9/29/89

ALAMEDA COUNTY
DEPT. OF ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS

Harding Lawson Associates

Transmittal/Memorandum

To: Alameda County Department of Environmental Health
470 27th Street, Room 322
Oakland, California 94612

Attention: Erin Levy

From: Michelle Watson
Date: September 26, 1989
Subject: Exxon Alameda
Job No.: 04167,284.02

Remarks: Enclosed please find a copy of our report titled *Phase II Evaluation of Petroleum Hydrocarbons, Exxon Service Station R/S #7-0104, 1725 Park Street, Alameda, California.* We are forwarding this report to you at Exxon's request

Please call me at 415/892-0821 if you have any questions or require any further information.

LMW/gh/B119

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cc:

A Report Prepared for

Exxon Company, USA
P.O. Box 4415
Houston, Texas 77210-4415

PHASE II EVALUATION OF PETROLEUM HYDROCARBONS
EXXON SERVICE STATION R/S# 7-0104
1725 PARK STREET
ALAMEDA, CALIFORNIA

HLA Job No. 04167,249.02

by

S. Michelle Watson
Staff Geologist

Michael L. Siembieda
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Harding Lawson Associates
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415/892-0821

March 21, 1989

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I INTRODUCTION

This report presents the results of Harding Lawson Associates' (HLA) Phase II Evaluation of Petroleum Hydrocarbons at Exxon Service Station R/S# 7-0104, 1725 Park Street, Alameda, California. The work was authorized by Exxon Contract No. 88946914, dated December 1, 1988.

The Exxon Station is located on the northwest corner of Eagle Avenue and Park Street in Alameda, California. The location of the site is shown on Plate 1. The site is located in a mixed commercial and residential district of Alameda.

A. Background

The site was formerly occupied by a Regal Service Station owned by Wickland Oil Company, Sacramento, California. In 1986, the station was remodeled and three double walled fiberglass tanks were installed. The tanks were used to store regular, unleaded, and premium unleaded gasoline. No information regarding soil and/or ground-water quality at the time of the tank removal could be obtained by HLA.

A Sensitive Receptor-Risk Assessment Survey for the site was prepared by EA Engineering Science and Technology, Inc. (EA). The EA engineering study identified 5 monitoring wells, an industrial water well and an irrigation well within 1/2 mile of the site.

On May 17, 1988, HLA was contracted to perform a Phase I Evaluation of Petroleum Hydrocarbons at the site. The results of the evaluation were presented in a letter report to Exxon dated June 24, 1988. As part of the evaluation, three monitoring wells were installed at the site on June 2, 1988, as shown on Plate 2. One soil sample was selected for laboratory analysis from each well boring and analyzed for total

petroleum hydrocarbons (TPH) as gasoline, and benzene, toluene, ethylbenzene and xylenes (BTEX). Results of these analyses are listed in Table 1. One round of water samples was collected from each well on June 7, 1988 and analyzed for TPH as gasoline, and BTEX. Analytical results are listed in Table 2. Wells at the site were surveyed to a common datum, water levels measured, and the ground-water gradient at the site was evaluated.

Review of water level data showed that ground-water flow at the site was directed east toward the Oakland Estuary. Petroleum hydrocarbon constituents were detected in soil and ground-water samples collected from the site. TPH as gasoline was detected in soil at concentrations ranging from 11 to 1400 parts per million (ppm). A maximum concentration of 110,000 parts per billion (ppb) of TPH as gasoline was detected in water sampled from monitoring well MW-2, located downgradient of the tank field. In addition, review of laboratory analyses of water sampled from Well MW-1, located upgradient of the tank and pump islands, showed that TPH as gasoline was present at a concentration of 27,000 ppb.

B. Scope of Services

Based on the results of the Phase I investigation, state and local regulations require that further site investigative work be conducted to evaluate the magnitude and extent of petroleum hydrocarbon contamination at the site. Based on these regulations, HLA's understanding of site conditions, and specific requests by Exxon, HLA completed the following tasks:

- Conducted a brief site survey of the surrounding area to identify potential sources of subsurface contamination.
- Reviewed California Regional Water Quality Control Board San Francisco Bay Region (RWQCB) and Alameda County Environmental Health

Department files for information on other subsurface contamination investigations in the area.

- Conducted a site survey of subsurface conditions to evaluate the extent of on-site petroleum contamination.
- Installed and developed three additional 4-inch-diameter ground-water monitoring wells.
- Sampled the six monitoring wells and analyzed water samples for total petroleum hydrocarbons (TPH) as gasoline, and benzene, ethylbenzene, toluene, and xylenes (BTEX).
- Prepared a report detailing site impact on local ground-water quality.
- Arranged for transport and disposal of drummed soil and water generated during monitoring well installation and sampling.

II HLA FIELD WORK

A. Petroleum Hydrocarbon Survey

On December 29, 1988, HLA supervised a survey of subsurface conditions at the site. A soil gas survey was originally scheduled to be performed, but due to the shallow depth to ground water at the site, water samples were collected for field analysis instead of soil gas samples.

Six ground-water samples were collected for field analysis by National Environmental Testing, Inc., (NET) Pacific, Santa Rosa, California. Water sample locations are shown on Plate 3. Samples were collected by pneumatically driving 3/4 inch probes to depths of 8 to 12 feet. Ground-water samples were collected with a stainless steel bailer and decanted into 40 milliliter volatile organic analysis (VOA) vials. Ground-water samples were analyzed on site in a mobile laboratory equipped with a gas chromatograph/photo ionization detector (GC/PID). Each sample was analyzed for peaks eluting prior to benzene, toluene, xylenes, ethyl benzene, and TPH as gasoline.

Table 3 presents analytical results of ground-water samples collected during the survey. Copies of original analytical results are presented in Appendix B.

B. Drilling and Soil Sampling

Prior to the start of the drilling, HLA obtained a permit to construct monitoring wells from the Alameda County Flood Control and Water Conservation District. Monitoring well locations were checked for underground utilities by contacting Underground Service Alert (U.S.A.).

On January 9, 1989, HLA drilled three soil borings to a maximum depth of 20.5 feet using a CME 75 truck-mounted drill rig equipped with 10-inch-diameter

hollow-stem augers. To avoid damaging any subsurface lines not identified by U.S.A., the borings were hand augered to an approximate depth of 2.5 feet. The borings were logged by an HLA geologist under the supervision of a California-registered geologist. The soil was classified using the Unified Soil Classification System (USCS). The boring logs and a copy of the USCS are included in Appendix A.

Soil samples were collected at approximately 5 foot intervals using a 3-inch outside diameter modified California sampler equipped with 6-inch-long stainless steel liners. Soil samples were screened for organic vapors using an organic vapor analyzer (OVA). Soil samples selected for laboratory analysis were covered with aluminum foil-lined plastic caps, taped, labeled, stored in a refrigerated environment and transported under chain of custody to Med-Tox Associates, Incorporated (Med-Tox), Pleasant Hill, California. Med-Tox is a state-certified analytical laboratory for the analyses requested. Soil cuttings derived from well installation activities were stored in 55-gallon drums on site pending receipt of laboratory analytical results.

C. Monitoring Well Installation and Development

Each of the three borings were completed as ground-water monitoring wells (Wells MW-4, MW-5, and MW-6). Four-inch-diameter flush-threaded Schedule 40 PVC well casing and .020 inch machine slotted well screen was inserted through the augers from the ground surface to the bottom of each boring. The screened interval extended from approximately 4.0 feet below ground surface to the bottom of the boring. Blank PVC casing extended from 4.0 feet to approximately 0.5 feet below ground surface. Number 3 Lonestar sand filter material was placed in the annular space between the well casing and the borehole. The filter pack extended from the bottom of the boring to approximately 6 inches above the screened interval. An approximate 6 inch thick layer

of bentonite pellets was placed above the filter pack and hydrated with water. The remaining annular space was backfilled to ground surface with a cement/bentonite grout mixture to approximately 1 foot below ground surface. A locking aluminum well cap was connected to the top of the 4-inch well casing. A Christy box was set in cement around the top of the well to protect it from surface traffic. Monitoring well construction details are presented in Appendix A. Monitoring well locations are shown on Plate 4.

Monitoring wells were developed by bailing a minimum of 8 casing volumes of water or until discharge water was visibly clear, and pH, conductivity, and temperature has stabilized. Water development data is included in Appendix A. Water generated during well development was stored in 55-gallon drums on site pending receipt of laboratory analysis.

D. Water Level Measurement and Ground-Water Sampling

HLA surveyed all six monitoring wells on site to a common datum of 100 feet on January 17, 1989. On January 17 and 24, 1989, depth to ground water was measured using a chalked steel tape. Water levels are considered to be accurate to within 0.01 feet. Water level data are presented in Table 4.

After water level measurements were taken on January 17, 1989, the ground water was visually inspected for evidence of a floating petroleum hydrocarbon layer (free product). No free product was present.

Prior to sample collection, 2.5 to 5 casing volumes were purged from each well. PH, conductivity and temperature were measured while purging each well. Water sampling data is included in Appendix A. Water generated during water sampling

activities was stored in 55-gallon drums on site pending receipt of laboratory analytical results.

All water samples were collected with a stainless steel bailer. Water samples were decanted from the bailer into 40 milliliter VOA vials, labeled, put in a refrigerated environment, and transported under chain of custody to Trace Analysis Laboratories (Trace), Hayward, California. Trace is a state-certified hazardous waste analytical laboratory for the analysis requested.

E. Equipment Decontamination

To minimize the possibility of cross contamination, all downhole drilling and sampling equipment was decontaminated prior to use. The augers were steam cleaned prior to drilling each boring. The soil and water sampling equipment was washed in a low-phosphorous soap solution and double rinsed with tap water between wells.

F. Soil and Water Disposal

Following receipt of laboratory analyses, the drummed soil and water remaining on site was disposed of in accordance with state and local regulations by Decon Environmental Services, Inc., Hayward, California.

III LABORATORY ANALYSES

A. Soil Sample Analysis

One soil sample was selected for laboratory analysis from each of the borings drilled by HLA. Samples collected just above the saturated zone (4.5 to 5.0 feet below grade) were selected for laboratory analysis. Soil samples were analyzed for TPH as gasoline and BTEX. The laboratory analytical results for the soil samples analyzed are listed in Table 5. Copies of original laboratory reports are presented in Appendix B.

B. Water Sample Analysis

One round of water samples were collected from each of the six wells on site on January 17 and 18, 1989. Ground-water samples were analyzed for TPH as gasoline and BTEX. The laboratory analytical results for the ground-water samples are listed in Table 6. Copies of the original laboratory analytical reports are presented in Appendix B.

IV DISCUSSION

A. Subsurface Conditions

All three borings drilled at the site encountered similar subsurface conditions. Review of boring logs indicates that 2 to 4.5 feet of fill overlies dark grey sand or silty sand. Below this horizon, a bed of green clayey sand to silty sand was encountered between 5 and 9 feet. The silty sand is underlain by 5 feet of green, poorly graded, medium grained sand. At a depth of 14 feet, a one to three inch layer of gravel was encountered. Yellowish brown silty sand or sandy silt underlies the gravel layer in all three borings drilled at the site. During drilling, a strong petroleum odor was noted in the soil between 2.5 and 9 feet.

Ground water was measured at the site at depths between 5 and 6 feet. On the basis of ground-water measurements and the well elevation survey, it appears that ground-water flow at the site is directed to the east towards the Alameda Estuary, located approximately 1,000 feet from the site. Slope of the ground-water gradient is 0.016 ft/ft. Ground-water contours and elevations are shown on Plate 5.

