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ENVIRONMENTAL ENGINEERING

G. D. GIBSON
SENIOR ENVIRONMENTAL ENGINEER

November 14, 1990

Exxon RAS 7-0104
1725 Park Street
Alameda, California

Mr. Ariu Levy
Alameda County Health Agency
Division of Hazardous Materials
80 Swan Way, Suite 200
Oakland, California 94621

Dear Mr. Levy:

Attached for your review and comment is the letter report on Third Quarter Groundwater Sampling for the above referenced site in the City of Alameda. This report, by Harding Lawson Associates of Novato, California, presents the results of the groundwater sampling event performed in September, 1990.

Detectable levels of disolved hydrocarbons continue to be detected in all wells at this site; we are currently in the process of designing a groundwater remediation system.

Should you have any questions or concerns after your review, please contact me at (415) 246-8768. Thank you.

Sincerely,

Gary D. Gibson

GDG:rh
1924E
Attachment

c - w/attachment:
Mr. L. Feldman - San Francisco Bay Region Water Quality Control Board

w/o attachment:
Mr. D. J. Bertoch
Mr. P. J. Brininstool
Ms. J. E. Folger
Mr. J. R. Hastings
Ms. S. M. Watson - Harding Lawson Associates

Harding Lawson Associates

November 2, 1990

04167,326.02

Exxon Company, U.S.A.
Post Office Box 4032
Concord, California 94520

Attention: Mr. Gary D. Gibson
Senior Environmental Engineer

Gentlemen:

Third Quarter Groundwater Sampling
Exxon Station #7-0104
Alameda, California

This letter presents the results of Harding Lawson Associates' (HLA) September 1990 monitoring of seven groundwater monitoring wells at Exxon Station 7-0104, 1725 Park Street, Alameda, California (site). The site history and detailed monitoring well sampling procedures are described in HLA's *Phase II Evaluation of Petroleum Hydrocarbons, Exxon Service Station R/S #7-0104, 1725 Park Street, Alameda, California*, dated March 21, 1989. The sampling round was conducted on September 19, 1990, and represents HLA's sixth sampling event and the second of a renewed year-long monitoring program.

Water-Level Monitoring and Groundwater Sampling

HLA has been obtaining monthly water-level and free-phase hydrocarbon measurements from the seven monitoring wells onsite since September 1989. All measurements were performed with an electric oil-water interface probe. The water was also visually inspected for the presence of free-phase petroleum product using a clear Lucite bailer. No free-phase product was measured in any of the wells during the course of this investigation. On September 19, 1990, prior to groundwater sample collection, the seven monitoring wells were purged a minimum of three well volumes by hand bailing or with a centrifugal pump. The purged water was stored onsite in 55 gallon drums. Measurements of pH, conductivity, and temperature of the purged water were taken during purging of the wells. Copies of HLA's Groundwater Sampling Forms documenting sampling activities are attached. All water-level measurement and sampling equipment was decontaminated prior to use by steam cleaning.

Groundwater samples from each of the monitoring wells were collected using a stainless steel bailer and decanted into 40-milliliter volatile organic analysis (VOA) vials. A laboratory-supplied trip blank accompanied the sample containers from the

laboratory into the field. The samples and trip blank were labeled, placed in a cooler with blue ice, and transported under chain of custody procedures to NET Pacific Laboratory (NET), Santa Rosa, California. NET is a state-certified hazardous waste laboratory.

Laboratory Analyses

The groundwater samples and trip blank were analyzed for total petroleum hydrocarbons (TPH) calibrated to gasoline, and for benzene, toluene, ethylbenzene, and xylenes (BTEX). Groundwater analytical results are listed in Table 1, along with analytical results from HLA's previous groundwater sampling rounds. Copies of the original laboratory reports are attached.

Groundwater Gradient and Flow Direction

Groundwater elevations from the September 1990 water-level survey are presented in Table 2, along with previously measured groundwater elevations. Water-level elevations at the site have decreased slightly over the past three months from the previous measurements. The water table appears to be fluctuating in response to seasonal precipitation and precipitation induced recharge. Groundwater contours are shown on Plate 1. As shown, the direction of groundwater flow is toward the east at an approximate gradient of 0.004 ft/ft. This flow direction is consistent with previous water-level data obtained during this investigation.

Laboratory Analytical Results

Review of laboratory analytical results indicates that petroleum hydrocarbon constituents were detected in all seven wells onsite. The highest concentrations of petroleum hydrocarbon constituents were detected in groundwater samples collected from wells located adjacent to and downgradient of the tank field area (Wells MW-6 and MW-2, respectively).

As presented in Table 1, the concentrations of TPH as gasoline have remained roughly analogous to concentrations detected during the previous sampling event with the exception of Well MW-1. The concentration of TPH as gasoline has decreased in Well MW-1 from 32 to 0.95 mg/l. The detected TPH concentrations range from 0.95 to 63 milligrams per liter (mg/l). The concentration of benzene detected in all monitoring wells at the site are in excess of the California State Department of Health Services (DHS) action level of 1.0 micrograms per liter (μg/l). Concentrations of toluene detected in Wells MW-2, MW-4, and MW-6 exceed the DHS action level of 100 μg/l. Ethylbenzene concentrations detected in Wells MW-3, MW-6, and MW-7 exceed the DHS action level of 680 μg/l. Xylenes concentrations detected in Wells MW-2, MW-4, MW-6, and MW-7 exceed DHS action levels of 620 μg/l.

