on Plate 3 and soil-gas survey results are presented in Table 3
- Drilled and sampled seven shallow soil borings (B-1 through B-7); locations are shown on Plate 3
- Drilled, constructed, developed, and sampled six on-site monitoring wells (MW-6A through MW-6F) and three off-site wells (MW-6G through MW-6I); locations are shown on Plate 5
- Ordered chemical analyses on soil and water samples to determine concentrations of petroleum hydrocarbons; results of analyses are presented in Tables 4 and 5, respectively
- Conducted slug tests in MW-6D, MW-6E, and MW-6H to estimate hydraulic conductivity and transmissivity values for the shallow aquifer; slug test results are presented in Table 1.

SUMMARY OF PREVIOUS FINDINGS

Vadose-zone Soil Condition

No significant concentrations of petroleum hydrocarbons have been found in vadose-zone soils. The fuel constituents benzene, toluene, ethylbenzene, and xylenes (BTEX) and total petroleum hydrocarbons (TPH) have been detected in concentrations exceeding 100 parts per million (ppm) exclusively in soils at 12 to 13.5 feet below the ground surface (Table 4); this depth is within the zone of fluctuation of the groundwater table.

Groundwater Conditions

No free product has been observed in any of the monitoring wells. As shown on Plate 5, hydrocarbons dissolved in the groundwater are generally limited to the vicinity of the tanks and pump islands, extending southwest.

Water from five on-site wells near the tanks and pump islands contains detectable levels of TPH as gasoline. As of April 1990, the lateral limits of the plume are delineated by MW-6G, MW-6F, and MW-6I; samples from these wells show no detectable hydrocarbons (detection limit for TPH = <50 parts per billion [ppb]). Upgradient plume definition is incomplete because of restricted subsurface access imposed by the City of Oakland and * BART.

WORK PERFORMED DURING THE SECOND QUARTER OF 1990

HLA performed the following activities during the second quarter of 1990:

1. Purged and sampled all monitoring wells and chemically analyzed groundwater samples for BTEX and TPH as gasoline (see Table 5). The laboratory report is presented in the Appendix.
2. Drilled and installed three recovery wells, RW-1, RW-2, and RW-3 (locations shown on Plate 3). Boring logs presented on Plates 6 through 8 and Construction Details are shown on Plates 9 through 11. RW-1 was constructed at the same location as Soil Boring B-3. Two-inch diameter Monitoring Wells MW-6D and MW-6C were drilled out and deepened to 25 feet to facilitate installation of four-inch diameter recovery wells RW-2 and RW-3.
3. Initiated fabrication of groundwater treatment system after reviewing and approving shop drawings.

4. Prepared construction specifications for installation of the groundwater collection and treatment system including:
 - Health and safety requirements
 - Scope of Work
 - Earthwork
 - Asphalt, concrete, and paving
 - Basic mechanical requirements
 - Pipes and pipe fittings
 - Basic electrical requirements.
5. Met with an Exxon representative on site to discuss proposed construction activities.

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Table 1. Slug Test Results

<u>Well Number</u>	<u>Most Permeable Stratum Adjacent to Well Screen</u>			
	<u>Lithology</u>	<u>Classification</u>	<u>Thickness (feet)</u>	<u>Estimated Hydraulic Conductivity (feet/day)</u>
MW-6D	sand	confined	2	5.9
MW-6E	sand, fine-grained	confined	2.5	1.2
MW-6H	sand, medium-grained	unconfined	6	4.8

Table 2. Well Monitoring and Survey Data

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-6A	12/15/88	98.99	13.77	85.22	--	--
	10/03/89		13.40	85.59	-0.37	-0.37
	05/11/90		12.87	86.12	-0.53	-0.90
MW-6B	12/15/88	98.81	13.01	85.80	--	--
	10/03/89		12.94	85.87	-0.07	-0.07
	04/30/90		12.53	86.28	-0.41	-0.48
MW-6C	12/15/88	99.89	14.41	85.48	--	--
	10/03/89		14.10	85.79	-0.31	-0.31
	04/30/90		13.81	86.08	-0.29	-0.60
MW-6D	12/15/88	98.78	13.53	85.25	--	--
	10/03/89		13.44	85.34	-0.09	-0.09
	04/30/90		13.19	85.59	-0.25	-0.34
MW-6E	12/15/88	98.99	13.84	85.15	--	--
	10/03/89		13.70	85.29	-0.14	-0.14
	04/30/90		13.43	85.56	-0.27	-0.41
MW-6F	12/15/88	99.91	14.73	85.18	--	--
	10/03/89		14.48	85.43	-0.25	-0.25
	04/30/90		14.14	85.77	-0.34	-0.69
MW-6G	12/15/88	99.16	12.39	86.77	--	--
	10/03/89		12.22	86.94	-0.17	-0.17
	04/30/90		11.73	87.43	-0.49	-0.66
MW-6H	12/15/88	97.93	12.39	85.54	--	--
	10/03/89		12.36	85.57	-0.03	-0.03
	04/30/90		12.10	85.83	-0.29	-0.29
MW-6I	12/15/88	97.60	12.82	84.78	--	--
	10/03/89		12.83	84.77	+0.01	+0.01
	04/30/90		12.66	84.94	-0.17	-0.16

Notes:

- 1 Elevation relative to HLA temporary benchmark located at the western end of the dispenser island nearest West Grand Avenue, 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

Table 3. Results of Soil-gas Survey
Conducted on September 19, 1988

Concentrations in micrograms per liter ($\mu\text{g/L}$)

<u>Sample</u>	<u>Depth (feet)</u>	<u>Benzene</u>	<u>Ethyl- benzene</u>	<u>Toluene</u>	<u>Xylenes</u>	<u>Total Petroleum Hydrocarbons</u>
Air	N/A	<0.7	<0.8	<0.8	<0.8	<0.7
SG-01	--	--	--	--	--	--
SG-02	5.0	<0.7	<0.8	<0.8	<0.8	<0.7
SG-03	12.0	10	4	<0.8	2,800	6,100
SG-04	13.0	<0.7	<0.8	<0.8	140	780
WS-05*	12.0	<75	<76	<77	<77	<75
SG-06	13.0	<0.7	<0.8	<0.8	<0.8	<0.7
SG-07	--	--	--	--	--	--
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
- * - WS-05 was a sample of groundwater

Table 4. Results of Soil Chemical Analyses
 Concentrations in milligrams per kilogram (mg/kg)

Sample Number	Depth (feet)	¹ <u>Benzene</u>	Ethyl- ² <u>benzene</u>	³ <u>Toluene</u>	³ <u>Xylenes</u>	TPH as ⁴ <u>Gasoline</u>
B-1	8.0	0.05	ND	ND	ND	ND
B-1	13.0	ND (5)	10 (10)	16 (10)	41 (10)	2,000 (1,000)
B-2	7.0	ND	ND	ND	ND	ND
B-2	13.5	ND	ND	ND	ND	ND
B-3	7.0	0.06	ND	ND	ND	ND
B-3	13.5	40 (25)	84 (50)	390 (50)	370 (50)	11,000 (5,000)
B-4	13.5	ND	ND	ND	ND	ND
B-5	5.5	ND	ND	ND	ND	ND
B-5	9.5	ND	ND	ND	ND	ND
B-5	12.5	ND	ND	ND	ND	ND
B-6	6.0	ND	ND	ND	ND	ND
B-6	9.5	ND	ND	ND	ND	ND
B-6	12.0	40 (5)	40 (20)	110 (10)	450 (10)	3,000 (1,000)
B-7	6.0	0.64	0.4	0.9	3.4	24
B-7	9.5	0.5	ND	0.7	1.0	ND
B-7	12.0	20 (5)	20 (20)	72 (10)	190 (10)	1,400 (1,000)
MW-6E	13.0	ND	ND	ND	ND	ND
MW-6F	13.0	ND	ND	ND	ND	ND
MW-6G	13.5	ND	ND	ND	ND	5.2
MW-6H	13.5	11 (0.5)	8.8 (2)	3.2 (1)	19 (1)	1,000 (495)
MW-6I	13.5	ND	ND	ND	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 5. Results of Groundwater Chemical Analyses
Concentrations in micrograms per liter ($\mu\text{g/L}$)

