PORT OF OAKLAND

ENVIRONMENTAL PROTECTION
99 SEP 21 PM 2:51

R0414

September 17, 1999

Mr. Barney Chan
Alameda County Health Care Services Agency
Environmental Protection Division
1131 Harbor Bay Parkway, #250
Alameda, CA 94502-6577

1049

SUBJECT: QUARTERLY GROUNDWATER MONITORING REPORT - FORMER TANK NUMBERS MF-25 AND MF-26, METROPOLITAN OAKLAND INTERNATIONAL AIRPORT, UNITED AIRLINES HANGAR AREA - ECONOMY PARKING LOT SITE, 1100 AIRPORT DRIVE, OAKLAND, CALIFORNIA

Dear Mr. Chan:

Enclosed is a copy of the September 17, 1999 "*Quarterly Groundwater Monitoring Report, July 1, through September 30, 1999, United Airlines Hangar - Economy Parking Lot Site, Metropolitan Oakland International Airport (MOIA)*", 1100 Airport Drive, Oakland, California. Monitoring activities were performed by Harding Lawson Associates, (HLA), one of the as-needed consultants retained by the Port of Oakland (Port).

Should you have any questions or need additional information, please contact me at 272-1118. Thank you for your on-going assistance and support on this project.

Sincerely,

Dale Klettke

Dale Klettke, CHMM
Associate Environmental Scientist
Environmental Health & Safety Compliance

enclosure

c: Neil Werner - EH & SC (w/o enc)
Files - EH & SC (w/o enc)
Michael Sides - HLA (w/o enc)
c:\msoffice\winword\028691bc.999

- D.O. low except in MW-1 ?
- Redox neg in MW2&3 ?
- HVOCs present, possibly from upgradient.
- ultimately can close w/Oakland RBCA – how do you handle HVOCs is this OK w/ the Water Board?

530 Water Street ■ Jack London Square ■ P.O. Box 2064 ■ Oakland, California 94604-2064
Telephone (510) 272-1100 ■ Fax (510) 272-1172 ■ TDD (510) 763-5703 ■ Cable address, PORTOFOAK, Oakland

September 17, 1999

43145.4

Mr. Dale H. Klettke, CHMM
Port of Oakland
Environmental Health & Safety Compliance
530 Water Street, 2nd Floor
Oakland, California 94607

Quarterly Groundwater Monitoring Report
July 1 through September 30, 1999
United Airlines Hangar Area – Economy Parking Lot Site
Metropolitan Oakland International Airport
Oakland, California

Dear Mr. Klettke:

Harding Lawson Associates (HLA) presents this groundwater monitoring report summarizing groundwater conditions observed during the third quarter of 1999 in eight monitoring wells at the United Airlines Hangar Area - Economy Parking Lot Site, Metropolitan Oakland International Airport (MOIA), Oakland, California (Plate 1). This report is the fourth of eight quarterly groundwater monitoring events that HLA will perform for the Port of Oakland in accordance with the *Work Plan for Installation of Oxygen Releasing Compound (ORC)*, dated December 18, 1999.

BACKGROUND

In March 1992, two underground storage tanks (USTs) MF-25 and MF-26 were removed. Approximately 700 cubic yards of impacted soil was removed and confirmation soil samples were collected following soil removal. The former UST excavation (approximately 80-feet by 80-feet) was reportedly backfilled with permeable material. The area is now paved and used for parking (Plate 2). Monitoring well MW-1 was installed in 1992 where total petroleum hydrocarbons as diesel (TPHd) and petroleum hydrocarbons as motor oil (TPHmo) were reported with elevated concentrations. Two additional monitoring wells, MW-2 and MW-3, were installed in 1995. Free product was observed in MW-2 and MW-3 in 1996 and 1997. Monitoring wells MW-4 though MW-8 were installed in 1998 and a sheen was observed on groundwater from MW-2 and MW-4.

A batch treatment of ORC was installed on December 23, 1998 after checking that no free product was present in the monitoring wells. A total of 780 pounds of time-release ORC was installed along the upgradient edge of the former UST excavation at 11 locations. A direct-push rig injected at total of 780 pounds of time-release ORC mixed into 60 gallons of water down 2-inch diameter rods to a depth of 4 to 8 feet below ground surface.

GROUNDWATER SAMPLING AND ANALYSIS

HLA measured dissolved oxygen (DO) concentrations in the eight monitoring wells on a monthly basis between July 1 and September 30, 1999. On August 17, HLA measured groundwater elevations and collected groundwater samples for chemical analyses. Prior to purging or sampling the monitoring wells, HLA measured DO concentrations, reduction oxidation potential (Redox), water levels, and checked for free product with an interface probe. HLA monitored the pH, conductivity, and temperature of the groundwater during purging. The monitoring wells were sampled after purging at least three well volumes of groundwater and after parameters had stabilized to within 10 percent; the groundwater sampling forms with the field data are included in Appendix A. Water samples were collected using a disposable Teflon bailer and all sampling equipment was decontaminated with a non-phosphate cleaning solution and rinsed with distilled water. HLA contained purged water in a 55-gallon drum for subsequent disposal by the Port of Oakland.

The water samples were placed in ice-chilled coolers and submitted to Sequoia Analytical of Walnut Creek, California under chain-of-custody protocol. The samples were analyzed for the following analytes:

- Total petroleum hydrocarbons as gasoline (TPHg) by EPA Test Method 8015 (modified)
- Benzene, toluene, ethylbenzene (BTEX) and methyl t-butyl ether (MTBE) by EPA Test Method 8020
- TPHd, TPHj(A), TPHmo by EPA Method 8015 with a silica gel cleanup procedure
- Purgeable halocarbons by EPA Method 8010
- Ferrous Iron, Ferric Iron, Nitrate, sulfate, orthophosphate
- Total organic carbon (TOC) by EPA Method 415.2
- Halogenated/Aromatic Volatile Organics by EPA Method 8010/8020

MONITORING RESULTS

No free product was observed in any of the eight monitoring wells and recent data indicate that ORC is reducing dissolved hydrocarbon concentrations. Groundwater elevations are presented in Table 1 and shown on Plate 3 with an apparent gradient towards the southwest. Chemical concentration results are shown in Tables 2, 3, and 4. DO concentrations are summarized in Table 5. The laboratory report and chain-of-custody forms are presented in Appendix B.

The ORC treatment appears to be stimulating the biological degradation of dissolved petroleum hydrocarbons in the vicinity of the former USTs, with the most significant improvement seen for TPHj which is the hydrocarbon range most commonly quantified by the laboratory for this site. At MW-4 (located within the former UST excavation), although TPHj remained relatively similar to last quarter's

results (1,900 and 2,000 micrograms per liter (µg/L)), there has been a 95-percent reduction (from 41,000 to the current 2,000 µg/L) during the 9 months since ORC application. TPHg has decreased adjacent to the former UST excavation at MW-1.

Successful ORC treatment is also supported by a comparison of monitoring parameters from before and after the ORC application. Elevated DO concentrations continue to be observed at MW-1, indicating that oxygen is still being released by ORC. In comparison, microbial activity appears to be stimulated at MW-4 where oxygen is being utilized as quickly as it is being released.

TPHg concentrations increased since last quarter in MW-2 from 4,700 to 17,000 µg/L. Although TPHj has decreased since the ORC application from 31,000 to 22,000 µg/L, a review of MW-2 historic data indicates relatively minor changes in dissolved hydrocarbon concentrations. In addition, MW-2 has consistently exhibited lower redox potential than MW-4, indicating that the area around MW-2 is very reduced and has not been influenced by the ORC last application. Based on these results, another ORC application may be warranted in the proximity of MW-2.

Chlorinated volatile organic compounds (VOCs) have been observed in all wells except downgradient wells MW-5 and MW-6. The highest chlorinated VOC concentrations have been observed at upgradient well MW-8 and adjacent to the former UST excavation at MW-2. Several VOCs have been detected at concentrations above the Maximum Contaminant Levels (MCLs).

CLOSURE

If you have any questions or need additional information, please contact the undersigned at (510) 451-1001.

Sincerely,

HARDING LAWSON ASSOCIATES

for

Heather Lee
Staff Engineer

Michael A. Sides
Civil Engineer

Table 1. Groundwater Elevations
United Airlines Hanger - Economy Parking Lot
Metropolitan Oakland International Airport

Well Name	Top of Casing Elevation (feet)	Date	Depth to Water (feet)	Groundwater Elevation (feet)	Product Thickness (feet)	Note
MW-1	6.91	15-May-92	3.10	3.81	--	1
		7-Aug-92	3.20	3.71	--	1
		24-Nov-92	4.04	2.87	--	1
		12-Feb-93	--	--	--	1
		11-Mar-93	2.09	4.82	--	1
		17-May-93	3.14	3.77	--	1
		3-Aug-93	3.15	3.76	--	1
		25-Nov-93	3.59	3.32	--	1
		24-Mar-94	3.21	3.70	--	1
		9-May-94	2.99	3.92	--	1
		29-Aug-94	3.34	3.57	--	1
		27-Sep-94	3.51	3.40	--	1
		25-Apr-95	2.38	4.53	--	1
		11-Aug-95	3.08	3.83	--	1
		3-Nov-95	3.52	3.39	--	1
		19-Jun-96	2.93	3.98	--	1
		24-Oct-96	3.52	3.39	--	1
		22-Jan-97	2.61	4.30	--	1
		25-Apr-97	2.77	4.14	--	1
		6-Aug-97	3.27	3.64	--	1
		23-Dec-97	3.14	3.77	--	1
		26-Mar-98	2.09	4.82	--	1
		13-May-98	--	--	--	2
		16-Dec-98	2.95	3.96	--	
		26-Feb-99	5.83	1.08	--	
		20-May-99	2.62	4.29	--	
		17-Aug-99	3.30	3.61	--	
MW-2	6.63	25-Apr-95	2.20	4.43	--	1
		11-Aug-95	3.11	3.52	--	1
		3-Nov-95	3.28	3.35	--	1
		19-Jun-96	2.53	4.14	0.05	1,3
		24-Oct-96	3.44	3.31	0.16	1,3
		22-Jan-97	2.45	4.20	0.02	1,3
		25-Apr-97	2.60	4.05	0.03	1,3
		30-Jul-97	--	--	0.14	1,4
		6-Aug-97	2.96	3.67	--	1
		23-Dec-97	2.85	3.97	0.25	1,3
		26-Mar-98	1.72	4.92	0.005	1,3
	6.58	13-May-98	1.80	4.78	--	2,5
		16-Dec-98	2.60	3.98	--	
		26-Feb-99	2.06	4.52	--	
		20-May-99	2.40	4.18	--	
		17-Aug-99	2.92	3.66	--	
MW-3	7.36	25-Apr-95	2.20	5.16	--	1
		11-Aug-95	3.11	4.25	--	1
		3-Nov-95	3.28	4.08	--	1
		19-Jun-96	2.53	4.14	0.05	1,3

Table 1. Groundwater Elevations
United Airlines Hanger - Economy Parking Lot
Metropolitan Oakland International Airport

Well Name	Top of Casing Elevation (feet)	Date	Depth to Water (feet)	Groundwater Elevation (feet)	Product Thickness (feet)	Note
MW-3		24-Oct-96	3.44	3.31	0.16	1,3
		22-Jan-97	2.45	4.20	0.02	1,3
		25-Apr-97	3.13	4.24	0.01	1,3
		30-Jul-97	NM	NM	0.03	1,4
		6-Aug-97	3.76	3.60	--	1
		23-Dec-97	3.48	3.88	--	1
		26-Mar-98	2.36	5.00	0.005	1,3
		13-May-98	--	--	--	2
		16-Dec-98	3.40	3.96	--	
		26-Feb-99	2.49	4.87	--	
		20-May-99	2.96	4.40	--	
		17-Aug-99	3.64	3.72	--	
MW-4	6.92	13-May-98	2.01	4.91	--	2
		16-Dec-98	2.84	4.08	--	
		26-Feb-99	1.94	4.98	--	
		20-May-99	2.47	4.45	--	
		17-Aug-99	3.10	3.82	--	
MW-5	5.79	13-May-98	1.05	4.74	--	2
		16-Dec-98	1.95	3.84	--	
		26-Feb-99	1.50	4.29	--	
		20-May-99	2.05	3.74	--	
		17-Aug-99	2.30	3.49	--	
MW-6	6.39	13-May-98	1.91	4.48	--	2
		16-Dec-98	2.64	3.75	--	
		26-Feb-99	1.89	4.50	--	
		20-May-99	2.65	3.74	--	
		17-Aug-99	3.03	3.36	--	
MW-7	5.86	13-May-98	1.51	4.35	--	2
		16-Dec-98	2.13	3.73	--	
		26-Feb-99	1.58	4.28	--	
		20-May-99	2.23	3.63	--	
		17-Aug-99	2.57	3.29	--	
MW-8	7.56	13-May-98	2.46	5.10	--	2
		16-Dec-98	3.51	4.05	--	
		26-Feb-99	2.59	4.97	--	
		20-May-99	3.06	4.50	--	
		17-Aug-99	3.75	3.81	--	

Notes
1 - Data from Table 1-Results of Groundwater Sampling and Analysis, Port of Oakland, Oakland International Airport, United Airlines Hanger Area-Economy Parking Lot Site, by ITSI
2 - Data from Table 1of Results of Additional Site Investigation, Port of Oakland, Oakland International Airport, United Airlines Hanger Area-Economy Parking Lot Site, dated October 21, 1998 by ITSI
3 - GroundWater elevation calculated assuming a specific gravity of 0.75 for product.
4 - Free product removed from well during redevelopment (July 30, 1997).
5 - Well MW-2 was reconstructed in May 1998.