Benzene, ethylbenzene, and xylenes were detected in the trip blank at concentrations of 0.8, 0.6, and 1.0 μg/l. These concentrations are slightly above the detection limit of 0.5 μg/l and are probably the result of laboratory cross contamination during the analytical process. However, based on the highly elevated concentrations detected in the other groundwater samples, the low levels detected in the trip blank do not appear to be significant.

HLA is in the process of designing a soil and groundwater remediation program for the site. Quarterly sampling and monthly groundwater level measurements will continue. The next quarterly sampling event is scheduled for December 1990. HLA recommends that this report be submitted to the Regional Water Quality Control Board and the Alameda County Health Agency.

Please call us at 415/892-0821 if you have any questions.

Yours very truly,

HARDING LAWSON ASSOCIATES

S. Michelle Watson
Project Geologist

Michael L. Siembieda
Associate Geologist - RG 4007

REGISTERED GEOLOGIST
MICHAEL L. SIEMBIEDA
No: 4007
STATE OF CALIFORNIA

SMW/MLS/bag/J14065-H

Attachments: Table 1
Table 2
Plate 1
Groundwater Sampling Forms
Laboratory Analytical Reports

Table 1. Summary of Chemical Results of Groundwater Samples

Well Number	Date	TPH Gasoline mg/l[1]	Benzene µg/l[2]	Toluene µg/l	Ethyl-benzene µg/l	Xylenes µg/l	Total Dissolved Solids mg/l
DHS Action Levels			1.0	100	680	620	
MW-1	06/07/88	27	5,000	77	1,100	2,700	NT[3]
	01/17/89	6.8	2,000	91	800	1,600	NT
	06/01/89	1.7	170	6.9	13	230	NT
	09/18/89	2.1	9.0	53	18	130	NT
	12/11/89	5.8	200	42	290	330	NT
	03/07/90	NT	NT	NT	NT	NT	910
	03/13/90	2.3	430	14	16	220	NT
	06/14/90	32	1,400	19	<5[4]	120	NT
	09/19/90	0.95	290	2.9	<0.5	27	NT
MW-2	06/07/88	110	12,000	12,000	2,100	12,000	NT
	01/17/89	30	6,600	3,300	1,600	7,700	NT
	06/01/89	8.7	330	280	680	1,200	NT
	09/18/89	17	580	280	570	220	NT
	12/11/89	32	1,000	850	310	1,200	NT
	03/13/90	39	3,500	1,500	2,100	3,900	NT
	06/14/90	34	3,800	730	1,600	3,900	NT
	09/19/90	63	670	180	390	1,000	NT
MW-3	06/07/88	28	6,000	80	940	1,900	NT
	01/17/89	5.3	2,500	230	590	1,100	NT
	06/01/89	5.4	330	300	570	680	NT
	09/18/89	12	680	170	350	860	NT
	12/11/89	14	1,100	150	670	690	NT
	03/13/90	18	6,300	200	1,100	1,100	NT
	06/14/90	9.5	1,300	880	310	1,800	NT
	09/19/90	16	5,000	65	1,500	450	NT

Table 1. Summary of Chemical Results of Groundwater Samples (continued)

Well Number	Date	TPH Gasoline mg/l	Benzene µg/l	Toluene µg/l	Ethyl-benzene µg/l	Xylenes µg/l	Total Dissolved Solids mg/l
DHS Action Levels			1.0	100	680	620	
MW-4	01/17/89	19	1,000	1,500	360	2,200	NT
	06/01/89	3.6	180	240	63	810	NT
	09/18/89	6.0	290	200	28	510	NT
	12/11/89	13	750	910	510	1,200	NT
	03/07/90	NT	NT	NT	NT	NT	370
	03/13/90	12	1,500	1,500	470	2,800	NT
	06/14/90	12	5,700	400	1,300	760	NT
	09/19/90	5.5	670	180	390	1,000	NT
MW-5	01/17/89	26	8,700	3,900	990	5,900	NT
	06/01/89	5.2	240	220	130	690	NT
	09/18/89	8.0	340	150	140	460	NT
	12/11/89	15	720	320	450	870	NT
	03/13/90	10	3,400	220	280	800	NT
	06/14/90	12	3,300	160	350	730	NT
	09/19/90	8.5	1,800	85	120	460	NT
MW-6	01/17/89	38	7,400	9,300	2,000	9,900	NT
	06/01/89	23	1,900	2,500	2,000	6,000	NT
	09/18/89	17	650	410	650	320	NT
	12/11/89	29	1,100	810	330	1,500	NT
	03/13/90	38	12,000	15,000	2,500	12,000	NT
	06/14/90	38	9,100	7,800	2,900	12,000	NT
	09/19/90	22	4,200	300	1,400	3,400	NT
MW-7	01/09/90	17	380	180	330	1,300	NT
	03/13/90	16	360	270	83	460	NT
	06/14/90	14	1,200	2,800	75	930	NT
	09/19/90	16	2,800	95	2,500	1,700	NT
Field Blank	12/11/89	<0.05	0.88	0.95	0.62	1.7	NT