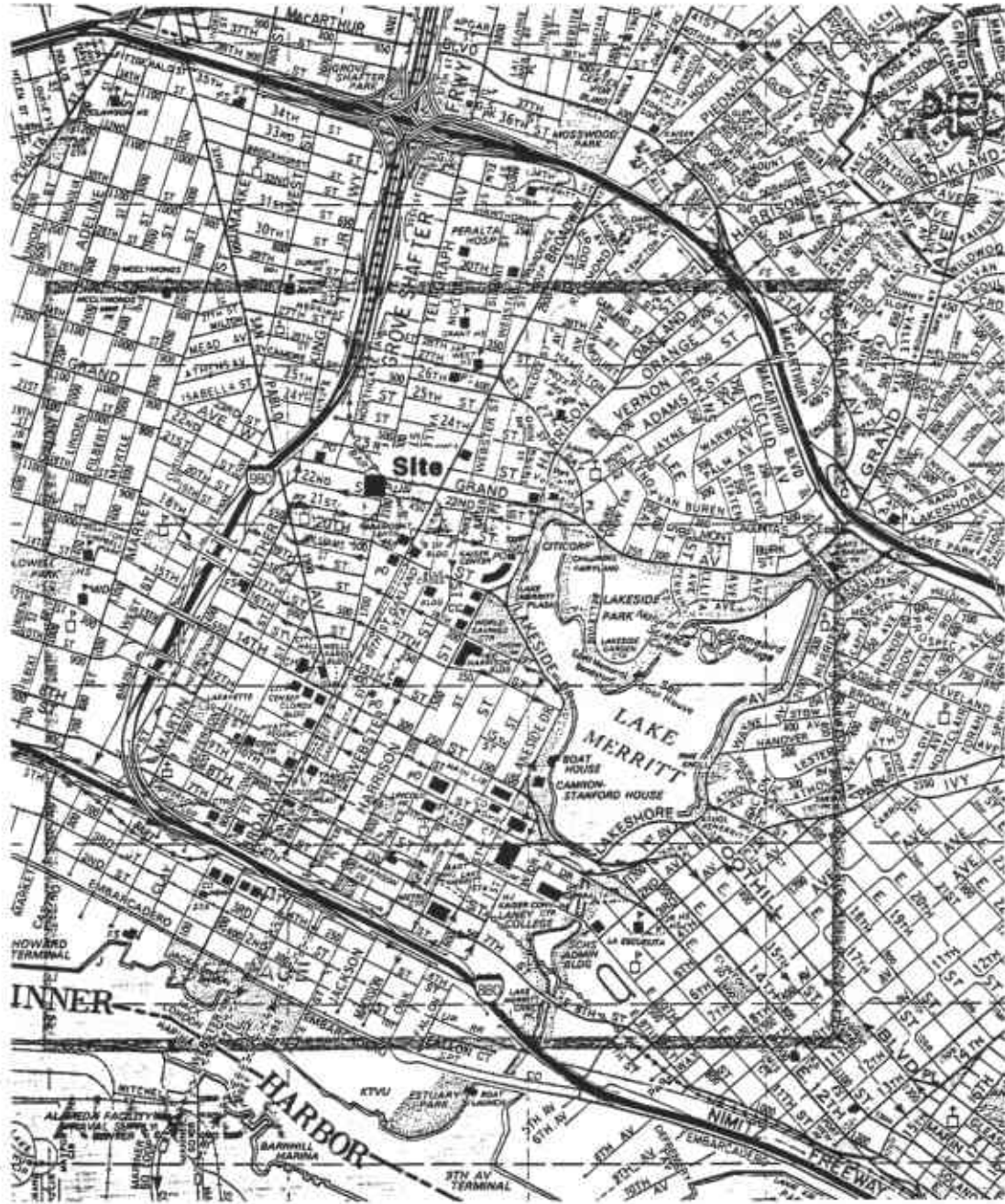
EPA TEST METHOD 602

Well Number	Date Sampled	<u>Benzene</u> ¹	<u>Ethylbenzene</u> ²	<u>Toluene</u> ³	<u>Xylenes</u> ³	<u>TPH</u> ⁴ (as gasoline)
MW-6A	06/24/88	ND	ND	ND	ND	-
	10/20/88	1	ND	ND	ND	-
	09/07/89	2	ND	ND	ND	ND
	05/11/90	150	ND (0.25)	6.2	13	ND (500)
MW-6B	06/24/88	ND	ND	ND	5	-
	10/20/88	4	ND	3	ND	-
	09/07/89	70 (2.5)	60 (3)	8 (3)	160 (4)	2,700 (25)
	04/30/90	45 (5)	20 (5)	6 (5)	22 (5)	168 (50)
MW-6C	06/24/88	7,480	170	7	2,300	-
	10/20/88	9,500 (50)	170 (2)	65 (100)	850 (1)	-
	09/07/89	7,900 (25)	350 (25)	430 (25)	1,100 (38)	18,000 (2,500)
	04/30/90	6,100 (250)	1,000 (250)	1,500 (250)	2,700 (250)	30,000 (25,000)
MW-6D	07/11/88	220 (5)	ND (20)	27 (10)	ND (10)	-
	10/20/88	710 (5)	22 (20)	74 (10)	110 (10)	-
	09/07/89	600 (12.5)	58 (13)	26 (13)	31 (19)	2,200 (1,250)
	04/30/90	800 (50)	310 (50)	150 (50)	280 (50)	3,600 (500)
MW-6E	10/20/88	1	ND	ND	3	-
	09/07/89	3	ND	ND	ND	220
	04/30/90	57 (5)	ND (5)	ND (5)	53 (5)	250 (50)
MW-6F	10/25/88	ND	ND	ND	2	-
	09/07/89	ND	ND	ND	ND	ND
	04/30/90	ND	ND	ND	ND	ND
MW-6G	12/07/88	ND	ND	ND	ND	-
	09/07/89	ND	ND	ND	ND	ND
	04/30/90	ND	ND	ND	ND	ND
MW-6H	12/07/88	1,200 (25)	110 (20)	320 (10)	220 (10)	-
	09/07/89	480 (10)	16 (10)	ND (10)	ND (15)	660 (500)
	04/30/90	700 (50)	31 (5)	39 (5)	50 (5)	630 (500)
MW-6I	12/07/88	ND	ND	ND	ND	-
	09/07/89	ND	ND	ND	ND	ND
	04/30/90	ND	ND	ND	ND	ND

ND = Not detected.

Detection limits given in parentheses, where applicable. If not:

1. Detection limit = 0.5
2. Detection limit = 2
3. Detection limit = 1
4. Detection limit = 50



Harding Lawson Associates
Engineers and Geoscientists

Site Location Map
Former Texaco Service Station
2225 Telegraph Avenue
Oakland, California

