Texaco Refining
and Marketing Inc

108 Cutting Boulevard
Richmond CA 94804

91 MAY -9 AM 10:5[illegible]

May 7, 1991

Mr. Rafat Shahid
Alameda County Environmental
Health Department
80 Swan Way, Room 200
Oakland, CA 94621

Dear Mr. Shahid:

Enclosed is a copy of our Quarterly Technical Report dated March 6, 1991 for our former Texaco Service Station located at 500 Grand Avenue in Oakland, California. This report covers the period from October through December, 1990.

Please call me at (415) 236-1770 if you have any questions.

Very truly yours,

R.R. Zielinski
Environmental Supervisor

Enclosure

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

pr: KD

KEG

500GA.RS

A Report Prepared for

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

QUARTERLY TECHNICAL REPORT
FOURTH QUARTER OF 1990
FORMER TEXACO STATION NO. 6248800235
500 GRAND AVENUE
OAKLAND, CALIFORNIA

HLA Job No. 2251,114.03
March 6, 1991
1990 Report No. 4

by

REGISTERED GEOLOGIST
JEANNA S. HUDSON
NO. 4492
STATE OF CALIFORNIA

Jeanna S. Hudson
Registered Geologist

REGISTERED PROFESSIONAL ENGINEER
STEPHEN J. OSBORNE
No. 656
Exp. 03/31/91
GEOTECHNICAL
STATE OF CALIFORNIA

for

Stephen J. Osborne
Geotechnical Engineer

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

INTRODUCTION

This Quarterly Technical Report (QTR) presents the results of investigation activities by Harding Lawson Associates (HLA) during the fourth quarter of 1990 at the former site of Texaco service station No. 6248800235, 500 Grand Avenue, Oakland, California (Plate 1). This site is currently operated by Exxon Company U.S.A. (Exxon). This report presents fourth quarter activities, summarizes previous work at the site, and describes planned activities for the first quarter of 1991.

SUMMARY OF PREVIOUS WORK

Texaco Refining and Marketing Inc. retained HLA to conduct a sensitive receptor survey at the subject location in May 1988. In June 1988, Texaco Refining and Marketing Inc. requested that HLA proceed with a subsurface investigation to evaluate whether hydrocarbons had affected shallow soil or groundwater. By the end of the third quarter of 1990, HLA had completed the following tasks in the site investigation:

- Conducted a soil-gas survey at 18 locations on or near the site (survey performed by Tracer Research Corporation)
- Drilled and developed four 2-inch-diameter groundwater monitoring wells (MW-8A, MW-8B, MW-8C, and MW-8D) and six 4-inch-diameter monitoring wells (MW-8E, MW-8F and MW-8G MW-8H, MW-8I, and MW-8J). Locations are shown on Plate 2.
- Obtained groundwater samples from each well on a quarterly basis and analyzed them for benzene, toluene, ethylbenzene, and total xylenes (BTEX), and total

petroleum hydrocarbons (TPH) as gasoline and as diesel fuel.

- Gauged water levels and estimated the direction of groundwater flow
- Performed slug tests in MW-8C and MW-8E to estimate hydraulic conductivity
- Drilled and sampled 15 soil borings to identify and delineate the extent of hydrocarbons in the vadose zone (Plate 2)
- Analyzed all soil samples for BTEX and TPH as gasoline
- Analyzed soil samples from B-6, B-7, B-8, B-9, B-10, B-11, B-12, B-13, B-14 and B-8K for TPH as diesel fuel
- Analyzed soil sample from B-13 for halogenated volatile organics, semivolatile organics, oil and grease, and selected metals.
- Submitted an Environmental Assessment Report to Texaco during the third quarter of 1989
- Pumped and disposed of 5,000 gallons of water from the tank backfill as an interim remedial measure.

RESULTS OF PREVIOUS WORK

The results of the soil-gas survey indicated petroleum hydrocarbons in the soil gas near the underground storage tanks and dispenser islands. Analyses of water samples from the four observation wells in the storage tank backfill showed the presence of dissolved petroleum hydrocarbons in groundwater adjacent to the underground tanks.

Soil samples and drill cuttings indicate that the subsurface materials at the site consist of clay and minor amounts of interbedded clayey sand. Analysis of slug test data obtained

from MW-3C and MW-3E indicate a hydraulic conductivity of 0.02 to 0.03 foot/day. Groundwater would be expected to move through the soils relatively slowly.

Local groundwater flow is to the south and southeast, toward Lake Merritt (Plate 3). Water-level data from monitoring wells across the site show that, in most wells, the water table has fluctuated 2.5 to 3.0 feet since early 1988. Water levels in MW-8A fluctuated as much as 8 feet; those data are suspect and were not used in contouring the phreatic surface.

Samples from 15 soil borings have been chemically analyzed to evaluate the horizontal and vertical extent of petroleum hydrocarbons in the subsurface. The analytical data are summarized in Tables 1 and 2. A contour map of TPH as gasoline in the vadose zone soil is presented on Plate 4. For this map, the vadose zone was defined by comparing sample depths to static water levels at the time of sampling.

Plate 4 depicts a vadose zone hydrocarbon plume that apparently originates at the underground tanks and extends off-site to MW-8. Significant concentrations of TPH as gasoline are also found in the area of the dispenser islands. The highest concentration, 2900 parts per million (ppm), was found in a soil sample collected at a depth of 1.5 foot in B-11. In general, BTEX concentrations in the soil are either below detection limits or very low.

The results of analyses for TPH as diesel fuel indicate concentrations ranging from nondetectable to 460 ppm (B-9); most

of the soil samples with detectable concentrations contained less than 100 ppm TPH as diesel fuel.

Table 3 presents the results of groundwater analyses obtained since 1988. Groundwater from monitoring wells MW-8E, MW-8H, MW-8I, and MW-8J, and observation wells OB-3 and OB-4 contained benzene in concentrations that exceed the Department of Health Services Drinking Water Action Levels (DWALs). In groundwater samples from wells MW-8A, MW-8B, and MW-8C, BTEX concentrations were either nondetectable or below the DWALs.

A contour map of benzene concentrations in groundwater is presented on Plate 5; Plate 6 is a contour map of concentrations of TPH as gasoline. These maps suggest that hydrocarbons in groundwater may have originated near the dispenser islands, as well as near the underground tanks. Water from monitoring well MW-8E, cross-gradient and down-gradient of the dispenser islands, has the highest concentrations of BTEX, TPH as gasoline, and TPH as diesel fuel.

Groundwater containing TPH as gasoline was detected downgradient from MW-8E in water samples from MW-8H, MW-8I, and MW-8J. Samples from MW-8F and MW-8G contained nondetectable concentrations of BTEX and TPH as gasoline and as diesel fuel. However, "heavy" hydrocarbons, beyond the range of diesel fuel, were detected in groundwater from these downgradient locations during the second quarter 1990 analyses.

In the third quarter 1990, workers installing overfill containment devices on the underground storage tanks discovered

floating waste oil around the waste oil tank. Exxon excavated this tank in September 1990. Waste oil and water from the tank backfill were pumped and disposed of by Exxon. Soil around the tank backfill was excavated and disposed of also. Clay sewer lines were discovered adjacent to the tank pit during the excavation process. Gil Wistar, of the Alameda County Department of Environmental Health, requested that Texaco excavate the clay lines and contaminated soil from the surrounding utility trench.

ACCOMPLISHMENTS DURING FOURTH QUARTER OF 1990

During the fourth quarter of 1990, HLA accomplished the following tasks at the 500 Grand Avenue site:

- Purged and sampled four on-site monitoring wells, five off-site monitoring wells, and two observation wells. Water samples were analyzed for BTEX, TPH as gasoline, and TPH as diesel fuel.
- Measured water levels in nine monitoring wells in October and November (Table 4).
- Issued an interim remedial plan (December 7, 1990) in lieu of a Third Quarter Technical Report
- Finalized subcontractor's agreement for removal of clay sewer lines adjacent to former waste oil tank location.

Groundwater Sampling

HLA continued to monitor water levels and groundwater quality at the subject location during the fourth quarter of 1990. Each well was purged while monitoring temperature, conductivity, and pH of the water. The water samples were collected and transported, under chain-of-custody, to ChemWest Analytical Laborato-

ries, Inc., in Sacramento, California. The water samples were analyzed for BTEX, TPH as gasoline, and TPH as diesel fuel.

Results of Analyses

Table 3 and Plates 5 and 6 summarize results of the fourth quarter groundwater analyses. Benzene concentrations exceeded the DWAL (1.0 parts per billion [ppb]) in groundwater from MW-8E, MW-8H, MW-8I, MW-8J, and the two observation wells, OB-3 and OB-4.

Heavier hydrocarbons were detected in groundwater samples from MW-8E, MW-8F, MW-8G, and the observation wells. The laboratory describes the compound as an "unknown hydrocarbon mixture beyond the range of diesel fuel #2", possibly a heavier fuel oil or waste oil.