Table 1. Summary of Chemical Results of Groundwater Samples (continued)

Well Number	Date	TPH Gasoline mg/l	Benzene µg/l	Toluene µg/l	Ethyl-benzene µg/l	Xylenes µg/l	Total Dissolved Solids mg/l
Trip Blank	06/14/90	<0.05	<0.5	<0.5	<0.5	<0.5	NT
	09/19/90	<0.05	0.8	<0.5	0.6	1.0	NT

1 mg/l: milligrams per liter (parts per million)

2 µg/l: micrograms per liter (parts per billion)

3 NT: Not tested

4 <: Numbers preceded by "<" indicate that sample was below the indicated detection limit.

Table 2. Groundwater Elevations and Product Thickness Measurements

Well Number	Elevation Top of Well Casing[1]	Date	Depth to Water BTOC[2] (feet)	Depth to Product BTOC (feet)	Product Thickness (feet)	Potentiometric Surface Elevation (feet above MSL)
MW-1	17.35	06-10-88	6.35	NP[3]	NP	11.00
		01-17-89	5.81	NP	NP	11.54
		01-24-89	5.16	NP	NP	12.19
		06-01-89	6.27	NP	Sheen	11.08
		09-18-89	7.11	NP	NP	10.24
		10-20-89	7.28	NP	NP	10.07
		11-22-89	7.02	NP	NP	10.33
		12-11-89	6.60	NP	NP	10.75
		02-13-90	6.02	NP	NP	11.33
		03-13-90	5.91	NP	NP	11.44
		04-18-90	6.18	NP	NP	11.17
		05-23-90	6.29	NP	NP	11.06
		06-14-90	6.19	NP	NP	11.28
		08-21-90	7.03	NP	NP	10.32
		09-19-90	7.26	NP	NP	10.09
MW-2	16.67	06-10-88	6.20	NP	NP	10.47
		01-17-89	5.96	NP	NP	10.71
		01-24-89	5.04	NP	NP	11.63
		06-01-89	6.32	NP	Sheen	10.35
		09-18-89	6.73	NP	NP	9.94
		10-20-89	6.87	NP	NP	9.80
		11-22-89	6.80	NP	NP	9.87
		12-11-89	6.57	NP	NP	10.10
		02-13-90	6.12	NP	NP	10.55
		03-13-90	6.02	NP	NP	10.65
		04-18-90	6.35	NP	NP	10.32
		05-23-90	6.28	NP	NP	10.39
		06-14-90	6.14	NP	NP	10.53
		08-21-90	6.70	NP	NP	9.97
		09-19-90	6.84	NP	NP	9.83
MW-3	17.11	06-10-88	6.05	NP	NP	11.06
		01-17-89	5.49	NP	NP	11.62
		01-24-89	5.38	NP	NP	11.73

Table 2. Groundwater Elevations and Product Thickness Measurements (continued)

Well Number	Elevation Top of Well Casing[1]	Date	Depth to Water BTOC[2] (feet)	Depth to Product BTOC (feet)	Product Thickness (feet)	Potentiometric Surface Elevation (feet above MSL)
		06-01-89	5.96	NP	NP	11.15
		09-18-89	6.65	NP	NP	10.46
		10-20-89	6.88	NP	NP	10.23
		11-22-89	6.74	NP	NP	10.37
		12-11-89	6.37	NP	NP	10.74
		02-13-90	5.58	NP	NP	11.53
		03-13-90	5.48	NP	NP	11.63
		04-18-90	6.01	NP	NP	11.10
		05-23-90	6.14	NP	NP	10.97
		06-14-90	5.83	NP	NP	11.28
		08-21-90	6.67	NP	NP	10.44
		09-19-90	6.88	NP	NP	10.23
MW-4	17.34	01-17-89	5.36	NP	NP	11.98
		01-24-89	5.46	NP	NP	11.88
		06-01-89	6.01	NP	NP	11.33
		09-18-89	6.80	NP	NP	10.54
		10-20-89	7.08	NP	NP	10.26
		11-22-89	6.82	NP	NP	10.52
		12-11-89	6.37	NP	NP	10.97
		02-13-90	5.49	NP	NP	11.85
		03-13-90	5.44	NP	NP	11.90
		04-18-90	6.14	NP	NP	11.20
		05-23-90	6.22	NP	NP	11.12
		06-14-90	5.92	NP	NP	11.42
		08-21-90	6.83	NP	NP	10.51
		09-19-90	7.07	NP	NP	10.27
MW-5	16.71	01-17-89	5.39	NP	NP	11.32
		01-24-89	5.51	NP	NP	11.20
		06-01-89	5.83	NP	Sheen	10.88
		09-18-89	6.52	NP	NP	10.19
		10-20-89	6.72	NP	NP	9.99
		11-22-89	6.54	NP	NP	10.17
		12-11-89	6.21	NP	NP	10.50
		02-13-90	5.60	NP	NP	11.11