PLATE

1

DRAWN
YC

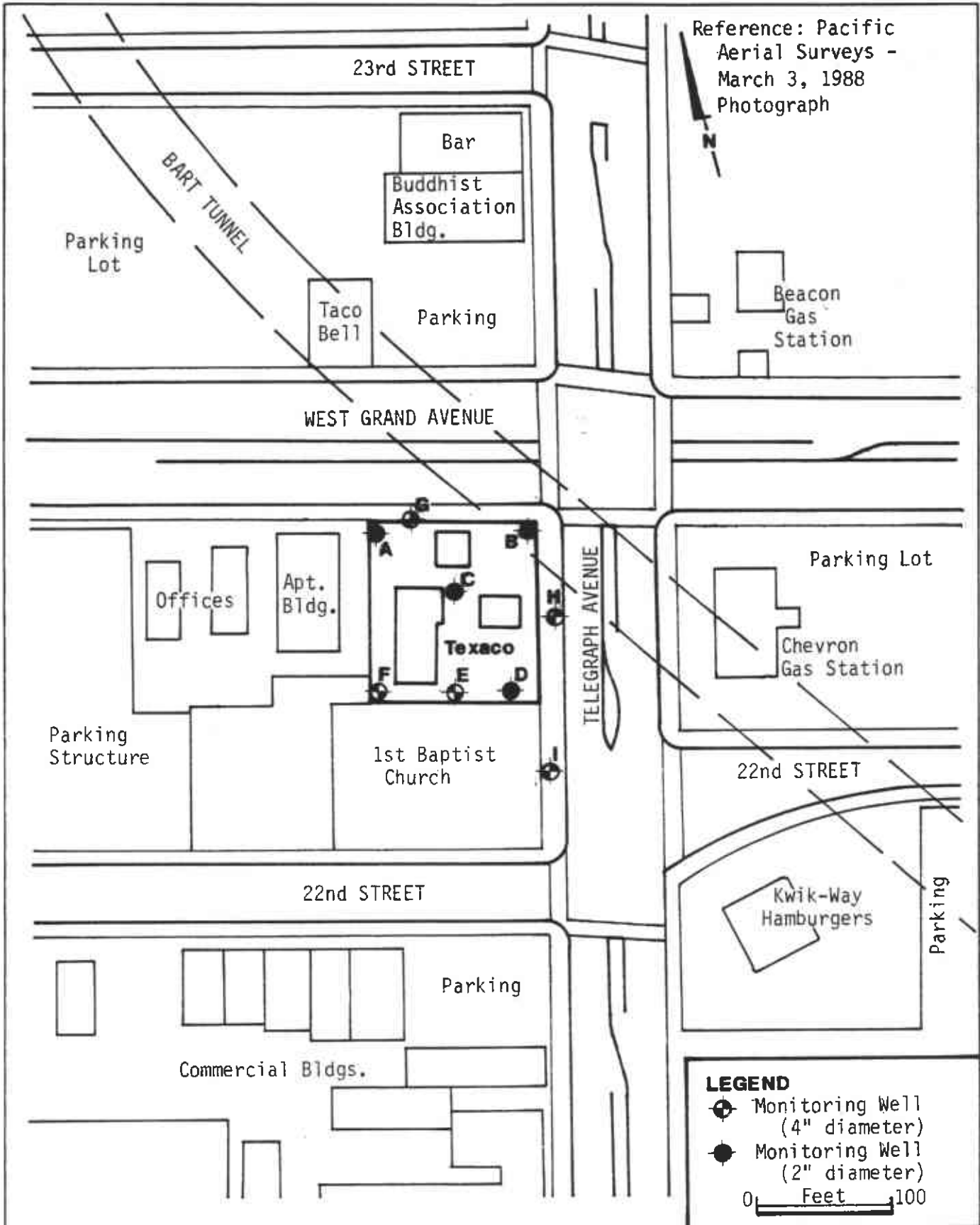
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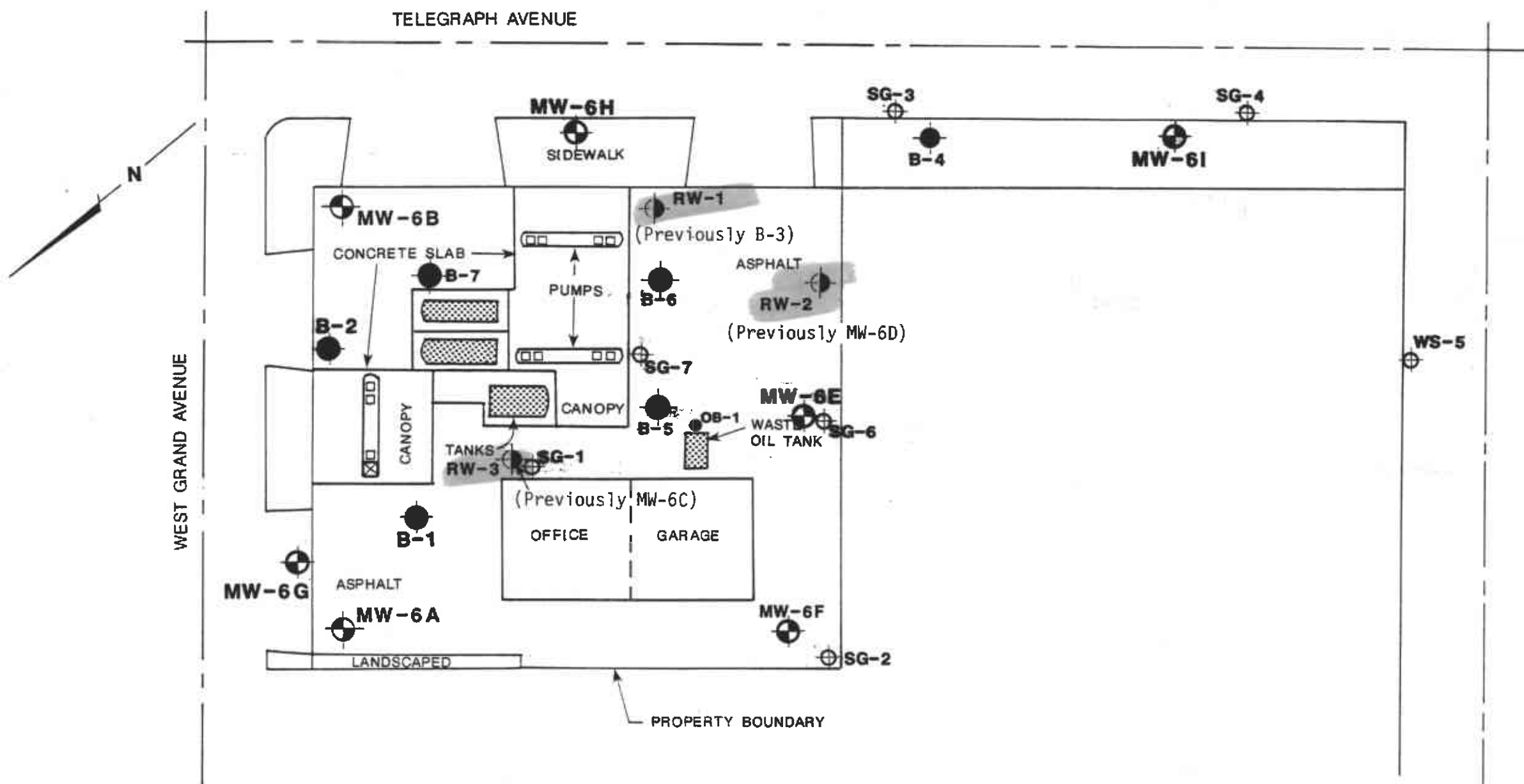


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Vicinity Plan
Former Texaco Service Station
2225 Telegraph Avenue
Oakland, California

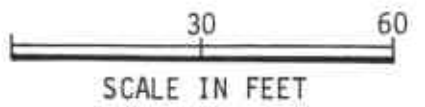
PLATE
2

Recovery wells

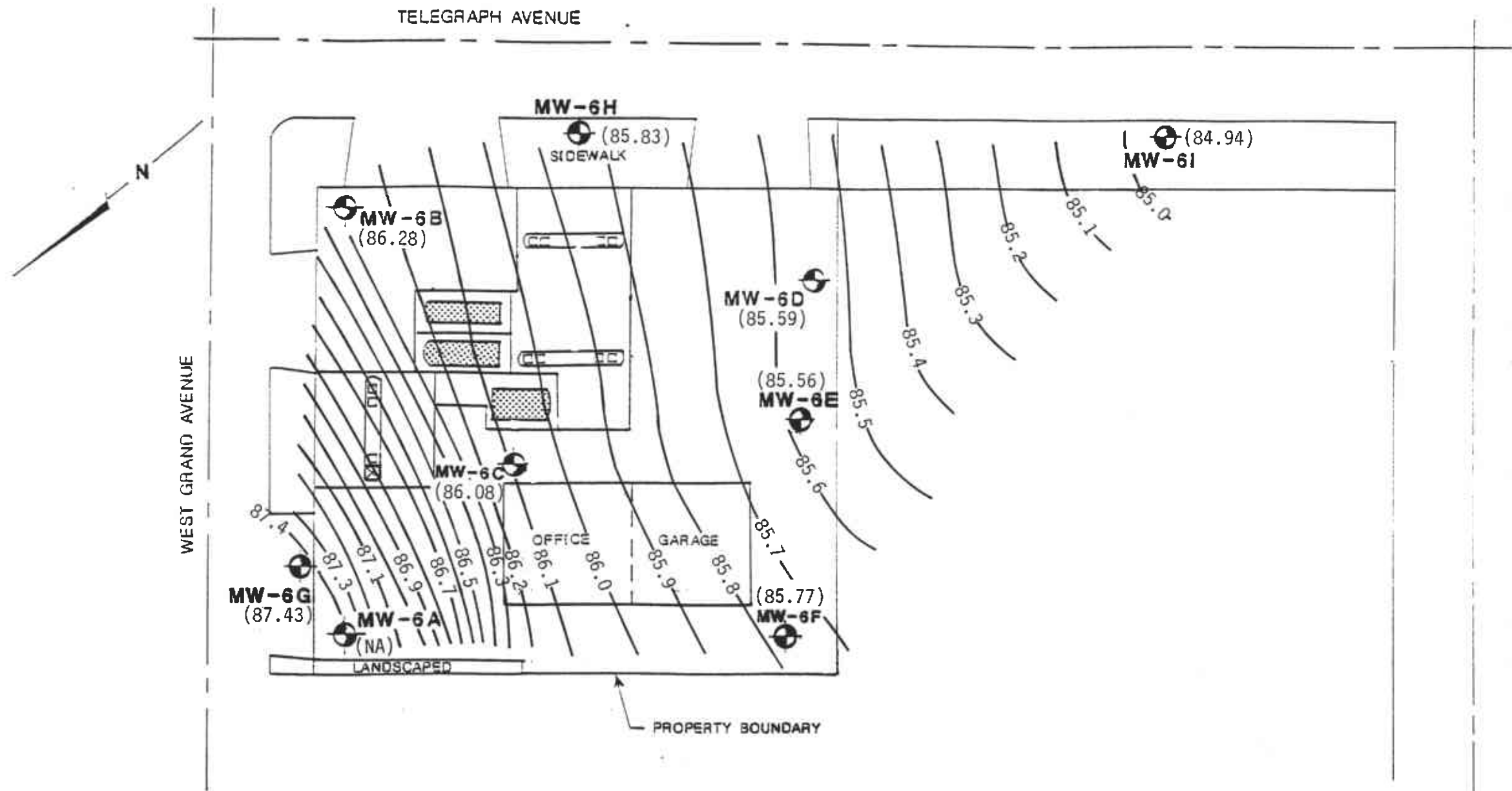


EXPLANATION



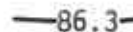
- MW-6A** Monitoring Well Location and Number
- OB-1** Observation Well Location and Number
- B-2** Boring Locations
- SG-1** Soil-Gas Probe Location
- RW-1** Recovery Well
- Bench Mark (HLA Datum El. = 100 feet)

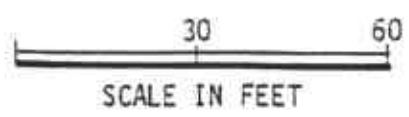


	Harding Lawson Associates Engineers and Geoscientists	Site Plan Former Texaco Service Station 2225 Telegraph Avenue Oakland, California	PLATE 3
	DRAWN YC	JOB NUMBER 2251,111.03	APPROVED



EXPLANATION


- MW-6A**  Monitoring Well Location and Groundwater Surface Elevation on 4/30/90
-  Bench Mark (HLA Datum El. = 100 feet)
-  86.3 Contour of Equal Groundwater Elevation
- NA Not Accessible