Table 2. Groundwater Analytical Results - Petroleum Hydrocarbos
United Airlines Hanger Economy Parking
Metropolitan Oakland International Airport

Monitoring Well ID	Date	Benzene (µg/L)	Toluene (µg/L)	Ethyl - benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	TPHg (µg/L)	TPH Diesel (C1-C-22) (µg/L)	TPH Jet Fuel A (C9-C16) (µg/L)	TPH Motor Oil (>C16) (µg/L)	Unidentified Extractable Hydrocarbons (µg/L)	Note
MW-1	5/15/92	<0.4	<0.3	<0.3	<0.4	--	<50	--	--	--	--	1
	8/7/92	<0.4	<0.3	<0.3	<0.4	--	<50	--	800	--	--	1
	11/24/92	<0.4	<0.3	<0.3	<0.4	--	<50	--	<50	--	--	1
	2/12/93	<0.4	<0.3	<0.3	<0.4	--	<50	--	--	--	--	1
	5/17/93	<0.4	<0.3	<0.3	<0.4	--	<50	--	--	--	--	1
	8/3/93	<0.5	<0.5	<0.5	<0.5	--	<50	5200	--	--	--	1
	11/25/93	<0.5	<0.5	<0.5	0.6	--	70	--	--	--	--	1
	5/9/94	<0.5	<0.5	<0.5	<0.5	--	<50	--	--	--	--	1
	8/29/94	<0.5	<0.5	2.7	<0.5	--	<50	--	--	--	--	1
	4/25/95	<5	<5	<5	<5	--	<50	1,400	<50	610	--	1
	8/11/95	<0.4	<0.3	<0.3	<0.4	--	<50	1,900	<50	1,200	--	1
	11/3/95	0.4	0.4	<0.3	<0.4	--	<50	4,200	<50	1,800	--	1
	6/19/96	0.99	<0.5	1.1	<1.0	--	<50	11,000	<500	820	--	1
	10/24/96	1.9	<0.5	<0.5	1.3	--	57	<250	<500	<250	--	1
	1/22/97	<0.5	<0.5	<0.5	<1.0	--	<50	220	<500	<250	--	1
	4/25/97	1.2	<0.5	1.0	1.2	--	110	<50	<500	<250	--	1
	8/6/97	2.1	<0.5	<0.5	<1.0	--	100	340	<500	<250	--	1
	12/23/97	0.7	<0.5	<0.5	<1.0	--	<50	<50	<50	<300	--	1
	3/26/98	<0.5	<0.5	<0.5	<1.0	--	<50	<48	<48	<290	--	2
	12/16/98	1.8	<0.5	<0.5	<0.5	<2.5	120	640	<50	<250	340	--
	2/26/99	0.96	<0.5	<0.5	<0.5	2.6	69	670	<50	350	<50	4
	5/20/99	1.7	<0.5	<0.5	<0.5	<2.5	85	380	<50	<250	<50	--
	8/17/99	2.6	0.52	<0.5	<0.5	<2.5	54	530	<50	<500	--	--
MW-2	04/25/95	340	570	110	580	--	5,200	<10,000	13,000	19,000	--	1
	08/11/95	320	680	110	510	--	5,500	<8,000	7,900	20,000	--	1
	11/03/95	200	400	27	360	--	3,800	<11,000	11,000	4,200	--	1
	06/19/96	--[3]	--[3]	--[3]	--[3]	--	--[3]	--[3]	--[3]	--[3]	--	1
	10/24/96	--[3]	--[3]	--[3]	--[3]	--	--[3]	--[3]	--[3]	--[3]	--	1
	01/22/97	--[3]	--[3]	--[3]	--[3]	--	--[3]	--[3]	--[3]	--[3]	--	1
	04/25/97	--[3]	--[3]	--[3]	--[3]	--	--[3]	--[3]	--[3]	--[3]	--	1
	08/06/97	170	270	92	410	--	9,900	12,000	<1,000	2,300	--	1
	12/23/97	--[3]	--[3]	--[3]	--[3]	--	--[3]	--[3]	--[3]	--[3]	--	1
	03/26/98	--[3]	--[3]	--[3]	--[3]	--	--[3]	--[3]	--[3]	--[3]	--	1
	05/13/98	150	270	94	440	--	4,000	2,600	3,400	<290	--	2,3,4
	12/16/98	130	180	71	330	<50	4,600	<1,000	31,000	8,200	<1,000	--
	02/26/99	86	210	64	350	<100	4,700	<1,000	18,000	7,800	<1,000	--
	05/20/99	120	280	76	360	<2.5	4,700	<50	15,000	5,800	<50	--
	08/17/99	55	44	57	200	<2.5	17,000	<1000	22,000	<10000	--	--

ORC add.

could reduce

Table 2. Groundwater Analytical Results - Petroleum Hydrocarbos
United Airlines Hanger Economy Parking
Metropolitan Oakland International Airport

Monitoring Well ID	Date	Benzene (µg/L)	Toluene (µg/L)	Ethyl - benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	TPHg (µg/L)	TPH Diesel (C1-C-22) (µg/L)	TPH Jet Fuel A (C9-C16) (µg/L)	TPH Motor Oil (>C16) (µg/L)	Unidentified Extractable Hydrocarbons (µg/L)	Note
MW-3	04/25/95	150	600	100	580	--	7,200	<40000	38,000	31,000	--	1
	08/11/95	--	--	--	--	--	--	--	--	--	--	1,5
	11/03/95	--	--	--	--	--	--	--	--	--	--	1,5
	06/19/96	--	--	--	--	--	--	--	--	--	--	1,5
	10/24/96	--	--	--	--	--	--	--	--	--	--	1,5
	01/22/97	--	--	--	--	--	--	--	--	--	--	1,5
	04/25/97	--	--	--	--	--	--	--	--	--	--	1,5
	08/06/97	4	16	14	90	--	4,200	1,400	<500	<250	--	1,5
	12/23/97	13	16	9	116	--	2,200	79,000	110,000	8,200	--	1,5
	03/26/98	--	--	--	--	--	--	--	--	--	--	2,5
	12/16/98	<10	12	<10	43	<50	2,300	--	--	--	--	7
	2/26/99	16	16	10	40	<100	5,700	--	--	--	--	7
	5/20/99	20	25	7.8	37	<2.5	2,700	--	--	--	--	7
	8/17/99	14	<0.5	<0.5	15	<2.5	2,100	--	--	--	--	7
MW-4	05/13/98	9.8	23	13	79	--	1,400	2,000	2,300	<310	--	2,3,4
	12/16/98	<10	<10	<10	58	<50	1,900	<1,000	40,000	8,800	<1,000	--
(Dup)	12/16/98	<10	<10	<10	51	<50	1,700	<1,000	41,000	9,400	<1,000	--
	2/26/99	13	<10	<10	22	<50	1,200	<500	5,500	<2,500	<500	--
(Dup)	02/26/99	16	<2.5	6.2	20	<10	1,200	<500	5,200	<2,500	<500	--
	05/20/99	16	0.83	3.0	10	5.5	670	<50	1,900	560	<50	
(Dup)	05/20/99	15	0.78	3.0	11	5.4	1,100	<50	1,200	290	<50	
	08/17/99	22	<0.5	<0.5	<0.5	<2.5	1,000	<50	2,000	<500	<50	
(Dup)	08/17/99	24	3.10	3.2	16	<2.5	690	<50	1,700	<500	--	
MW-5	05/13/98	<0.5	<0.5	<0.5	<1.0	--	<50	<50	<50	<300	--	2
	12/16/98	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	260	--
	02/26/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	69	<50	<250	<50	--
	05/20/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	<50	
	08/17/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	79	<50	<500	--	
MW-6	05/13/98	<0.5	<0.5	<0.5	<1.0	--	<50	<48	<48	<290	--	2
	12/16/98	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	<50	--
	02/26/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	83	<50	<250	<50	--
	05/20/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	<50	
	08/17/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	72	<50	<500	--	
MW-7	05/13/98	<0.5	0.6	<0.5	<1.0	--	<50	<51	<51	<310	--	2
	12/16/98	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	<50	--
	02/26/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	<50	--
	05/20/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	<50	<50	<250	<50	
	08/17/99	<0.5	<0.5	<0.5	<0.5	<2.5	<50	52	<50	<500	--	

— not enough sample to run these w/ —

Table 2. Groundwater Analytical Results - Petroleum Hydrocarbos
United Airlines Hanger Economy Parking
Metropolitan Oakland International Airport

Monitoring Well ID	Date	Benzene (µg/L)	Toluene (µg/L)	Ethyl - benzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	TPHg (µg/L)	TPH Diesel (C1-C-22) (µg/L)	TPH Jet Fuel A (C9-C16) (µg/L)	TPH Motor Oil (>C16) (µg/L)	Unidentified Extractable Hydrocarbons (µg/L)	Note
MW-8	05/13/98	**2**	<0.5	<0.5	<1.0	–	<50	<47	<47	<280	–	2
	12/16/98	**4.1**	<0.5	<0.5	<0.5	**2.9**	**53**	<50	200	<250	<50	6
	2/26/99	**3.5**	<0.5	<0.5	<0.5	**2.7**	<50	<50	<50	<250	<50	6
	5/20/99	**2.8**	<0.5	<0.5	<0.5	<2.5	<50	**150**	<50	<250	<50	--
	8/17/99	**3.5**	<0.5	<0.5	<0.5	**2.9**	**51**	**190**	<50	<250	--	--
MCLs		1	150	700	1,750	--	--	--	--	--	--	--

Note:

1 - Data from Table 2-Summary of Laboratory Results Tanks MF25 and MF26 (United Airlines Hanger Area - Economy Parking Lot Site) Metropolitan Oakland International Airport (MOIA), 1100 Airport Drive, Oakland California by ITSI.

2 - Data from Table 3 of Results of Additional Site Investigation, Port of Oakland, Oakland Internatinonal Airport, United Airlines Hanger Area-Economy Parking Lot Site, dated October 21, 1998 by ITSI dated October 21, 1998 by ITSI

3 - Hydrocarbons for TPHd do not match profile for laboratory standards

4 - Hydrocarbons for TPHd are lighter than indicated standard

5 - Not analyzed due to the presence of free product

6 - MTBE detected by GC methods at slightly over reporting limit has not been confirmed by MS.

7 - 4 - MW-3 has slow recovery so not enough water could be collected for all analysis.

MCLs - Maximum Contaminant Levels

- Shaded areas indicate detected concentration exceeds MCL.