Plate 3 is the most recent contour map of the potentiometric surface, based on water levels measured on October 18, 1990. No significant changes in groundwater flow direction are apparent.

ANTICIPATED ACTIVITIES FOR FIRST QUARTER, 1991

HLA personnel will supervise the removal of the clay sewer lines during the first quarter of 1991. Soil samples and water samples (if available) will be collected from the excavation and utility trench backfill. Quarterly groundwater samples will be collected and analyzed for BTEX and TPH as gasoline, as diesel fuel, and as motor oil. Water levels will be measured monthly.

LIST OF TABLES

LIST OF ILLUSTRATIONS

APPENDICES

Table 1. Results of Soil Sample Analyses
(concentrations in mg/kg [ppm])

Boring/ Well Number	Sample Depth (feet)	Benzene	Toluene	Ethyl-benzene	Xylenes	TPH as Gasoline	TPH as Diesel	TPH Other**
B-1	6.5	ND	ND	ND	ND	12	NA	
B-3	4.0	ND	ND	ND	5	520	NA	
B-4	3.5	ND	1	3.5	13	510	NA	
B-5	5.5	ND	ND	ND	ND	<10	NA	
B-5	10.5	ND	ND	ND	ND	ND	NA	
B-5	16.0	ND	ND	ND	ND	ND	NA	
B-6	2.0	ND	0.08	ND	ND	1.0	<100*	<100*
B-6	4.5	ND	0.09	ND	ND	ND	<10	<10
B-7	3.0	ND	6.7	5.1	50	580	<100*	<100*
B-8	2.0	0.05	ND	ND	0.34	3.4	<10	<10
B-9	2.5	0.05	0.32	0.81	6.4	100	460	<100*
B-8K	1.5	ND	ND	ND	ND	2.1		ND
	3.0	ND	0.05	ND	ND	6.6		ND
	5.5	ND	ND	0.08	0.05	84		20
B-10	1.5	0.28	ND	0.20	0.18	8.4		ND
	2.5	0.09	ND	ND	ND	ND		ND
	5.5	ND	ND	ND	ND	ND		ND
	8.5	ND	ND	ND	ND	ND		ND
B-11	1.5	ND	ND	5.4	1.6	2,900		30
	2.5	ND	ND	0.31	0.12	62		11
	5.5	ND	ND	0.06	ND	17		ND
	8.5	ND	ND	ND	ND	ND		ND
B-12	1.0	0.22	0.11	0.18	0.42	13		ND
	2.5	ND	ND	0.19	0.83	49		ND
	4.5	ND	ND	1.27	0.67	1,200		94
	6.0	ND	0.06	ND	ND	ND		ND
B-13	1.5	ND	ND	ND	ND	ND	ND	ND
	2.5	ND	ND	1.7	5.4	130	ND	1,000
	3.5	ND	0.06	0.06	0.30	26	ND	250
B-14	1.5	ND	ND	ND	ND	4.8	ND	85
	3.5	ND	ND	ND	ND	2.3	ND	62
MW-8D	1.3	ND	0.40	ND	0.50	10	NA	
MW-8E	5.5	0.82	6.5	5.5	26	750	NA	
MW-8F	11.0	ND	ND	ND	ND	ND	NA	
MW-8G	6.0	ND	ND	ND	ND	ND	NA	
MW-8H	1.5	ND	0.07	ND	ND	ND		ND
	3.0	ND	0.24	ND	ND	2.6		ND
	5.5	ND	ND	0.30	0.83	550		66
	10.5	ND	ND	ND	ND	ND		ND
MW-8I	1.5	0.10	ND	ND	ND	3.0		ND
	3.5	0.06	ND	ND	0.02	ND		ND
	5.5	ND	ND	2.7	9.2	280		ND
	10.5	ND	ND	ND	ND	ND		ND
MW-8J	1.5	0.18	0.09	0.06	0.05	24		ND
	3.0	0.08	0.14	0.04	ND	13		33
	5.5	ND	ND	25	9.2	2,100		83
	10.5	ND	0.02	ND	ND	8		ND

ND = Not detected
NA = Not analyzed
* Laboratory increased reporting limits because of matrix interference.
** "Heavy" petroleum hydrocarbons such as waste oil, mineral spirits, jet fuel, or fuel oil.

Table 2. Summary of Chemical Analyses
Soil Sample B-13 (2.5 feet deep)

Semivolatile Organics; EPA Test Method 8270

- Analyses for 55 semivolatile organic compounds
- Results were below reporting limit on all except:

Naphthalene	900 ppb
2 Methylnapthalene	1400 ppb
Bis (2-ethylhexyl) phthalate	260 ppb

Halogenated Volatile Organics; EPA Method 8010

- Analyses for 29 compounds
- Results were below reporting limits on all except:

Trichloroethane	0.06 ppm

Total Oil and Grease (IR) 5600 ppm

Cd, Cr, Pb, Zn - EPA Method 503E

Cd - Below reporting limit
Cr - 36 ppm
Pb - Below reporting limit
Zn - 41 ppm

Table 3. Results of Groundwater Analyses
Concentrations in µg/l (ppb)

Well	Depth (feet)	Date Sampled	Benzene	Toluene	Ethyl-benzene	Xylenes	TPH as Gasoline	TPH as Diesel	TPH Other**
MW-8A	32	06/14/88	<0.5*	1.5	<2	6.6	--	--	--
		10/28/88	<0.5	<1	<2	<1	--	--	--
		09/28/89	<0.5	<0.5	<0.5	<3	<50	--	--
		11/29/89	<0.5	1.0	<0.5	<0.5	<50	1,200	<50
		01/24/90	<0.5	<0.5	<0.5	<0.5	<100	--	2,800
		04/26/90	<0.5	<0.5	<0.5	<0.5	<2,500	<50	890
		07/26/90	6.0	<0.5	<0.5	<0.5	<50	<50	<50
		10/18/90	<0.5	<0.5	<0.5	<0.5	<50	<50	<50
MW-8B	20	06/14/88	<0.5	<1	<2	<1	--	--	--
		10/21/88	<0.5	<1	<2	3.1	--	--	--
		09/28/89	<0.5	<0.5	<0.5	<3	<50	--	--
		11/29/89	<0.5	<0.5	<0.5	<0.5	<50	<50	380
		01/24/90	<0.5	<0.5	<0.5	<0.5	<100	--	350
		04/26/90	<0.5	<0.5	<0.5	<0.5	<50	<50	110
		07/26/90	<0.5	<0.5	<0.5	<0.5	<50	<50	<50
		10/18/90	<0.5	<0.5	<0.5	<0.5	<50	<50	<50
MW-8C	24.5	06/14/88	5.3	3.5	2.6	13.0	--	--	--
		10/21/88	<0.5	<1	<2	<1	--	--	--
		09/28/89	<0.5	<0.5	<0.5	<3.0	<50	--	--
		11/29/89	<0.5	<0.5	<0.5	<0.5	<50	<50	190
		01/24/90	0.9	<0.5	<0.5	<0.5	<100	--	480
		04/26/90	<0.5	<0.5	<0.5	<0.5	<50	<50	160
		07/26/90	<0.5	<0.5	<0.5	<0.5	<50	<50	<50
		10/18/90	<0.5	<0.5	<0.5	<0.5	<50	<50	<50
MW-8E	20	10/25/88	1,400	510	2.9	420	--	--	--
		09/28/89	5,600	3,100	<500	<3,000	22,000	--	--
		11/29/89	4,900	2,600	<250	1,490	15,000	6,800	<50
		01/24/90	10,100	3,340	540	1,790	36,000	--	4,900
		04/26/90	11,000	5,700	840	2,900	48,000	1,400	<50
		07/26/90	15,000	6,200	520	4,700	56,000	<50	<50
		10/18/90	1,500	1,300	170	1,800	15,000	620	<50

Table 3 (continued)