Table 2. Groundwater Elevations and Product Thickness Measurements (continued)

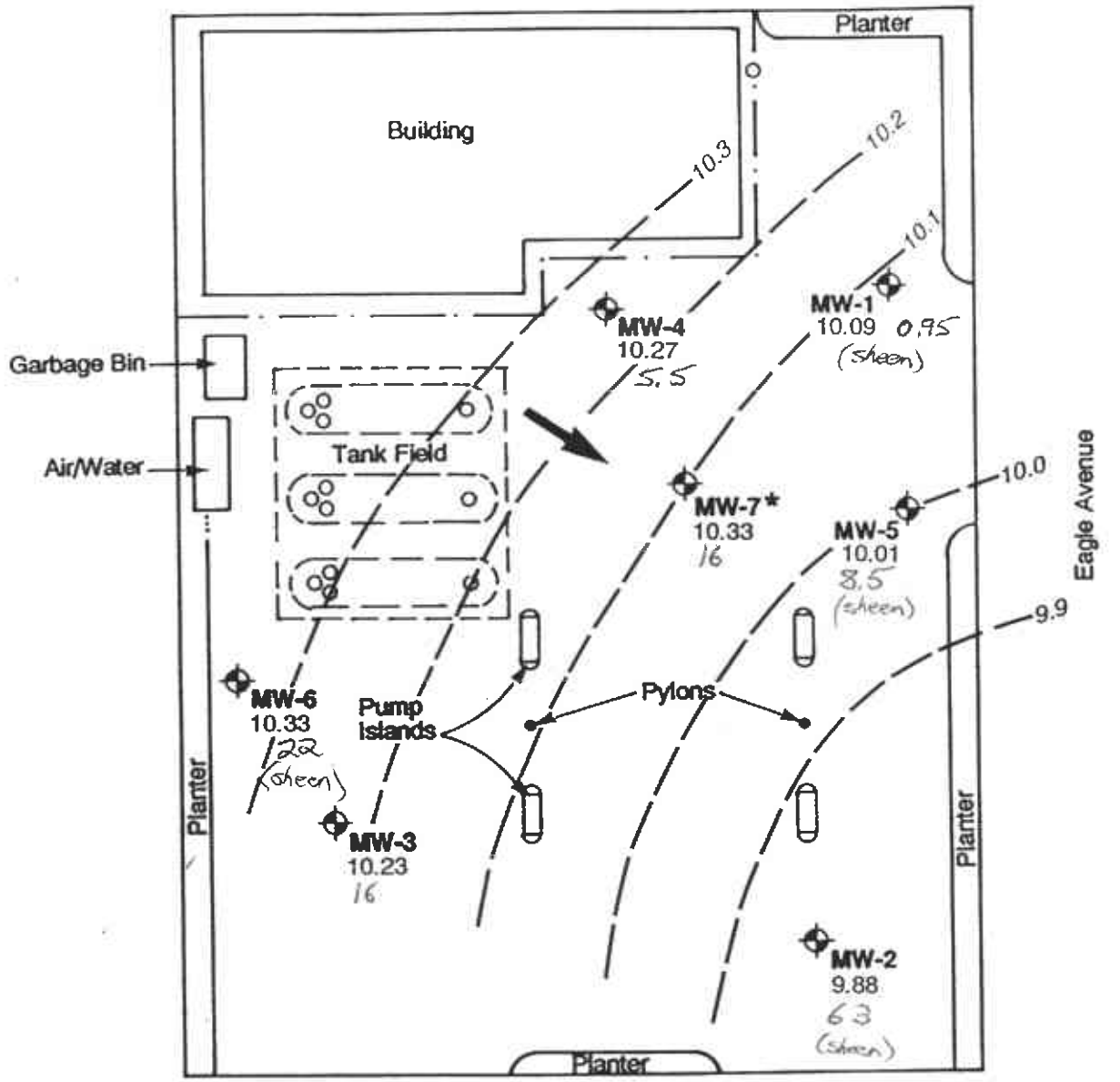
Well Number	Elevation Top of Well Casing[1]	Date	Depth to Water BTOC[2] (feet)	Depth to Product BTOC (feet)	Product Thickness (feet)	Potentiometric Surface Elevation (feet above MSL)
		03-13-90	5.54	NP	NP	11.17
		04-18-90	5.75	NP	NP	10.76
		05-23-90	5.98	NP	NP	10.73
		06-14-90	5.81	NP	NP	10.90
		08-21-90	6.51	NP	NP	10.20
		09-19-90	6.70	NP	NP	10.01
MW-6	17.56	01-17-89	5.59	NP	NP	11.97
		01-24-89	5.27	NP	NP	12.29
		06-01-89	6.25	NP	Sheen	11.31
		09-18-89	6.95	NP	NP	10.61
		10-20-89	7.24	NP	NP	10.32
		11-22-89	7.05	NP	NP	10.51
		12-11-89	6.63	NP	NP	10.93
		02-13-90	5.70	NP	NP	11.86
		03-13-90	5.63	NP	NP	11.93
		04-18-90	6.26	NP	NP	11.30
		05-23-90	6.42	NP	NP	11.14
		06-14-90	6.19	NP	NP	11.37
		08-21-90	7.01	NP	NP	10.55
		09-19-90	7.23	NP	NP	10.33
MW-7	17.12	02-13-90	4.98	NP	NP	12.14
		03-13-90	4.94	NP	NP	12.18
		05-23-90	5.87	NP	NP	11.25
		06-14-90	5.55	NP	NP	11.57
		09-19-90	6.79	NP	NP	10.33