Ground water in the East Bay is not used as drinking water. Although there currently is no use for the shallow ground water, there is possibly a hydraulic connection between the shallow ground water and the deeper, confined aquifers. Deeper aquifers in the area are reportedly being used as a source for industrial water supplies and irrigation.

B. Off-Site Reconnaissance and Agency File Review

A brief survey of the surrounding area was conducted by HLA personnel on February 15, 1989. During this survey, HLA identified several businesses where

C. Petroleum Hydrocarbon Survey

Review of mobile laboratory analytical results of December 1988 ground-water sampling indicates that petroleum hydrocarbons were present in ground-water samples collected east of the service station building. Significant levels of contamination (20,000 to 76,000 ppb TPH as gasoline) were present in ground water sampled north and east of the tank field.

D. Laboratory Results

Review of laboratory analyses of soil samples collected from the site on June 2, 1988, and January 9, 1989; indicates that petroleum hydrocarbons are present at significant levels in all soil samples collected from the site. The highest levels of petroleum hydrocarbons were detected in soil collected from boring B-2 (1,400 ppm), located east (or downgradient) of the pump islands, and Boring B-6 (490 ppm), which is situated east of the tank field.

Review of laboratory analyses of water samples collected on January 17, 1989, indicates that petroleum hydrocarbons are present at significant levels in ground water collected from all wells at the site. Water sampled from all six wells exceed California Department of Health Services (DOHS) action levels for benzene and xylenes. Water samples collected from Wells MW-1, MW-2, MW-5, and MW-6 exceed DOHS action levels for ethylbenzene, and water collected from Wells MW-2, MW-3, MW-4, MW-5, and MW-6 exceed DOHS action levels for toluene.

A comparison of June 7, 1988 and January 17, 1989 ground-water analyses shows that concentrations of petroleum hydrocarbons have decreased in monitoring wells MW-1, MW-2, and MW-3.

V CONCLUSIONS

On the basis of work performed to date, it appears that past or present practices have caused degradation of soil and ground-water quality at the site. Petroleum hydrocarbons may have been released from leaks in the petroleum storage or distribution system, from surface spillage, or from possible off-site sources. It appears that petroleum hydrocarbon contamination is present north, east and southeast of the USTs and pump islands. To date, the boundary of the plume of contamination has not been defined. Ground-water flow at the site is directed towards the east at a gradient of 0.016 ft/ft. Due to the relatively high permeability of soils and high levels of petroleum constituents detected at the site, it is likely that petroleum hydrocarbons have migrated off site.

Table 1. Analytical Results
HLA Soil Sampling
June 2, 1988
(ppm)[1]

Boring	Sample Depth (feet)	TPH as gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
B-1	10	11	0.67	ND[2]	0.15	0.37
B-2	5	1,400	ND	32	25	150
B-3	5	74	ND	ND	ND	2.4

1 ppm - parts per million

2 ND - Not Detected

Table 2. Analytical Results
HLA Ground-Water Sampling
June 7, 1988
(ppb)[1]

Well Number	TPH as gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
MW-1	27,000	5,000	77	1,100	2,700
MW-2	110,000	12,000	12,000	2,100	12,000
MW-3	28,000	6,000	80	940	1,900

[1] ppb - parts per billion

Table 3. Mobile Laboratory
HLA Ground-Water Sampling
December 30, 1988
(ppb)[1]

Probe Number	TPH as gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
P-1	ND[2]	ND	ND	ND	ND
P-2	20,000	4,400	3,000	2,500	6,100
P-3	650	200	6.2	51	76
P-4	45,000	11,000	5,200	3,200	8,000
P-5	76,000	16,000	10,000	1,500	69
P-6	800	51	69	30	160

1 ppb - parts per billion

2 ND - Not Detected

Table 4. Water-Level Data

Well Number	Date	Depth to Water BTOC* (feet)	Well Elevation (feet)	Ground-Water Elevation (feet)
MW-1	1/17/89	5.81	98.81	93.00
	1/24/89	5.16	98.81	93.65
MW-2	1/17/89	5.96	97.94	91.98
	1/24/89	5.04	97.94	92.90
MW-3	1/17/89	5.49	98.47	92.98
	1/24/89	5.38	98.47	93.09
MW-4	1/17/89	5.36	98.69	93.33
	1/24/89	5.46	98.69	93.23
MW-5	1/17/89	5.39	98.30	92.91
	1/24/89	5.51	98.30	92.79
MW-6	1/17/89	5.59	98.96	93.37
	1/24/89	5.27	98.96	93.69

* BTOC - Below Top of Casing

Table 5. Analytical Results
HLA Soil Sampling
January 9, 1989
(ppm)[1]

Boring	Sample Depth (feet)	TPH as gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
B-4	5	0.6	0.017	0.002	0.007	0.012
B-5	4.5	2.0	0.055	0.007	0.066	0.240
B-6	5.0	490	3.7	0.970	23.0	94.0

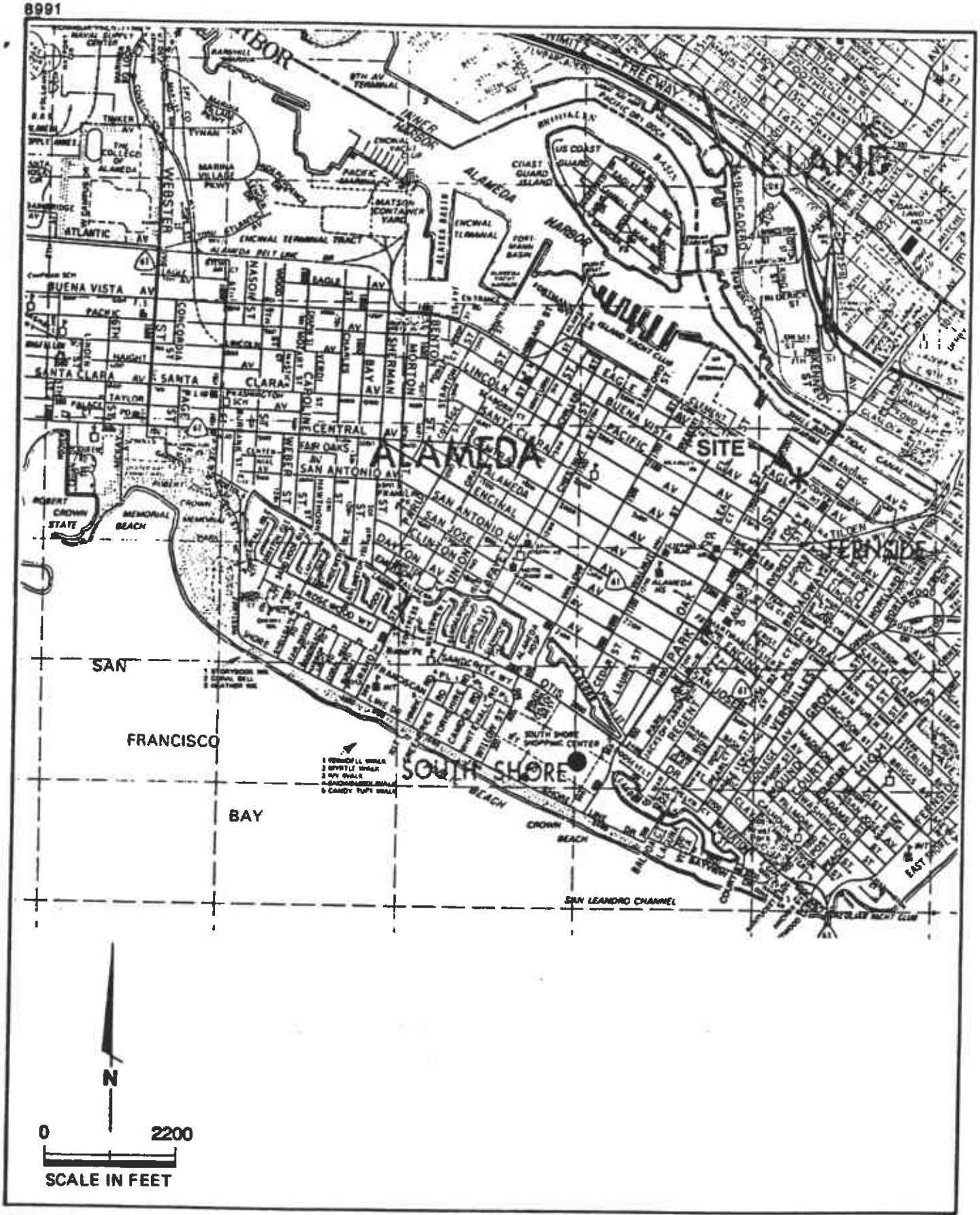
[1] ppm - parts per million

Table 6. Analytical Results
HLA Ground-Water Sampling
January 17-18, 1988
(ppb)[1]

Well Number	TPH as gasoline	Benzene	Toluene	Ethylbenzene	Xylenes
MW-1	6,800	2,000	91	800	1,600
MW-2	30,000	6,600	3,300	1,600	7,700
MW-3	5,300	2,500	230	590	1,100
MW-4	19,000	1,000	1,500	360	2,200
MW-5	26,000	8,700	3,900	990	5,900
MW-6	38,000	7,400	9,300	2,000	9,900

[1] ppb - parts per billion

8991



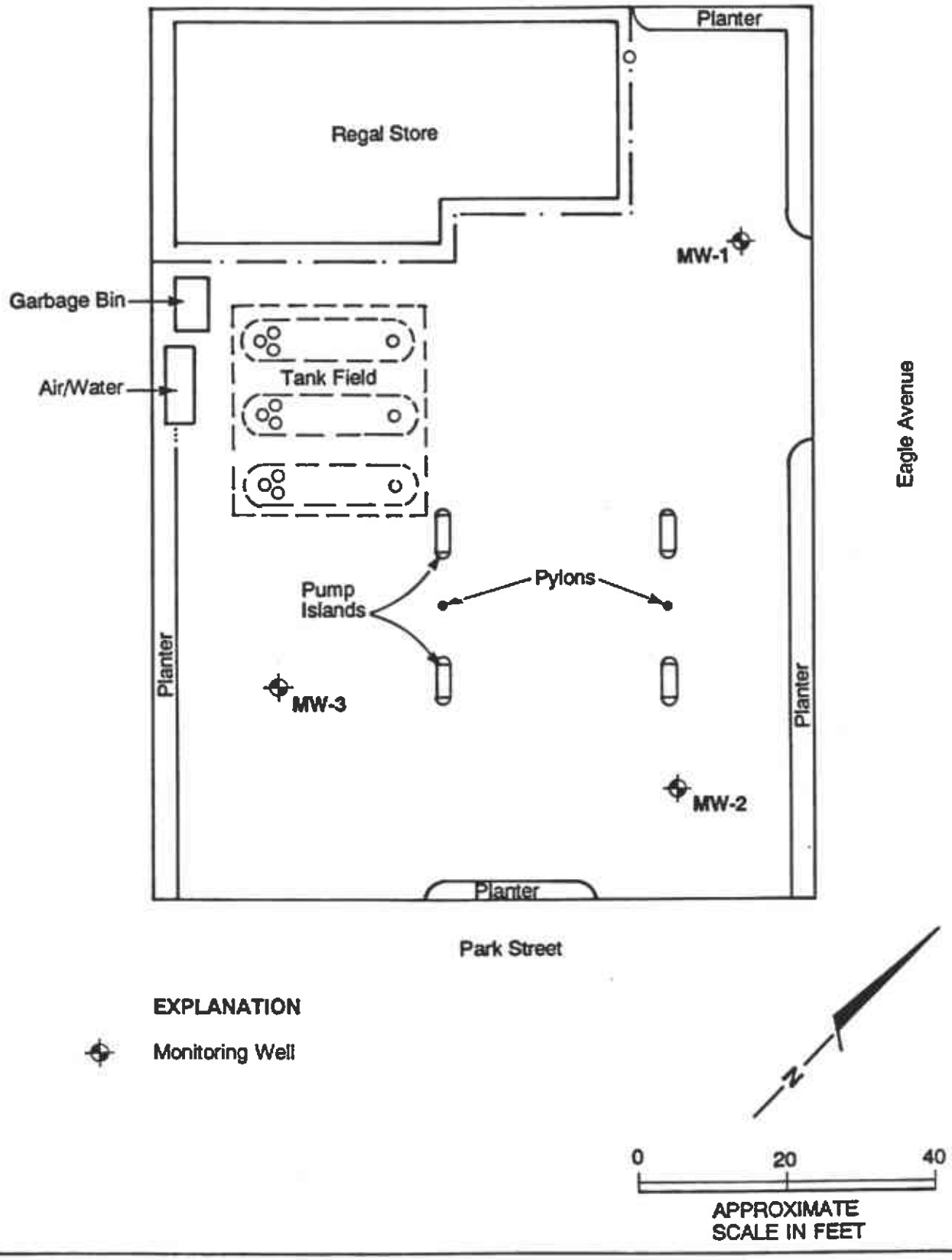
Harding Lawson Associates
Engineering and
Environmental Services