Well	Depth (feet)	Date Sampled	Benzene	Toluene	Ethyl-benzene	Xylenes	TPH as Gasoline	TPH as Diesel	TPH Other**
MW-8F	16.5	04/14/89	<0.5	<1	<2	<1	--	--	--
		09/28/89	<0.5	<0.5	<0.5	<3	<50	--	--
		11/29/89	<0.5	<0.5	<0.5	<0.5	<50	<50	<50
		01/24/90	<0.5	<0.5	<0.5	<0.5	<100	--	<300
		04/26/90	<0.5	<0.5	<0.5	<0.5	<50	<50	110
		07/26/90	<0.5	<0.5	<0.5	<0.5	<50	<50	<50
		10/18/90	<0.5	<0.5	<0.5	<0.5	<50	360	<50
MW-8G	16.5	04/14/89	<0.5	<1	<2	<1	--	--	--
		09/28/89	<0.5	<0.5	<0.5	<3	<50	--	--
		11/29/89	<0.5	<0.5	<0.5	<0.5	<50	<50	<50
		01/24/90	<0.5	<0.5	<0.5	<0.5	<100	--	650
		04/26/90	<0.5	<0.5	<0.5	<0.5	<50	<50	120
		07/26/90	<0.5	<0.5	<0.5	<0.5	<50	<50	<50
		10/18/90	<0.5	<0.5	<0.5	<0.5	<50	460	<50
MW-8H	16.5	01/24/90	14.8	14.8	10.8	38.8	460	--	<300
		04/26/90	67	19	43	64	830	<50	820
		07/26/90	45	1.3	12	8.2	190	<50	<50
		10/18/90	17	2.5	14	8.5	300	<50	<50
MW-8I	16.5	01/24/90	116	2.9	13	30.5	580	--	440
		04/26/90	2,400	100	230	350	4,400	<50	1,400
		07/26/90	<0.5	<0.5	<0.5	<0.5	<50	<50	<50
		10/18/90	92	4.1	37	21	530	<50	<50
MW-8J	16.5	01/24/90	2.7	<0.5	1	2.6	<100	--	<300
		04/26/90	28	7.7	19	24	160	<50	320
		07/26/90	<0.5	<0.5	<0.5	<0.5	<50	<50	<50
		10/18/90	8.3	<0.5	2.6	1.5	<50	<50	<50

Table 3 (continued)

Well	Depth (feet)	Date Sampled	Benzene	Toluene	Ethyl-benzene	Xylenes	TPH as Gasoline	TPH as Diesel	TPH Other**
OB-3	11.5	11/06/89	420	8	6	64	4,000	--	--
		04/26/90	160	19	5	8.6	1,000	3,200	<50
		07/26/90	<0.5	<0.5	<0.5	0.9	68	1,200	<50
		10/18/90	260	69	35	490	3,200	2,100	<50
OB-4	10.0	11/06/89	500	11	10	24	4,000	--	--
		04/26/90	360	10	10	18	460	3,900	<50
		07/26/90	23	3.7	1.6	5.9	200	1,600	<50
		10/18/90	600	540	83	840	4,300	330	<50
DWAL			1.0	680	100	1,750			

DWAL = Drinking water action levels, State of California Department of Health Services (April, 1989).

* <0.5 indicates that concentrations are below the reporting limit of 0.5 µg/l.

** "Heavy" petroleum hydrocarbons such as waste oil, mineral spirits, jet fuel, or fuel oil.

(07/26/90) Sample not analyzed for BTEX and TPH (g) within 14-day holding time

-- = Compounds not analyzed

Table 4. Historical Record of Depth to Groundwater

Well		MW-8A	MW-8B	MW-8C	MW-8E	MW-8F	MW-8G	MW-8H	MW-8I	MW-8J
Top of Casing Elev.		99.72	101.11	98.41	99.38	97.94	97.24	98.57	97.94	97.38
Date										
JAN 24, 90	GW ELEV	91.47	100.60	90.87	96.07	88.06	86.57	94.97	91.94	91.44
FEB 27, 90	GW ELEV	95.21	100.73	91.15	96.13	87.95	86.68	95.06	92.03	91.60
MAR 27,90	GW ELEV	95.64	100.66	91.24	96.09	88.69	87.45	95.03	92.02	91.58
APR 24,90	GW ELEV	96.10	100.69	91.51	96.07	88.95	87.59	95.02	91.98	91.39
MAY 29, 90	GW ELEV	97.37	100.84	87.88	96.36	89.67	86.61	PAVED	PAVED	PAVED
JUNE 28, 90	GW ELEV	97.37	100.71	89.79	96.24	88.95	87.45	PAVED	PAVED	PAVED

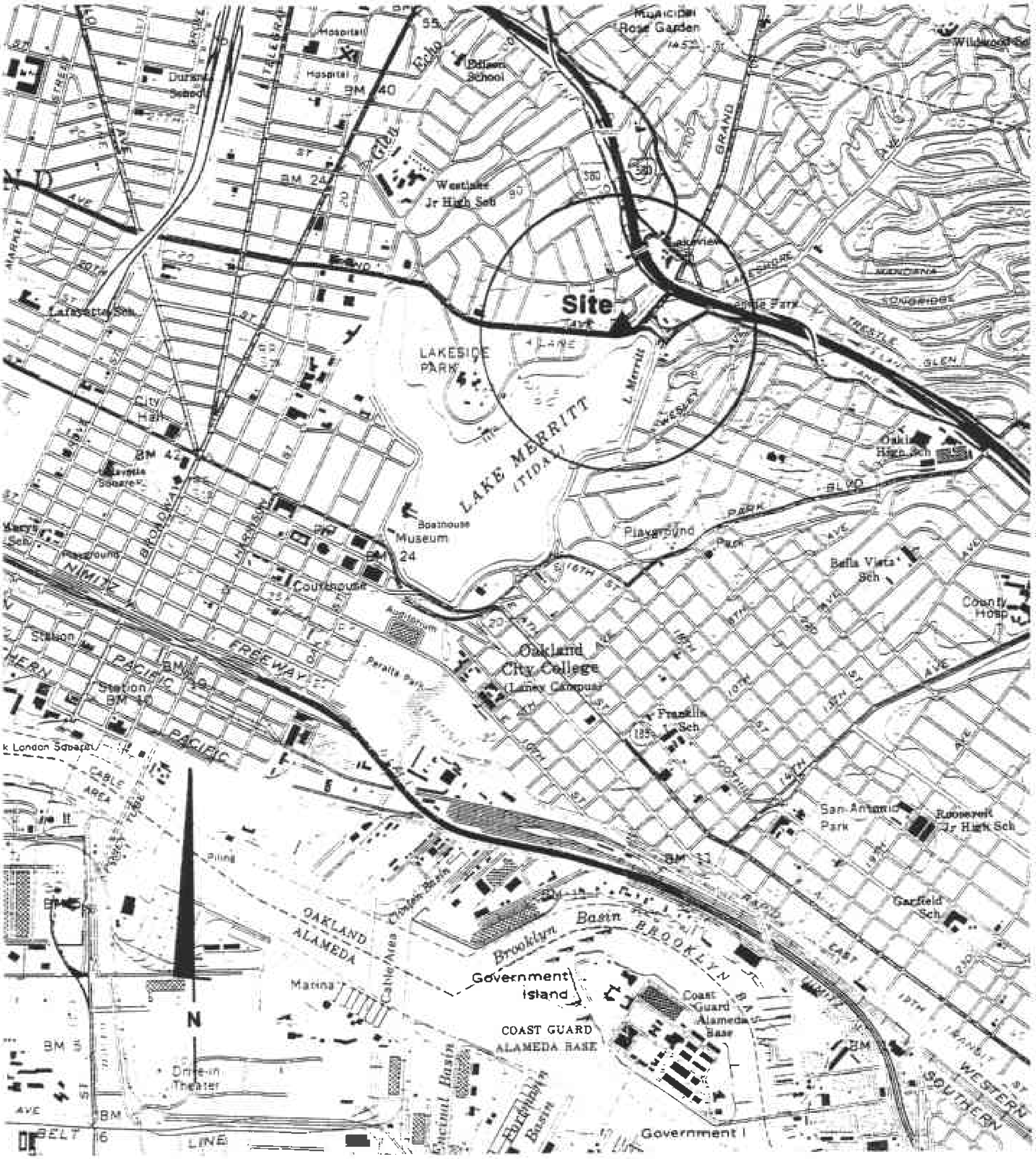
Well		MW-8A	MW-8B	MW-8C	MW-8E	MW-8F	MW-8G	MW-8H	MW-8I	MW-8J
Top of Casing Elev.		99.72	101.11	98.41	99.38	97.94	97.24	98.90	98.27	97.69
Date										
JUL 24, 90	GW ELEV	97.31	100.62	90.98	96.06	88.74	87.54	95.14	92.05	91.21
AUG 24, 90	GW ELEV	94.74	100.60	90.30	95.90	87.13	86.08	92.14	91.93	93.89
SEPT 25, 90	GW ELEV	95.24	100.56	91.05	95.94	87.25	BLOCKED	95.10	91.90	91.01
OCT 18, 90	GW ELEV	96.11	100.55	90.92	95.86	86.89	85.62	95.07	91.85	90.96
NOV 28, 90	GW ELEV	89.69	100.54	88.60	96.00	87.02	85.57	94.94	92.16	91.01

All measurement are in feet

TOC = Top of casing elevation relative to arbitrary datum of 100 feet

GW Elev = Groundwater elevation relative to arbitrary datum

105649



Ref: USGS, 7.5 Minute Topographic Map, Oakland West, California, Photo revised 1980.