Table 3. Groundwater Analytical Results - VOCs
United Airlines Hanger Economy Parking
Metropolitan Oakland International Airport

Monitoring Well ID	Date	Acetone (µg/L)	2-Butanone (µg/L)	Chloroform (µg/L)	1,1-DCA (µg/L)	(cis/trans) 1,2-DCE (µg/L)	4-Methyl-2-Pentanone (µg/L)	1,1,1-TCA (µg/L)	TCE (µg/L)	PCE (µg/L)	Chloroethane (µg/L)	1,2-DCA (µg/L)	1,1-DCE (µg/L)	Vinyl Chloride (µg/L)	Notes
MW-1	11/24/92	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	1
	2/12/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	1
	5/17/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	1
	8/3/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	1
	11/25/93	ND	ND	ND	ND	**6.0**	ND	ND	ND	ND	--	--	--	--	1
	5/9/94	ND	ND	ND	ND	ND	ND	ND	ND	**5.5**	--	--	--	--	1
	9/27/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--	--	1
	1/25/95	<20	<20	<5	<5	<5	<20	--	--	<5	--	--	--	--	1
	8/11/95	--	--	<0.5	**4.3**	**13**	--	**2.0**	**1.8**	**0.6**	--	--	--	--	1
	11/3/95	--	--	<0.5	**1.3**	**3.7**	--	0.6	**0.5**	<0.5	--	--	--	--	1
	6/19/96	--	--	<0.5	**5.4**	<0.5	--	<0.5	**1.2**	<0.5	--	--	--	--	1
	10/24/96	--	--	<0.5	**12**	<1.0	--	<0.5	**1.4**	<0.5	--	--	--	--	1
	1/22/97	--	--	<0.5	**3.9**	**8.4**	--	<0.5	**1.7**	<0.5	--	--	--	--	1
	4/25/97	--	--	<0.5	**6.2**	**10**	--	<0.5	**1.2**	**0.62**	--	--	--	--	1
	8/6/97	--	--	<0.5	**14**	**19**	--	<0.5	**2.5**	**0.54**	--	--	--	--	1
	12/23/97	--	--	<1.0	**6.6**	**9.3**	--	<1.0	<1.0	<1.0	--	--	--	--	1
	3/26/98	--	--	<1.0	**5.3**	**8.1**	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	3
	12/16/98	--	--	<0.5	**20**	**18**	--	<0.5	<0.5	<0.5	<1.0	<0.5	**1.5**	<1.0	
	2/26/99	--	--	<0.5	**15**	**9.8**	--	**2.9**	<0.5	<0.5	<1.0	<0.5	**0.79**	<1.0	
	5/20/99	--	--	<0.5	**22**	**17**	--	<0.5	<0.5	<0.5	<1.0	<0.5	**1.5**	**1.2**	
	8/17/99	--	--	<0.5	**23**	**15**	--	<0.5	<0.5	<0.5	<1.0	<0.5	**2.1**	<1.0	
MW-2	4/25/95	<200	200	<50	**50**	<50	<200	--	--	<50	--	--	--	--	1
	8/11/95	--	--	**5.0**	**79**	**26**	--	**20**	**4.0**	**9.0**	--	--	--	--	1
	11/3/95	--	--	<0.5	**73**	**24**	--	**4.8**	**6.7**	**6.8**	--	--	--	--	1
	6/19/96	--	--	--	--	--	--	--	--	--	--	--	--	--	1,2
	10/24/96	--	--	--	--	--	--	--	--	--	--	--	--	--	1,2
	1/22/97	--	--	--	--	--	--	--	--	--	--	--	--	--	1,2
	4/25/97	--	--	--	--	--	--	--	--	--	--	--	--	--	1,2
	8/6/97	--	--	<5	**69**	**160**	--	<5	<12	<5	--	--	--	--	1
	12/23/97	--	--	--	--	--	--	--	--	--	--	--	--	--	1,2
	3/26/98	--	--	--	--	--	--	--	--	--	--	--	--	--	1,2
	5/13/98	--	--	--	**51**	**140**	--	--	ND	<1.0	**3.4**	<1.0	<1.0	<2.0	3
	12/16/98	--	--	<5.0	**58**	**220**	--	<2.5	<2.5	<2.5	<1.0	<2.5	<2.5	<5.0	
	2/26/99	--	--	<1.3	**19**	**57**	--	**2.9**	<1.3	<1.3	<2.5	<1.3	<1.3	<2.5	
	5/20/99	--	--	<0.5	**63**	**191.5**	--	**5.8**	**1.1**	**1.5**	**4.4**	<0.5	**0.82**	<1.0	
	8/17/99	--	--	<2.5	**70**	**140**	--	<2.5	<2.5	<2.5	<5.0	<2.5	<2.5	<5.0	
MW-3	4/25/95	**300**	**300**	--	**30**	<30	**200**	--	--	<30	--	--	--	--	1
	8/11/95	--	--	--	--	--	--	--	--	--	--	--	--	--	1,2
	11/3/95	--	--	--	--	--	--	--	--	--	--	--	--	--	1,2

Table 3. Groundwater Analytical Results - VOCs
United Airlines Hanger Economy Parking
Metropolitan Oakland International Airport

Monitoring Well ID	Date	Acetone (µg/L)	2-Butanone (µg/L)	Chloroform (µg/L)	1,1-DCA (µg/L)	(cis/trans) 1,2-DCE (µg/L)	4-Methyl-2-Pentanone (µg/L)	1,1,1-TCA (µg/L)	TCE (µg/L)	PCE (µg/L)	Chloroethane (µg/L)	1,2-DCA (µg/L)	1,1-DCE (µg/L)	Vinyl Chloride (µg/L)	Notes
	6/19/96	--	--	--	--	--	--	--	--	--	--	--	--	--	1,2
	10/24/96	--	--	--	--	--	--	--	--	--	--	--	--	--	1,2
	1/22/97	--	--	--	--	--	--	--	--	--	--	--	--	--	1,2
	4/25/97	--	--	--	--	--	--	--	--	--	--	--	--	--	1,2
	8/6/97	--	--	2.1	3.8	<0.5	--	<0.5	<1.2	0.62	--	--	--	--	1
	12/23/97	--	--	<1.0	4.2	<1.0	--	<1.0	<1.0	<1.0	--	--	--	--	1
	3/26/98	--	--	--	--	--	--	--	--	--	--	--	--	--	3,2
	12/16/98	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4
	2/26/99	--	--	<0.5	4.4	<0.5	--	1.6	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	--
	5/20/99	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4
	8/17/99	NA	NA	<0.5	3.6	<0.5	NA	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	--
MW-4	5/13/98	--	--	--	31	9.9	--	--	--	2.8	2.8	<1.0	<1.0	<2.0	3
	12/16/98	--	--	<0.5	53	17	--	<5.0	<0.5	0.94	6.8	<0.5	1.6	<1.0	--
(dup)	12/16/98	--	--	<0.5	52	14	--	<5.0	<0.5	0.88	4.4	<0.5	1.2	<1.0	--
	2/26/99	--	--	<0.5	39	28	--	1.4	<0.5	0.97	6.5	<0.5	<0.5	<1.0	--
(dup)	2/26/99	--	--	<0.5	43	36	--	1.7	<0.5	1.3	8.3	<0.5	2.8	<1.0	--
	5/20/99	--	--	<0.5	45	42.1	--	<0.5	0.54	1.7	8.9	<0.5	2.8	<1.0	--
(dup)	5/20/99	--	--	<0.5	48	39.4	--	3.9	0.59	1.9	8.6	<0.5	2.5	<1.0	--
	8/17/99	--	--	<0.5	37	22	--	<0.5	0.7	1.8	4.3	<0.5	2	<1.0	--
(dup)	8/17/99	--	--	<0.5	45	0.77	--	<0.5	5.5	2	13	<0.5	2.8	<1.0	--
MW-5	5/13/98	--	--	--	<1.0	<1.0	--	--	--	<1.0	<2.0	<1.0	<1.0	<2.0	3
	12/16/98	--	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	--
	2/26/99	--	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	--
	5/20/99	--	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	--
	8/17/99	--	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	--
MW-6	5/13/98	--	--	--	<1.0	<1.0	--	--	--	<1.0	<2.0	<1.0	<1.0	<2.0	3
	12/16/98	--	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	--
	2/26/99	--	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	--
	5/20/99	--	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	--
	8/17/99	--	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<1.0	<0.5	<0.5	<1.0	--
MW-7	5/13/98	--	--	--	8	<1.0	--	--	--	<1.0	<2.0	<1.0	3.4	<2.0	3
	12/16/98	--	--	<0.5	12	<0.5	--	<0.5	<0.5	<0.5	<1.0	<0.5	5.0	<1.0	--
	2/26/99	--	--	<0.5	15	<0.5	--	<0.5	<0.5	<0.5	<1.0	<0.5	6.8	<1.0	--
	5/20/99	--	--	<0.5	19	0.74	--	<0.5	<0.5	<0.5	<1.0	<0.5	7.3	<1.0	--
	8/17/99	--	--	<0.5	22	0.59	--	<0.5	<0.5	0.52	<1.0	<0.5	9.6	<1.0	--
MW-8	5/13/98	--	--	--	180	1.9	--	--	--	<1.0	<2.0	2.7	180	6.0	3
	12/16/98	--	--	<0.5	440	1.2	--	<0.5	<0.5	<0.5	<1.0	10	520	6.6	--
	2/26/99	--	--	<2.5	390	<2.5	--	<2.5	<2.5	<2.5	<5.0	6.9	490	10	--
	5/20/99	--	--	<0.5	410	1.2	--	<0.5	<0.5	<0.5	<1.0	8.3	480	3.9	--

Indicative of anticipated degradation?

Table 3. Groundwater Analytical Results - VOCs
United Airlines Hanger Economy Parking
Metropolitan Oakland International Airport

Monitoring Well ID	Date	Acetone (µg/L)	2-Butanone (µg/L)	Chloroform (µg/L)	1,1-DCA (µg/L)	(cis/trans) 1,2-DCE (µg/L)	4-Methyl-2-Pentanone (µg/L)	1,1,1-TCA (µg/L)	TCE (µg/L)	PCE (µg/L)	Chloroethane (µg/L)	1,2-DCA (µg/L)	1,1-DCE (µg/L)	Vinyl Chloride (µg/L)	Notes
MW-8	8/17/99	--	--	<2.5	500	<2.5	--	<2.5	<2.5	<2.5	<5	11	700	<5.0	--
MCLs (California/Fed)		--	--	--	5/-	6/70	--	--	5/5	5/5	--	0.5/5	6/7	0.5/2	

1 - Data from Table 3-Summary of Laboratory Results for Volatile Organic Compounds Tanks MF25 and MF26 (United Airlines Hanger Area - Economy Parking Lot Site) Metropolitan Oakland International Airport (MOIA), 1100 Airport Drive, Oakland California by ITSI.

2 - Not sampled due to the presence of free product in monitoring well.

3 - Data from Table 4 of Results of Additional Site Investigation, Port of Oakland, Oakland International Airport, United Airlines Hanger Area - Economy Parking Lot Site, dated October 21, 1998 by ITSI

4 - MW-3 has slow recovery so not enough water could be collected for all analysis.

MCLs - Maximum Contaminant Levels

- Shaded areas indicate detected concentration exceeds MCL.

Table 4. Groundwater Analytical Results - Inorganics
United Airlines Hanger Economy Parking
Metropolitan Oakland International Airport

Monitoring Well ID	Date	Ferrous Iron Fe^{+2} (mg/L)	Ferric Iron Fe^{+3} (mg/L)	Total Iron (mg/L)	Nitrate NO_3 (mg/L)	Sulfate (mg/L)	Ortho-phosphate PO_4 (mg/L)	TDS (mg/L)	TOC (mg/L)	Redox (millivolts)	Notes
MW-1	5/15/92	--	--	--	--	--	--	5,900	<5	--	1
	8/7/92	--	--	--	--	--	--	--	<5	--	1
	11/24/92	--	--	--	--	--	--	--	<5	--	1
	2/12/93	--	--	--	--	--	--	--	<5	--	1
	5/17/93	--	--	--	--	--	--	4,100	<5	--	1
	8/3/93	--	--	--	--	--	--	7,700	<5	--	1
	11/25/93	--	--	--	--	--	--	3,790	<5	--	1
	5/9/94	--	--	--	--	--	--	9,600	<0.93	--	1
	8/29/94	--	--	--	--	--	--	3,900	<1.0	--	1
	4/25/95	--	--	--	--	--	--	4,000	--	--	1
	8/11/95	--	--	--	--	--	--	8,500	--	--	1
	11/3/95	--	--	--	--	--	--	6,600	--	--	1
	6/19/96	--	--	--	--	--	--	3,040	--	--	1
	10/24/96	--	--	--	--	--	--	3,090	--	--	1
	1/22/97	--	--	--	--	--	--	4,240	--	--	1
	4/25/97	--	--	--	--	--	--	2,770	--	--	1
	8/6/97	--	--	--	--	--	--	2,430	--	--	1
	12/23/97	<0.2	3.9	--	<0.2	120	--	3,570	--	--	1
	3/26/98	0.41	2.1	--	<0.2	110	--	3,240	--	--	3
	12/16/98	--	--	3.3	<0.1	70	<0.5	--	32	40	--
	2/26/99	0.21	--	0.57	<0.1	110	1.1	--	30	147	--
	5/20/99	0.26	1.2	--	<0.1	97	1.5	--	22	96	--
	8/17/99	0.31	--	0.88	<0.1	100	1.3	--	74	151	--
MW-2	4/25/95	--	--	--	--	--	--	1,700	--	--	1
	8/11/95	--	--	--	--	--	--	2,500	--	--	1
	11/3/95	--	--	--	--	--	--	2,000	--	--	1
	6/19/96	--	--	--	--	--	--	--	--	--	1
	10/24/96	--	--	--	--	--	--	--	--	--	1
	1/22/97	--	--	--	--	--	--	--	--	--	1
	4/25/97	--	--	--	--	--	--	--	--	--	1
	8/6/97	--	--	--	--	--	--	--	--	--	1
	4/25/97	--	--	--	--	--	--	--	--	--	1
	12/23/97	--	--	--	--	--	--	--	--	--	1,2
	5/13/98	0.53	8.0	--	<0.05	12	0.72	3,240	--	123	3
	12/16/98	--	--	28	<0.1	21	<0.5	--	210	146	--