Area Map
Exxon-Alameda
Phase II Evaluation of Petroluem Hydrocarbons
Alameda, California

PLATE **1**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MOI	4167,249.02		2/89		

8996



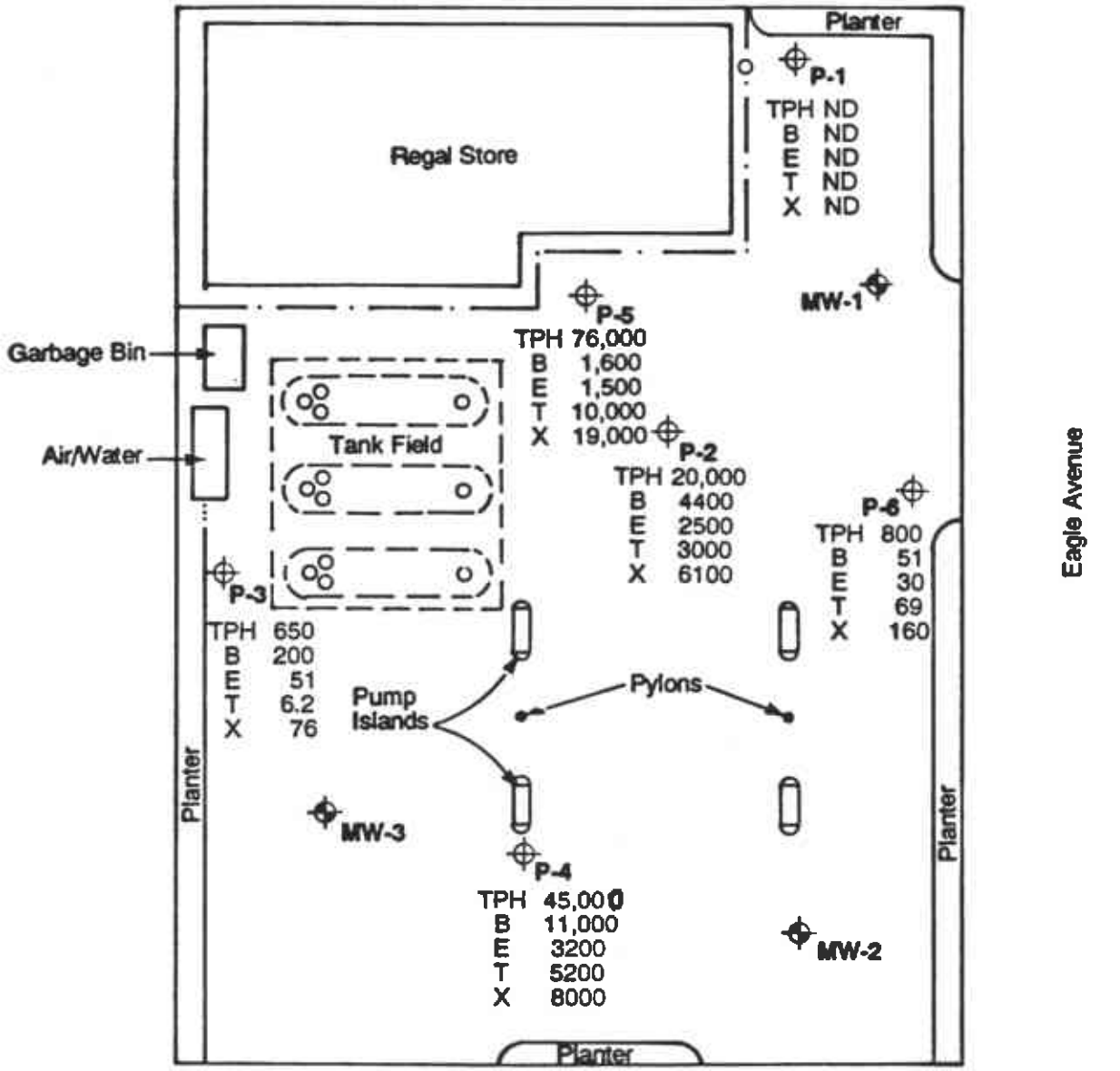
Harding Lawson Associates
Engineering and
Environmental Services

Site Plan - June 1988
Phase II Evaluation of Petroluem Hydrocarbons
Exxon
Alameda, California

PLATE
2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MOI	4167,249.02		2/89		

3993



EXPLANATION

- Monitoring Well
- Probe Location
- TPH — Total petroleum hydrocarbons as gasoline (ppb)
- B — Benzene (ppb)
- E — Ethyl benzene (ppb)
- T — Toluene (ppb)
- X — Xylenes (ppb)

N

0 20 40

APPROXIMATE SCALE IN FEET

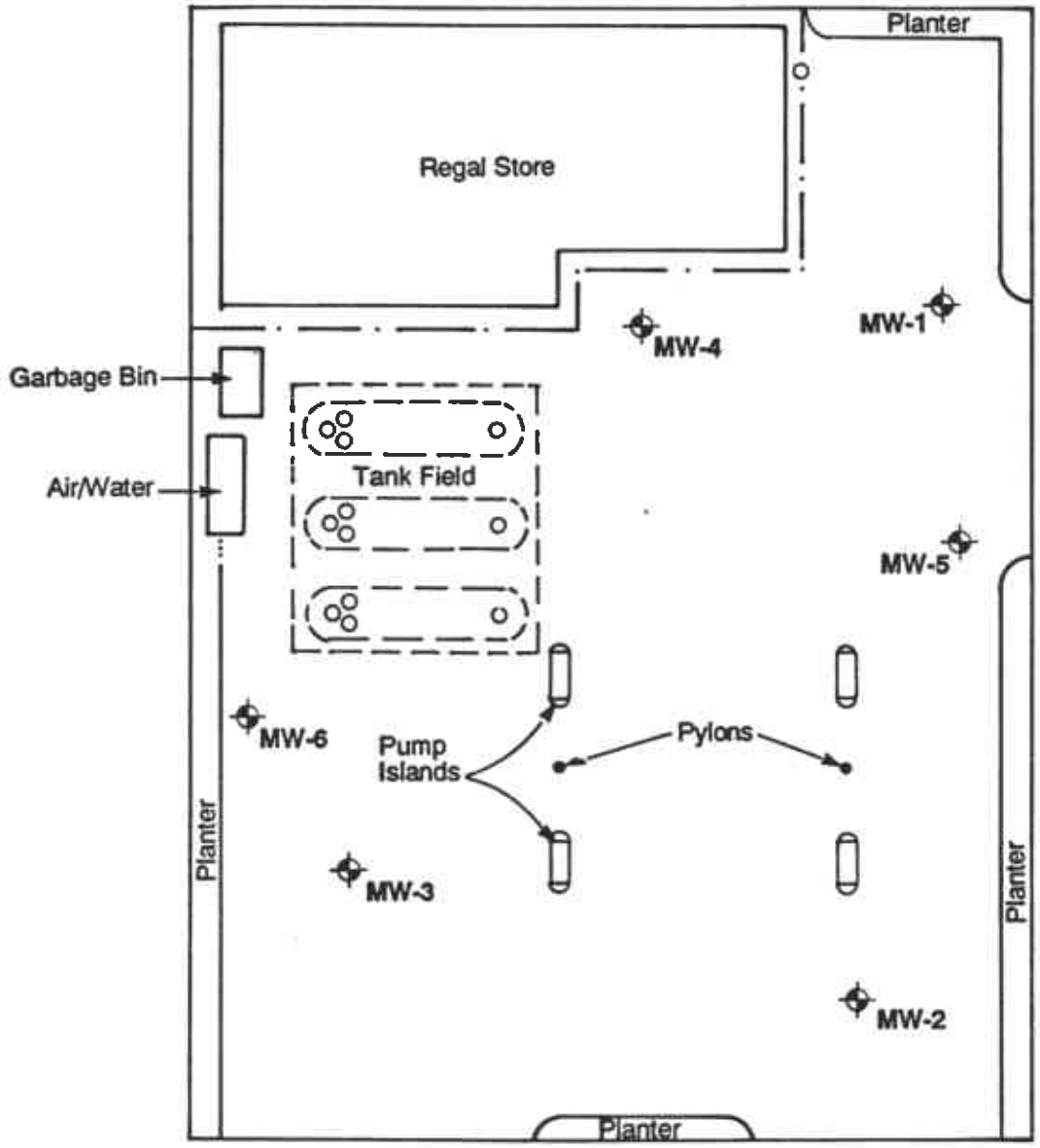
HLA Harding Lawson Associates
Engineering and Environmental Services

Mobile Laboratory Ground-water Sampling
Phase II Evaluation of Petroluem Hydrocarbons
Exxon
Alameda, California

PLATE **3**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MOI	4167.249.02		2/89		