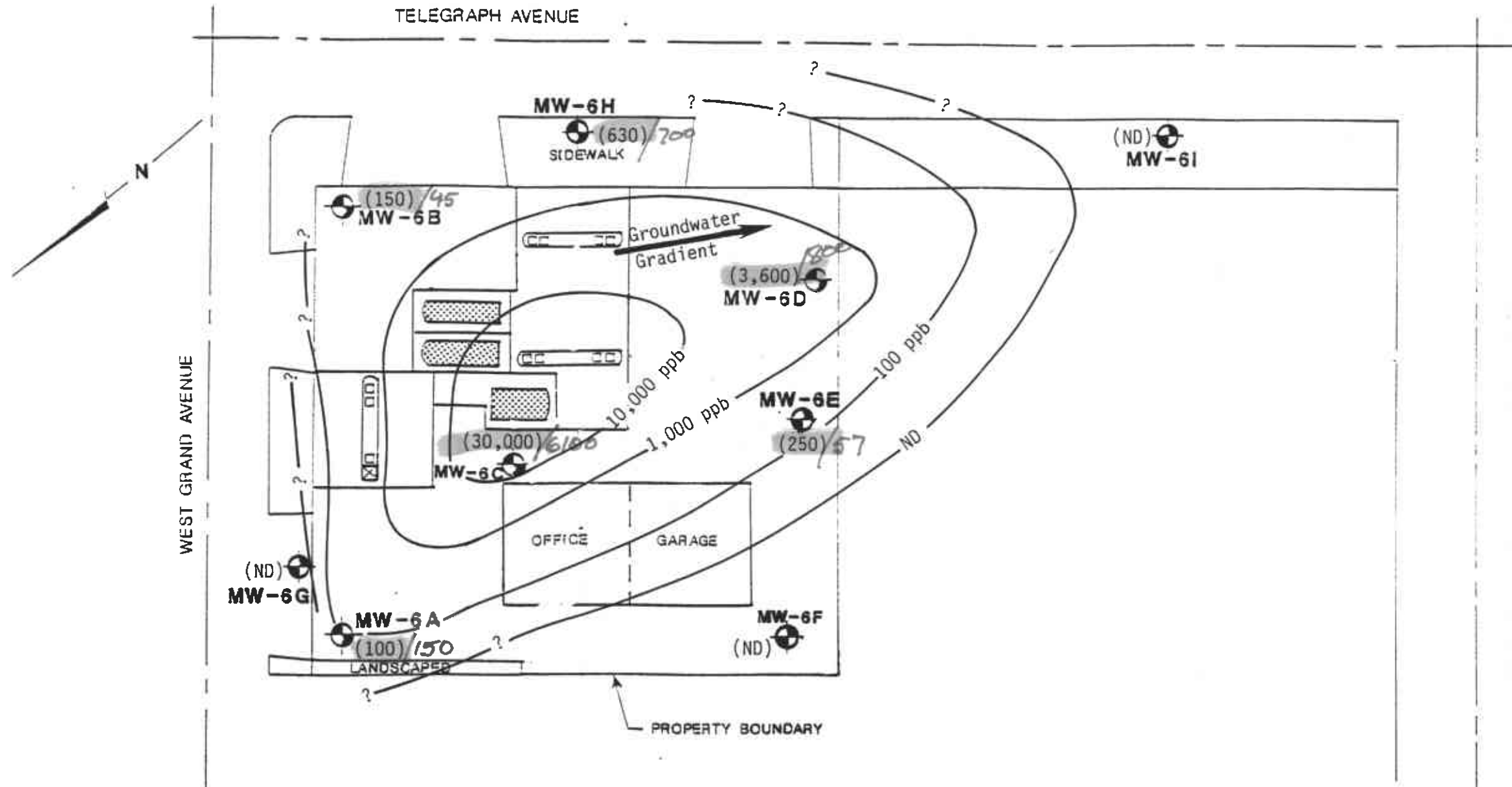


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Groundwater Surface Map (4/90)
Former Texaco Service Station
2225 Telegraph Avenue
Oakland, California

PLATE
4

DRAWN YC	JOB NUMBER 2251,123.03	APPROVED 	DATE 7/90	REVISED	DATE
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EXPLANATION

MW-6A Monitoring Well Location and Number

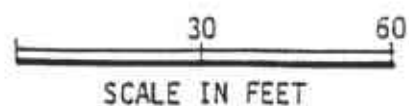
(630) Total Petroleum Hydrocarbons (TPH) as Gasoline Concentration on April 30, 1990 (concentration in ppb).

benzene
 Contour of Constant TPH Concentration

Bench Mark (HLA Datum E1. = 100 feet)

ND Not Detectable (<50 ppb)

* Well sampled on May 10, 1990



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Distribution of Hydrocarbons in Groundwater (4/90)
 Former Texaco Service Station
 2225 Telegraph Avenue
 Oakland, California

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
YC	2251.123.03		7/90		

Laboratory Tests

Blows/foot
GAS TECH
(ppm) *

30 125

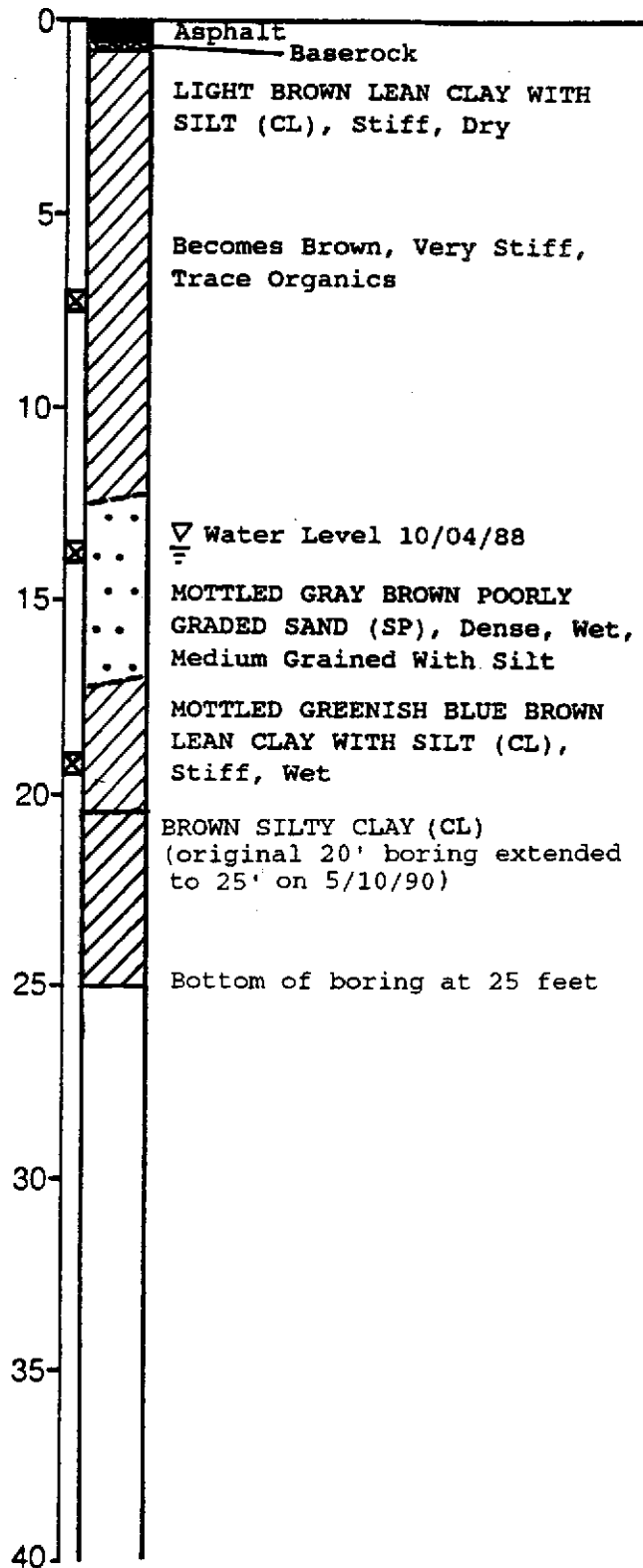
39 >500

12 200

Depth (ft)
Sample

Equipment 8" Hollow Stem Auger

Elevation ** 98.0' Date 10/04/88



* Gas-Tech Model 1314,
Calibrated to Hexane
ppm - Parts per Million
** Reference Elevation
(Arbitrary Datum)
ND Non-Detectable



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Engineers and Geoscientists

Log of Boring B-3 (Modified to B-1)
Former Texaco Service Station
2225 Telegraph Avenue
Oakland, California