1 Elevations surveyed to mean sea level.

2 BTOC - Below top of casing.

3 NP: No product.

19758



EXPLANATION

Park Street

MW-1 ⊕ Monitoring Well Location

10.33 Potentiometric Surface Elevation in Feet Above Mean Sea Level

10.2 Potentiometric Surface Elevation Contour

Approximate Direction of Local Ground-Water Flow

* Elevation not used for contouring

N

0 20 40

APPROXIMATE SCALE IN FEET

HLA Harding Lawson Associates
Engineering and Environmental Services

Generalized Potentiometric Surface Contour Map - September 19, 1990
Phase III Evaluation of Petroleum Hydrocarbons
Exxon Station #7-0104
Alameda, California

PLATE 1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
CVD	04167,326.02	SMW	10/90		

Harding Lawson Associates
Engineers and Geoscientists

GROUND-WATER SAMPLING FORM

Job Name: EXXON ALAMEDA
Job Number: 4167,309.02
Recorded by: (Signature)

Well No.: MW-1
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date: 9/19/90 Time: 14:14
Sampled by: TSN JWA (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): 20.5'
Water Level Depth (WL in feet BTOC): 7.26'
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

(20.5' TD (feet) - 7.26' WL (feet)) x (4)² D (inches) x 3 # Vols X 0.0408 = 26 gallons Calculated Purge Volume

PURGE TIME

13:45 Start 14:06 Stop 21 MIN Elapsed

PURGE RATE

Initial 1.5 gpm Final 1.0 gpm

ACTUAL PURGE VOLUME

20 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other TURB
0 Gallons	6.7	600	25	>100
10 "	6.8	600	25.5	33
15 "	6.8	600	26	32
20 "	7.0	575	26.5	22
~~25 "~~				

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
~~26 Gallons~~				

Meter Nos. pH #5226, Cond #1971, Turb #8804 03249

Observations During Purging (Well Condition, Turbidity, Color, Odor): Sl. Gasoline odor, Sl. Turbid → Clear
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 Gallon Drum Onsite

WELL SAMPLING

SAMPLING METHOD

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

☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLE DISTRIBUTION

Sample Series: 9009

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1901	3 VOA's	TPH(gas) & BTEX	None	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

GROUND-WATER SAMPLING FORM

Well No. MW-2
Well Type: ☑ Monitor ☐ Extraction ☐ Other
Well Material: ☑ PVC ☐ St. Steel ☐ Other
Date 9/19/90 Time 17:25
Sampled by TSN (Initials)

Job Name EXXON ALAMEDA
Job Number 4167.326.02
Recorded by Thomas S Nott (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): 16.0
Water Level Depth (WL in feet BTOC): 6.84
Number of Well Volumes to be purged (# Vols)
☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☑ Bailer - Type: PVC
☐ 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

$(16.0 \text{ TD (feet)} - 6.84 \text{ WL (feet)}) \times 4^2 \text{ D (inches)} \times 3 \text{ \# Vols} \times 0.0408 = 18$ gallons Calculated Purge Volume

PURGE TIME

_____ Start _____ Stop _____ Elapsed

PURGE RATE

Initial _____ gpm Final _____ gpm

ACTUAL PURGE VOLUME

18 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other Turb
Initial	6.6	600	23°	55 ntu
5 gal.	6.8	700	24°	87 ntu
10 gal	6.6	700	24°	>100 ntu
15 gal	6.9	700	24°	>100 ntu
18 gal	7.0	700	23°	>100

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	pH# 5226; Cond# 14768; Turb# EE0403249			

Observations During Purging (Well Condition, Turbidity, Color, Odor): sheen on water, strong HC odor
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☑ Other in drum, onsite

WELL SAMPLING

SAMPLING METHOD

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

SAMPLE DISTRIBUTION

Sample Series: 9009

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1906	3 40Ac	BTEX, TPH-Gas	none	NET PAC	

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

GROUND-WATER SAMPLING FORM

Well No. MW-3
Well Type: ☑ Monitor ☐ Extraction ☐ Other
Well Material: ☑ PVC ☐ St. Steel ☐ Other
Job Name EXXON ALAMEDA
Job Number 4167.326.02
Date 9/19/20 Time 16:20
Recorded by Thomas Nett (Signature)
Sampled by TSN (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): 14.2
Water Level Depth (WL in feet BTOC): 6.88
Number of Well Volumes to be purged (# Vols)
☑ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☒ Bailer - Type: PVC
☐ 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