8995



EXPLANATION

Monitoring Well

N

0 20 40

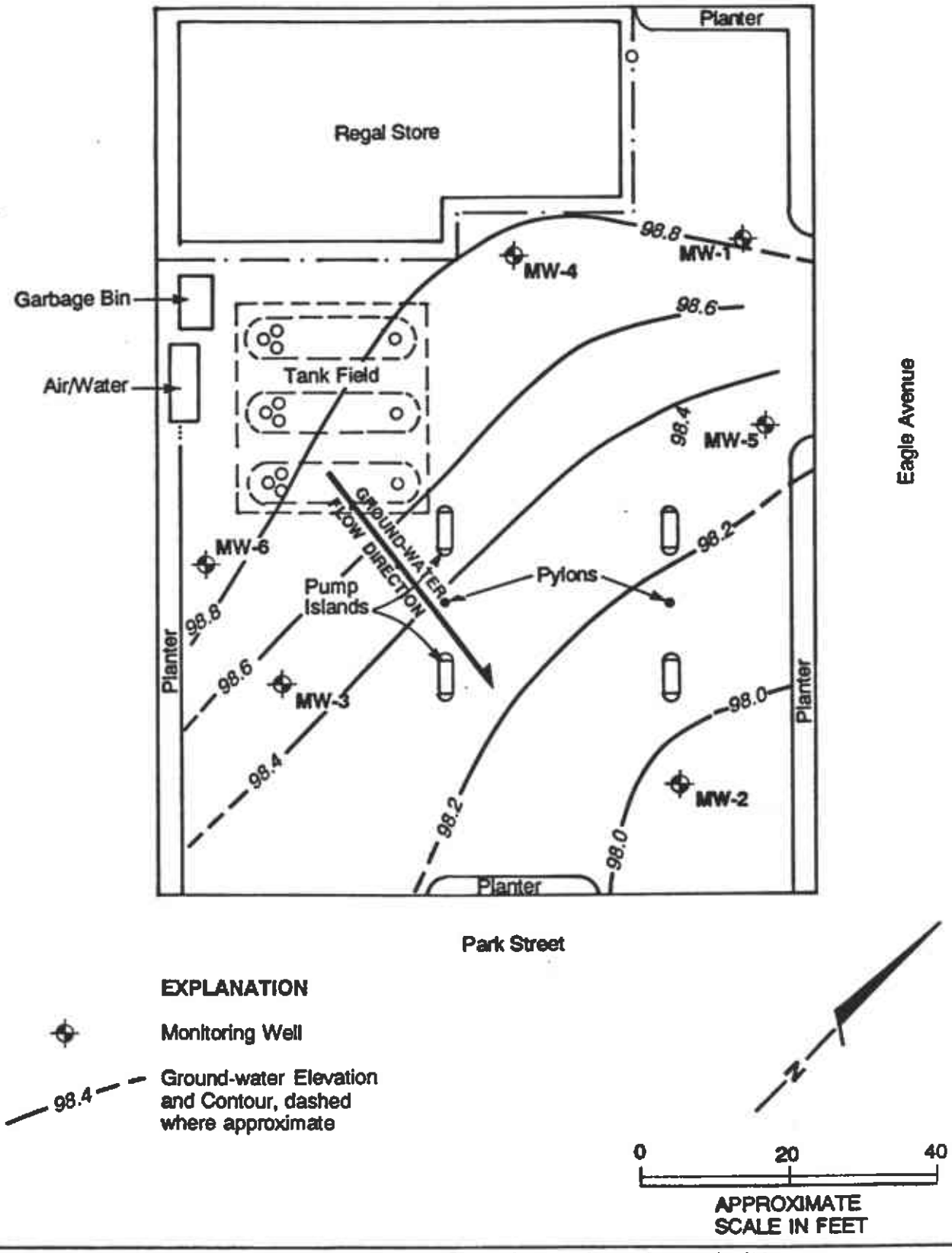
APPROXIMATE
SCALE IN FEET

Harding Lawson Associates
Engineering and
Environmental Services

Site Plan - January 1989
Phase II Evaluation of Petroluem Hydrocarbons
Exxon
Alameda, California

PLATE **4**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MOI	4167,249.02		2/89		



Harding Lawson Associates
Engineering and Environmental Services

Ground-water Elevations, 1/18/89
Phase II Evaluation of Petroluem Hydrocarbons
Exxon
Alameda, California

PLATE **5**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MOI	4167,249.02		2/89		

Harding Lawson Associates
Engineering and Environmental Services

Sites with Known or Potential Subsurface Contamination
Exxon-Alameda
Phase II Evaluation of Petroleum Hydrocarbons
Alameda, California

PLATE **6**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MOI	4167,249.02		2/89		

APPENDIX A

BORING LOGS/WELL CONSTRUCTION DETAILS,

WELL DEVELOPMENT DATA

8891

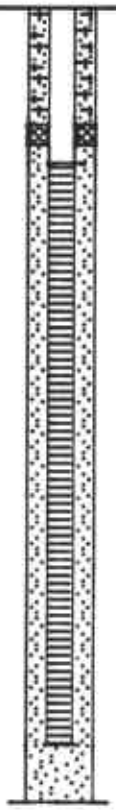
Top of PVC Casing Elevation ft

GROUND SURFACE

Equipment CME-75

Elevation _____ Date _____

Blows/foot	OVA (ppm)	Depth (ft)	Sample
		0	
10	50	5	
22	80	10	
8	0	15	
20	0	20	
		25	
		30	
		35	
		40	



10 IN. DIAMETER BORING
0 to 20.5 ft
4 IN. DIAMETER SCHEDULE 40 PVC WELL CASING
0.5 below ground to 4.0 ft
BENTONITE-CEMENT SEAL
0 to 3.0 ft
BENTONITE PELLET SEAL
3.0 to 3.5 ft

LONESTAR #3 SANDPACK
3.5 to 20.5 ft

4 IN. DIAMETER WELL SCREEN
(0.020 in. slot size)
4.0 to 19.0 ft

BOTTOM WELL CAP to 19.0 ft

BOREHOLE CLEANED OUT to 19.0 ft
BOTTOM OF BOREHOLE 20.5 ft

ASPHALT
GRAVEL (GW) (fill)
strong petroleum odor

DARK GRAYISH BROWN SILTY SAND (SM) 2.5Y 4/2
loose, moist, very strong petroleum odor

GREEN CLAYEY SAND (SC) loose, moist, medium-grained

GREEN SAND WITH MINOR SILT (SP) medium dense, saturated, poorly graded, medium-grained, petroleum odor

3" gravel layer at 14.0 ft
YELLOWISH BROWN SILTY SAND (SM) 10YR 5/6
loose, saturated, medium-grained
YELLOWISH BROWN SANDY SILT (ML) 10YR 5/6
medium stiff, saturated

GREEN SILTY SAND (SM) medium dense, saturated, medium-grained, with minor plant fragments

bottom of boring at 20.5 ft
converted to monitoring well MW-4

PLATE

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion Detail B4/MW4

Exxon - Alameda

Alameda, California

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	04167.249.02		2/89		

6892

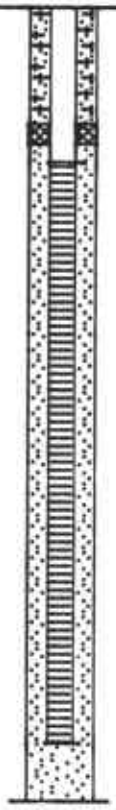
Top of PVC Casing Elevation ft

GROUND SURFACE

Equipment CME-75

Elevation _____ Date _____

Blows/foot	OVA (ppm)	Depth (ft)	Sample
		0	
11	100	5	
22	50	10	
26		15	
25	0	20	
		25	
		30	
		35	
		40	



10 IN. DIAMETER BORING
0 to 20.5 ft
4 IN. DIAMETER SCHEDULE 40 PVC WELL CASING
0.5 below ground to 4.0 ft
BENTONITE-CEMENT SEAL
0.5 to 3.0 ft
BENTONITE PELLET SEAL
3.0 to 3.5 ft

LONESTAR #3 SANDPACK
3.5 to 20.5 ft

4 IN. DIAMETER WELL SCREEN
(0.020 in. slot size)
4.0 to 19.0 ft

BOTTOM WELL CAP to 19.0 ft

BOREHOLE CLEANED OUT to 19.0 ft
BOTTOM OF BOREHOLE 20.5 ft

ASPHALT
FILL
BLACK SILTY SAND (SM) 10YR 2/1 damp, strong petroleum odor
DARK GRAY SAND (SP) 5Y 4/1 moist

GREEN CLAYEY SILTY SAND (SM) medium dense, damp, angular, medium-grained sand strong petroleum odor

GREEN SAND (SP) medium dense, saturated, subangular medium-grained, with minor silt, petroleum odor

1" gravelly layer at 14.0 ft
YELLOWISH BROWN SILTY SAND (SM) 10YR 5/4 medium dense, saturated, high percentage of silt

color change to green

bottom of boring at 20.5 ft
converted to monitoring well MW-5

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion Detail B5/MW5

PLATE

Exxon - Alameda
Alameda, California

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	04167.249.02		2/89		

6893

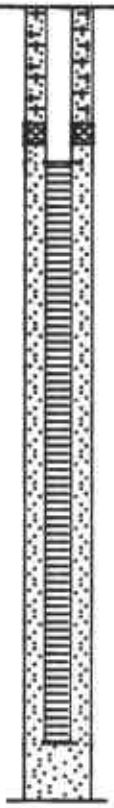
Top of PVC Casing Elevation ft

GROUND SURFACE

Equipment CME-75

Elevation _____ Date _____

Blows/foot	OVA (ppm)	Depth (ft)	Sample
		0	
5	100	5	
17	600	10	
11	0	15	
15	0	20	
		25	
		30	
		35	
		40	



10 IN. DIAMETER BORING
0 to 20.5 ft
4 IN. DIAMETER SCHEDULE 40 PVC WELL CASING
0.5 below ground to 4.0 ft
BENTONITE-CEMENT SEAL
0.5 to 3.0 ft
BENTONITE PELLET SEAL
3.0 to 3.5 ft

LONESTAR #3 SANDPACK
3.5 to 20.5 ft

4 IN. DIAMETER WELL SCREEN
(0.020 in. slot size)
4.0 to 19.0 ft

BOTTOM WELL CAP to 19.0 ft

BOREHOLE CLEANED OUT to 19.0 ft
BOTTOM OF BOREHOLE 20.5 ft

ASPHALT
BLACK SILTY CLAY WITH GRAVEL (CL) (fill)
strong petroleum odor

GREEN TO GREENISH DARK GRAY SILTY SAND (SM)
loose, moist, medium-grained, subangular, very strong petroleum odor

GREEN SAND (SP) medium dense, saturated, medium-grained

1" gravel layer at 14.0 ft
YELLOWISH BROWN SANDY SILT (ML) 10YR 5/6
stiff, saturated, 25% sand

increase in sand content
YELLOWISH BROWN SILTY SAND (SM) 10YR 5/6
medium dense, saturated, medium-grained

bottom of boring at 20.5 ft
converted to monitoring well MW-6

PLATE

Harding Lawson Associates
Engineering and Environmental Services

Log of Boring and Well Completion Detail B6/MW6

Exxon - Alameda

Alameda, California

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
	04167.249.02		2/89		

MAJOR DIVISIONS					TYPICAL NAMES
COARSE–GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN No. 4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW		WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP		POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM		SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC		CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW		WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP		POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM		SILTY SANDS WITH OR WITHOUT GRAVEL
			SC		CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE–GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL		ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC SILTS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			Pt		PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION – ASTM D2487-85

Perm	—	Permeability
Consol	—	Consolidation
LL	—	Liquid Limit (%)
PI	—	Plastic Index (%)
G_s	—	Specific Gravity
MA	—	Particle Size Analysis
■	—	"Undisturbed" Sample
⊠	—	Bulk or Classification Sample

Shear Strength (psf) ↓ ; Confining Pressure ↓

TxUU (FM) or (S)	3200	(2600)	—	Unconsolidated Undrained Triaxial Shear (field moisture or saturated)
TxCU (P)	3200	(2600)	—	Consolidated Undrained Triaxial Shear (with or without pore pressure measurement)
TxCD	3200	(2600)	—	Consolidated Drained Triaxial Shear
SSCU (P)	3200	(2600)	—	Simple Shear Consolidated Undrained (with or without pore pressure measurement)
SSCD	3200	(2600)	—	Simple Shear Consolidated Drained
DSCD	2700	(2000)	—	Consolidated Drained Direct Shear
UC	470		—	Unconfined Compression
LVS	700		—	Laboratory Vane Shear