PLATE

6

DRAWN
YC

JOB NUMBER
2251,123.03

APPROVED
CA

DATE
12/88

REVISED
6/90

DATE

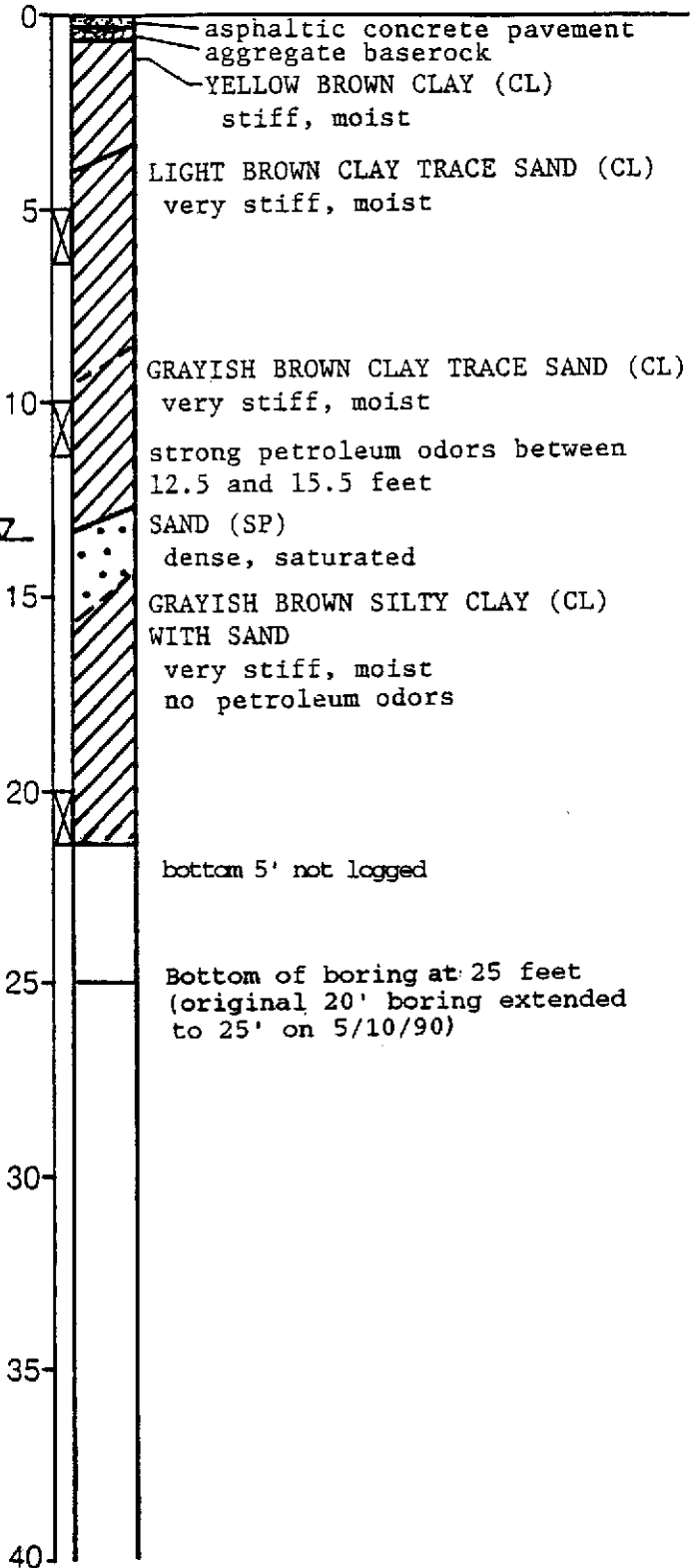
Laboratory Tests

Blows/foot

PID *
Reading
(ppm)

Depth (ft)
Sample

Equipment 6-inch Flight Auger
Elevation 99 feet** Date 7/6/88



*PID = photo ionization detector,
HNU PI 101

**Reference Elevation
(arbitrary datum)



Harding Lawson Associates
Engineers, Geologists
& Geophysicists

Log of Boring MW-6D (Modified to RW-2)
Texaco Station - 62488000195
2225 Telegraph Avenue
Oakland, California

PLATE

7

DRAWN
RS

JOB NUMBER
2251,123.03

APPROVED
RS

DATE
2/89

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6/90

DATE

Laboratory Tests

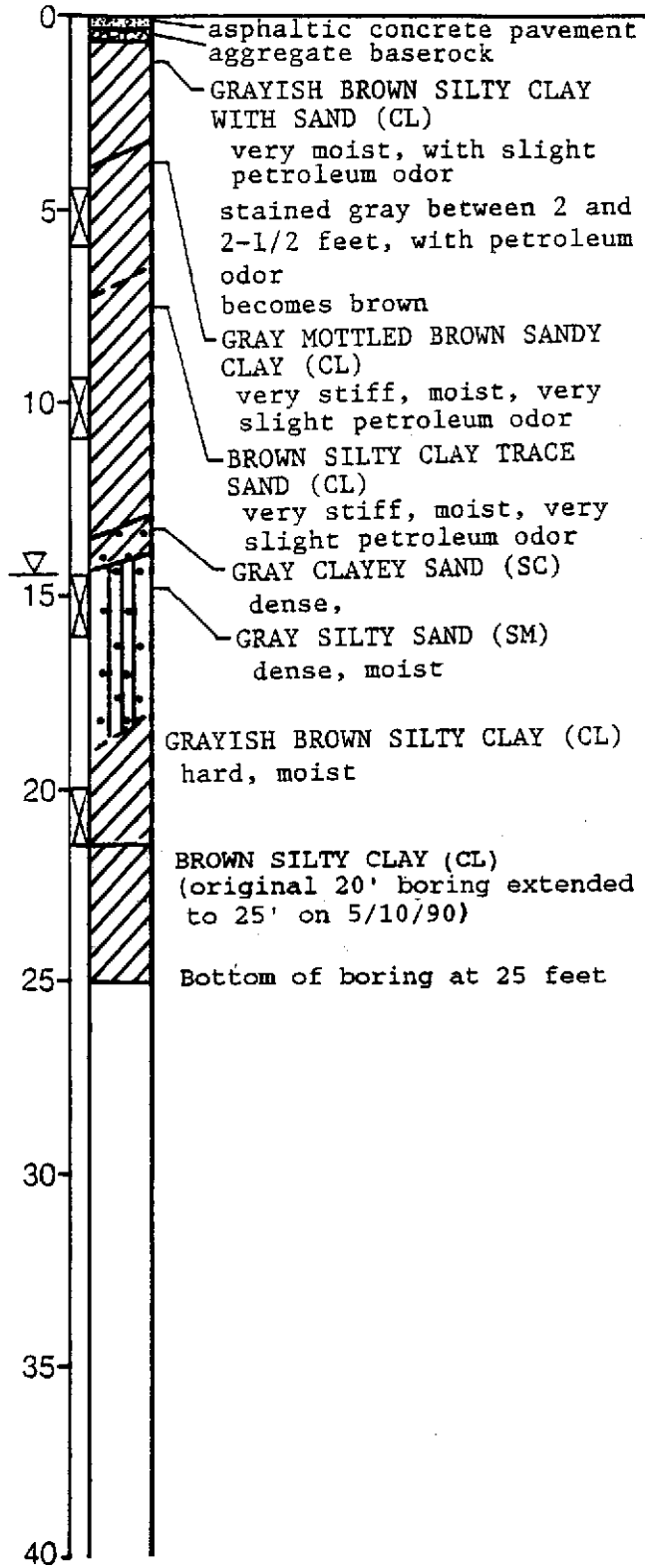
Blows/foot

PID *
Reading
(ppm)

Depth (ft)
Sample

Equipment 8-inch Hollow Stem Auger

Elevation 100.2 feet** Date 6/15/88



*PID = photo ionization detector,
HNU PI 101
ppm = parts per million

**Reference Elevation
(arbitrary datum)



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Engineers, Geologists
& Geophysicists

Log of Boring MW-6C (Modified to RW-3)
Texaco Station - 62488000195
2225 Telegraph Avenue
Oakland, California

PLATE

8

DRAWN
RS

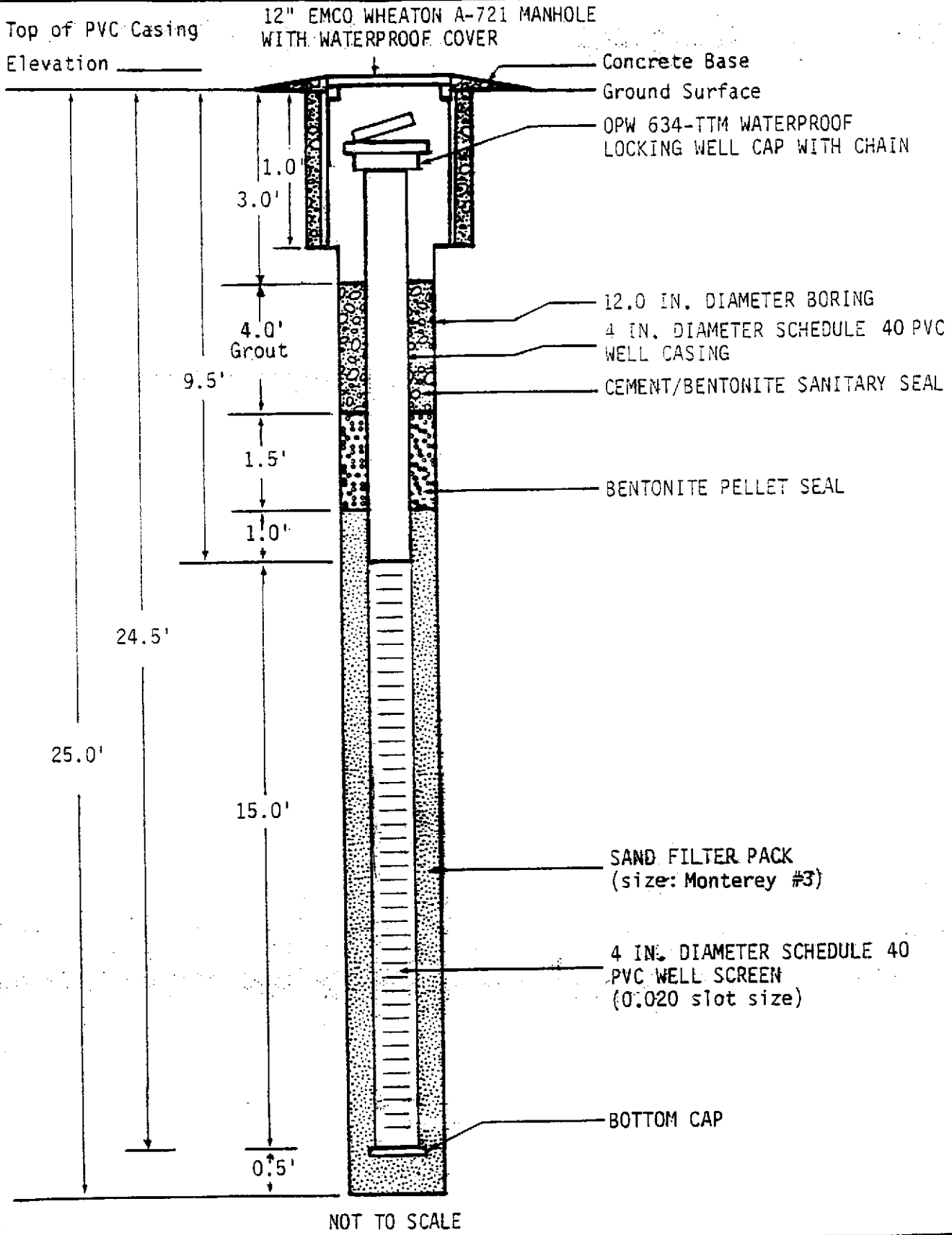
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2/89