(14.2 TD (feet) − 6.88 WL (feet)) X 4 D (inches)^2 X 3 # Vols X 0.0408 = 14.3 Calculated Purge Volume gallons

PURGE TIME

Start Stop Elapsed

PURGE RATE

Initial gpm Final gpm

ACTUAL PURGE VOLUME

15.0 gallons

FIELD PARAMETER MEASUREMENT

~~Minutes~~ Since Pumping Began	pH	Cond. (µmhos/cm)	T ☑ °C ☐ °F	Other Turb.
Initial	6.6	650	26°	32 NTU
5 gal.	6.5	700	26°	>100
10 gal	6.6	650	26°	>100
15 gal	6.7	600	26°	>100

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	pH# 5226; Cond# 14766; Turb# 88X403249			

Observations During Purging (Well Condition, Turbidity, Color, Odor): gasoline odor
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☑ Other IN DRUM - ONSITE

WELL SAMPLING

SAMPLING METHOD

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

SAMPLE DISTRIBUTION

Sample Series: 9009

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
19004	3 VOAs	TPH(Gas) & BTEX	NONE	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

GROUND-WATER SAMPLING FORM

Job Name: EXXON / ALAMEDA
Job Number: 04167.002
Recorded by: [signature] (Signature)

Well No.: MW-4
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date: 9/19/1990 Time: 16:37
Sampled by: JWA (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): 18'
Water Level Depth (WL in feet BTOC): 7.07'
Number of Well Volumes to be purged (# Vols)
☒ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☒ Bailer - Type: PVC (2")
☐ 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' TD (feet) - 7.07' WL (feet)) x (4) D (inches)^2 x 3 # Vols X 0.0408 = 21.4 Calculated Purge Volume gallons

PURGE TIME
15:45 Start 16:30 Stop 45 MIN Elapsed

PURGE RATE
Initial — gpm Final — gpm

ACTUAL PURGE VOLUME
22 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒°C ☐°F	Other TURB
0 GALLONS	6.6	600	25	23
10 "	6.7	550	24	48
15 "	6.7	500	23	67
20 "	6.7	500	23	>100
21.40 "	6.8	495	23.5	>100

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

Meter Nos. COND# 1476E, pH# 5226, TURB# 880403249

Observations During Purging (Well Condition, Turbidity, Color, Odor): CLEAR - SL. TURBID; GAS ODOR → ODORLESS

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

WELL SAMPLING

SAMPLING METHOD

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

☐ Same As Above
☐ Grab - Type:
☐ Other - Type:

SAMPLE DISTRIBUTION Sample Series: 9009

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1905	3 VOA's	TPH(GAS)/BTEX	NONE	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

GROUND-WATER SAMPLING FORM

Well No. MW-5
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 9/19/1990 Time 14:50
Sampled by JWA TSN (Initials)

Job Name EXXON / ALAMEDA
Job Number 04167.326.02
Recorded by [signature] (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): 6.70'
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

(19' TD (feet) − 6.70' WL (feet)) X (4) D (inches)^2 X 3 # Vols X 0.0408 = 24 Calculated Purge Volume gallons

PURGE TIME

14:19 Start 14:41 Stop 22 MIN Elapsed

PURGE RATE

Initial 13.0 gpm Final 10.0 gpm

ACTUAL PURGE VOLUME

24 gallons

FIELD PARAMETER MEASUREMENT

~~Minutes~~ Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other TURB
0 GALLONS	6.7	700	25.5	>100
10 "	6.7	700	26.5	78
15 "	6.7	700	26.5	92
20 "	6.9	700	27.5	>100
24 "	6.9	700	27	81

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

Meter Nos. COND # 14 K-E; TURB # E8C403249; pH # 52X

Observations During Purging (Well Condition, Turbidity, Color, Odor): TURBID − ~CLEAR / Sl. GASOLINE 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: 9009

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1902	3 VOA's	TPH(GAS) & BTEX	NONE	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

GROUND-WATER SAMPLING FORM

Job Name: Exxon / Alameda
Job Number: 04167.326.02
Recorded by: [signature] (Signature)

Well No.: MW-6
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date: 9/19/1990 Time: 15:33
Sampled by: JWA TSN (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): 18.6'
Water Level Depth (WL in feet BTOC): 7.23'
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

$$\left(18.6 - 7.23\right) \times (4)^2 \times 3 \times 0.0408 = 22.3 \text{ gallons}$$

TD (feet), WL (feet), D (inches), # Vols, Calculated Purge Volume

PURGE TIME

15:00 Start 15:25 Stop 25 MIN Elapsed

PURGE RATE

Initial 22.0 gpm Final 23.0 gpm

ACTUAL PURGE VOLUME

24 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☒ °C ☐ °F	Other TURB
0 Gallons	6.7	575	27.5	58
10 "	6.6	575	25	69
15 "	6.6	575	25	53
20 "	6.6	550	24	93
22.3 "	6.6	550	24	7100