0 2000 4000
SCALE IN FEET

Harding Lawson Associates
Engineers and Geoscientists

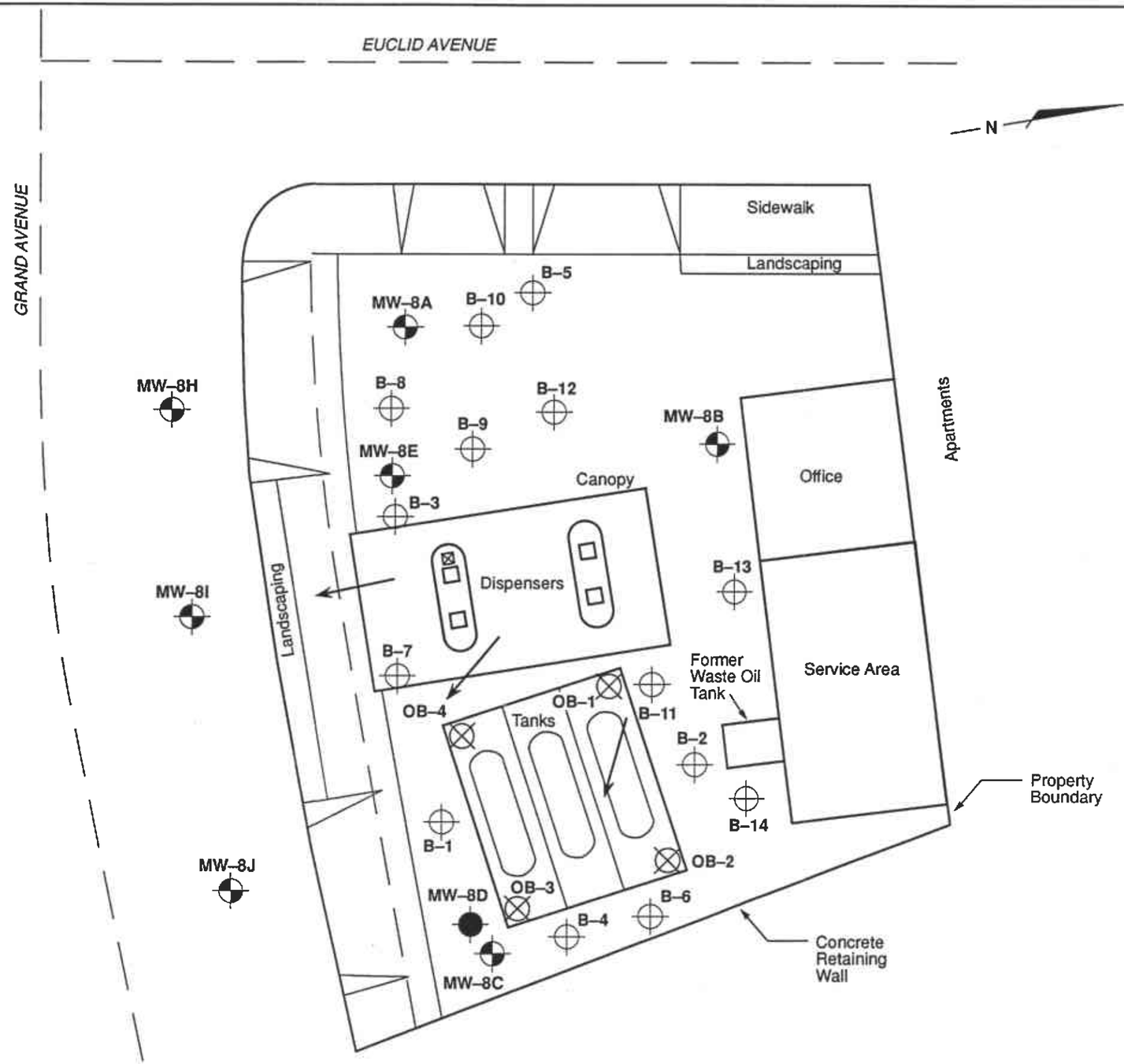
Regional Map
Former Texaco Service Station
500 Grand Avenue
Oakland, California

PLATE
1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
YC	2251,114.03	AK	5/89		

LEGEND

- Monitoring Well
- Observation Well
- Soil Boring
- Decommissioned Monitoring Well
- Ground-Water flow direction
- Bench Mark (HLA datum el. = 100 Feet)



Harding Lawson Associates
Engineering and
Environmental Services

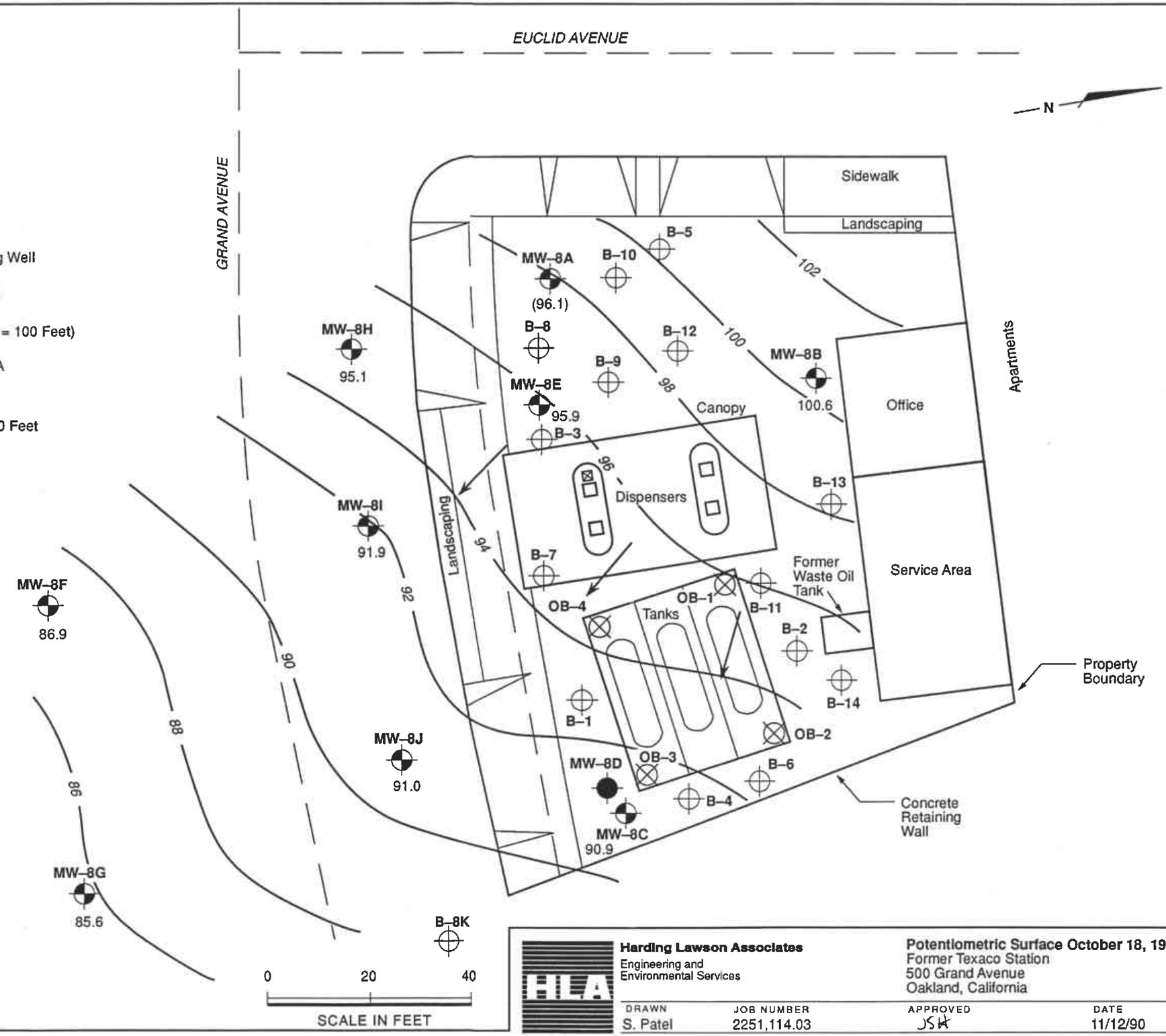
Site Plan
Former Texaco Station
500 Grand Avenue
Oakland, California

PLATE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
S. Patel	2251,114.03	JSH	11/09/90	

LEGEND

- Monitoring Well
- Observation Well
- Soil Boring
- Decommissioned Monitoring Well
- Ground-Water flow direction
- Bench Mark (HLA datum el. = 100 Feet)
- 91.9 — Water Level Relative To HLA Datum, 10/18/90
- 96 — Contour Of Potentiometric Surface, Contour Interval 2.0 Feet
- (96.1) — Suspect Data Point Not Used For Contouring