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6/90

DATE



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Recovery Well Completion Detail RW-1
Former Texaco Service Station
2225 Telegraph Avenue
Oakland, California

PLATE

9

DRAWN
YC

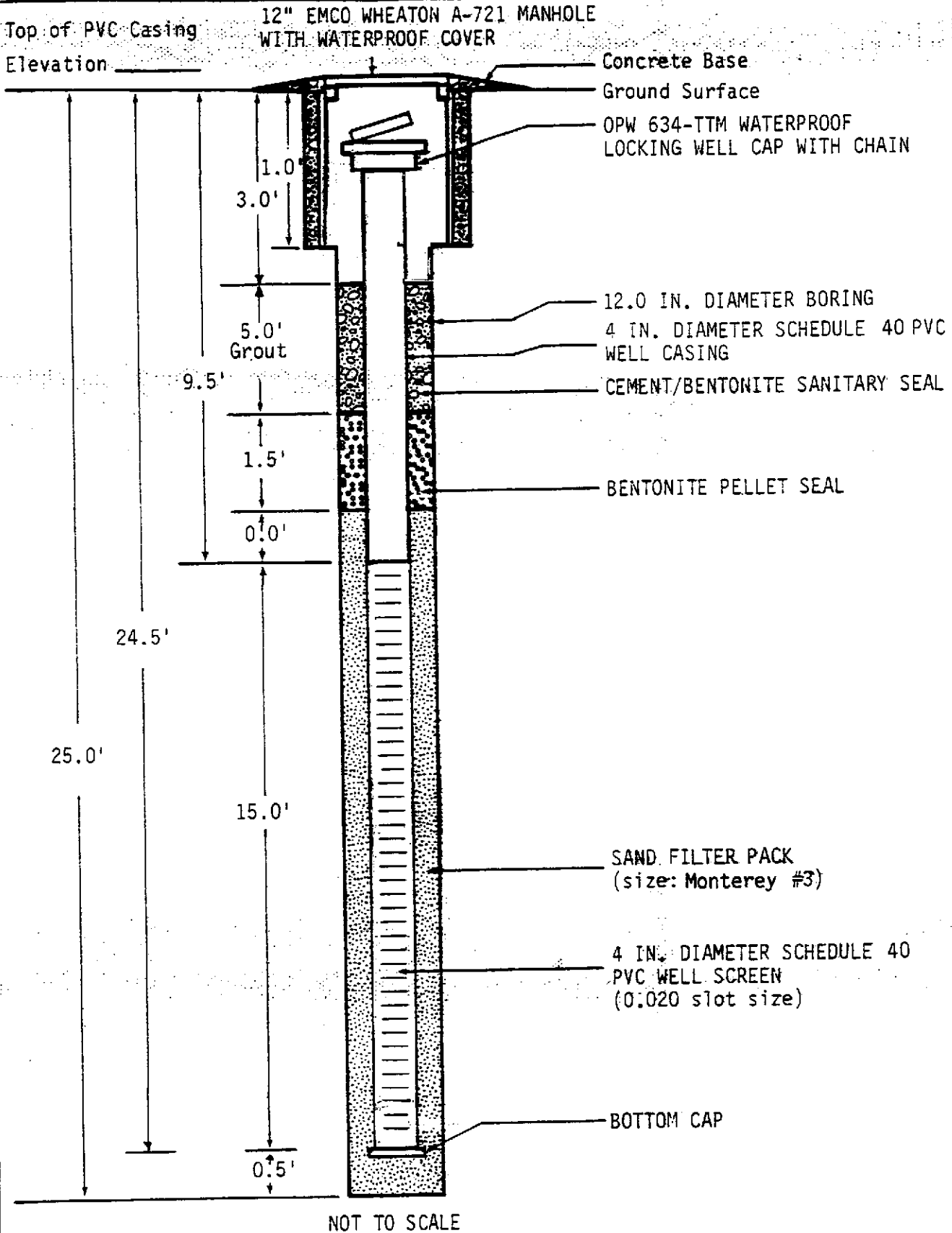
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6/90

REVISED

DATE



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Recovery Well Completion Detail RW-2
Former Texaco Service Station
2225 Telegraph Avenue
Oakland, California

PLATE

10

DRAWN
YC

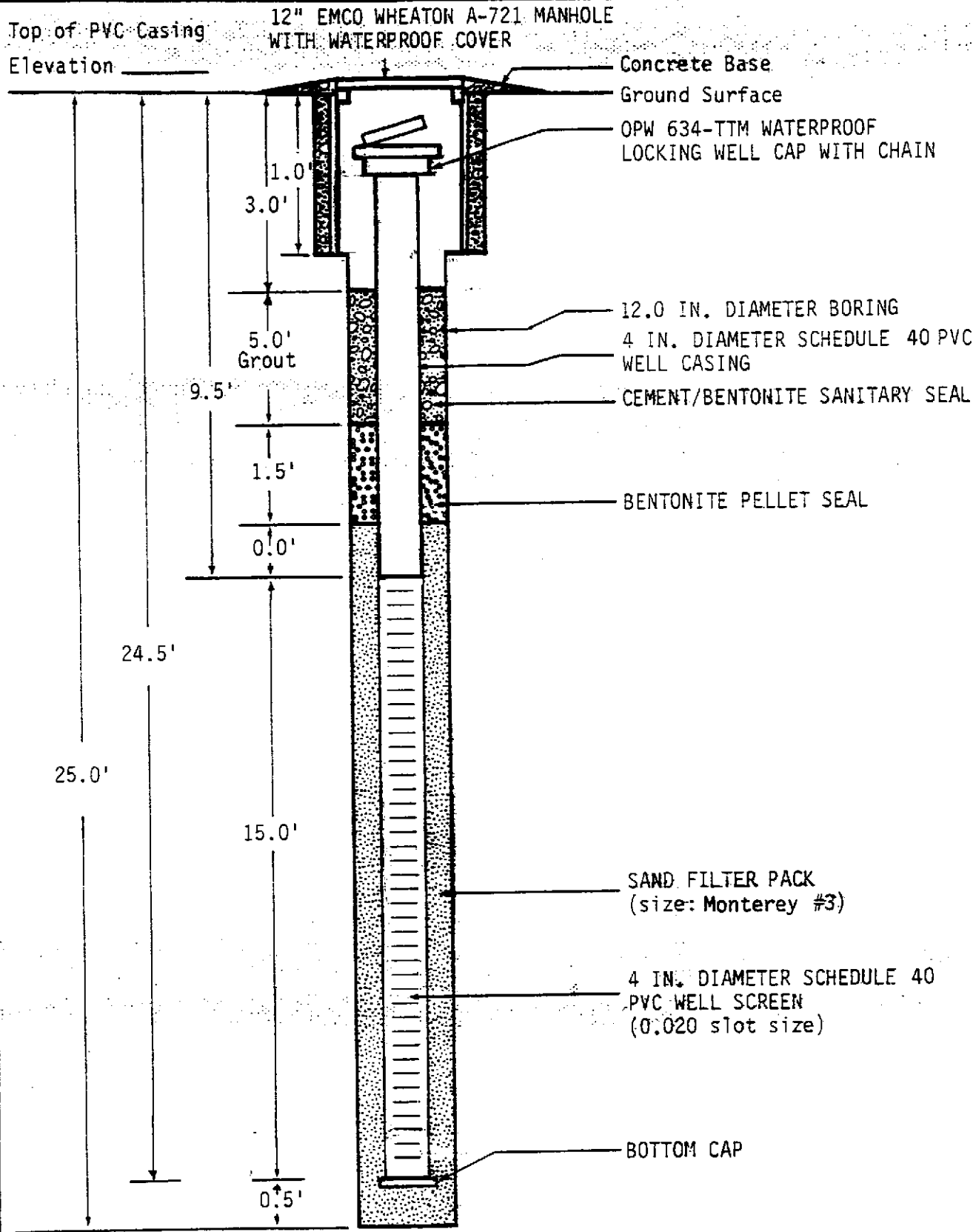
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REVISED

DATE



NOT TO SCALE



Harding Lawson Associates
Engineers and Geoscientists

Recovery Well Completion Detail RW-3
Former Texaco Service Station
2225 Telegraph Avenue
Oakland, California

PLATE

11

DRAWN
YC

JOB NUMBER
2251,123.03

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6/90

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DATE

APPENDIX
LABORATORY ANALYSES REPORT

 **CHEMWEST**
ANALYTICAL LABORATORIES, INC.

May 15, 1990

Harding Lawson Associates
1355 Willow Way, Suite 109
Concord, CA 94520

Attention: Mr. Randy Stone

Subject: Report of Data - Case Number 5919

Dear Mr. Stone:

The technical staff at CHEMWEST is pleased to provide our report for the analyses you requested: Total Petroleum Hydrocarbons, purgeable (gasoline) - DHS Method, LUFT Field Manual; and BTEX - EPA Method 8020.