Table 4. Groundwater Analytical Results - Inorganics
United Airlines Hanger Economy Parking
Metropolitan Oakland International Airport

Monitoring Well ID	Date	Ferrous Iron Fe^{+2} (mg/L)	Ferric Iron Fe^{+3} (mg/L)	Total Iron (mg/L)	Nitrate NO_3 (mg/L)	Sulfate (mg/L)	Ortho-phosphate PO_4 (mg/L)	TDS (mg/L)	TOC (mg/L)	Redox (millivolts)	Notes
	2/26/99	17	--	36	<0.1	27	0.59	--	100	-235	--
	5/20/99	8.9	36	--	<0.1	2	<1.0	--	130	-124	--
	8/17/99	0.37	--	31	0.15	33	<0.5	--	210	-110	--
MW-3	4/25/95	--	--	--	--	--	--	5,600	--	--	1
	8/11/95	--	--	--	--	--	--	--	--	--	1
	11/3/95	--	--	--	--	--	--	--	--	--	1
	6/19/96	--	--	--	--	--	--	--	--	--	1
	10/24/96	--	--	--	--	--	--	--	--	--	1
	1/22/97	--	--	--	--	--	--	--	--	--	1
	4/25/97	--	--	--	--	--	--	--	--	--	1
	8/6/97	--	--	--	--	--	--	15,100	--	--	1
	4/25/97	--	--	--	--	--	--	13,900	--	--	1
	12/23/97	--	--	--	--	--	--	--	--	--	1
	3/26/98	--	--	--	--	--	--	--	--	--	3,2
	12/16/98	--	--	--	--	--	--	--	240	157	4
	2/26/99	--	--	--	--	--	--	--	100	-142	4
	5/20/99	--	--	--	--	--	--	--	84	-125	4
	8/17/99	--	--	--	--	--	--	--	290	-156	4
MW-4	5/13/98	0.53	2.9	--	<0.05	20	2.1	1,420	66	168	3
	12/16/98	--	--	13	<0.1	2.8	4.1	--	140	118	-
	12/16/98	--	--	11	<0.1	2.6	4.6	--	110	118	--
	2/26/99	<0.01	--	2.7	1.6	56	2.8	--	60	81	--
	2/26/99	<0.01	--	2.9	1.3	54	2.9	--	95	81	--
	5/20/99	<0.01	3.7	--	<0.1	44	3.3	--	36	89	--
	5/20/99	<0.01	2.9	--	0.22	56	2.2	--	39	208	--
	8/17/99	0.36	--	0.91	<0.1	13	2.4	--	110	208	--
	8/17/99	0.017	--	1.3	<0.1	14	2.4	--	130	208	--
MW-5	5/13/98	<0.2	0.7	--	0.36	250	0.47	2,300	20	150	3
	12/16/98	--	--	10	<0.1	340	0.57	--	32	46	--
	2/26/99	0.64	--	23	<0.1	260	1.2	--	22	230	--
	5/20/99	0.75	11	--	0.11	260	<1.0	--	15	209	--
	8/17/99	0.23	--	12	<0.1	350	<0.5	--	82	62	--
MW-6	5/13/98	<0.2	0.69	--	2.1	400	0.15	4,240	13	126	3
	12/16/98	--	--	26	0.45	400	0.65	--	22	47	--
	2/26/99	0.44	--	16	4.3	380	0.89	--	42	262	--

Table 4. Groundwater Analytical Results - Inorganics
United Airlines Hanger Economy Parking
Metropolitan Oakland International Airport

Monitoring Well ID	Date	Ferrous Iron Fe^{+2} (mg/L)	Ferric Iron Fe^{+3} (mg/L)	Total Iron (mg/L)	Nitrate NO_3 (mg/L)	Sulfate (mg/L)	Ortho-phosphate PO_4 (mg/L)	TDS (mg/L)	TOC (mg/L)	Redox (millivolts)	Notes
	5/20/99	1.2	8.7	--	7.5	300	<1.0	--	22	227	--
	8/17/99	3.7	--	18	2.1	470	0.64	--	92	251	--
MW-7	5/13/98	<0.2	0.62	--	0.9	100	<0.03	1,380	7	132	3
	12/16/98	--	--	19	6.9	100	0.53	--	7.7	159	--
	2/26/99	0.15	--	14	8.3	82	0.78	--	20	272	--
	5/20/99	0.89	13	--	4.3	160	<1.0	--	6.8	243	--
	8/17/99	0.52	--	12	3.4	160	0.68	--	38	200	--
MW-8	5/13/98	<0.2	2.2	--	<0.5	500	0.08	8,300	99	60.4	3
	12/16/98	--	--	37	<0.1	360	<0.5	--	2.4	83	--
	2/26/99	0.076	--	26	<0.1	290	0.69	--	63	280	--
	5/20/99	2	26	--	17	440	<1.0	--	21	196	--
	8/17/99	1.4	--	3.8	<0.2	580	<1.0	--	150	-62	--

Notes

1 - Data from Table 4-Summary of Laboratory Results for Inorganic Anaalytes Tanks MF25 and MF26 (United Airlines Hanger Area - Economy Parking Lot Site) Metropolitan Oakland International Airport (MOIA), 1100 Airport Drive, Oakland California by ITSI.

2 - Not sampled due to presence of free product in monitoring well.

3 - Data from Table 5 of Results of Additional Site Investigation, Port of Oakland, Oakland International Airport, United Airlines Hanger Area Economy Parking Lot Site, dated October 21, 1998

4 - MW-3 has slow recovery so not enough water could be collected for all analysis.

Table 5 - Dissolved Oxygen Concentrations
United Airlines Hanger Economy Parking
Metropolitan Oakland International Airport

	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6		MW-7		MW-8
16-Dec-98	2.0		1.2		0.5		1.2		2.0		1.1		2.4		0.8
23-Dec-98	ORC injected in former UST cavity.														
6-Jan-99	>15	1	1.1	2	0.9		>15	1,2	1.3		2.8		3.0		0.6
12-Jan-99	>15	1	0.8		1.0		8.0		0.7		2.4		3.2		0.7
22-Jan-99	>15	1	0.6		0.8		1.4		1.1		3.1		4.7		1.4
30-Jan-99	>15	1	0.6		1.6		1.0		1.6		4.8		2.6		2.8
26-Feb-99	>15		0.5		0.5		1.4		1.1		4.4		4.0		5.2
30-Mar-99	>15		0.5	2	0.8		1.0		1.2		1.1		4.2		1.6
20-May-99	>15		1.0	2	1.4	2	1.5		1.7		1.9		3.2		1.2
23-Jun-99	>15		0.5	2	0.4	2	0.6		0.6		1.0		0.8		0.6
26-Jul-99	>15		0.5	2	0.4	2	0.6		0.8		0.6		0.5		0.7
17-Aug-99	>15		0.3	2	0.45	2	0.5		0.2		0.3		0.8		0.6
12-Sep-99	>15		0.5	2	0.3	2	0.8		0.4		0.5		0.5		0.4

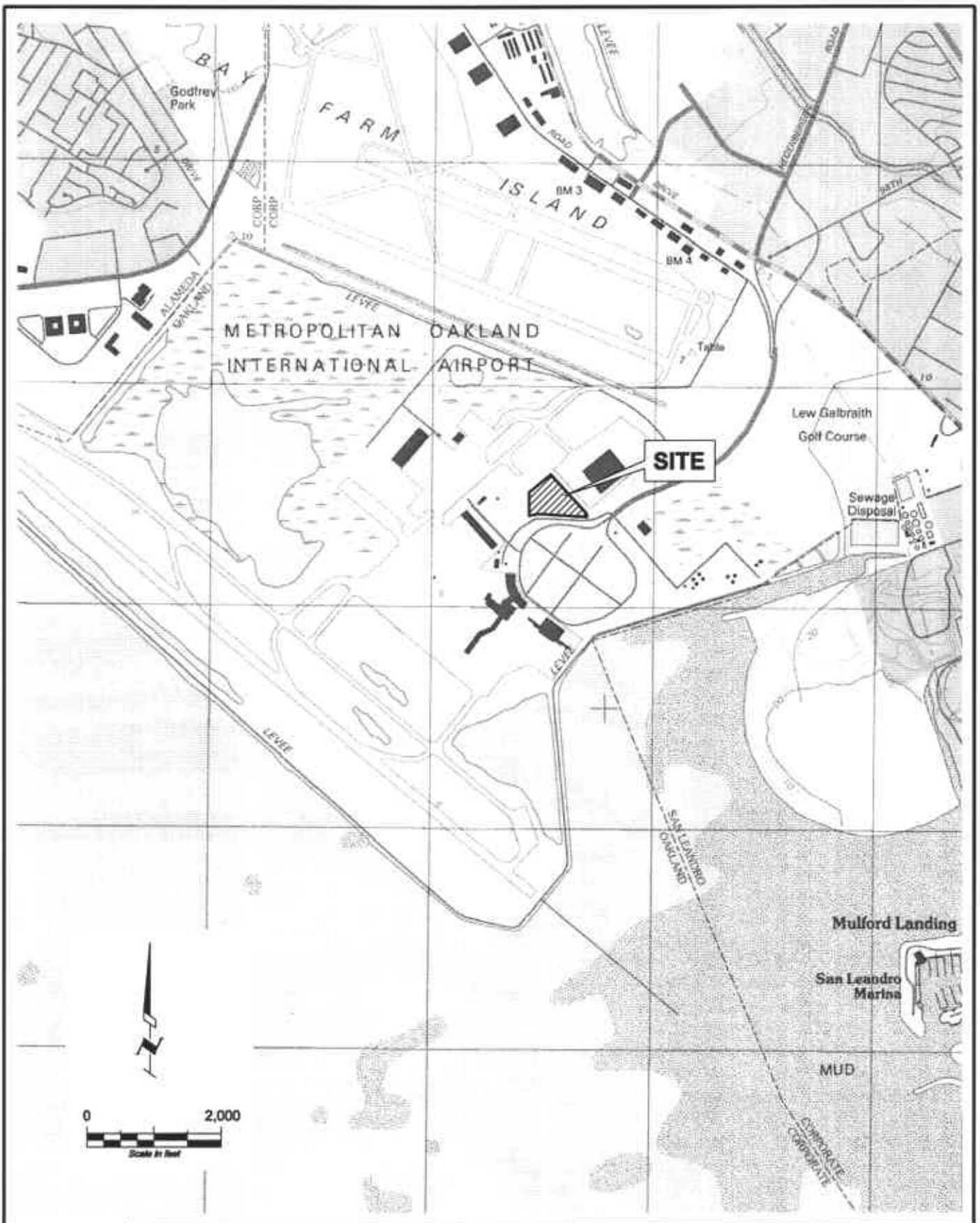
All concentrations are presented in milligrams per liter (mg/L)

Notes:

Satd. O_2. (Why is this well the only one w/ residual ORC?) This area is only slightly impacted.