Harding Lawson Associates
Engineering and Environmental Services

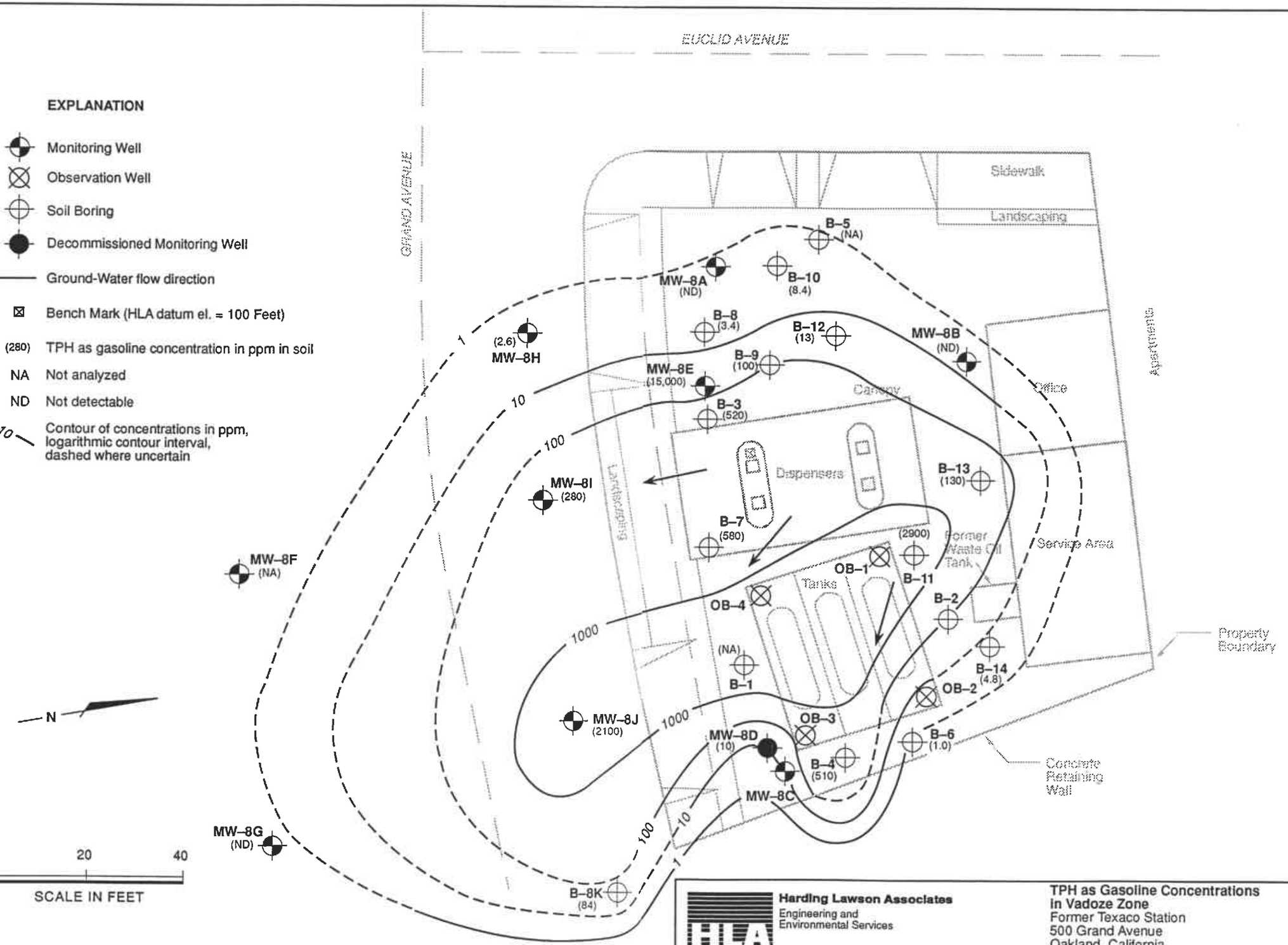
Potentiometric Surface October 18, 1990
Former Texaco Station
500 Grand Avenue
Oakland, California

PLATE **3**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
S. Patel	2251,114.03	JSH	11/12/90	12/05/90

EXPLANATION

- Monitoring Well
- Observation Well
- Soil Boring
- Decommissioned Monitoring Well
- Ground-Water flow direction
- Bench Mark (HLA datum el. = 100 Feet)
- (280) TPH as gasoline concentration in ppm in soil
- NA Not analyzed
- ND Not detectable
- 10 Contour of concentrations in ppm, logarithmic contour interval, dashed where uncertain



Harding Lawson Associates
Engineering and Environmental Services

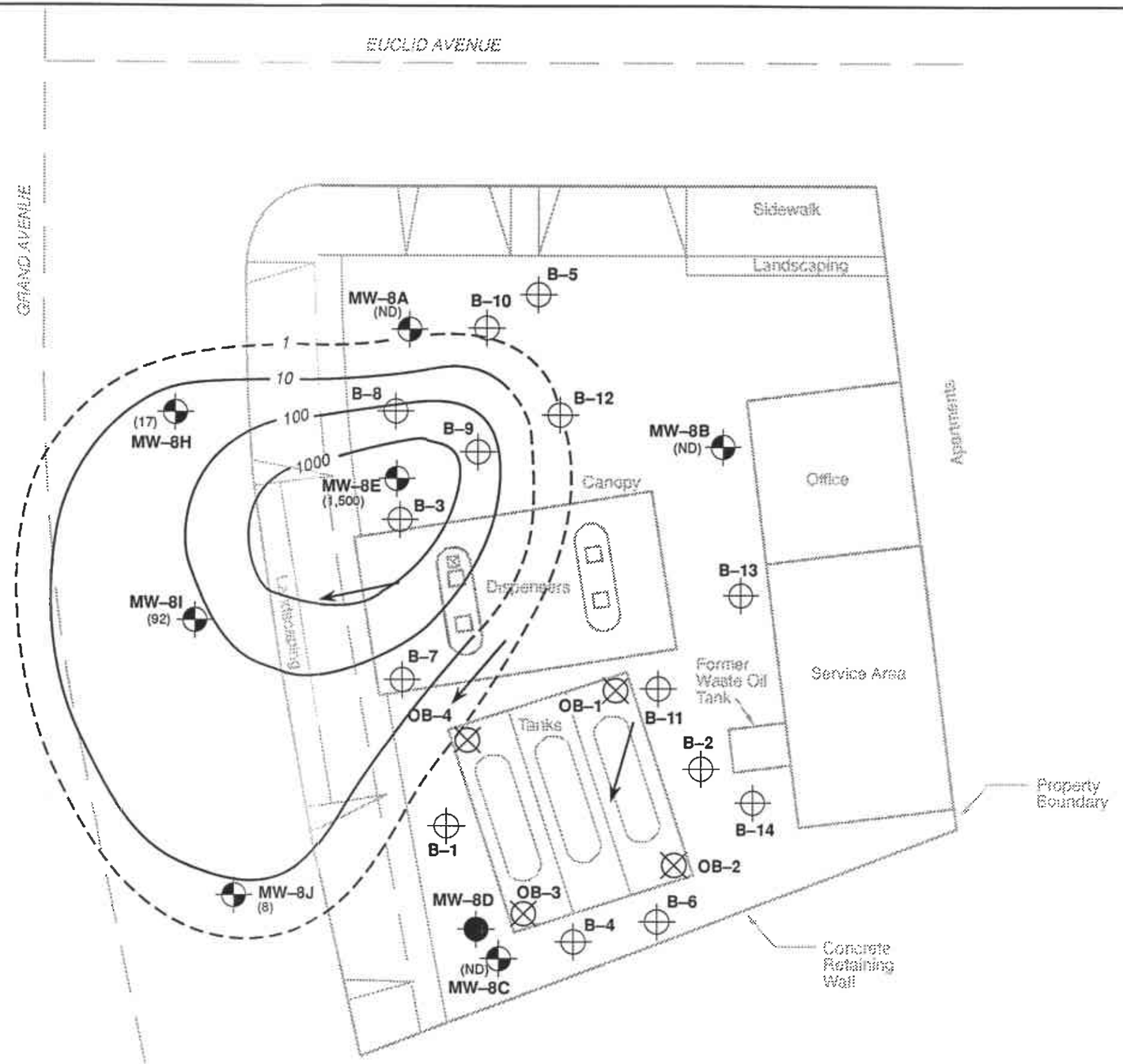
TPH as Gasoline Concentrations in Vadoze Zone
Former Texaco Station
500 Grand Avenue
Oakland, California

PLATE **4**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
SP/RHC	2251,114.03	JSH	11/09/90	2/22/91

EXPLANATION

- Monitoring Well
- Observation Well
- Soil Boring
- Decommissioned Monitoring Well
- Ground-Water flow direction
- Bench Mark (HLA datum el. = 100 Feet)
- (1,500) Benzene concentration in ppb 10/18/90
- ND Not detectable (concentration < 0.5 ppb)
- 10 Contour of concentrations in ppb, logarithmic contour interval, dashed where uncertain