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

Meter Nos.: Turb # 880403249; pH # 5226; Cond. # 14768

Observations During Purging (Well Condition, Turbidity, Color, Odor): Sl - Turbid, Gasoline Odor
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 Gallon Drum - Onsite

WELL SAMPLING

SAMPLING METHOD

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

SAMPLE DISTRIBUTION

Sample Series: 9009

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1903	3 - VOA's	TPH(gas) & BTEX	None	NET Pacific	

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

GROUND-WATER SAMPLING FORM

Well No. MW-7
Well Type: [X] Monitor [ ] Extraction [ ] Other
Well Material: [X] PVC [ ] St. Steel [ ] Other
Date 9/19/1990 Time 17:27
Sampled by JWA (Initials)

Job Name EXXON / ALAMEDA
Job Number 04167,326.02
Recorded by James W. Carden (Signature)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
[ ] 2-inch [X] 4-inch [ ] 6-inch [ ] Other
Total Depth of Casing (TD in feet BTOC): 17'
Water Level Depth (WL in feet BTOC): 6.79'
Number of Well Volumes to be purged (# Vols)
[X] 3 [ ] 4 [ ] 5 [ ] 10 [ ] Other

PURGE METHOD

[X] Bailer - Type: PVC (2")
[ ] 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

(17.0' [TD (feet)] − 6.79' [WL (feet)]) x (4)² [D (inches)] x 3 [# Vols] X 0.0408 = 20 gallons [Calculated Purge Volume]

PURGE TIME

16:50 Start 17:19 Stop 29 min Elapsed

PURGE RATE

Initial — gpm Final — gpm

ACTUAL PURGE VOLUME

20 gallons

FIELD PARAMETER MEASUREMENT

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T [X] °C [ ] °F	Other TURB
0 GALLONS	6.6	575	24	14
10 "	6.6	575	24	>100
15 "	6.6	575	24.5	>100
20 "	6.7	575	24.5	>100

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T [ ] °C [ ] °F	Other

Meter Nos. TURB# 880403249; COND# 1976S; pH# 5226

Observations During Purging (Well Condition, Turbidity, Color, Odor): CLEAR W/GAS ODOR → TURBID W/SL. ODOR

Discharge Water Disposal: [ ] Sanitary Sewer [ ] Storm Sewer [X] Other 55 GAL DRUM - ONSITE

WELL SAMPLING

SAMPLING METHOD

[X] Bailer - Type: STAINLESS STEEL
[ ] Submersible [ ] Centrifugal [ ] Bladder; Pump No.:
[ ] Same As Above
[ ] Grab - Type:
[ ] Other - Type:

SAMPLE DISTRIBUTION Sample Series: 9009

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
1907	3 VOAs	TPH (GAS) & BTEX	NONE	NET	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

NATIONAL ENVIRONMENTAL TESTING, INC.

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

OCT 90 9:44

Michelle Watson
Harding Lawson Associates
200 Rush Landing
Novato, CA 94947

Date: 10-04-90
NET Client Acct No: 281
NET Pacific Log No: 3918
Received: 09-19-90 1942

Client Reference Information

Exxon Alameda, Job: 4167,326.02

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

Approved by:

Jules Skamarack
Laboratory Manager

JS:rct
Enclosure(s)

Client No: 281 Date: 10-04-90
Client Name: Harding Lawson Associates
NET Log No: 3918 Page: 2

Ref: Exxon Alameda, Job: 4167,326.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 90091901 09-19-90 1414 63273	 90091902 09-19-90 1450 63274	Units
PETROLEUM HYDROCARBONS			--	--	
VOLATILE (WATER)			--	--	
DILUTION FACTOR *			1	50	
DATE ANALYZED			09-28-90	09-29-90	
METHOD GC FID/5030			--	--	
as Gasoline		0.05	0.95	8.5	mg/L
METHOD 602			--	--	
DILUTION FACTOR *			1	50	
DATE ANALYZED			09-28-90	09-29-90	
Benzene		0.5	290	1,800	ug/L
Ethylbenzene		0.5	ND	120	ug/L
Toluene		0.5	2.9	85	ug/L
Xylenes, total		0.5	27	460	ug/L

Client No: 281
Client Name: Harding Lawson Associates
NET Log No: 3918

Date: 10-04-90

Ref: Exxon Alameda, Job: 4167,326.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 90091903 09-19-90 1533 63275	 90091904 09-19-90 1620 63276	Units
PETROLEUM HYDROCARBONS			--	--	
VOLATILE (WATER)			--	--	
DILUTION FACTOR *			50	50	
DATE ANALYZED			09-29-90	09-29-90	
METHOD GC FID/5030			--	--	
as Gasoline		0.05	22	16	mg/L
METHOD 602			--	--	
DILUTION FACTOR *			50	50	
DATE ANALYZED			09-29-90	09-29-90	
Benzene		0.5	4,200	5,000	ug/L
Ethylbenzene		0.5	1,400	1,500	ug/L
Toluene		0.5	300	65	ug/L
Xylenes, total		0.5	3,400	450	ug/L