1 Milky water; ORC is visibly present in well.

2 Diesel odor



econpark0899.dwg

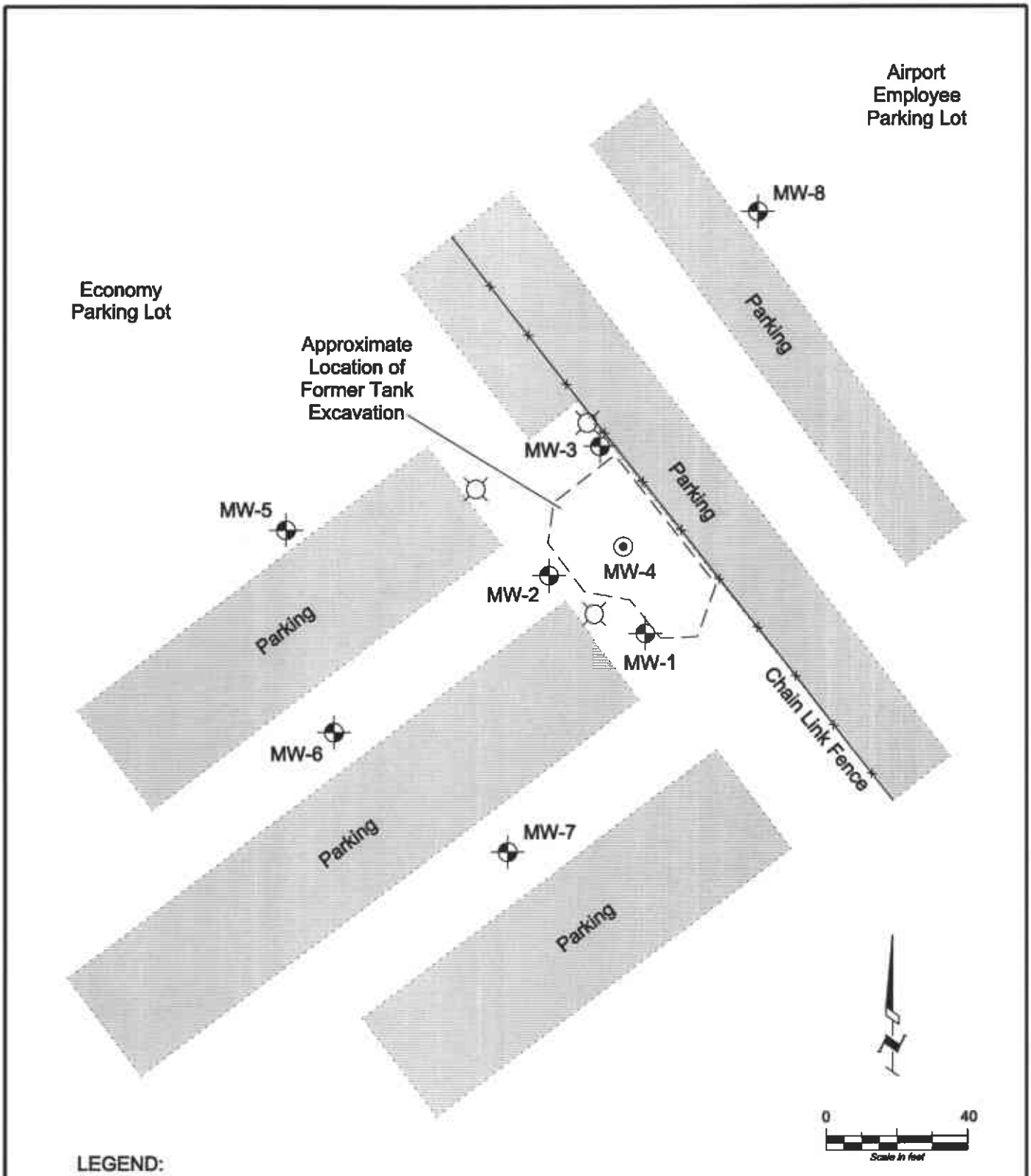
Harding Lawson Associates
Engineering and
Environmental Services

Site Location Map

Economy Parking Lot - United Airlines Hanger Site
Oakland International Airport
1100 Airport Drive, Oakland, California

PLATE
1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
AJW	43145.2	MS	8/26/99	---



LEGEND:

- Monitoring Well (2-in. diameter)
- Remediation Well (1-in. diameter)
- Light Pole

Reference:
Map based on a figure prepared by
Innovative Technologies Solutions, Inc.

econpark0899.dwg

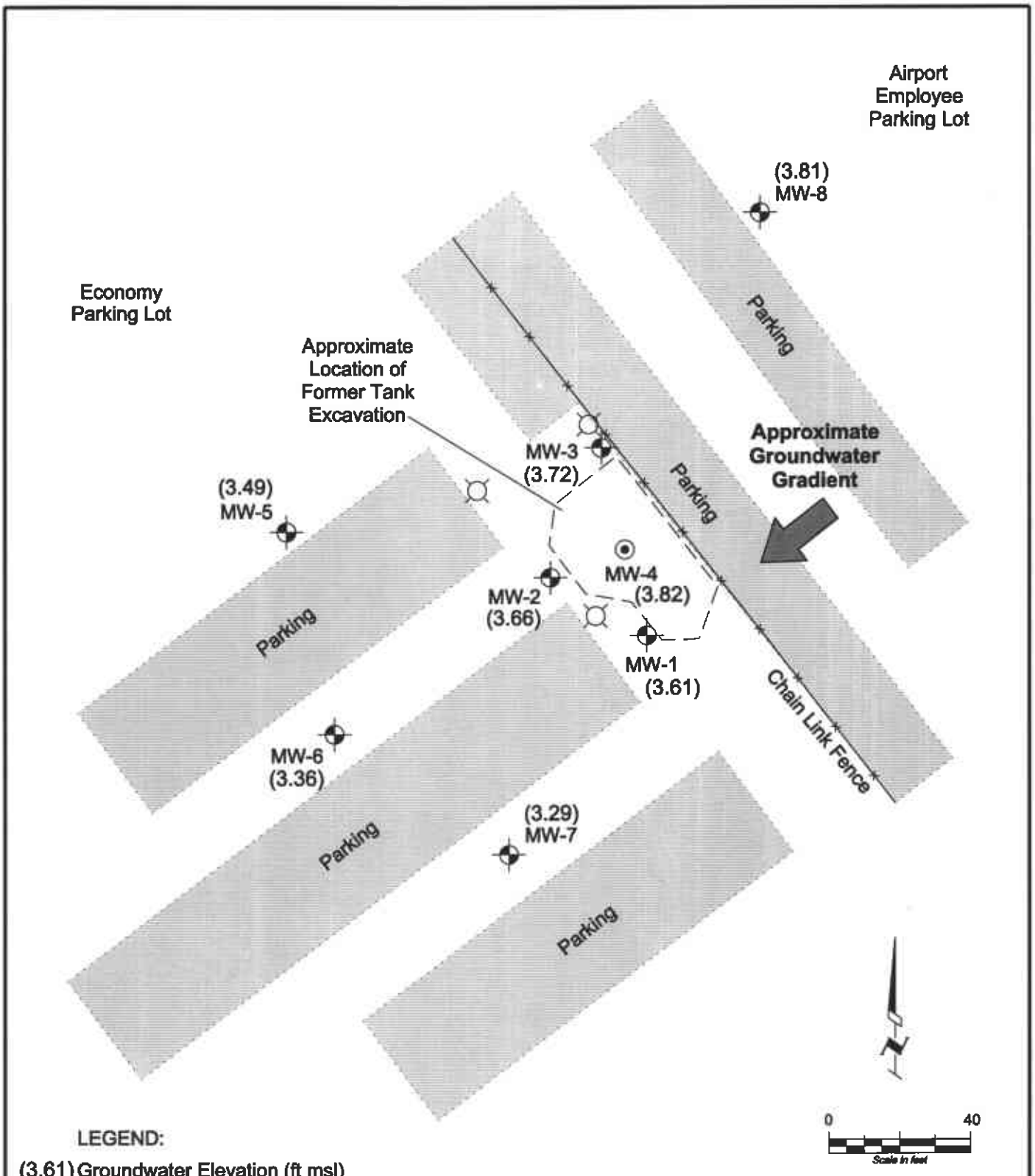
Harding Lawson Associates
Engineering and
Environmental Services

Site Plan

Economy Parking Lot - United Airlines Hanger Site
Oakland International Airport
1100 Airport Drive, Oakland, California

PLATE
2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
AJW	43145.2	MS	8/26/99	---



econpark0899.dwg

Harding Lawson Associates
Engineering and
Environmental Services

Groundwater Elevation Map
Economy Parking Lot - United Airlines Hanger Site
Oakland International Airport
1100 Airport Drive, Oakland, California

PLATE
3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
AJW	43145.2	MS	8/26/99	...

APPENDIX A

GROUNDWATER SAMPLING REPORTS

Harding Lawson Associates
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Port of Oakland - ORC Inj
Job Number 43145.4
Recorded by Heather D Lee (Signature)

Well No. MW-1
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 8/17/99 Time 1028
Sampled by HDL (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): 13.90
Water Level Depth (WL in feet BTOC): 3.30
Number of Well Volumes to be purged (# Vols)
☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☒ Bailer - Type: teflon
☐ 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

$(13.09 - 3.30) \times 2^2 \times 3 \times 0.0408 = 5.19$ gallons

(13.09 TD (feet) - 3.30 WL (feet)) × 2 D (inches)^2 × 3 # Vols × 0.0408 = 5.19 Calculated Purge Volume

PURGE TIME

1007 Start 1022 Stop 15 Elapsed

PURGE RATE

Initial _____ gpm Final _____ gpm

ACTUAL PURGE VOLUME

5.5 gallons

FIELD PARAMETER MEASUREMENT

~~Minutes~~ Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☒ °F	Other
Initial	8.99	8510	69.5	
1.5	8.78	7320	70.4	
3	8.72	5760	70.5	
5.5	8.62	4850	69.3	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	9205			

Observations During Purging (Well Condition, Turbidity, Color, Odor): milky white, no odor, no sheen
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 gal. drum

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9933

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-1	2 VOA	8020/MTBE/BTEX	HCl	Sequoia	
	2 VOA	TPHg 8015	HCl		
	1 VOA Amb	TOC (415.1)	HCl		
	1 LA	TPHd M3510 (A)	none		
	500 mL Poly	Ferrous Iron	none		24 hr holding
	500 mL Poly	NO_3, SO_4, PO_4	none		
	500 mL Poly	Ferric Iron	HNO_3		

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Port of Oakland - ORC Inj
Job Number 43145.4
Recorded by Martha D Lee (Signature)

Well No. MW-2
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 8/17/99 Time 0950
Sampled by HDL (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): 10.89
Water Level Depth (WL in feet BTOC): 2.92
Number of Well Volumes to be purged (# Vols)
☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☒ Bailer - Type: teflon
☐ 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:

(10.89 TD (feet) - 2.92 WL (feet)) x 2 D (inches)^2 x 3 # Vols X 0.0408 = 3.90 gallons
Calculated Purge Volume

PURGE TIME

0934 Start 0945 Stop 11 Elapsed

PURGE RATE

Initial gpm Final gpm

ACTUAL PURGE VOLUME

gallons

FIELD PARAMETER MEASUREMENT

~~Minutes~~ Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☒ °F	Other
Initial	7.05	3030	67.0	
1.5	6.70	1770	69.5	
3	6.76	3460	71.3	
4	6.75	7330	70.0	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	9205			

Observations During Purging (Well Condition, Turbidity, Color, Odor): fuel odor, clear, becomes gray, slight sheen
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 gal. drum

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9933

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-2	2 VOA	8020/MTBE/BTEX	HCl	Sequoia	
	2 VOA	TPHg 8015	HCl		
	1 VOA Amber	TOC (415.1)	HCl		
	1 LA	TPHd m.o. (CA)	none		
	500 mL Poly	Ferrous Iron	none		24 hr holding
	500 mL Poly	NO_3, SO_4, PO_4	none		
	500 mL Poly	Ferric Iron	HNO_3		

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Port of Oakland - ORC Inj
Job Number 43145.4
Recorded by Heather Dee (Signature)

Well No. MW-3
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 8/17/99 Time 0720
Sampled by HDL (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): 11.06
Water Level Depth (WL in feet BTOC): 3.64
Number of Well Volumes to be purged (# Vols)
☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☒ Bailer - Type: teflon
☐ 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

$(11.06 - 3.64) \times 2^2 \times 3 \times 0.0408 = 3.63$ gallons

(TD (feet) − WL (feet)) × D (inches)² × # Vols × 0.0408 = Calculated Purge Volume

PURGE TIME

0702 Start 0715 Stop 13 Elapsed

PURGE RATE

Initial _____ gpm Final _____ gpm

ACTUAL PURGE VOLUME

Dry at 3 gallons

FIELD PARAMETER MEASUREMENT

~~Minutes~~ Hours Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Initial	8.42	17440	70.1	
1.5	8.42	14320	69.2	
3	8.42	15370	68.4	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	9205			

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

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9933

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-3	2 VOA	8020/MTBE/BTEX	HCl	Sequoia	
↓	2 VOA	TPHg 8015	HCl	↓	
	1 VOA Amber	TOC (415.1)	HCl		
	1 LA	TPHd m.o. (A)	none		
	500 mL Poly	Ferrous Iron	none		24 hr holding
	500 mL Poly	NO_3, SO_4, PO_4	none		
	500 mL Poly	Ferric Iron	HNO_3		

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name: Port of Oakland - ORC Inj
Job Number: 43145.4
Recorded by: Heather D Lee (Signature)

Well No.: MW-4
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date: 8/13/99 Time: ~~1050~~ 1100
Sampled by: HDL (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): 9.97
Water Level Depth (WL in feet BTOC): 3.10
Number of Well Volumes to be purged (# Vols)
~~☒ 3~~ ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☒ Bailer - Type: teflon
☐ 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:

$(9.97 - 3.10) \times 4^2 \times 3 \times 0.0408 = 13.45$ gallons

(TD (feet) − WL (feet)) × D (inches)² × # Vols × 0.0408 = Calculated Purge Volume

PURGE TIME

~~1045~~ Start 1055 Stop 10 Elapsed

PURGE RATE

Initial ____ gpm Final ____ gpm

ACTUAL PURGE VOLUME

14 gallons

FIELD PARAMETER MEASUREMENT

~~Minutes~~ Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☒ °F	Other ____
Initial	8.99	5310	68.7	
5	9.10	4440	71.2	
10	9.22	4260	72.1	
14	9.34	3590	73.4	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other ____
Meter Nos.	9205			

Observations During Purging (Well Condition, Turbidity, Color, Odor): Light green, murky brown, no odor
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 gal drum