Harding Lawson Associates
Engineering and Environmental Services

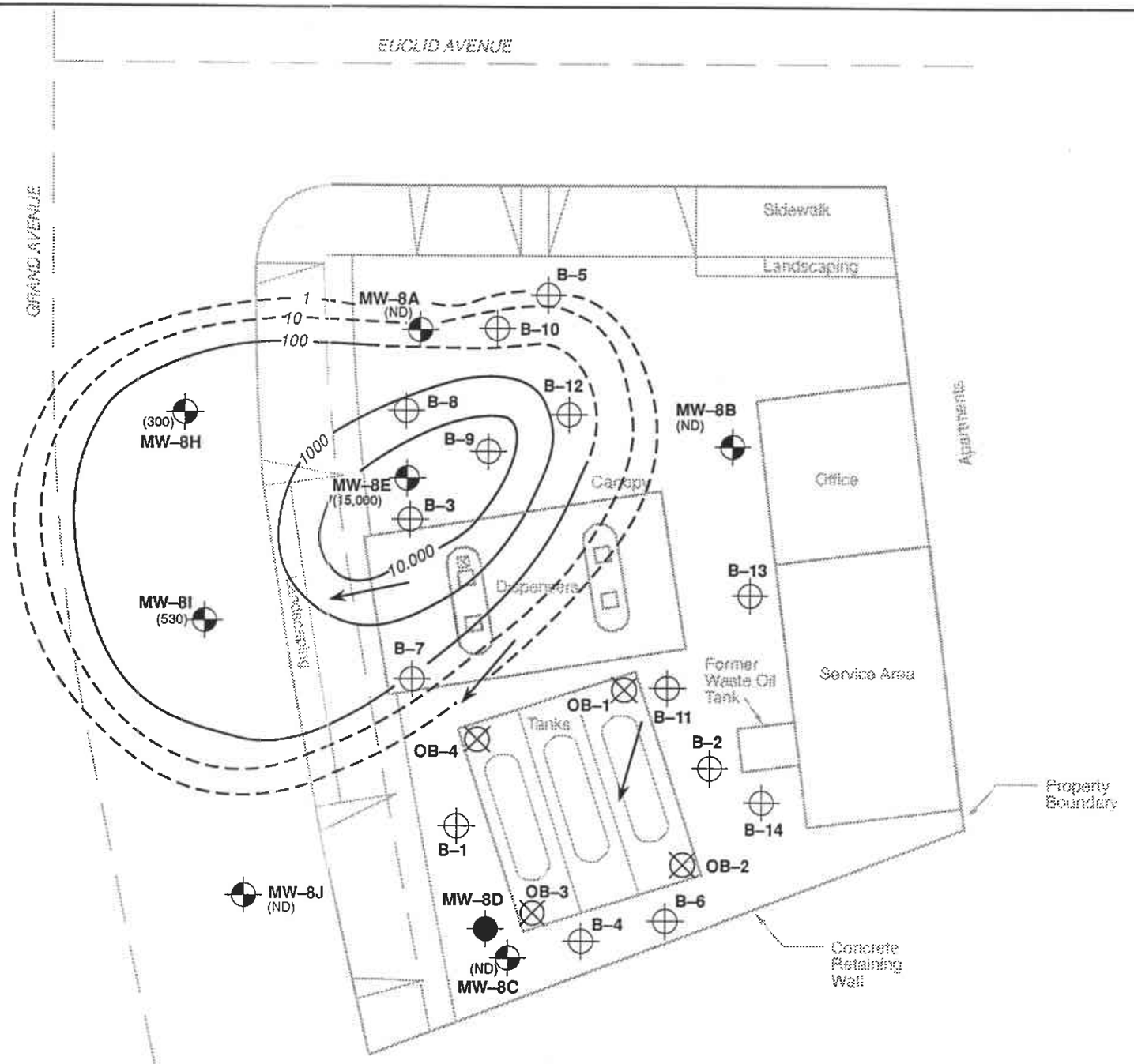
Benzene Concentrations In Groundwater
Former Texaco Station
500 Grand Avenue
Oakland, California

PLATE **5**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
SP/RHC	2251,114.03	JSH	11/09/90	2/21/91

EXPLANATION

- Monitoring Well
- Observation Well
- Soil Boring
- Decommissioned Monitoring Well
- Ground-Water flow direction
- Bench Mark (HLA datum el. = 100 Feet)
- (530) TPH as gasoline concentration in ppb 10/18/90
- ND Not detectable (concentration < 50 ppb)
- 10 Contour of concentrations in ppb, logarithmic contour interval, dashed where uncertain



Harding Lawson Associates
Engineering and Environmental Services

TPH as Gasoline Concentrations in Groundwater
Former Texaco Station
500 Grand Avenue
Oakland, California

PLATE 6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
SP/RHC	2251,114.03	JSH	11/09/90	2/21/91

APPENDIX

LABORATORY RESULTS OF GROUNDWATER ANALYSES

HARDING ASSOC.
JSH
NOV 16 1990

CHEMWEST
ANALYTICAL LABORATORIES, INC.

November 9, 1990

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

Attention: Ms. J. Hudson

Subject: Report of Data - Case Number 6950

Dear Ms. Hudson:

The technical staff at CHEMWEST is pleased to provide our report for the analyses you requested: BTEX - EPA Method 602; and Total Petroleum Hydrocarbons (gasoline) - DHS Method. LUFT Field Manual.

Eleven water samples for Project Texaco #8 500 Grand, Project Number 2251,081.03 were received October 22, 1990 in good condition. Results of the analyses, along with the analytical methodology and appropriate reporting limits, are presented on the following page(s).

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

Robert T. Hart
Data Control Manager

RTH:rp

cc: File

600W North Market Boulevard • Sacramento, CA 95834 • Phone (916) 923-0840 • FAX (916) 923-1938

A Subsidiary of CompuChem Corporation

QUALITY ASSURANCE NARRATIVE

Subject: Sample Dilution

When any target analyte is detected in a sample at a concentration above the calibrated range of the instrumentation, a dilution of the sample or extract is required to bring the analyte concentration into that range (as addressed in references 1, 2, and others). Elevated reporting limits are also needed for sample results in which a dilution is required.

For this reason, samples flagged as "Diluted into range." have been reported with a dilution factor greater than 1 and elevated reporting limits.

References

1 USEPA, "Test Methods for Evaluating Solid Waste", SW-846, 3rd. Edition, 1986, pages 6010-11, 7000-9, 8000-5, 8240-21, 8270-17, et al.

2 CFR 40, Appendix A to Part 136, "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", Section 10.11, Methods 601, 602, Section 12.6, Method 608, Section 11.10, method 624, Section 13.5, Method 625, et al.

S. C. Madden
Quality Assurance Manager

9/25/90
Date

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.

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 (TPH) Extractables by GC-FID

Extraction Procedure:

WATER -

A 1 liter sample is poured into a 2 liter separatory funnel. 3x100 ml extractions with methylene chloride (2 minute shake outs) are completed. The methylene chloride is decanted off and concentrated to a 5 ml final volume.

SOIL -

A 30 gram, or other appropriate aliquot of soil, is mixed with 30 grams of washed sodium sulfate. 100 mls of 2+1 methylene chloride/Acetone is added to the soil and placed on a mechanical shaker for 1 hour. The solvent is decanted off and the process is repeated with an additional 50 ml of methylene chloride/Acetone. The combined solvent extracts are filtered through sodium sulfate and the extract is concentrated to a 3 ml final volume.

GC ANALYSIS -

An appropriate volume of the sample extract is injected into a Gas Chromatograph equipped with a Flame Ionization Detector (FID), a split/ splitless capillary injector (operated in the splitless mode), and a fused silica capillary column. The TPH fraction is quantitated as gasoline and/or #2 diesel fuel (and/or different petroleum hydrocarbon fuel types if requested, such as JP-4 jet fuel) based on relative retention times and examination of the elution profile. The TPH fraction quantitation is based on chromatographic peak areas against a multipoint standard curve.