KEY TO TEST DATA

Harding Lawson Associates
Engineers and Geoscientists

WELL DEVELOPMENT GROUNDWATER SAMPLING FORM

Well No. MW-4
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 1/12/89 Time
Sampled by (Initials)

Job Name EXXON ALAMEDA
Job Number 04167 24902
Recorded by Mary Jo Weaselen (Signature)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other
Total Depth of Casing (TD in feet BTOC): 19
Water Level Depth (WL in feet BTOC): 5.42
Number of Well Volumes to be purged (# Vols)
☐ 3 ☐ 4 ☐ 5 ☐ 10 ☒ Other 8

PURGE METHOD

☐ Bailer - Type:
☐ Submersible ☒ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

PUMP INTAKE SETTING

☒ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): Screen Interval in feet (BTOC): from to

PURGE VOLUME CALCULATION

(19 TD (feet) − 5.42 WL (feet)) × 4 D (inches)² × 8 # Vols × 0.0408 = 70.92 gallons Calculated Purge Volume

PURGE TIME

Discontinuous pumpuse
11:42 Start 16:26 Stop ~~Elapsed~~

PURGE RATE

Initial 2 gpm Final 2 gpm

ACTUAL PURGE VOLUME

80 gallons

FIELD PARAMETER MEASUREMENT

TOTAL GALLONS

~~Minutes~~ Gallons Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Turbidity Other
3	6.83	11600	16	V TURBID
25	6.71	1000	17	V-MOD. TURBID
40	6.75	1150	17	MOD TURB
52	6.79	620	17	MOD-SLIGHTLY TURBID
57	6.70	550	17.5	SLIGHTLY

~~Minutes~~ Gallons Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
65 GALLON	6.69	550	16.5	Sl. turbid,
80	6.75	500	15.0	Sl. turbid
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): Slight to moderate petroleum odor
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 gallon drum

WELL SAMPLING

SAMPLING METHOD

☐ Same As Above
☐ Bailer - Type:
☐ Grab - Type:
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series:

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineers and Geoscientists

WELL DEVELOPMENT GROUND WATER SAMPLING FORM

Well No. MW-5

Job Name EXXON ALAMEDA

Job Number 07167249.02

Recorded by Mary Jo Heausler (Signature)

Well Type: ☒ Monitor ☐ Extraction ☐ Other

Well Material: ☒ PVC ☐ St. Steel ☐ Other

Date 11/2/89 Time

Sampled by (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):

☐ 2-inch ☒ 4-inch ☐ 6-inch ☐ Other

Total Depth of Casing (TD in feet BTOC): 19

Water Level Depth (WL in feet BTOC): 5.41

Number of Well Volumes to be purged (# Vols)

☐ 3 ☐ 4 ☐ 5 ☐ 10 ☒ Other 8

PURGE VOLUME CALCULATION

$\left(\frac{19.}{\text{TD (feet)}} - \frac{5.41}{\text{WL (feet)}}\right) \times \frac{4^2}{\text{D (inches)}} \times \frac{8}{\text{\# Vols}} \times 0.0408 = \frac{70.97}{\text{Calculated Purge Volume}}$ gallons

PURGE PUMP DESIGN

☒ Bailer - Type: 4" PVC

☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:

☐ Other - Type:

PUMP INTAKE DEPTH

☐ Near Bottom ☐ Near Top ☐ Other

Depth in feet (BTOC): Screen Interval in feet (BTOC): from to

PURGE TIME

discontinuous Pacing

1210 Start 1556 Stop Elapsed

PURGE RATE

Initial gpm Final gpm

ACTUAL PURGE VOLUME

80 GALLONS gallons

FIELD PARAMETER MEASUREMENT

Gallons

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other TURBIDITY
6	6.79	1190	15	MOD TURB.
20	6.45	1150	15	V. TURBID
40	6.89	1000	16.5	V. TURBID
50	6.80	910	16.0	V. TURBID
65	6.69	650	16.0	SLIGHTLY TURB

Gallons

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other TURBIDITY
80	6.62	610	14.0	SL-MOD. TURB
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): petroleum odor + sheen on H2O

Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 GALLON DRUM.

WELL SAMPLING

SAMPLING METHOD

☐ Bailer - Type:

☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:

☐ Same As Above

☐ Grab - Type:

☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series:

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineers and Geoscientists

WELL DEVELOPMENT GROUNDWATER SAMPLING FORM

Well No. MW-6

Job Name EXXON ALAMEDA

Job Number ~~04167~~ 24902

Recorded by Mary Jo Hassler (Signature)

Well Type: ☒ Monitor ☐ Extraction ☐ Other

Well Material: ☒ PVC ☐ St. Steel ☐ Other

Date 1/12/89 Time

Sampled by (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):

☐ 2-inch ☒ 4-inch ☐ 6-inch ☐ Other

Total Depth of Casing (TD in feet BTOC): 19

Water Level Depth (WL in feet BTOC): 5.66

Number of Well Volumes to be purged (# Vols)

☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other 3

PURGE METHOD

☐ Bailer - Type:

☐ Submersible ☒ Centrifugal ☐ Bladder; Pump No.:

☐ Other - Type:

PUMP INTAKE LOCATION

☒ Near Bottom ☐ Near Top ☐ Other

Depth in feet (BTOC): Screen Interval in feet (BTOC): from to

PURGE VOLUME CALCULATION

$(19 \text{ TD (feet)} - 5.66 \text{ WL (feet)}) \times 4^2 \text{ D (inches)} \times 3 \text{ \# Vols} \times 0.0408 = 69.97$ gallons Calculated Purge Volume

PURGE TIME

DISCONTINUOUS PUMPING

11:10 Start 1546 Stop Elapsed

PURGE RATE

Initial 3 gpm Final 2.5 gpm

TOTAL PURGE VOLUME

70 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other TURBIDITY
10	6.75	1320	16.0	V. TURBID
18	6.71	870	16.5	V-MOD TURB
40	6.64	690	16.0	MOD TURBID
52	6.59	680	15.0	MOD-SLIGHTLY TURBID
65	6.58	600	15.0	SLIGHTLY TURB

GALLONS

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other TURBIDITY
70	6.65	610	15.0	SLIGHTLY
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor):

Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 GALLON DRUM

WELL SAMPLING

SAMPLING METHOD

☐ Same As Above

☐ Bailer - Type:

☐ Grab - Type:

☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:

☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series:

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments

QUALITY CONTROL SAMPLES

Duplicate Samples		Blank Samples		Other Samples	
Original Sample No.	Duplicate Sample No.	Type	Sample No.	Type	Sample No.

Harding Lawson Associates
Engineers and Geoscientists

GROUNDWATER SAMPLING FORM

Well No. MW-1
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 1-17-89 Time 6:34 / 18:34
Sampled by MJH (Initials)

Job Name Exxon Alameda
Job Number 04167249.02
Recorded by Mary Gassler (Signature)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☒ 4-inch ☐ 6-inch ☐ Other
Total Depth of Casing (TD in feet BTOC): 21.5
Water Level Depth (WL in feet BTOC):
Number of Well Volumes to be purged (# Vols)
☒ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☐ Bailer - Type:
☐ Submersible ☒ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

PUMP INTAKE SET

☒ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): Screen Interval in feet (BTOC): from to

PURGE VOLUME CALCULATION

(21.5 TD (feet) − 5.81 WL (feet)) × 4² D (inches) × 3 # Vols × 0.0408 = 30.73 gallons
Calculated Purge Volume

PURGE TIME

discontinuous pumpuse
1556 Start 1636 Stop Elapsed

PURGE RATE

Initial 3.3 gpm Final 5 gpm

ACTUAL PURGE VOLUME

30 gallons

FIELD PARAMETER MEASUREMENT

BAILED

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐°C ☐°F	Other Turbidity
10	6.84	600	15.0	clear
20	6.85	620	17.0	clear
30	6.96	570	16.5	clear

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐°C ☐°F	Other
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor):
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☐ Other

WELL SAMPLING

SAMPLING METHOD

☒ Bailer - Type: Stainless Steel.
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series:

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-1	4 x 1 VOA	TPH (gas) BTXE	HCL	NET	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

HLA Harding Lawson Associates
Engineers and Geoscientists

GROUND WATER SAMPLING FORM

Job Name: Exxon Alameda
Job Number: 04167 24902
Recorded by: Mary Beaster (Signature)

Well No.: MW-2
Well Type: ☒ Monitor ☐ Extraction ☐ Other ______
Well Material: ☒ PVC ☐ St. Steel ☐ Other ______
Date: 1-18-89 Time: 12:05
Sampled by: MJH (initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☒ 4-inch ☐ 6-inch ☐ Other ______
Total Depth of Casing (TD in feet BTOC): 16
Water Level Depth (WL in feet BTOC): 5.96
Number of Well Volumes to be purged (# Vols)
☒ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other ______

PURGE VOLUME CALCULATION

(16.00 ~~5.96~~ TD (feet) – 5.96 WL (feet)) x 4 D (inches)² x 3 # Vols x 0.0408 = 19.66 Calculated Purge Volume gallons

PURGE TIME BALL
10:08 Start 11:19 Stop ______ Elapsed

PURGE RATE
Initial ______ gpm Final ______ gpm

ACTUAL PURGE VOLUME
20 gallons

[illegible]
☒ Bailer - Type: PVC
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.: ______
☐ Other - Type: ______

[illegible]
☒ Near Bottom ☐ Near Top ☐ Other ______
Depth in feet (BTOC): ______ Screen Interval in feet (BTOC): from ______ to ______

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began (GALLONS)	pH	Cond. (µmhos/cm)	T ☒°C ☐°F	Other Turbidity	Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐°C ☐°F	Other
5	6.70	890	15.5	Cloudy - slight sheen, odor					
17	6.71	850	19.0	Sl. cloudy					
20	6.83	860	19.0	V. sl. cloudy					
					Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): Slight sheen, petroleum odor
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 gal drum

WELL SAMPLING

SAMPLING METHOD
☒ Bailer - Type: Stainless steel
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.: ______
☐ Same As Above
☐ Grab - Type: ______
☐ Other - Type: ______

SAMPLE DISTRIBUTION Sample Series: ______

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-2	40ml. VOA	TPH(gas) BTXE	HCL	NET	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineers and Geoscientists

GROUNDWATER SAMPLING FORM

Well No. MW-3
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 1-17-89 Time 4:06 / 16:06
Sampled by MJH (Initials)

Job Name Exxon Alameda
Job Number 04167 24902
Recorded by Mary Hearsley (Signature)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☒ 4-inch ☐ 6-inch ☐ Other
Total Depth of Casing (TD in feet BTOC): 14.5
Water Level Depth (WL in feet BTOC): 5.49
Number of Well Volumes to be purged (# Vols)
☒ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☐ Bailer - Type:
☐ Submersible ☒ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

PUMP INTAKE SETTING

☒ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): _____ Screen Interval in feet (BTOC): from _____ to _____

PURGE VOLUME CALCULATION

$(14.5 \text{ TD (feet)} - 5.49 \text{ WL (feet)}) \times 4^2 \text{ D (inches)} \times 3 \text{ \# Vols} \times 0.0408 = 17.64$ gallons Calculated Purge Volume

PURGE TIME

discontinuous
1330 Start 16:06 Stop _____ Elapsed

PURGE RATE

Initial 1.25 gpm Final _____ gpm

ACTUAL PURGE VOLUME

30 gallons (5 casing volumes)