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9933

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-4	2 VOA	8020/MTBE/BTEX	HCl	Sequoia	
	2 VOA	TPH-g 8015	"	"	
	1 VOA Amb	TOC (415.1)	"	"	
	1 LA	TPH-d, mo. (A)	none	"	
	500 mL Poly	Ferrous Iron	"	"	24 hour hold time
	500 mL Poly	NO_3, SO_4, Poly	"	"	
	500 mL Poly	Ferric Iron	$NaNO_3$	"	

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.
9933 MW4	9933 MW4D
1100	1120

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Port of Oakland - ORC Inj
Job Number 43145.4
Recorded by Heather Dyer (Signature)

Well No. MW-5
Well Type: ☒ Monitor ☐ Extraction ☐ Other ____
Well Material: ☒ PVC ☐ St. Steel ☐ Other ____
Date 8/17/99 Time 1145
Sampled by HDL (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): 7.92
Water Level Depth (WL in feet BTOC): 2.30
Number of Well Volumes to be purged (# Vols)
☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other ____

PURGE METHOD

☒ Bailer - Type: teflon
☐ 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:

$(7.92 \text{ TD (feet)} - 2.30 \text{ WL (feet)}) \times 2 \text{ D (inches)}^2 \times 3 \text{ \# Vols} \times 0.0408 = 2.75$ gallons
Calculated Purge Volume

PURGE TIME

1131 Start 1140 Stop 9 Elapsed

PURGE RATE

Initial ____ gpm Final ____ gpm

ACTUAL PURGE VOLUME

3 gallons

FIELD PARAMETER MEASUREMENT

~~Minutes~~ Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☒ °F	Other ____
Initial	8.68	3910	71.9	
1	8.36	3690	72.8	
2	8.14	4300	74.8	
3	7.78	71640	74.4	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other ____
Meter Nos.	9205			

Observations During Purging (Well Condition, Turbidity, Color, Odor): no odor, light brown, no sheen
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 gal. drum

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9933

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-5	2 VOA	8020/MTBE/BTEX	HCl	Sequoia	
	2 VOA	TPHg 8015	HCl		
	1 VOA Amber	TOC (415.1)	HCl		
	1 LA	TPHd no silica (A)	none		
	500 mL Poly	Ferrous Iron	none		24 hr holding time
	500 mL Poly	NO_3, SO_4, PO_4	none		
	500 mL Poly	Ferric Iron	HNO_3		

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Port of Oakland - ORC Inj
Job Number 43145.4
Recorded by Heather Dyer (Signature)

Well No. MW-6
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 8/17/99 Time 0915
Sampled by HDL (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): 8.13
Water Level Depth (WL in feet BTOC): 3.03
Number of Well Volumes to be purged (# Vols)
☒ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☒ Bailer - Type: teflon
☐ 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:

$(8.13 - 3.03) \times 2^2 \times 3 \times 0.0408 = 2.49$ gallons

(TD (feet) − WL (feet)) × D (inches)² × # Vols × 0.0408 = Calculated Purge Volume

PURGE TIME

0900 Start 0909 Stop 9 Elapsed

PURGE RATE

Initial gpm Final gpm

ACTUAL PURGE VOLUME

3 gallons

FIELD PARAMETER MEASUREMENT

~~Minutes~~ Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☒ °F	Other
Initial	7.77	5310	70.2	
1	7.68	5510	71.4	
2	7.53	6940	72.5	
3	7.44	8080	72.3	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	9205			

Observations During Purging (Well Condition, Turbidity, Color, Odor): turbid brown, no odor, no sheen
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55-gal. drum

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9933

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-6	2 VOA	8020/MTBE/BTEX	HCl	Sequoia	
	2 VOA	TPHg 8015	HCl		
	1 VOA Amber	TOC (415.1)	HCl		
	1 LA	TPHd, mo. (A)	none		
	500 mL Poly	Ferrous Iron	none		24 hr holding time
	500 mL Poly	NO_3, SO_4, PO_4	none		
	500 mL Poly	Ferric Iron	HNO_3		

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Port of Oakland - ORC Inj
Job Number 43145.4
Recorded by Heather D Lee (Signature)

Well No. MW-7
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 8/17/99 Time 0845
Sampled by HDL (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): 8.43
Water Level Depth (WL in feet BTOC): 2.57
Number of Well Volumes to be purged (# Vols)
☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☒ Bailer - Type: teflon
☐ 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:

$(8.43 - 2.57) \times 2^2 \times 3 \times 0.0408 = 2.87$ gallons

(TD (feet) − WL (feet)) × D (inches)² × # Vols × 0.0408 = Calculated Purge Volume

PURGE TIME

0830 Start 0839 Stop 9 Elapsed

PURGE RATE

Initial ____ gpm Final ____ gpm

ACTUAL PURGE VOLUME

3 gallons

FIELD PARAMETER MEASUREMENT

~~Minutes~~ Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☒ °F	Other
Initial	8.08	3070	67.2	
1	8.19	10680	70.3	
2	7.77	4250	70.6	
3	7.77	4020	70.3	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	9205			

Observations During Purging (Well Condition, Turbidity, Color, Odor): Strong odor, no sheen, clear to turbid brown

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

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9933

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-7	2 VOA	8020/MTBE/BTEX	HCl	Sequoia	
	2 VOA	TPHg 8015	HCl		
	1 VOA Amber	TOC (415.1)	HCl		
	1 LA	TPHd, mo (A)	none		
	500 mL Poly	Ferrous Iron	none		24 hr holding time
	500 mL Poly	NO_3, SO_4, PO_4	none		
	500 mL Poly	Ferric Iron	HNO_3		

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Harding Lawson Associates
Engineering and
Environmental Services

GROUND-WATER SAMPLING FORM

Job Name Port of Oakland - ORC Inj
Job Number 43145.4
Recorded by Heather Dee (Signature)

Well No. MW-8
Well Type: ☒ Monitor ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ St. Steel ☐ Other
Date 8/17/99 Time 0810
Sampled by HDL (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): 11.02
Water Level Depth (WL in feet BTOC): 3.75
Number of Well Volumes to be purged (# Vols)
☐ 3 ☐ 4 ☐ 5 ☐ 10 ☐ Other

PURGE METHOD

☒ Bailer - Type: teflon
☐ 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

(11.02 (TD) - 3.75 (WL)) X 2 (D) ^{2} X 3 (# Vols) X 0.0408 = 3.56 gallons (Calculated Purge Volume)

PURGE TIME

0754 Start 0805 Stop 11 Elapsed

PURGE RATE

Initial gpm Final gpm

ACTUAL PURGE VOLUME

4 gallons

FIELD PARAMETER MEASUREMENT

~~Minutes~~ Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☒ °F	Other
Initial	7.53	9790	67.7	
1.5	7.43	10910	70.8	
3	7.24	12940	69.2	
4	7.14	13860	70.1	

Minutes Since Pumping Began	pH	Cond. (µmhos/cm)	T ☐ °C ☐ °F	Other
Meter Nos.	9205			

Observations During Purging (Well Condition, Turbidity, Color, Odor): green, no odor, no sheen
Discharge Water Disposal: ☐ Sanitary Sewer ☐ Storm Sewer ☒ Other 55 gal. drum

WELL SAMPLING

SAMPLING METHOD

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

SAMPLING DISTRIBUTION

Sample Series: 9933

Sample No.	Volume/Cont.	Analysis Requested	Preservatives	Lab	Comments
MW-8	2 VOA	8020/MTBE/BTEX	HCl	Sequoia	
	2 VOA	TPHg 8015	HCl		
	1 VOA Amb	TOC (415.1)	HCl		
	1 LA	TPHd, mo (CA)	none		
	500 mL Poly	Ferrous Iron	none		24 hr holding
	500 mL Poly	NO_3, SO_4, PO_4	none		
	500 mL Poly	Ferric Iron	HNO_3		

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

APPENDIX B

LABORATORY REPORTS

Harding Lawson Associates
383 Fourth Street, Third Floor
Oakland, California 94607
(510) 451-1001 - Phone
(510) 451-3165 - Fax

CHAIN OF CUSTODY FORM

W9908348 N. 3321

Lab: Sequoia

Samplers: Heather Lee

Job Number: 43145.4

Name/Location: Part of Oakland - ORC Inj

Project Manager: Mike Bides

Recorder: Heather Lee (Signature Required)

SOURCE CODE	MATRIX: Water	Sediment	Soil	Oil	# CONTAINERS & PRESERV.: Unpres.	H_2SO_4	HNO_3	HCl	Ice	SAMPLE NUMBER OR LAB NUMBER: Yr Wk Seq	DATE: Yr Mo Day Time	STATION DESCRIPTION/ NOTES	ANALYSIS REQUESTED: EPA 8010 Propylene Dichloride	EPA 8020	EPA 8260	EPA 8270	METALS	EPA 8015M/TPHG	EPA 8020/BTEX/MTBE	EPA 8015M/TPHd,o	TPH_{mo} TPH(CA)	EPA 415.1 TOC	2 Nitrate	Sulfate	Orthophosphate	Ferrous Iron *	Ferric Iron
	X							5		99 33 MW-3	99 08 17 0720	01A-E	X					X	X			X					
	X				3		1	5		99 33 MW-8	99 08 17 0810	02A-I	X					X	X	X	X	X	X	X	X	X	X
	X				3		1	5		99 33 MW-7	99 08 17 0845	03	X					X	X	X	X	X	X	X	X	X	X
	X				3		1	5		99 33 MW-6	99 08 17 0915	04	X					X	X	X	X	X	X	X	X	X	X
	X				3		1	5		99 33 MW-2	99 08 17 0950	05	X					X	X	X	X	X	X	X	X	X	X
	X				3		1	5		99 33 MW-1	99 08 17 1028	06	X					X	X	X	X	X	X	X	X	X	X
	X				3		1	5		99 33 MW-4	99 08 17 1100	07	X					X	X	X	X	X	X	X	X	X	X
	X				3		1	5		99 33 MW-HD	99 08 17 1120	08	X					X	X	X	X	X	X	X	X	X	X
	X				3		1	5		99 33 MW-5	99 08 17 1145	09	X					X	X	X	X	X	X	X	X	X	X

LAB NUMBER: Yr Wk Seq	DEPTH IN FEET	COL MTD CD	QA CODE	MISCELLANEOUS
				* Ferrous Iron 24 hour hold time / Lab Filtered

CHAIN OF CUSTODY RECORD

RELINQUISHED BY: (Signature)	RECEIVED BY: (Signature)	DATE/TIME
Heather Lee	Will Hungerford	8-17-99 13:40
Will Hungerford 8-17-99 16:15	WC	8/17/99 16:15
	Kenneth Jensen	
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

SAMPLE CONDITION WHEN RECEIVED BY THE LABORATORY

Laboratory Copy Project Office Copy Field or Office Copy

Sequoia
Analytical

404 N. Wiget Lane
Walnut Creek, CA 94598
(925) 988-9600
FAX (925) 988-9673

7 September, 1999

Mike Sides
Harding-Lawson Associates - Oakland
383 Fourth Street
Oakland, CA 94607

RE: Port of Oakland

Enclosed are the results of analyses for samples received by the laboratory on 17-Aug-99 16:15. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Melissa Brewer

Melissa Brewer
Project Manager

Sequoia Analytical

404 N. Wiget Lane
Walnut Creek, CA 94598
(925) 988-9600
FAX (925) 988-9673

Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
9933MW-8	W908348-02	Water	17-Aug-99 08:10	17-Aug-99 16:15
9933MW-4	W908348-07	Water	17-Aug-99 11:00	17-Aug-99 16:15
9933MW-1	W908348-06	Water	17-Aug-99 10:28	17-Aug-99 16:15
9933MW-7	W908348-03	Water	17-Aug-99 08:45	17-Aug-99 16:15
9933MW-3	W908348-01	Water	17-Aug-99 07:20	17-Aug-99 16:15
9933MW-4D	W908348-08	Water	17-Aug-99 11:20	17-Aug-99 16:15
9933MW-6	W908348-04	Water	17-Aug-99 09:15	17-Aug-99 16:15
9933MW-5	W908348-09	Water	17-Aug-99 11:45	17-Aug-99 16:15
9933MW-2	W908348-05	Water	17-Aug-99 09:50	17-Aug-99 16:15

Melissa Brewer

Melissa Brewer, Project Manager

Sequoia Analytical

404 N. Wiget Lane
Walnut Creek, CA 94598
(925) 988-9600
FAX (925) 988-9673

SEP 1 0 1999

Harding Lawson Associates	Client Project ID:	43145.4, Port of Oakland - ORC Inj.	Sampled: Aug 17, 1999
383 Fourth Street, 3rd Floor	Sample Matrix:	Water	Received: Aug 17, 1999
Oakland, CA 94607	Analysis Method:	EPA 5030/8015 Mod./8020	Reported: Sep 7, 1999
Attention: Mike Sides	First Sample #:	W908348	