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

Client I.D.: Method Blank
Date/Time Analyzed: 10/29/90 0914
Date/Time Sampled: NA

CHEMWEST I.D.: MB
Matrix : Water
Dilution Factor: 1:1

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	104%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.
NA: Not Applicable

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

Approved by: JSP

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: Method Blank
Date/Time Analyzed: 10/30/90 1140
Date/Time Sampled: NA

CHEMWEST I.D.: MB
Matrix : Water
Dilution Factor: 1:1

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	82%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.
NA: Not Applicable

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

Approved by: YP

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: Method Blank
Date/Time Analyzed: 10/31/90 0904
Date/Time Sampled: NA

CHEMWEST I.D.: MB
Matrix : Water
Dilution Factor: 1:1

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	70%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.
NA: Not Applicable

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

Approved by: JC

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: Method Blank
Date/Time Analyzed: 11/06/90 1839
Date/Time Sampled: NA

CHEMWEST I.D.: MB
Matrix : Water
Dilution Factor: 1:1

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	124%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.
NA: Not Applicable

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

Approved by: _____

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: MW-8A
Date/Time Analyzed: 10/26/90 2307
Date/Time Sampled: 10/19/90

CHEMWEST I.D.: 6950-1A
Matrix : Water
Dilution Factor: 1:1

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	76%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

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

Approved by: _____

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: MW-8B
Date/Time Analyzed: 10/29/90 1918
Date/Time Sampled: 10/18/90

CHEMWEST I.D.: 6950-2A
Matrix : Water
Dilution Factor: 1:1

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	108%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

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

Approved by: YP

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: MW-8C
Date/Time Analyzed: 10/30/90 1749
Date/Time Sampled: 10/19/90

CHEMWEST I.D.: 6950-3B
Matrix : Water
Dilution Factor: 1:1

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	79%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

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

Approved by: _____

Date Reported:
11/15/90

REV5:9.90

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

Client I.D.: MW-8E
Date/Time Analyzed: 11/06/90 1726
Date/Time Sampled: 10/19/90

CHEMWEST I.D.: 6950-4A
Matrix : Water
Dilution Factor: 1:20

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	1500	10
Toluene	1300	10
Ethyl Benzene	170	10
Para-Xylene	560	10
Meta-Xylene	560	10
Ortho-Xylene	680	10
Total-Xylenes (1)	1800	NA
Total Petroleum Hydrocarbon (Purgeable)	15000	1000

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: JP

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: MW-8H
Date/Time Analyzed: 10/29/90 2259
Date/Time Sampled: 10/18/90

CHEMWEST I.D.: 6950-5A
Matrix : Water
Dilution Factor: 1:1

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	17	0.5
Toluene	2.5	0.5
Ethyl Benzene	14	0.5
Para-Xylene	4.0	0.5
Meta-Xylene	2.7	0.5
Ortho-Xylene	1.8	0.5
Total-Xylenes (1)	8.5	NA
Total Petroleum Hydrocarbon (Purgeable)	300	50

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	116%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

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

Approved by: JP

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: MW-8I
Date/Time Analyzed: 10/29/90 2333
Date/Time Sampled: 10/18/90

CHEMWEST I.D.: 6950-6A
Matrix : Water
Dilution Factor: 1:1

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	92	0.5
Toluene	4.1	0.5
Ethyl Benzene	37	0.5
Para-Xylene	19	0.5
Meta-Xylene	BRL	0.5
Ortho-Xylene	1.8	0.5
Total-Xylenes (1)	21	NA
Total Petroleum Hydrocarbon (Purgeable)	530	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: _____

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: MW-8J
Date/Time Analyzed: 10/30/90 2207
Date/Time Sampled: 10/18/90

CHEMWEST I.D.: 6950-7A
Matrix : Water
Dilution Factor: 1:1

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	8.3	0.5
Toluene	BRL	0.5
Ethyl Benzene	2.6	0.5
Para-Xylene	1.5	0.5
Meta-Xylene	BRL	0.5
Ortho-Xylene	BRL	0.5
Total-Xylenes (1)	1.5	NA
Total Petroleum Hydrocarbon (Purgeable)	BRL	50

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	128%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

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

Approved by: _____

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: OB-3
Date/Time Analyzed: 10/30/90 2241
Date/Time Sampled: 10/18/90

CHEMWEST I.D.: 6950-8A
Matrix : Water
Dilution Factor: 1:5

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	260	2.5
Toluene	69	2.5
Ethyl Benzene	35	2.5
Para-Xylene	130	2.5
Meta-Xylene	240	2.5
Ortho-Xylene	120	2.5
Total-Xylenes (1)	490	NA
Total Petroleum Hydrocarbon (Purgeable)	3200	250

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	86%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

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

Approved by: _____

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: OB-4
Date/Time Analyzed: 10/30/90 2316
Date/Time Sampled: 10/18/90

CHEMWEST I.D.: 6950-9B
Matrix : Water
Dilution Factor: 1:10

Compound	Amount Detected (ug/L)	RL (ug/L)
Benzene	600	5.0
Toluene	540	5.0
Ethyl Benzene	83	5.0
Para-Xylene	140	5.0
Meta-Xylene	290	5.0
Ortho-Xylene	410	5.0
Total-Xylenes (1)	840	NA
Total Petroleum Hydrocarbon (Purgeable)	4300	500

Surrogate	% Recovery	Acceptance Window
Bromofluorobenzene	83%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

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

Approved by: _____

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: MW-8F
Date/Time Analyzed: 10/30/90 1715
Date/Time Sampled: 10/18/90

CHEMWEST I.D.: 6950-10B
Matrix : Water
Dilution Factor: 1:1

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	85%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

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

Approved by: _____

Date Reported:
11/09/90

REV5:9.90

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

Client I.D.: MW-8G
Date/Time Analyzed: 10/30/90 1424
Date/Time Sampled: 10/18/90

CHEMWEST I.D.: 6950-11A
Matrix : Water
Dilution Factor: 1:1

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	103%	50-150%

BRL: Below Reporting Limit.
RL: Reporting Limit.

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

Approved by: _____

Date Reported:
11/09/90

REV5:9.90

CHEMWEST ANALYTICAL LABORATORIES
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Date Extracted : 10/24/90
Dilution Factor: 1:1

Case : 6950
Matrix: Water

Reporting Units: ug/L

Client ID	CHEMWEST ID	Diesel Result	RL	Other Hydrocarbon Mixture Result	RL
Method Blank	MB	BRL	50	BRL	50
MW-8A	6950-1C	BRL	50	BRL	50
MW-8B	6950-2C	BRL	50	BRL	50
MW-8C	6950-3C	BRL	50	BRL	50
MW-8E	6950-4C	620	50	BRL	50
MW-8H	6950-5C	BRL	50	BRL	50
MW-8I	6950-6C	BRL	50	BRL	50
MW-8J	6950-7C	BRL	50	BRL	50
OB-3	6950-8C	2100	50	BRL	50
OB-4	6950-9C	330	50	BRL	50
MW-8F	6950-10C	360	50	BRL	50

Client ID	CHEMWEST ID	Date Sampled	Date/Time Analyzed
Method Blank	MB	NA	11/03/90 1717
MW-8A	6950-1C	10/19/90	11/03/90 1808
MW-8B	6950-2C	10/18/90	11/03/90 1951
MW-8C	6950-3C	10/19/90	11/03/90 2043
MW-8E	6950-4C	10/19/90	11/03/90 2134
MW-8H	6950-5C	10/18/90	11/03/90 2226
MW-8I	6950-6C	10/18/90	11/03/90 2317
MW-8J	6950-7C	10/18/90	11/04/90 0009
OB-3	6950-8C	10/18/90	11/04/90 0100
OB-4	6950-9C	10/18/90	11/04/90 1352
MW-8F	6950-10C	10/18/90	11/04/90 0243

BRL: Below Reporting Limit.
RL: Reporting Limit.

Approved by: _____

Date Reported:
11/13/90

REV4:9.90

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

CLIENT

Order No. 06950
Date Rec'd. 10-22-90 @ 15:10
Compl. Date
Section JOEL C. BIRD

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

Project Name: Texaco #8 500 Grand
Project No. 2251,081.03
P.O. NO.
Contact J. Hudson / Randy Stone
Phone (415) 687-9660

ANALYSIS: Eleven water samples rec'd under chain of custody in 1 qt amber glass bottles (2), 40 ml voa vials (22) to be analyzed for BTEX, TPH Gas & Diesel. *C of C does not agree.

Sample Id	Date	Analysis	Matrix	Container
6950-1A-D MW-8A	*10-19-90	BTEX, TPH G&D	water	4-containers
-2A-D MW-8B	10-18-90	same as above		
-3A-D MW-8C	*10-19-90			
-4A-D MW-8E	*10-19-90			
-5A-D MW-8H	10-18-90			
-6A-D MW-8I	10-18-90			
-7A-D MW-8J	10-18-90			
-8A-D OB-3	10-18-90			
-9A-D OB-4	10-18-90			
-10A-D MW-8F	10-18-90			
-11A,B MW-8G	10-18-90	TPH-G, BTEX		2-40 ml voa vials

B2, GC
S.G.