FIELD PARAMETER MEASUREMENT

GAL

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other Turbidity
5	6.55	590	16.0	V. slight.
8	6.99	550	16	slightly
12	6.73	420	15.5	V. slight.
18	6.65	400	16.5	clear - slight sheen
30	6.70	410	16.0	clear

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): Feotid, Slight petroleum odor slight sheen
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 gallon drum

WELL SAMPLING

SAMPLING METHOD

☒ Bailer - Type: Stainless steel
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series:

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-3	40 ml VOA	TPH (gas)	HCl	Trace	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

RL004

OFFICE COPY

0748

Harding Lawson Assoc.
Engineers and Geoscientists

GROUNDWATER SAMPLING FORM

Well No. MW-4

Well Type: ☒ Monitor ☐ Extraction ☐ Other ____

Well Material: ☒ PVC ☐ St. Steel ☐ Other ____

Job Name Exxon Alameda

Job Number 04167249.02

Recorded by Mary Chastler (Signature)

Date 1-17-89 Time 6:34 / 18:34

Sampled by MJH (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):

☐ 2-inch ☒ 4-inch ☐ 6-inch ☐ Other ____

Total Depth of Casing (TD in feet BTOC): 19

Water Level Depth (WL in feet BTOC): 5.36

Number of Well Volumes to be purged (# Vols)

☒ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other ____

PURGE METHOD

☐ Bailer - Type: ____

☐ Submersible ☒ Centrifugal ☐ Bladder; Pump No.: ____

☐ Other - Type: ____

PUMP INTAKE

☒ Near Bottom ☐ Near Top ☐ Other ____

Depth in feet (BTOC): ____ Screen Interval in feet (BTOC): from ____ to ____

PURGE VOLUME CALCULATION

(19 (TD (feet)) - 5.36 (WL (feet))) x 4 (D (inches))^2 x 3 (# Vols) x 0.0408 = 26.71 gallons (Calculated Purge Volume)

PURGE TIME

discontinuous

16:45 Start 17:26 Stop ____ Elapsed

PURGE RATE

Initial ____ gpm Final ____ gpm

ACTUAL PURGE VOLUME

25 gallons

FIELD PARAMETER MEASUREMENT

GAL

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other TURBIDITY
7	6.74	700	16.8	V. Slight
25	6.78	600	15.2	Slight

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other ____
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): ____

Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 gallon drum

WELL SAMPLING

SAMPLING METHOD

☒ Bailer - Type: Stainless Steel

☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.: ____

☐ Same As Above

☐ Grab - Type: ____

☐ Other - Type: ____

SAMPLE DISTRIBUTION

Sample Series: ____

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-4	40ml VOA	TPH (gas)	HCl	NET	

QUALITY CONTROL SAMPLES

Duplicate Samples		Blank Samples		Other Samples	
Original Sample No.	Duplicate Sample No.	Type	Sample No.	Type	Sample No.

Harding Lawson Associates
Engineers and Geoscientists

GROUNDWATER SAMPLING FORM

Well No. MW-5

Job Name Exxon Alameda
Job Number 041667 24902
Recorded by Mary Wessler (Signature)

Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 1-17-89 Time 5:55/17:55
Sampled by MJH (Initials)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☒ 4-inch ☐ 6-inch ☐ Other
Total Depth of Casing (TD in feet BTOC): 19
Water Level Depth (WL in feet BTOC): 5.39
Number of Well Volumes to be purged (# Vols)
☒ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☐ Bailer - Type:
☐ Submersible ☒ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

PURGE INTAKE

☒ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): Screen Interval in feet (BTOC): from to

PURGE VOLUME CALCULATION

$(19 - 5.39) \times 4^2 \times 3 \times 0.0408 = 26.65$ gallons

(19 = TD (feet); 5.39 = WL (feet); 4 = D (inches); 3 = # Vols; 26.65 = Calculated Purge Volume)

PURGE TIME discontinuous
1535 Start 1755 Stop ____ Elapsed

PURGE RATE
Initial 2.5 gpm Final 4 gpm

ACTUAL PURGE VOLUME
72 gallons
(2.5 casing vol's)

FIELD PARAMETER MEASUREMENT

GAL

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other Turbidity
5	7.02	820	16.5	V. slightly
18	6.44	510	14.8	Slightly
22				

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor):
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 GALLON DRUM.

WELL SAMPLING

SAMPLING METHOD

☒ Bailer - Type: Stainless Steel
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series:

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-5	40ml VOA	TPH (gas) BTXE	HCl	NET	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineers and Geoscientists

GROUNDWATER SAMPLING FORM

Well No. MW-6
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 1-17-89 Time 3:34 / 15:34
Sampled by MJH (Initials)

Job Name Exxon Alameda
Job Number 04167 249 02
Recorded by Mary Heasley (Signature)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☒ 4-inch ☐ 6-inch ☐ Other
Total Depth of Casing (TD in feet BTOC): 19
Water Level Depth (WL in feet BTOC): 5.59
Number of Well Volumes to be purged (# Vols)
☒ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☐ Bailer - Type:
☐ Submersible ☒ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

SAMPLE INTAKE

☒ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): ____ Screen Interval in feet (BTOC): from ____ to ____

PURGE VOLUME CALCULATION

(19 TD (feet) − 5.59 WL (feet)) × 4 D (inches)² × 2 # Vols × 0.0408 = 26.26 gallons Calculated Purge Volume

PURGE TIME discontinuous
1354 Start 1534 Stop ____ Elapsed

PURGE RATE
Initial 5 gpm Final ____ gpm

ACTUAL PURGE VOLUME
35 gallons (4 casing vol's)

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other turbidity
5	6.67	600	14	V. SLIGHTLY
19	6.68	520	15.5	V. SLIGHTLY
35	6.76	520	14.5	V. SLIGHT–

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
				slight sheen
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor):
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 gallon drum.

WELL SAMPLING

SAMPLING METHOD

☒ Bailer - Type: Stainless Steel
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLE DISTRIBUTION Sample Series:

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-6	2 40ml VOAs	TPH gas BTXE	HCl	NET	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

RL004

OFFICE COPY

0746

APPENDIX B

LABORATORY ANALYTICAL RESULTS

WESCO Laboratories

Report date: June 16, 1988 Wescojob #: HLA 08102 -L
Client: Harding Lawson Associates
P.O Box 578
Novato, CA 94947

Date sampled: June 1, 1988 Site: Exxon Alameda
Sampled by: M. Thompson Attn.: M. Thompson

Date received: June 2, 1988 P.O.: 4167,224,02
Submitted by: M. Thompson

Lab #	Client ID	Matrix	Analysis
8- 5476	BA2 05.0	soil	TPH with BTXE
8- 5480	BA3 05.0	soil	TPH with BTXE
8- 5471	BH1 25.0	soil	TPH with BTXE
8- 5474	BH2 15.0	soil	TPH with BTXE

Dear Client,

No problems were encountered with the analysis of your samples. We will store samples for 30 days after the report date. the samples will be returned to you after the 30-day period, unless other arrangements are made.
If you have any questions, please feel free to call, (415)883-6425.

Sample Controller

14 Galli Drive, Suite A
Novato, California 94947 415 883-6425
A Division of Western Ecological Services Company

Report Date: 16-Jun-88 Extract/Purge Date: 15-Jun-88
WESCO JOB #: HLA 08102-L Completion Date: 15-Jun-88
Analytical Method: EPA 5030/8015/8020 Analyst: Attia/Farah
MATRIX: SOIL

LAB #: 8-5476 CLIENT'S ID: BA2 05.0

COMPOUND	RESULT (ug/kg)	Detection Limit(ug/kg)
Benzene	N.D.	2000
Toluene	32000	2000
Ethylbenzene	25000	2000
Xylene	150000	2000
Total Petroleum Hydrocarbons (light)	1400000	200000

QUALITY CONTROL DATA	Surrogate Spike % Recovery
Fluorobenzene	89 %

LAB #: 8-5480 CLIENT'S ID: BA3 0.05

COMPOUND	RESULT (ug/kg)	Detection Limit(ug/kg)
Benzene	N.D.	500
Toluene	N.D.	500
Ethylbenzene	N.D.	500
Xylene	2400	500
Total Petroleum Hydrocarbons (light)	74000	50000

QUALITY CONTROL DATA	Surrogate Spike % Recovery
Fluorobenzene	108 %

N.D.: Not Detected

Analytical Supervisor

QUALITY CONTROL DATA
METHOD: EPA 5030/8015/8020 WESCO JOB #: HLA 08102-L
Sample #: 8-5476, 8-5480

COMPOUND	Blank ug/l	Spike Duplicate % deviation	Spike % recovery
Benzene----------	N.D.	5	100
Toluene----------	N.D.	10	96
p-Xylene----------	N.D.	17	106
Gasoline----------	N.D.	19	84
QUALITY CONTROL DATA			
Surrogate Spike % Recovery			
Fluorobenzene	93 %	85 %	83 %

N.D.: Not Detected

Analytical Supervisor

7655 Redwood Blvd.
P.O. Box 578
Novato, CA 94948
(415) 892-0821

CHAIN OF CUSTODY FORM

HLA office

Job Number: 4167,224.02

Name/Location: Exxon Alameda

Project Manager: MDT

Samplers: Michael Thompson

Recorder: Michael Thompson (Signature Required)

Source Code	Matrix: Water	Matrix: Sediment	Matrix: Soil	Matrix: Oil	Unpres.	H_2SO_4	HNO_3	Sample Number or Lab Number (Yr Wk Seq)	Date (Yr Mo Dy)	Time	Station Description/Notes	EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	Priority Pllnt. Metals	Benzene/Toluene/Xylene	Total Petrol. Hydrocarb. Light
[illegible]			X		X			BA-201.5	880601	0710	HOLD							
50			X		X			BA-205.0	880601	0720	TPH light + BTXE						X	X
50			X		X			BA-215.0	880601	0745	HOLD							
50			X		X			BA-301.5	880601	1050	HOLD							
50			X		X			BA-305.0	880601	1100	TPH light + BTXE						X	X
50			X		X			BA-310.0	880601	1115	HOLD							
50			X		X			BA-316.0	880601	1135	HOLD							

Lab Number (Wk)	Lab Number (Seq)	Depth in Feet	Col Mtd CD	QA Code	Miscellaneous

CHAIN OF CUSTODY RECORD

Relinquished By: (Signature)	Received By: (Signature)	Date/Time
Michael Thompson	Robert A. Shlyn	6-2-88 8:00
Robert A. Shlyn	Donald Zikarchi (ucx)	6/2 1050

Dispatched By: (Signature)	Date/Time	Received for Lab By: (Signature)	Date/Time
		Michelle Casey	6/2 11[10] am

Method of Shipment: Courier

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6533

WESCO Laboratories

Report date: June 16, 1988 Wescojob #: HLA 08100 -L
Client: Harding Lawson Associates
P.O Box 578
Novato, CA 94947

Date sampled: May 31, 1988 Site: Exxon Alameda
Sampled by: M. Thompson Attn.: M. Thompson

Date received: June 1, 1988 P.O.: 4167,224.02
Submitted by: M. Thompson

Lab #	Client ID	Matrix	Analysis
8- 5427	BA1-10.0	soil	TPH with BTXE

Dear Client,

No problems were encountered with the analysis of your samples. We will store samples for 30 days after the report date. the samples will be returned to you after the 30-day period, unless other arrangements are made.
If you have any questions, please feel free to call, (415)883-6425.