Client No: 281 Date: 10-04-90
Client Name: Harding Lawson Associates
NET Log No: 3918 Page: 5

Ref: Exxon Alameda, Job: 4167,326.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 90091907 09-19-90 1727 63279	 90091908 09-19-90 1800 63280	Units
PETROLEUM HYDROCARBONS			--	--	
VOLATILE (WATER)			--	--	
DILUTION FACTOR *			50	1	
DATE ANALYZED			09-29-90	09-28-90	
METHOD GC FID/5030			--	--	
as Gasoline		0.05	16	ND	mg/L
METHOD 602			--	--	
DILUTION FACTOR *			50	1	
DATE ANALYZED			09-29-90	09-28-90	
Benzene		0.5	2,800	0.8	ug/L
Ethylbenzene		0.5	2,500	0.6	ug/L
Toluene		0.5	95	ND	ug/L
Xylenes, total		0.5	1,700	1.0	ug/L

Client No: 281
Client Name: Harding Lawson Associates
NET Log No: 3918

Date: 10-04-90

Ref: Exxon Alameda, Job: 4167,326.02

Parameter	Method	Reporting Limit	Descriptor, Lab No. and Results 90091905 09-19-90 1637 63277	 90091906 09-19-90 1725 63278	Units
PETROLEUM HYDROCARBONS			--	--	
VOLATILE (WATER)			--	--	
DILUTION FACTOR *			50	100	
DATE ANALYZED			09-29-90	09-28-90	
METHOD GC FID/5030			--	--	
as Gasoline		0.05	5.5	63	mg/L
METHOD 602			--	--	
DILUTION FACTOR *			50	100	
DATE ANALYZED			09-29-90	09-28-90	
Benzene		0.5	450	670	ug/L
Ethylbenzene		0.5	170	390	ug/L
Toluene		0.5	220	180	ug/L
Xylenes, total		0.5	650	1,000	ug/L

Ref: Exxon Alameda, Job: 4167,326.02

QUALITY CONTROL DATA

Parameter	Reporting Limits	Units	Cal Verf Stand % Recovery	Blank Data	Spike % Recovery	Duplicate Spike % Recovery	RPD
Gasoline	0.05	mg/L	91	ND	97	99	2.0
Toluene	0.5	ug/L	92	ND	106	108	1.9
Benzene	0.5	ug/L	92	ND	132	133	< 1

COMMENT: Blank Results were ND on other analytes tested.

Gasoline	0.05	mg/L	108	ND	82	96	15.7
Benzene	0.5	ug/L	98	ND	71	87	20.3
Toluene	0.5	ug/L	103	ND	82	91	10.4

COMMENT: Blank Results were ND on other analytes tested.

KEY TO ABBREVIATIONS and METHOD REFERENCES

<	:	Less than; When appearing in results column indicates analyte not detected at the value following, which supercedes the listed reporting limit.
mean	:	Average; sum of measurements divided by number of measurements.
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.
mL/L/hr	:	Milliliters per liter per hour.
MPN/100 mL	:	Most probable number of bacteria per one hundred milliliters of sample.
N/A	:	Not applicable.
NA	:	Not analyzed.
ND	:	Not detected; the analyte concentration is less than applicable listed reporting limit.
NTU	:	Nephelometric turbidity units.
RPD	:	Relative percent difference, 100 [Value 1 - Value 2]/mean value.
SNA	:	Standard not available.
ug/Kg (ppb)	:	Concentration in units of micrograms of analyte per kilogram of sample, wet-weight basis (parts per billion).
ug/L	:	Concentration in units of micrograms of analyte per liter of sample.
umhos/cm	:	Micromhos per centimeter.

Method References

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

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

* Reporting Limits are a function of the dilution factor for any given sample. To obtain the actual reporting limits for this sample, multiply the stated reporting limits by the dilution factor.

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Novato, California 94948
415/892-0821
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CHAIN OF CUSTODY FORM

3918

Lab: NET PACIFIC

Samplers: JWA
TSN

Job Number: 4167.326.02

Name/Location: EXXON ALAMEDA

Project Manager: MICHELLE WATSON

Recorder: _____ (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 (BTE)	Total Petrol. Hydrocarb. (LUFT)
23	X				3			9	0	09 1901	90	09	19	1414							X	X
23	X				3			9	0	09 1902	90	09	19	1450							X	X
23	X				3			9	0	09 1903	90	09	19	1533							X	X
23	X				3			9	0	09 1904	90	09	19	1620							X	X
23	X				3			9	0	09 1905	90	09	19	1637							X	X
23	X				3			9	0	09 1906	90	09	19	1725							X	X
23	X				3			9	0	09 1907	90	09	19	1727							X	X
23	X				2			9	0	09 1908	90	09	19	1800							X	X

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

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature) Thomas S Nett	DATE/TIME 9/19/90 17:50
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) Thomas S Nett 9/19/90 7:42	RECEIVED FOR LAB BY: (Signature) Tammy Lopez	DATE/TIME 9/19/90 7:42 pm
METHOD OF SHIPMENT		

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

6533