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX / MTBE

Analyte	Reporting Limit µg/L	Sample I.D. W908348-01 9933MW-3	Sample I.D. W908348-02 9933MW-8	Sample I.D. W908348-03 9933MW-7	Sample I.D. W908348-04 9933MW-6	Sample I.D. W908348-05 9933MW-2	Sample I.D. W908348-06 9933MW-1
QC Batch Number:		GC082799 802002A	GC082799 802002A	GC082699 802002A	GC082699 802002A	GC082799 802002A	GC082699 802005A
Purgeable Hydrocarbons	50	2,100	51	N.D.	N.D.	17,000	54
Benzene	0.50	14	3.5	N.D.	N.D.	55	2.6
Toluene	0.50	N.D.	N.D.	N.D.	N.D.	44	0.52
Ethyl Benzene	0.50	N.D.	N.D.	N.D.	N.D.	57	N.D.
Total Xylenes	0.50	15	N.D.	N.D.	N.D.	200	N.D.
MTBE	2.5	N.D.	2.9	N.D.	N.D.	N.D.	N.D.
Chromatogram Pattern:		Gasoline	Unidentified Hydrocarbons C6-C12	--	--	Unidentified Hydrocarbons C6-C12	Gasoline

Quality Control Data

Report Limit Multiplication Factor:	20	1.0	1.0	1.0	20	1.0
Date Analyzed:	8/27/99	8/27/99	8/26/99	8/26/99	8/27/99	8/26/99
Instrument Identification:	HP-2	HP-2	HP-2	HP-2	HP-2	HP-5
Surrogate Recovery, %: (QC Limits = 70-130%)	100	91	92	98	88	86

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL, #1271

Melissa A. Brewer
Project Manager

W908348.HLA <1>

Sequoia Analytical

404 N. Wiget Lane
Walnut Creek, CA 94598
(925) 988-9600
FAX (925) 988-9673

Harding Lawson Associates	Client Project ID:	43145.4, Port of Oakland - ORC Inj.	Sampled: Aug 17, 1999
383 Fourth Street, 3rd Floor	Sample Matrix:	Water	Received: Aug 17, 1999
Oakland, CA 94607	Analysis Method:	EPA 5030/8015 Mod./8020	Reported: Sep 7, 1999
Attention: Mike Sides	First Sample #:	W908348-07	

QC Batch Number:	GC082699	GC082799	GC082699
	802005A	802005A	802005A

TOTAL PURGEABLE PETROLEUM HYDROCARBONS with BTEX / MTBE

Analyte	Reporting Limit µg/L	Sample I.D. W908348-07 9933MW-4	Sample I.D. W908348-08 9933MW-4D	Sample I.D. W908348-09 9933MW-5
Purgeable Hydrocarbons	50	1,000	690	N.D.
Benzene	0.50	22	24	N.D.
Toluene	0.50	N.D.	3.1	N.D.
Ethyl Benzene	0.50	N.D.	3.2	N.D.
Total Xylenes	0.50	N.D.	16	N.D.
MTBE	2.5	N.D.	N.D.	N.D.
Chromatogram Pattern:		Gasoline	Gasoline	--

Quality Control Data

Report Limit Multiplication Factor:	20	5.0	1.0
Date Analyzed:	8/26/99	8/27/99	8/26/99
Instrument Identification:	HP-5	HP-5	HP-5
Surrogate Recovery, %: (QC Limits = 70-130%)	85	88	85

Purgeable Hydrocarbons are quantitated against a fresh gasoline standard.
Analytes reported as N.D. were not detected above the stated reporting limit.

SEQUOIA ANALYTICAL, #1271

Melissa A. Brewer

Melissa A. Brewer
Project Manager

Sequoia Analytical

404 N. Wiget Lane
Walnut Creek, CA 94598
(925) 988-9600
FAX (925) 988-9673

Harding Lawson Associates	Client Project ID:	43145.4, Port of Oakland - ORC Inj.	Sampled:	Aug 17, 1999
383 Fourth Street, 3rd Floor	Sample Descript:	Water	Received:	Aug 17, 1999
Oakland, CA 94607	Analysis for:	Total Organic Carbon		
Attention: Mike Sides	First Sample #:	W908348-01	Analyzed:	Aug 20, 1999
			Reported:	Sep 7, 1999

LABORATORY ANALYSIS FOR: Total Organic Carbon

Sample Number	Sample Description	Detection Limit mg/L	Sample Result mg/L	QC Batch Number
W908348-01	9933MW-3	20	290	9080504
W908348-02	9933MW-8	20	150	9080504
W908348-03	9933MW-7	20	38	9080504
W908348-04	9933MW-6	20	92	9080504
W908348-05	9933MW-2	20	210	9080504
W908348-06	9933MW-1	20	74	9080504
W908348-07	9933MW-4	20	110	9080504
W908348-08	9933MW-4D	20	130	9080504
W908348-09	9933MW-5	20	82	9080504

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL, #I-2374

Melissa A. Brewer

Melissa A. Brewer
Project Manager

Sequoia Analytical

404 N. Wiget Lane
Walnut Creek, CA 94598
(925) 988-9600
FAX (925) 988-9673

Harding Lawson Associates
383 Fourth Street, 3rd Floor
Oakland, CA 94607
Attention: Mike Sides

Client Project ID: 43145.4, Port of Oakland - ORC Inj.
Matrix: Liquid
QC Sample Group: W908348
Reported: Sep 7, 1999

QUALITY CONTROL DATA REPORT

Analyte:	Benzene	Toluene	Ethyl Benzene	Xylenes	Total Organic Carbon
QC Batch#:	GC082699	GC082699	GC082699	GC082699	9080504
	802005A	802005A	802005A	802005A	
Analy. Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 415.1
Prep. Method:	EPA 5030	EPA 5030	EPA 5030	EPA 5030	-
Analyst:	C. Westwater	C. Westwater	C. Westwater	C. Westwater	Petaluma
MS/MSD #:	W908321-03	W908321-03	W908321-03	W908321-03	P908382-01
Sample Conc.:	N.D.	N.D.	N.D.	N.D.	1.2 mg/L
Prepared Date:	8/26/99	8/26/99	8/26/99	8/26/99	8/20/99
Analyzed Date:	8/26/99	8/26/99	8/26/99	8/26/99	8/20/99
Instrument I.D.#:	HP-5	HP-5	HP-5	HP-5	-
Conc. Spiked:	20 µg/L	20 µg/L	20 µg/L	60 µg/L	40 mg/L
Result:	15	16	16	51	39
MS % Recovery:	75	80	80	85	94
Dup. Result:	17	18	19	57	38
MSD % Recov.:	85	90	95	95	93
RPD:	13	12	17	11	1.4
RPD Limit:	0-20	0-20	0-20	0-20	0-20
LCS #:	5LCS082699	5LCS082699	5LCS082699	5LCS082699	LCS082099
Prepared Date:	8/26/99	8/26/99	8/26/99	8/26/99	8/20/99
Analyzed Date:	8/26/99	8/26/99	8/26/99	8/26/99	8/20/99
Instrument I.D.#:	HP-5	HP-5	HP-5	HP-5	-
Conc. Spiked:	20 µg/L	20 µg/L	20 µg/L	60 µg/L	40 mg/L
LCS Result:	17	18	18	56	40
LCS % Recov.:	85	90	90	93	100
MS/MSD LCS Control Limits	70-130	70-130	70-130	70-130	80-120

SEQUOIA ANALYTICAL, #1271
& #I-2374

Melissa A. Brewer
Project Manager

Please Note:
The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

** MS = Matrix Spike, MSD = MS Duplicate, RPD = Relative % Difference

Sequoia Analytical

404 N. Wiget Lane
Walnut Creek, CA 94598
(925) 988-9600
FAX (925) 988-9673

Harding Lawson Associates
383 Fourth Street, 3rd Floor
Oakland, CA 94607
Attention: Mike Sides

Client Project ID: 43145.4, Port of Oakland - ORC Inj.
Matrix: Liquid
QC Sample Group: W908348
Reported: Sep 7, 1999

QUALITY CONTROL DATA REPORT

Analyte:	Benzene	Toluene	Ethyl Benzene	Xylenes
QC Batch#:	GC082699	GC082699	GC082699	GC082699
	802002A	802002A	802002A	802002A
Analy. Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Prep. Method:	EPA 5030	EPA 5030	EPA 5030	EPA 5030
Analyst:	C. Westwater	C. Westwater	C. Westwater	C. Westwater
MS/MSD #:	W908301-10	W908301-10	W908301-10	W908301-10
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Prepared Date:	8/26/99	8/26/99	8/26/99	8/26/99
Analyzed Date:	8/26/99	8/26/99	8/26/99	8/26/99
Instrument I.D.#:	HP-2	HP-2	HP-2	HP-2
Conc. Spiked:	20 µg/L	20 µg/L	20 µg/L	60 µg/L
Result:	16	15	15	51
MS % Recovery:	80	75	75	85
Dup. Result:	17	16	17	55
MSD % Recov.:	85	80	85	92
RPD:	6.1	6.5	13	7.5
RPD Limit:	0-20	0-20	0-20	0-20
LCS #:	2LCS082699	2LCS082699	2LCS082699	2LCS082699
Prepared Date:	8/26/99	8/26/99	8/26/99	8/26/99
Analyzed Date:	8/26/99	8/26/99	8/26/99	8/26/99
Instrument I.D.#:	HP-2	HP-2	HP-2	HP-2
Conc. Spiked:	20 µg/L	20 µg/L	20 µg/L	60 µg/L
LCS Result:	21	19	22	66
LCS % Recov.:	105	95	110	110
MS/MSD LCS Control Limits	70-130	70-130	70-130	70-130

SEQUOIA ANALYTICAL, #1271

Melissa A. Brewer
Project Manager

Please Note:
The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

** MS = Matrix Spike, MSD = MS Duplicate, RPD = Relative % Difference

Sequoia Analytical

404 N. Wiget Lane
Walnut Creek, CA 94598
(925) 988-9600
FAX (925) 988-9673

Harding Lawson Associates
383 Fourth Street, 3rd Floor
Oakland, CA 94607
Attention: Mike Sides

Client Project ID: 43145.4, Port of Oakland - ORC Inj.
Matrix: Liquid
QC Sample Group: W908348

Reported: Sep 7, 1999

QUALITY CONTROL DATA REPORT

Analyte:	Benzene	Toluene	Ethyl Benzene	Xylenes
QC Batch#:	GC082799 802002A	GC082799 802002A	GC082799 802002A	GC082799 802002A
Analy. Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Prep. Method:	EPA 5030	EPA 5030	EPA 5030	EPA 5030
Analyst:	C. Westwater	C. Westwater	C. Westwater	C. Westwater
MS/MSD #:	W908321-03	W908321-03	W908321-03	W908321-03
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Prepared Date:	8/27/99	8/27/99	8/27/99	8/27/99
Analyzed Date:	8/27/99	8/27/99	8/27/99	8/27/99
Instrument I.D.#:	HP-2	HP-2	HP-2	HP-2
Conc. Spiked:	20 µg/L	20 µg/L	20 µg/L	60 µg/L
Result:	*	*	*	*
MS % Recovery:	*	*	*	*
Dup. Result:	*	*	*	*
MSD % Recov.:	*	*	*	*
RPD:	-	-	-	-
RPD Limit:	-	-	-	-

* MS/MSD was not spiked.