Sample Controller

14 Galli Drive, Suite A
Novato, California 94947 415 883-6425
A Division of Western Ecological Services Company

Report Date:	16-Jun-88	Extract/Purge Date:	10-Jun-88
WESCO JOB #:	HLA 08100-L	Completion Date:	10-Jun-88
Analytical Method:	EPA 5030/8015/8020	Analyst:	Attia
MATRIX:	SOIL		

LAB #: 8-5427 CLIENT'S ID: BA1-10.0

COMPOUND	RESULT (ug/kg)	Detection Limit(ug/kg)
Benzene	670	25.0
Toluene	N.D.	25.0
Ethylbenzene	150	25.0
Xylene	370	25.0
Total Petroleum Hydrocarbons (light)	11000	2,500.0

QUALITY CONTROL DATA	Surrogate Spike % Recovery
Fluorobenzene	96 %

N.D.: Not Detected

Analytical Supervisor

QUALITY CONTROL DATA

METHOD: EPA 5030/8015/8020 WESCO JOB #: HLA 08100-L

COMPOUND	Blank ug/l	Spike Duplicate % deviation	Spike % recovery
Benzene----------	N.D.	2	115
Toluene----------	N.D.	11	112
p-Xylene----------	N.D.	11	112
Gasoline----------	N.D.	11	97
QUALITY CONTROL DATA			
Surrogate Spike % Recovery			
Fluorobenzene	98 %	97 %	76 %

N.D.: Not Detected

Analytical Supervisor

Harding Lawson Associates
7655 Redwood Blvd.
P.O. Box 578
Novato, CA 94948
(415) 892-0821

CHAIN OF CUSTODY FORM

Job Number: 4167,224.02
Name/Location: Exxon Alameda
Project Manager: M. Thompson

Samplers: Michael Thompson
Bob Stolzman
Recorder: Michael Thompson (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	EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	Priority Pllnt. Metals	Benzene/Toluene/Xylene	Total Petrol. Hydrocarb./LG
50						1					BA1-01.5	88	05	31	1325	HOLD							
50						1					BA1-05.0	88	05	31	1335	HOLD							
50						1					BA1-10.0	88	05	31	1350	LIGHT TPH+BTXE						X	X
50						1					BA1-15.0	88	05	31	1415	HOLD							
50						1					BA1-20.0	88	05	31	1440	HOLD							

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
Michael Thompson	Robert A. Stolzman	5-31-88 / 1910

DISPATCHED BY: (Signature)	DATE/TIME	RECEIVED FOR LAB BY: (Signature)	DATE/TIME
Robert A. Stolzman	6-1-88 / 9:00	Donald Ikeuchi	6/1 / 900A

METHOD OF SHIPMENT: Wesco Courier

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

6533

WESCO Laboratories

Report date: June 16, 1988 Wescojob #: HLA 08104 -L
Client: Harding Lawson Associates
200 Rush Landing Road
Novato, CA 94947

Date sampled: June 7, 1988 Site: Exxon Alameda
Sampled by: C. Larkin Attn.: M. Thompson

Date received: June 8, 1988 P.O.: 4167,224.02
Submitted by: C. Larkin

Lab #	Client ID	Matrix	Analysis
8- 5629	8823EXA1	water	TPH with BTXE
8- 5630	8823EXA2	water	TPH with BTXE
8- 5631	8823EXA3	water	TPH with BTXE
8- 5632	8823EXA4	water	TPH with BTXE

Dear Client,

No problems were encountered with the analysis of your samples. We will store samples for 30 days after the report date. the samples will be returned to you after the 30-day period, unless other arrangements are made.
If you have any questions, please feel free to call, (415)883-6425.

Sample Controller

14 Galli Drive, Suite A
Novato, California 94947 415 883-6425
A Division of Western Ecological Services Company

Report Date: 16-Jun-88
WESCO JOB #: HLA 08104-L
Analytical Method: EPA 5030/8015/602
MATRIX: WATER

Extracted Date: 10-Jun-88
Completion Date: 10-Jun-88
Analyst: Lewis/Arntzen

LAB #: 8-5629 CLIENT'S ID: 23EXA1

COMPOUND	RESULT (ug/l)	Detection Limit (ug/l)
Benzene	6000	25
Toluene	80	25
Ethylbenzene	940	25
Xylene	1900	25
Total Petroleum Hydrocarbons (light)	28000	2500

QUALITY CONTROL DATA
Surrogate Spike % Recovery
Fluorobenzene 91 %

LAB #: 8-5630 CLIENT'S ID: 23EXA2

COMPOUND	RESULT (ug/l)	Detection Limit (ug/l)
Benzene	12000	125
Toluene	12000	125
Ethylbenzene	2100	125
Xylene	12000	125
Total Petroleum Hydrocarbons (light)	110000	12500

QUALITY CONTROL DATA
Surrogate Spike % Recovery
Fluorobenzene 100 %

N.D.: Not Detected

Analytical Supervisor

Report Date: 16-Jun-88
WESCO JOB #: HLA 08106-L
Analytical Method: EPA 5030/8015/602
MATRIX: WATER

Extracted Date: 10-Jun-88
Completion Date: 10-Jun-88
Analyst: Lewis

LAB #: 8-5631 CLIENT'S ID: 23EXA3

COMPOUND	RESULT (ug/l)	Detection Limit (ug/l)
Benzene	N.D.	0.5
Toluene	N.D.	0.5
Ethylbenzene	N.D.	0.5
Xylene	N.D.	0.5
Total Petroleum Hydrocarbons (light)	N.D.	50.0

QUALITY CONTROL DATA
Surrogate Spike % Recovery
Fluorobenzene 105 %

LAB #: 8-5632 CLIENT'S ID: 23EXA4

COMPOUND	RESULT (ug/l)	Detection Limit (ug/l)
Benzene	5000	50
Toluene	77	50
Ethylbenzene	1100	50
Xylene	2700	50
Total Petroleum Hydrocarbons (light)	27000	5000

QUALITY CONTROL DATA
Surrogate Spike % Recovery
Fluorobenzene 95 %

N.D.: Not Detected

Analytical Supervisor

QUALITY CONTROL DATA
BLANK, SPIKE DUPLICATE AND SPIKE REPORT FOR JOB # HLA 08104-L
METHOD: EPA 5030/8015/602

COMPOUND	Blank ug/l	Spike Duplicate % deviation	Spike % recovery
Benzene----------	N.D.	2	115
Toluene----------	N.D.	11	112
p-Xylene----------	N.D.	11	112
Gasoline----------	N.D.	11	97
QUALITY CONTROL DATA			
Surrogate Spike % Recovery			
Fluorobenzene	98 %	97 %	76 %

N.D.: Not Detected

Analytical Supervisor

Harding Lawson Associates
Environmental Services Division
200 Rush Landing Road
Novato, California 94947
(415) 892-0821

CHAIN OF CUSTODY FORM

Samplers: CHRIS LARKIN

Job Number: 4167,224.02

Name/Location: EXXON - ALAMEDA

Project Manager: MICHAEL THOMSON

Recorder: Christopher Lobue (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	Priority Pllnt. Metals	Benzene/Toluene/Xylene (E)	Total Petrol. Hydrocarb. (L)
2	X				2			88 23 EXA 1	88 06 07 1500			X				X	X
2 3	X				2			88 23 EXA 2	88 06 07 1803							X	X
2 3	X				2			88 23 EXA 3	88 06 07 1954							X	X
2 3	X				2			88 23 EXA 4	88 06 07 2005							X	X

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) Christopher Lobue	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
DISPATCHED BY: (Signature) DATE/TIME	RECEIVED FOR LAB BY: (Signature)	DATE/TIME 0938 6/8/88
METHOD OF SHIPMENT		

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6533

NET NATIONAL ENVIRONMENTAL TESTING, INC.

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

Formerly: ANATEC Labs, Inc.

Mary Jo Hessler
Harding Lawson Associates
200 Rush Landing Rd.
PO Box 6107
Novato, CA 94947

12-30-88
NET Pacific Log No: 5164 (1-6)
Series No: 281
Client Ref: Mary Jo Hessler

Subject: Analytical Results for Six Water Samples Collected at 1725 Park St., Alameda, CA Received 12-29-88.

Dear Ms. Hessler:

Analysis of the samples referenced above has been completed. Results are presented on the following pages.

Please feel welcome to contact us should you have questions regarding procedures or results.

Submitted by:

Fred Choske
Project Chemist

Approved by:

William G. Rotz
Project Manager

/sm

KEY TO ABBREVIATIONS

mg/Kg (ppm)	:	Concentration in units of milligrams of analyte per kilogram of sample, wet-weight basis (parts per million).
mg/L	:	Concentration in units of milligrams of analyte per liter of sample, unless noted otherwise.
mL/L/hr	:	Milliliters per liter per hour.
MPN/100 mL	:	Most probable number of bacteria per one hundred milliliters of sample.
NA	:	Not analyzed; see cover letter for details.
ND	:	Not detected; the analyte concentration is less than the listed reporting limit.
NR	:	Not requested.
NTU	:	Nephelometric turbidity units.
RL	:	Reporting limit.
RPD	:	Relative percent deviation.
SNA	:	Standard not available.
ug/Kg (ppb)	:	Concentration in units of micrograms of analyte per kilogram of sample, wet-weight basis (parts per billion).
ug/L	:	Concentration in units of micrograms of analyte per liter of sample.
ug/filter	:	Concentration in units of micrograms of analyte per filter.
umhos/cm	:	Micromhos per centimeter.
*	:	See cover letter for details.

Parameter	Reporting Limit (ug/L)	Descriptor, Lab No. and Results (ug/L) #1 8' 12-28-88 0900 (-20472)	#2 8' 12-28-88 1000 (-20473)[a]	#3 8' 12-28-88 1140 (-20474)
PETROLEUM HYDROCARBONS				
Volatile, as Gasoline	50	ND	20,000	650
Benzene	0.5	ND	4,400	200
Ethyl benzene	0.6	ND	2,500	51
Toluene	0.5	ND	3,000	6.2
Xylenes, total	1.5	ND	6,100	76

Parameter	Reporting Limit (ug/L)	Descriptor, Lab No. and Results (ug/L) #4 8' 12-28-88 1250 (-20475)[a]	#5 8' 12-28-88 1430 (-20476)[a]	#6 12-28-88 (-20477)
PETROLEUM HYDROCARBONS				
Volatile, as Gasoline	50	45,000	76,000	800
Benzene	0.5	11,000	1,600	51
Ethyl benzene	0.6	3,200	1,500	30
Toluene	0.5	5,200	10,000	69
Xylenes, total	1.5	8,000	19,000	160

[a]The reporting limits for this sample are 10 times the listed reporting limits.

MED-TOX ASSOCIATES, INC.