SUSAN GILBERT

9106130 22

CHEM WEST COURIER

SAMPLE WILL BE HELD 30 DAYS UNLESS LONGER TIME IS ARRANGED

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

CHAIN OF CUSTODY FORM

Lab: Chemwest

Samplers: Steve Hanson

Job Number: 2251.081.03

Name/Location: Texaco #8 500 Grand

Project Manager: J. Hudson

Recorder: Steven B. Hanson (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	STATION DESCRIPTION/ NOTES
	X							2	M	W	8 A	90	10	18		
23	X				2				M	W	8 A					
23	X							2	M	W	8 B					
23	X				2				M	W	8 B					
23	X							2	M	W	8 C					
23	X				2				M	W	8 C					
23	X							2	M	W	8 E					
23	X				2				M	W	8 E					
23	X							2	M	W	8 H					
23	X				2				M	W	8 H	90	10	18		

ANALYSIS REQUESTED

EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	ICP METALS	EPA 8015M/TPH	BTEX, TPH as gas	TPH as diesel-waste oil
					X		
						X	
					X		
						X	
					X		
						X	
					X		
						X	
					X		
						X	

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) Steven B. Hanson	RECEIVED BY: (Signature) GARY BIASE	DATE/TIME 10-22-90 | 11:40
RELINQUISHED BY: (Signature) GARY BIASE	RECEIVED BY: (Signature)	DATE/TIME 10-22-90 | 15:10
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) SUSAN GILBERT	DATE/TIME 10/24/90 | 15:10
METHOD OF SHIPMENT: CHEM WEST COURIER		CHEMWEST LAB

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

6533

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

CHAIN OF CUSTODY FORM

Lab: Chemwest

Samplers: Steve Hanson

Job Number: 2251, 081.03

Name/Location: Texaco #8 500 Grand

Project Manager: J. Hudson

Recorder: Steven B. Hanson (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	STATION DESCRIPTION/ NOTES	ANALYSIS REQUESTED: EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	ICP METALS	EPA 8015M/TPH	BTEX TPH as gas	TPH as diesel-waste oil
	X							2	MW	-	8 I	90	10	18									X	
23	X				2				MW	-	8 I													X
23	X							2	MW	-	8 J												X	
23	X				2				MW	-	8 J													X
23	X							2	OB	-	3												X	
23	X				2				OB	-	3													X
23	X							2	OB	-	4												X	
23	X				2				OB	-	4													X
23	X							2	MW	-	8 F												X	
23	X				2				MW	-	8 F	90	10	18										X

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) Steven B. Hanson	RECEIVED BY: (Signature) GARY BIASE Gary Biase DATE/TIME 10-22-90 | 11:40
RELINQUISHED BY: (Signature) Gary Biase GARY BIASE	RECEIVED BY: (Signature) DATE/TIME 10-22-90 | 15:10
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) SUSAN GILBERT Susan Gilbert DATE/TIME 10/22/90 | 15:10
METHOD OF SHIPMENT CHEM WEST COURIER	CHEMWEST LAB

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

6533

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

CHAIN OF CUSTODY FORM

Lab: Chemwest

Samplers: Steve Hansen

Job Number: 2251, 081.03

Name/Location: Texaco #8 500 Grand

Project Manager: J. Hudson

Recorder: Steve B. Hansen (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	STATION DESCRIPTION/ NOTES	ANALYSIS REQUESTED: EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	ICP METALS	EPA 8015M/TPH	TPH as gas BTEX
2	X							2	MW	-	8G	90	10	18								X	

SAMPLES REC'D IN GOOD CONDITION
NO LEAKAGE OR BREAKAGE
-No bubbles

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) Steve B. Hansen	RECEIVED BY: (Signature) GARY BIASE Gary Biase	DATE/TIME 10-22-90 11:40
RELINQUISHED BY: (Signature) GARY BIASE Gary Biase	RECEIVED BY: (Signature)	DATE/TIME 10-22-90 15:10
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) SUSAN GILBERT Susan Gilbert	DATE/TIME 10/22/90 15:10
METHOD OF SHIPMENT WEST COURIER	CHEMWEST LAB	

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

6533

CHEMWEST
ANALYTICAL LABORATORIES, INC.

November 15, 1990

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

Attention: Ms. Jenna Hudson

Subject: Report of Data - Case Number 6963

Dear Ms. Hudson:

The technical staff at CHEMWEST is pleased to provide our report for the analysis you requested: TPH EXTN/GC - FID - DHS Method; LUFT Field Manual.

One water sample for Project Texaco #8 500 Grand, Project Number 2251,081.03 was received October 23, 1990 in good condition. Results of the analysis, along with the analytical methodology and appropriate reporting limits, are presented on the following page(s).

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

Robert T. Hart
Data Control Manager

RTH:rp

cc: File

ANALYTICAL METHODOLOGY

Total Petroleum Hydrocarbons (TPH) Extractables by GC-FID

Extraction Procedure:

WATER -

A 1 liter sample is poured into a 2 liter separatory funnel. 3x100 ml extractions with methylene chloride (2 minute shake outs) are completed. The methylene chloride is decanted off and concentrated to a 5 ml final volume.

SOIL -

A 30 gram, or other appropriate aliquot of soil, is mixed with 30 grams of washed sodium sulfate. 100 mls of 2+1 methylene chloride/Acetone is added to the soil and placed on a mechanical shaker for 1 hour. The solvent is decanted off and the process is repeated with an additional 50 ml of methylene chloride/Acetone. The combined solvent extracts are filtered through sodium sulfate and the extract is concentrated to a 3 ml final volume.

GC ANALYSIS -

An appropriate volume of the sample extract is injected into a Gas Chromatograph equipped with a Flame Ionization Detector (FID), a split/ splitless capillary injector (operated in the splitless mode), and a fused silica capillary column. The TPH fraction is quantitated as gasoline and/or #2 diesel fuel (and/or different petroleum hydrocarbon fuel types if requested, such as JP-4 jet fuel) based on relative retention times and examination of the elution profile. The TPH fraction quantitation is based on chromatographic peak areas against a multipoint standard curve.

CHEMWEST ANALYTICAL LABORATORIES
TOTAL PETROLEUM HYDROCARBONS - EXTRACTABLE

Date Extracted : 10/24/90
Dilution Factor: 1:1

Case : 6963
Matrix: Water

Reporting Units: ug/L

Client ID	CHEMWEST ID	Diesel Result	RL	Other Hydrocarbon Mixture Result	RL
Method Blank	MB	BRL	50	BRL	50
MW-8G	6963-1	460	50	BRL	50

Client ID	CHEMWEST ID	Date Sampled	Date/Time Analyzed
Method Blank	MB	NA	11/04/90 1536
MW-86	6963-1	10/22/90	11/04/90 1628

BRL: Below Reporting Limit.
RL: Reporting Limit.
NA: Not Applicable

Approved by: JSH

Date Reported:
11/17/90

REV4:9.90

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

CLIENT

Order No. 06963
Date Rec'd. 10/23/90 18:05
Compl. Date
Section JOEL C BIRD

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

Project Name: TEXACO #9-500 Ground
Project No. 2251,081.03
P.O. NO.
Contact J. Hudson / Randy Stone
Phone (415) 687-9660

ANALYSIS: One water sample rec'd under chain of custody in CHEMWEST 1 qt. amber glass bottles (2) to be analyzed for TPH/D & waste oil. Chain of Custody does not agree - See C of C

SAMPLE ID	DATE	ANALYSIS	MATRIX	CONTAINER
6963AB - MW-86	10/22/90	TPH/D, WASTE OIL	WATER	2-1 qt. glass bottles

R-1
BM/S
BILL McBENCE

22 60 06 130 92

CHEM WEST COURIER

SAMPLE WILL BE HELD 30 DAYS UNLESS LONGER TIME IS ARRANGED

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

CHAIN OF CUSTODY FORM

Lab: Chemwest

Samplers: Steve Hansen

Job Number: 2251,08,03

Name/Location: Texaco #8 500 Grand

Project Manager: J. Hudson

Recorder: Steven B. Hansen (Signature Required)

SOURCE CODE	MATRIX: Water	Sediment	Soil	Oil	#CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	SAMPLE NUMBER OR LAB NUMBER: Yr	Wk	Seq	DATE: Yr	Mo	Dy	Time	STATION DESCRIPTION/ NOTES	ANALYSIS REQUESTED: EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	ICP METALS	EPA 8015M/TPH	TPH as diesel and waste oil
2	X				X			90														
2 3	X				2			MW	-	86	90	10	22	X	2/1 Lambers * Chain of custody does not agree - Date on bottle 10/18/90. 10/24/90 09:50 Per conversation between J. Hudson & Bill McBenge correct date is on C of C 10/22/90. BMc						X	

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) Steven B. Hansen	RECEIVED BY: (Signature) GARY BIASE Gary Biase	DATE/TIME 10-23-90 10:25
RELINQUISHED BY: (Signature) Gary Biase GARY BIASE	RECEIVED BY: (Signature)	DATE/TIME 10-23-90 18:05
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) BILL McBENGE Bill McBenge	DATE/TIME 10/24/90 18:05

METHOD OF SHIPMENT CHEM WEST COURIER

6533

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

DISTRIBUTION

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

JSH/SJO/pkp 031480B/R44

QUALITY CONTROL REVIEWER

Glenn S. Young
Project Geologist