Eight water samples for Project Texaco #6, Project Number 2251.111.03 were received May 1, 1990 in good condition. Results of the analyses, along with the analytical methodology and appropriate reporting limits, are presented on the following pages.

Thank you for choosing CHEMWEST Laboratories. Should you have questions concerning this data report or the analytical methods employed, please do not hesitate to contact Debbie Pearce your Customer/Technical Service Representative. We hope that you will consider CHEMWEST Laboratories for your future analytical support and service requirements.

Sincerely,



Robert T. Hart
Data Control Manager

RTH:ba

cc: File

ANALYTICAL METHODOLOGY

BTEX (Benzene, Toluene, Ethyl Benzene, and Xylenes) by Purge & Trap and GC-PID

WATER - Method 602 or 8020

A 5 ml sample volume, or 5 ml of a suitable dilution, is purged on a suitable purge and trap system with helium. The purged sample is analyzed on a Gas Chromatograph equipped with a Photoionization Detector (PID). A packed column is used to separate the compounds.

SOIL - Method 8020

A 10 gram, or other appropriate aliquot of soil, is weighed into a clean VOA vial. Soils received in brass core tubes are sampled by discarding 2-5 centimeters of soil from each end of the tubes (this is done to reduce the possibility of analyzing a portion of soil that has been exposed to sampling technique contamination). Equal aliquots of soil are then removed from each end of the tube and combined in the VOA vial. Soil in jars or bags is aliquoted using a similar technique, which discards exposed sample surfaces. A 10 mL, or other appropriate volume of methanol, is added to the soil and the soil is shaken with the solvent. 100 ul of the extract, or a reduced aliquot or volume of a suitable dilution, is injected into 5 ml of laboratory blank water and analyzed by the same technique used for water samples.

ANALYTICAL METHODOLOGY

Total Petroleum Hydrocarbons by Purge & Trap and GC-FID

WATER - DHS Method - Luft Field Manual

A 5 ml sample volume, or 5 ml of a suitable dilution, is purged on a suitable purge and trap system with helium. The purged sample is analyzed on a Gas Chromatograph equipped with a Flame Ionization Detector (FID). A packed column is used to separate the compounds.

SOIL - DHS Method - Luft Field Manual

A 10 gram, or other appropriate aliquot of soil, is weighed into a clean VOA vial. Soils received in brass core tubes are sampled by discarding 2-5 centimeters of soil from each end of the tubes (this is done to reduce the possibility of analyzing a portion of soil that has been exposed to sampling technique contamination). Equal aliquots of soil are then removed from each end of the tube and combined in the VOA vial. Soil in jars or bags is aliquoted using a similar technique, which discards exposed sample surfaces. A 10 ml, or other appropriate volume of methanol, is added to the soil and the soil is shaken with the solvent. 100 ul of the extract, or a reduced aliquot or volume of a suitable dilution, is injected into 5 ml of laboratory blank water and analyzed by the same technique used for water samples.

CHEMWEST ANALYTICAL LABORATORIES
 BENZENE, TOLUENE, ETHYL BENZENE, XYLENES
 AND TOTAL PETROLEUM HYDROCARBONS - PURGEABLE

Client I.D.: Method Blank
 Date Analyzed: 05/12/90

CHEMWEST I.D.: 5919-MB
 Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	BRL	0.5
Toluene	BRL	0.5
Ethyl Benzene	BRL	0.5
Para-Xylene	BRL	0.5
Meta-Xylene	BRL	0.5
Ortho-Xylene	BRL	0.5
Total-Xylenes (1)	BRL	NA
Total Petroleum Hydrocarbon (Purgeable)	BRL	50

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	64%	50-150%

BRL: Below Reporting Limit.
 RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by:

REV4:1.90

CHEMWEST ANALYTICAL LABORATORIES
 BENZENE, TOLUENE, ETHYL BENZENE, XYLENES
 AND TOTAL PETROLEUM HYDROCARBONS - PURGEABLE

Client I.D.: MW-6B
 Date Analyzed: 05/12/90

CHEMWEST I.D.: 5919-1
 Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	45	5.0
Toluene	6.0	5.0
Ethyl Benzene	20	5.0
Para-Xylene	9.4	5.0
Meta-Xylene	5.3	5.0
Ortho-Xylene	7.2	5.0
Total-Xylenes (1)	22	NA
Total Petroleum Hydrocarbon (Purgeable)	150 168	500 50

Revised 6/28/90 MAS

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	71%	50-150%

BRL: Below Reporting Limit.
 RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by: Xc

REV4:1.90

CHEMWEST ANALYTICAL LABORATORIES
 BENZENE, TOLUENE, ETHYL BENZENE, XYLENES
 AND TOTAL PETROLEUM HYDROCARBONS - PURGEABLE

Client I.D.: MW-6C
 Date Analyzed: 05/12/90

CHEMWEST I.D.: 5919-2
 Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	6100	250
Toluene	1500	250
Ethyl Benzene	1000	250
Para-Xylene	760	250
Meta-Xylene	1000	250
Ortho-Xylene	960	250
Total-Xylenes (1)	2700	NA
Total Petroleum Hydrocarbon (Purgeable)	30000	25000

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	69%	50-150%

BRL: Below Reporting Limit.

RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by: JP

REV4:1.90

CHEMWEST ANALYTICAL LABORATORIES
 BENZENE, TOLUENE, ETHYL BENZENE, XYLENES
 AND TOTAL PETROLEUM HYDROCARBONS - PURGEABLE

Client I.D.: MW-6D
 Date Analyzed: 05/12/90

CHEMWEST I.D.: 5919-3
 Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	800	50
Toluene	150	50
Ethyl Benzene	310	50
Para-Xylene	140	50
Meta-Xylene	73	50
Ortho-Xylene	67	50
Total-Xylenes (1)	280	NA
Total Petroleum Hydrocarbon (Purgeable)	3600	500

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	74%	50-150%

BRL: Below Reporting Limit.
 RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by: SP

REV4:1.90

CHEMWEST ANALYTICAL LABORATORIES
 BENZENE, TOLUENE, ETHYL BENZENE, XYLENES
 AND TOTAL PETROLEUM HYDROCARBONS - PURGEABLE

Client I.D.: MW-6E
 Date Analyzed: 05/12/90

CHEMWEST I.D.: 5919-4
 Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	57	5.0
Toluene	BRL	5.0
Ethyl Benzene	BRL	5.0
Para-Xylene	BRL	5.0
Meta-Xylene	53	5.0
Ortho-Xylene	BRL	5.0
Total-Xylenes (1)	53	NA
Total Petroleum Hydrocarbon (Purgeable)	BRL ²⁵⁰ <i>Revised 6/28/90 MKS</i>	500 ⁵⁰

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	84%	50-150%

BRL: Below Reporting Limit.
 RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by: JK

REV4:1.90

CHEMWEST ANALYTICAL LABORATORIES
 BENZENE, TOLUENE, ETHYL BENZENE, XYLENES
 AND TOTAL PETROLEUM HYDROCARBONS - PURGEABLE

Client I.D.: MW-6F
 Date Analyzed: 05/12/90

CHEMWEST I.D.: 5919-5
 Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	BRL	0.5
Toluene	BRL	0.5
Ethyl Benzene	BRL	0.5
Para-Xylene	BRL	0.5
Meta-Xylene	BRL	0.5
Ortho-Xylene	BRL	0.5
Total-Xylenes (1)	BRL	NA
Total Petroleum Hydrocarbon (Purgeable)	BRL	50

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	73%	50-150%

BRL: Below Reporting Limit.
 RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by: VP

REV4:1.90

CHEMWEST ANALYTICAL LABORATORIES
 BENZENE, TOLUENE, ETHYL BENZENE, XYLENES
 AND TOTAL PETROLEUM HYDROCARBONS - PURGEABLE

Client I.D.: MW-6G
 Date Analyzed: 05/12/90

CHEMWEST I.D.: 5919-6
 Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	BRL	0.5
Toluene	BRL	0.5
Ethyl Benzene	BRL	0.5
Para-Xylene	BRL	0.5
Meta-Xylene	BRL	0.5
Ortho-Xylene	BRL	0.5
Total-Xylenes (1)	BRL	NA
Total Petroleum Hydrocarbon (Purgeable)	BRL	50

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	68%	50-150%

BRL: Below Reporting Limit.

RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by: MP

REV4:1.90

CHEMWEST ANALYTICAL LABORATORIES
 BENZENE, TOLUENE, ETHYL BENZENE, XYLENES
 AND TOTAL PETROLEUM HYDROCARBONS - PURGEABLE

Client I.D.: MW-6H
 Date Analyzed: 05/12/90

CHEMWEST I.D.: 5919-7
 Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	700	50
Toluene	39	5.0
Ethyl Benzene	31	5.0
Para-Xylene	18	5.0
Meta-Xylene	16	5.0
Ortho-Xylene	16	5.0
Total-Xylenes (1)	50	NA
Total Petroleum Hydrocarbon (Purgeable)	630	500

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	71%	50-150%

BRL: Below Reporting Limit.
 RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by: K

REV4:1.90

CHEMWEST ANALYTICAL LABORATORIES
 BENZENE, TOLUENE, ETHYL BENZENE, XYLENES
 AND TOTAL PETROLEUM HYDROCARBONS - PURGEABLE

Client I.D.: MW-6I
 Date Analyzed: 05/12/90

CHEMWEST I.D.: 5919-8
 Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	BRL	0.5
Toluene	BRL	0.5
Ethyl Benzene	BRL	0.5
Para-Xylene	BRL	0.5
Meta-Xylene	BRL	0.5
Ortho-Xylene	BRL	0.5
Total-Xylenes (1)	BRL	NA
Total Petroleum Hydrocarbon (Purgeable)	BRL	50

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	55%	50-150%

BRL: Below Reporting Limit.
 RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by:

REV4:1.90

CHEMWEST ANALYTICAL LABORATORIES, INC.

600W North Market Blvd.
Sacramento, California 95834
(916) 923-0840 FAX (916) 923-1938

CLIENT

Order No. 05919
Date Rec'd. 5/1/90 17:45
Compl. Date
Section

CLIENT: Narding Lawson Associates
1355 Willow Way Suite 109
Concord, CA 94520

Project Name: TEXACO # 6
Project No. 225L111.03
P.O. NO.
Contact Mike Sides/Ready Stone
Phone (916) 687-9660

ANALYSIS: Eight water samples rec'd under chain of custody
in 40ml vial vials in duplicate (16) to be analyzed for
BTEX, TPH GAS.

SAMPLE ID.	DATE	ANALYSIS	MATRIX	CONTAINERS
5919-1 MW-6B	4/30/90	BTEX/G	WATER	2-40ml vial vials
-2 MW-6C	}	}	}	}
-3 MW-6D				
-4 MW-6E				
-5 MW-6F				
-6 MW-6G				
-7 MW-6H				
-8 MW-6I				

GC
BMS
BILLMCCANCE

131 11 06 AM '90

CHEM WEST COURIER



Harding Lawson Associates
 1355 Willow Way, Suite 109
 Concord, California 94520
 415/687-9660
 Telecopy: 415/687-9673

CHAIN OF CUSTODY FORM

Lab: Chem West

Job Number: 2256, 111, 03
 Name/Location: Tenasco # G
 Project Manager: Mike Sillis

Samplers: Don Johnson
Mike Bient

Recorder: Don Johnson
 (Signature Required)

ANALYSIS REQUESTED											
EPA 601/8010											
EPA 602/8020											
EPA 624/8240											
EPA 625/8270											
ICP METALS											
EPA 8015M/TPH											
<u>DETR, TPH, GAO</u>											

SOURCE CODE	MATRIX					#CONTAINERS & PRESERV.				SAMPLE NUMBER OR LAB NUMBER			DATE				STATION DESCRIPTION/ NOTES	
	Water	Sediment	Soil	Oil		Unpres.	H ₂ SO ₄	HNO ₃	HCl	Yr	Wk	Seq	Yr	Mo	Dy	Time		
3	/											90	00	90				
2/3	/											90	00	430				
	/																	
	/																	
	/																	
	/																	
	/																	
	/																	
	/																	

LAB NUMBER		DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS
Wk	Seq				

CHAIN OF CUSTODY RECORD		
RELINQUISHED BY: (Signature) <u>Don Johnson</u>	RECEIVED BY: (Signature) <u>Gary Biase</u>	DATE/TIME <u>5-1-90 10:15</u>
RELINQUISHED BY: (Signature) <u>Gary Biase</u>	RECEIVED BY: (Signature)	DATE/TIME <u>5-1-90 17:45</u>
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) <u>Bill McBenge</u>
METHOD OF SHIPMENT CHEM WEST COURIER		DATE/TIME <u>5/1/90 17:45</u>

JUL 3 1990

 **CHEMWEST**
ANALYTICAL LABORATORIES, INC.

June 28, 1990

Harding Lawson Associates
1355 Willow Way, Suite 109
Concord, CA 94520

Attention: Mr. Randy Stone

Subject: Report of Amended Data - Case Number 5919

Dear Mr. Stone

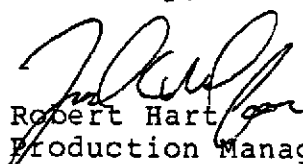
Enclosed you will find amended data sheets for the re-analysis of the Total Petroleum Hydrocarbon (Purgeable) Analysis for sample numbers MW-6B & MW-6E (CW5919-1 & 4).

Project Number: 2251.111.03

The enclosed data sheets reflect the correct results for the above samples.

I hope that this has not caused you any inconvenience, should you have any further questions please do not hesitate to give Debbie Pearce, your Customer/Technical Service Representative, a call.

Sincerely,


Robert Hart
Production Manager

cc: File

CHEMWEST ANALYTICAL LABORATORIES
TOTAL PETROLEUM HYDROCARBONS

Client I.D.: Method Blank
Date Analyzed: 05/22/90

CHEMWEST I.D.: 5919-MB
Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Total Petroleum Hydrocarbon (Purgeable)	BRL	50

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	110%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by: *HL*

REV4:1.90

CHEMWEST ANALYTICAL LABORATORIES
TOTAL PETROLEUM HYDROCARBONS

Client I.D.: MW-6B
Date Analyzed: 05/22/90

CHEMWEST I.D.: 5919-1
Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Total Petroleum Hydrocarbon (Purgeable)	168	50

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	129%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by: *[Signature]*

REV4:1.90

CHEMWEST ANALYTICAL LABORATORIES
TOTAL PETROLEUM HYDROCARBONS

Client I.D.: MW-6E
Date Analyzed: 05/22/90

CHEMWEST I.D.: 5919-4
Matrix : Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Total Petroleum Hydrocarbon (Purgeable)	250	50

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	97%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by: *gaf*

REV4:1.90

HARDING ASSOC.

JUL 9 1990



July 14, 1990

Harding Lawson Associates
1355 Willow Way, Suite 109
Concord, CA 94520

Attention: Mr. Mike Sides

Subject: Report of Amended Data - Case Number 5997

Dear Mr. Sides

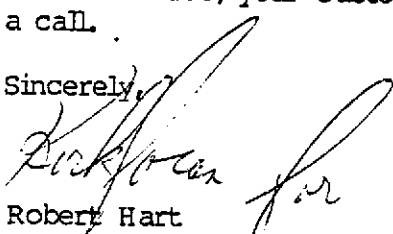
Enclosed you will find amended data sheets for the Total Petroleum Hydrocarbons (Purgeable) Analysis of sample number MW-6A (CW5997-1).

Project Number: 2251,123.03

The enclosed data sheets now reflect the amount detected in the Total Petroleum Hydrocarbons (Purgeable) analysis per your request.

I hope that this has not caused you any inconvenience, should you have any further questions please do not hesitate to give Debbie Pearce, your Customer/Technical Service Representative, a call.

Sincerely,


Robert Hart
Production Manager

cc: File

CHEMWEST ANALYTICAL LABORATORIES
 BENZENE, TOLUENE, ETHYL BENZENE, XYLENES
 AND TOTAL PETROLEUM HYDROCARBONS - PURGEABLE

Client I.D.: MW-6A
 Date(s) Analyzed: 05/18/90

CHEMWEST I.D.: 5997-1
 Matrix: Water

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	150	5
Toluene	6.2	2.5
Ethyl Benzene	BRL	2.5
p-Xylene	6.5	2.5
m-Xylene	6.5	2.5
o-Xylene	BRL	2.5
Total-Xylenes (1)	13	NA
Total Petroleum Hydrocarbon (Purgeable)	100	50

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	92%	50-150%

BRL: Below Reporting Limit.
 RL: Reporting Limit.

(1): Total of P-, M-, and O- Xylenes.

Approved by: YH

REV3.1.89

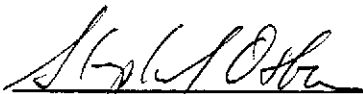
DISTRIBUTION

3 copies: Texaco Refining and Marketing Inc.
10 Universal City Plaza
Universal City, California 91608
Attention: Mr. R. W. Conlon

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

MAS/RS/mlw 031714L/R38

QUALITY CONTROL REVIEWER



Stephen J. Osborne
Principal Engineer