ENVIRONMENTAL & OCCUPATIONAL HEALTH SERVICES

3440 Vincent Road Pleasant Hill, CA 94523 • (415) 930-9090 • FAX# (415) 930-0256

LABORATORY ANALYSIS REPORT

HARDING LAWSON ASSOCIATES
200 RUSH LANDING ROAD
P.O. BOX 6107
NOVATO, CA 94948
ATTN: Mike Siembieda

REPORT DATE: 01/25/89

DATE SAMPLED: 01/09/89

DATE RECEIVED: 01/10/89

CLIENT PROJECT ID: 04167,249.02

MED-TOX JOB NO: 8801037

ANALYSIS OF: THREE SOIL SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, TOTAL XYLENES, AND TOTAL PETROLEUM HYDROCARBONS

NOTE: INDIVIDUAL LABORATORY METHOD BLANKS, APPROPRIATE TO EACH APPLICABLE METHOD, WERE PROCESSED IN THE SAME MANNER AS ACTUAL SAMPLES. NONE OF THESE METHOD BLANKS CONTAINED A DETECTABLE QUANTITY OF ANY ANALYTE

See attached for results

Michael J. Jaeger, Manager
Organic Laboratory

Results FAXed to Mike Siembieda 01/23/89

HARDING LAWSON ASSOCIATES

CLIENT ID: B-4-05.0
CLIENT JOB NO: 04167,249.02

MED-TOX LAB NO: 8901037-01A
MED-TOX JOB NO: 8901037

DATE SAMPLED: 01/09/89
DATE RECEIVED: 01/10/89

DATE ANALYZED: 01/13/89
REPORT DATE: 01/25/89

TOTAL PETROLEUM HYDROCARBONS WITH PURGEABLE AROMATICS

METHOD: EPA 8020, 8015 (PURGE & TRAP)

	CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
Benzene	17	1
Toluene	2	1
Ethylbenzene.	7	1
Xylenes	12	3
Total Petroleum Hydrocarbons as:		
Gasoline	0.6 mg/kg	0.2 mg/kg

ND = Not detected at or above indicated method detection limit

HARDING LAWSON ASSOCIATES

CLIENT ID: B-5-04.5
CLIENT JOB NO: 04167,249.02

MED-TOX LAB NO: 8901037-02A
MED-TOX JOB NO: 8901037

DATE SAMPLED: 01/09/89
DATE RECEIVED: 01/10/89

DATE ANALYZED: 01/13/89
REPORT DATE: 01/25/89

TOTAL PETROLEUM HYDROCARBONS WITH PURGEABLE AROMATICS

METHOD: EPA 8020, 8015 (PURGE & TRAP)

	CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
Benzene	55	1
Toluene	7	1
Ethylbenzene.	66	1
Xylenes	240	3
Total Petroleum Hydrocarbons as:		
Gasoline	2 mg/kg	0.2 mg/kg

ND = Not detected at or above indicated method detection limit

HARDING LAWSON ASSOCIATES

CLIENT ID: B-6-05.0
CLIENT JOB NO: 04167,249.02

MED-TOX LAB NO: 8901037-03A
MED-TOX JOB NO: 8901037

DATE SAMPLED: 01/09/89
DATE RECEIVED: 01/10/89

DATE ANALYZED: 01/13-17/89
REPORT DATE: 01/25/89

TOTAL PETROLEUM HYDROCARBONS WITH PURGEABLE AROMATICS

METHOD: EPA 8020, 8015 (PURGE & TRAP)

	CONCENTRATION (ug/kg)	DETECTION LIMIT (ug/kg)
Benzene	3,700	10
Toluene	970	10
Ethylbenzene	23,000	10
Xylenes	94,000	30
Total Petroleum Hydrocarbons as:		
Gasoline	490 mg/kg	2 mg/kg

ND = Not detected at or above indicated method detection limit

MED-TOX ASSOCIATES, INC.

MED-TOX JOB NO: 8901037
HLA JOB NO: 04167,249.02

MATRIX SPIKE RECOVERY SUMMARY

METHOD 8020/8015 (PURGE & TRAP)

ANALYTE	Spike Conc. (ug/kg)	Sample Result (ug/kg)	MS Result (ug/kg)	MSD Result (ug/kg)	Average Percent Recovery	RPD
Benzene	18.1	3.2	19.8	19.8	91.7	0.0
Toluene	86.8	9.7	97.2	94.2	91.1	3.1
TPH as Gasoline	1140	ND	1050	998	89.8	5.5

CURRENT QC LIMITS

Analyte	Percent Recovery	RPD
Benzene	(60-142)	24
Toluene	(60-137)	25
TPH as Gasoline	(60-131)	26

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
ND = Not Detected

MED-TOX ASSOCIATES, INC.

MED-TOX JOB NO: 8901037
HLA JOB NO: 04167,249.02

MATRIX SPIKE RECOVERY SUMMARY

METHOD 8020/8015 (PURGE & TRAP)

ANALYTE	Spike Conc. (ug/kg)	Sample Result (ug/kg)	MS Result (ug/kg)	MSD Result (ug/kg)	Average Percent Recovery	RPD
Benzene	20.2	54.8	39.4	51.1	----	---*
Toluene	101	7.2	91.3	89.3	82.7	2.4
TPH as Gasoline	1140	1550	1850	2010	40.0	42

* In the event that Matrix Spike Compound concentration in the discrete sample exceeds the amount spiked, recovery data is not compiled.

CURRENT QC LIMITS

Analyte	Percent Recovery	RPD
Benzene	(60-142)	24
Toluene	(60-137)	25
TPH as Gasoline	(60-131)	26

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
ND = Not Detected

Ha[illegible] Law[illegible] Asso[illegible]
200 [illegible] Landing Road
P.O. Box 6107
Novato, California 94948
415/892-0821
Telecopy: 415/892-1586

8901037

CHAIN OF CUSTODY FORM

Lab: MED-TOX

Samplers: S Michelle Watson

Job Number: 04167.249.02

Name/Location: EXXON MAINEDA II

Project Manager: Mike Siembieda

Recorder: S Michelle Watson
(Signature Required)

SOURCE CODE	MATRIX: Water	Sediment	Soil	Oil	#CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	Ice	SAMPLE NUMBER OR LAB NUMBER: Yr	Wk	Seq	DATE: Yr	Mo	Dy	Time	STATION DESCRIPTION/ NOTES
SO			X					1	B	4	05.08	89	01	09	1000	1A
SO			X					1	B	5	04.58	89	01	09	1220	2A
SO			X					1	B	6	05.08	89	01	09	1420	3A

ANALYSIS REQUESTED

EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	Priority Pllnt. Metals	Benzene/Toluene/Xylene/BTEX	Total Petrol. Hydrocarb. GAS
				X	X	X
				X	X	
				X	X	

LAB NUMBER: Yr	Wk	Seq	DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS
						2 week turn around

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
S Michelle Watson	[illegible] St John	01-10-89 3:30
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
[illegible] St John		
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
DISPATCHED BY: (Signature) DATE/TIME	RECEIVED FOR LAB BY: (Signature) DATE/TIME	
	M Van Vleck 1-10 17:5	
METHOD OF SHIPMENT		

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

653

Trace Analysis Laboratory, Inc.
3423 Investment Boulevard, #8 • Hayward, California 94545 *(415) 783-6960*

TAL

DATE: 2/15/89

LOG NO.: 6915

DATE SAMPLED: 1/17/89

DATE RECEIVED: 1/18/89

CUSTOMER: Harding Lawson Associates

REQUESTER: Mary Jo Heassler

PROJECT: No. 04167, 249.02, Exxon Alameda

Sample Type: Water

Method and Constituent	Units	MW-1 Concentration	MW-1 Detection Limit	MW-2 Concentration	MW-2 Detection Limit	MW-3 Concentration	MW-3 Detection Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/l	6,800	300	30,000	2,000	5,300	300
Modified EPA Method 8020:							
Benzene	ug/l	2,000	30	6,600	200	2,500	30
Toluene	ug/l	91	30	3,300	200	230	30
Xylenes	ug/l	1,600	60	7,700	300	1,100	60
Ethyl Benzene	ug/l	800	40	1,600	200	590	40

DATE: 2/15/89
LOG NO.: 6915
DATE SAMPLED: 1/17/89
DATE RECEIVED: 1/18/89
PAGE: Two

Sample Type: Water

Method and Constituent	Units	MW-4 Concentration	MW-4 Detection Limit	MW-5 Concentration	MW-5 Detection Limit	MW-6 Concentration	MW-6 Detection Limit
DHS Method:							
Total Petroleum Hydrocarbons as Gasoline	ug/l	19,000	300	26,000	300	38,000	4,000
Modified EPA Method 8020:							
Benzene	ug/l	1,000	10	8,700	200	7,400	400
Toluene	ug/l	1,500	10	3,900	200	9,300	400
Xylenes	ug/l	2,200	20	5,900	300	9,900	600
Ethyl Benzene	ug/l	360	20	990	200	2,000	400

Dan Farah

Dan Farah, Ph.D.
Supervisory Chemist

DF:mln

tard swa socl
7655 Redwood Boulevard
P.O. Box 578
Novato, California 94948
415/892-0821
Telecopy: 415/892-0831
Telex: 340523

CHAIN OF CUSTODY FORM

Lab: TRACE ANALYSES

Samplers: MARY JO HEASSLER

Job Number: 24167.242.02

Name/Location: Exxon, Alameda

Project Manager: Michael Stembridge

Recorder: Mary Jo Heassler
(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	EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	Priority Pllnt. Metals	Benzene/Toluene/Xylene (BTE)	Total Petrol. Hydrocarb. (gas)
3	X							2	MW-	1		880117			0925	STANDARD TURN AROUND TIME					X	X	
3	X							2	MW-	2		880118			1205	"					X	X	
3	X							2	MW-	3		880117			0406	"					X	X	
3	X							2	MW-	4		880117			0634	"					X	X	
3	X							2	MW-	5		880117			0555	"					X	X	
3	X							2	MW-	6		880117			0334	"					X	X	

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature) Mary Jo Heassler	RECEIVED BY: (Signature) TAL Alexis Drush	DATE/TIME 11/18/87 14:31
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
DISPATCHED BY: (Signature) DATE/TIME	RECEIVED FOR LAB BY: (Signature)	DATE/TIME
METHOD OF SHIPMENT		

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

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Harding Lawson Associates
Engineers and Geoscientists

GROUND-WATER SAMPLING FORM

Well No. MW-6
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 6/1/89 Time 1452
Sampled by JJF/TMD (Initials)

Job Name EXXON ALAMEDA
Job Number 04107 284 02
Recorded by (Signature)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☒ 4-inch ☐ 6-inch ☐ Other
Total Depth of Casing (TD in feet BTOC): 18.5
Water Level Depth (WL in feet BTOC): 6.25
Number of Well Volumes to be purged (# Vols)
☒ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☐ Bailer - Type:
☐ Submersible ☒ Centrifugal ☐ Bladder; Pump No.:
☐ Other - Type:

PUMP INTAKE SETTING

☐ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): Screen Interval in feet (BTOC): from to

PURGE VOLUME CALCULATION

(18.5 TD (feet) − 6.25 WL (feet)) × 4 D (inches)^2 × 3 # Vols × 0.0408 = 24.0 gallons Calculated Purge Volume

PURGE TIME

1428 Start 1448 Stop 20 Elapsed

PURGE RATE

Initial 1.2 gpm Final 1.2 gpm

ACTUAL PURGE VOLUME

25 gallons

FIELD PARAMETER MEASUREMENT

~~Minutes~~ Gallons Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other NTU
0 GAL	6.4	980	29	26
5	6.7	880	26	21
10	6.7	900	26	18
15	6.7	870	24	16
20	6.7	860	16	20

~~Minutes~~ Gallons Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other NTU
24 GAL	6.7	820	24	70
Meter Nos.				

Observations During Purging (Well Condition, Turbidity, Color, Odor): SLIGHT HYDROCARBON (GASOLINE) ODOR, AND SHEEN
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 GAL DRUM (ON SITE)

WELL SAMPLING

SAMPLING METHOD

☒ Bailer - Type: SS
☐ Submersible ☐ Centrifugal ☐ Bladder; Pump No.:
☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series: 8906

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
0101	3 VOAS	TPH AS GASOLINE & BTXE	NONE	NET	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

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