LCS #:	2LCS082799	2LCS082799	2LCS082799	2LCS082799
Prepared Date:	8/27/99	8/27/99	8/27/99	8/27/99
Analyzed Date:	8/27/99	8/27/99	8/27/99	8/27/99
Instrument I.D.#:	HP-2	HP-2	HP-2	HP-2
Conc. Spiked:	20 µg/L	20 µg/L	20 µg/L	60 µg/L
LCS Result:	20	18	21	63
LCS % Recov.:	100	90	105	105
LCSD Result:	20	18	18	61
LCSD % Recov.:	100	90	90	102
MS/MSD LCS Control Limits	70-130	70-130	70-130	70-130

Please Note:
The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

** MS = Matrix Spike, MSD = MS Duplicate, RPD = Relative % Difference

SEQUOIA ANALYTICAL, #1271

Melissa A. Brewer
Project Manager

Sequoia Analytical

404 N. Wiget Lane
Walnut Creek, CA 94598
(925) 988-9600
FAX (925) 988-9673

Harding Lawson Associates
383 Fourth Street, 3rd Floor
Oakland, CA 94607
Attention: Mike Sides

Client Project ID: 43145.4, Port of Oakland - ORC Inj.
Matrix: Liquid
QC Sample Group: W908348

Reported: Sep 7, 1999

QUALITY CONTROL DATA REPORT

Analyte:	Benzene	Toluene	Ethyl Benzene	Xylenes
QC Batch#:	GC082799 802005A	GC082799 802005A	GC082799 802005A	GC082799 802005A
Analy. Method:	EPA 8020	EPA 8020	EPA 8020	EPA 8020
Prep. Method:	EPA 5030	EPA 5030	EPA 5030	EPA 5030
Analyst:	C. Westwater	C. Westwater	C. Westwater	C. Westwater
MS/MSD #:	W908371-12	W908371-12	W908371-12	W908371-12
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Prepared Date:	8/27/99	8/27/99	8/27/99	8/27/99
Analyzed Date:	8/27/99	8/27/99	8/27/99	8/27/99
Instrument I.D.#:	HP-5	HP-5	HP-5	HP-5
Conc. Spiked:	20 µg/L	20 µg/L	20 µg/L	60 µg/L
Result:	20	20	20	63
MS % Recovery:	100	100	100	105
Dup. Result:	21	21	21	65
MSD % Recov.:	105	105	105	108
RPD:	4.9	4.9	4.9	3.1
RPD Limit:	0-20	0-20	0-20	0-20

LCS #:	5LCS082799	5LCS082799	5LCS082799	5LCS082799
Prepared Date:	8/27/99	8/27/99	8/27/99	8/27/99
Analyzed Date:	8/27/99	8/27/99	8/27/99	8/27/99
Instrument I.D.#:	HP-5	HP-5	HP-5	HP-5
Conc. Spiked:	20 µg/L	20 µg/L	20 µg/L	60 µg/L
LCS Result:	23	23	22	70
LCS % Recov.:	115	115	110	117

MS/MSD LCS Control Limits	70-130	70-130	70-130	70-130

SEQUOIA ANALYTICAL, #1271

Melissa A. Brewer
Project Manager

Please Note:
The LCS is a control sample of known, interferent-free matrix that is analyzed using the same reagents, preparation, and analytical methods employed for the samples. The matrix spike is an aliquot of sample fortified with known quantities of specific compounds and subjected to the entire analytical procedure. If the recovery of analytes from the matrix spike does not fall within specified control limits due to matrix interference, the LCS recovery is to be used to validate the batch.

** MS = Matrix Spike, MSD = MS Duplicate, RPD = Relative % Difference

Sequoia Analytical

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Harding Lawson Associates	Client Project ID:	43145.4, Port of Oakland - ORC Inj.	
383 Fourth Street, 3rd Floor			Received: Aug 17, 1999
Oakland, CA 94607			
Attention: Mike Sides	Lab Number:	W908348	Reported: Sep 9, 1999

LABORATORY NARRATIVE

EPA 8020: MTBE

Sample: W908348-02
Sample I.D.: 9933MW-8

MTBE was analyzed using EPA method 8020 which identifies peaks based on peak retention time windows. The sample could not be definitively identified as MTBE due to the uncertainty inherent in this method. Confirmation by EPA 8260 could not be performed within holding time or using unopened vials.

SEQUOIA ANALYTICAL, #1271

Melissa A. Brewer
Project Manager

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Diesel Hydrocarbons (C9-C24) and Motor Oil by DHS LUFT

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
9933MW-8 (W908348-02) Water	**Sampled: 17-Aug-99 08:10**		**Received: 17-Aug-99 16:15**						
Jet-A (C9-C17)	ND	50	ug/l	1	9H30014	30-Aug-99	03-Sep-99	DHS LUFT	
Diesel Range Hydrocarbons	**190**	50	"	"	"	"	"	"	D-13
Motor Oil (C16-C36)	ND	500	"	"	"	"	"	"	
Surrogate: n-Pentacosane		*51.1 %*	*50-150*		"	"	"	"	
9933MW-7 (W908348-03) Water	**Sampled: 17-Aug-99 08:45**		**Received: 17-Aug-99 16:15**						
Jet-A (C9-C17)	ND	50	ug/l	1	9H30014	30-Aug-99	03-Sep-99	DHS LUFT	
Diesel Range Hydrocarbons	**52**	50	"	"	"	"	"	"	D-13
Motor Oil (C16-C36)	ND	500	"	"	"	"	"	"	
Surrogate: n-Pentacosane		*69.1 %*	*50-150*		"	"	"	"	
9933MW-6 (W908348-04) Water	**Sampled: 17-Aug-99 09:15**		**Received: 17-Aug-99 16:15**						
Jet-A (C9-C17)	ND	50	ug/l	1	9H30014	30-Aug-99	03-Sep-99	DHS LUFT	
Diesel Range Hydrocarbons	**72**	50	"	"	"	"	"	"	D-13
Motor Oil (C16-C36)	ND	500	"	"	"	"	"	"	
Surrogate: n-Pentacosane		*69.1 %*	*50-150*		"	"	"	"	
9933MW-2 (W908348-05) Water	**Sampled: 17-Aug-99 09:50**		**Received: 17-Aug-99 16:15**						
Jet-A (C9-C17)	**22000**	1000	ug/l	20	9H30014	30-Aug-99	03-Sep-99	DHS LUFT	D-04
Diesel Range Hydrocarbons	ND	1000	"	"	"	"	"	"	
Motor Oil (C16-C36)	ND	10000	"	"	"	"	"	"	
Surrogate: n-Pentacosane		*%*	*50-150*		"	"	"	"	*D-09*
9933MW-1 (W908348-06) Water	**Sampled: 17-Aug-99 10:28**		**Received: 17-Aug-99 16:15**						
Jet-A (C9-C17)	ND	50	ug/l	1	9H30014	30-Aug-99	03-Sep-99	DHS LUFT	
Diesel Range Hydrocarbons	**530**	50	"	"	"	"	"	"	D-13
Motor Oil (C16-C36)	ND	500	"	"	"	"	"	"	
Surrogate: n-Pentacosane		*66.1 %*	*50-150*		"	"	"	"	

Sequoia Analytical - Walnut Creek

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Melissa Brewer, Project Manager

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Diesel Hydrocarbons (C9-C24) and Motor Oil by DHS LUFT

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
9933MW-4 (W908348-07) Water Sampled: 17-Aug-99 11:00 Received: 17-Aug-99 16:15									
Jet-A (C9-C17)	**2000**	50	ug/l	1	9H30014	30-Aug-99	03-Sep-99	DHS LUFT	D-04
Diesel Range Hydrocarbons	ND	50	"	"	"	"	"	"	
Motor Oil (C16-C36)	ND	500	"	"	"	"	"	"	
Surrogate: n-Pentacosane		*78.1 %*	*50-150*		"	"	"	"	
9933MW-4D (W908348-08) Water Sampled: 17-Aug-99 11:20 Received: 17-Aug-99 16:15									
Jet-A (C9-C17)	**1700**	50	ug/l	1	9H30014	30-Aug-99	03-Sep-99	DHS LUFT	D-04
Diesel Range Hydrocarbons	ND	50	"	"	"	"	"	"	
Motor Oil (C16-C36)	ND	500	"	"	"	"	"	"	
Surrogate: n-Pentacosane		*75.1 %*	*50-150*		"	"	"	"	
9933MW-5 (W908348-09) Water Sampled: 17-Aug-99 11:45 Received: 17-Aug-99 16:15									
Jet-A (C9-C17)	ND	50	ug/l	1	9H30014	30-Aug-99	03-Sep-99	DHS LUFT	
Diesel Range Hydrocarbons	**79**	50	"	"	"	"	"	"	D-13
Motor Oil (C16-C36)	ND	500	"	"	"	"	"	"	
Surrogate: n-Pentacosane		*75.1 %*	*50-150*		"	"	"	"	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Total Metals by EPA 6000/7000 Series Methods

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
9933MW-8 (W908348-02) Water Sampled: 17-Aug-99 08:10 Received: 17-Aug-99 16:15									
Ferrous Iron	**1.4**	0.010	mg/l	1	9H27007	25-Aug-99	30-Aug-99	EPA 6010A	
Iron	**3.8**	0.010	"	"	"	"	"	"	
9933MW-7 (W908348-03) Water Sampled: 17-Aug-99 08:45 Received: 17-Aug-99 16:15									
Ferrous Iron	**0.52**	0.010	mg/l	1	9H27007	25-Aug-99	30-Aug-99	EPA 6010A	
Iron	**12**	0.010	"	"	"	"	"	"	
9933MW-6 (W908348-04) Water Sampled: 17-Aug-99 09:15 Received: 17-Aug-99 16:15									
Ferrous Iron	**3.7**	0.010	mg/l	1	9H27007	25-Aug-99	30-Aug-99	EPA 6010A	
Iron	**18**	0.010	"	"	"	"	"	"	
9933MW-2 (W908348-05) Water Sampled: 17-Aug-99 09:50 Received: 17-Aug-99 16:15									
Ferrous Iron	**0.37**	0.010	mg/l	1	9H27007	25-Aug-99	30-Aug-99	EPA 6010A	
Iron	**31**	0.010	"	"	"	"	"	"	
9933MW-1 (W908348-06) Water Sampled: 17-Aug-99 10:28 Received: 17-Aug-99 16:15									
Ferrous Iron	**0.31**	0.010	mg/l	1	9H27007	25-Aug-99	30-Aug-99	EPA 6010A	
Iron	**0.88**	0.010	"	"	"	"	"	"	
9933MW-4 (W908348-07) Water Sampled: 17-Aug-99 11:00 Received: 17-Aug-99 16:15									
Ferrous Iron	**0.36**	0.010	mg/l	1	9H27007	25-Aug-99	30-Aug-99	EPA 6010A	
Iron	**0.91**	0.010	"	"	"	"	"	"	
9933MW-4D (W908348-08) Water Sampled: 17-Aug-99 11:20 Received: 17-Aug-99 16:15									
Ferrous Iron	**0.017**	0.010	mg/l	1	9H27007	25-Aug-99	30-Aug-99	EPA 6010A	
Iron	**1.3**	0.010	"	"	"	"	"	"	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Total Metals by EPA 6000/7000 Series Methods

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
933MW-5 (W908348-09) Water Sampled: 17-Aug-99 11:45 Received: 17-Aug-99 16:15									
Ferrous Iron	**0.23**	0.010	mg/l	1	9H27007	25-Aug-99	30-Aug-99	EPA 6010A	
Iron	**12**	0.010	"	"	"	"	"	"	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Volatile Organic Compounds by EPA Method 8010B

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
9933MW-3 (W908348-01) Water	**Sampled: 17-Aug-99 07:20**		**Received: 17-Aug-99 16:15**						
Bromodichloromethane	ND	0.50	ug/l	1	9H20006	23-Aug-99	25-Aug-99	EPA 8010B	
Bromoform	ND	0.50	"	"	"	"	"	"	
Bromomethane	ND	1.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	0.50	"	"	"	"	"	"	
Chlorobenzene	ND	0.50	"	"	"	"	"	"	
Chloroethane	ND	1.0	"	"	"	"	"	"	
Chloroform	ND	0.50	"	"	"	"	"	"	
Chloromethane	ND	1.0	"	"	"	"	"	"	
Dibromochloromethane	ND	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethane	**3.6**	0.50	"	"	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethene	ND	0.50	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.50	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.50	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.50	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
Methylene chloride	ND	5.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.50	"	"	"	"	"	"	
Tetrachloroethene	ND	0.50	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.50	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.50	"	"	"	"	"	"	
Trichloroethene	ND	0.50	"	"	"	"	"	"	
Trichlorofluoromethane	ND	0.50	"	"	"	"	"	"	
Vinyl chloride	ND	1.0	"	"	"	"	"	"	
Surrogate: Dibromodifluoromethane		*110 %*	*50-150*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*100 %*	*50-150*		"	"	"	"	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Volatile Organic Compounds by EPA Method 8010B

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
933MW-8 (W908348-02) Water Sampled: 17-Aug-99 08:10 Received: 17-Aug-99 16:15									
Bromodichloromethane	ND	2.5	ug/l	5	9H20006	23-Aug-99	23-Aug-99	EPA 8010B	
romoform	ND	2.5	"	"	"	"	"	"	
romomethane	ND	5.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	2.5	"	"	"	"	"	"	
hlorobenzene	ND	2.5	"	"	"	"	"	"	
hloroethane	ND	5.0	"	"	"	"	"	"	
Chloroform	ND	2.5	"	"	"	"	"	"	
Chloromethane	ND	5.0	"	"	"	"	"	"	
ibromochloromethane	ND	2.5	"	"	"	"	"	"	
,3-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
2-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1-Dichloroethane	**500**	25	"	50	"	"	25-Aug-99	"	
1,2-Dichloroethane	**11**	2.5	"	5	"	"	23-Aug-99	"	
1,1-Dichloroethene	**700**	25	"	50	"	"	25-Aug-99	"	
is-1,2-Dichloroethene	ND	2.5	"	5	"	"	23-Aug-99	"	
rans-1,2-Dichloroethene	ND	2.5	"	"	"	"	"	"	
1,2-Dichloropropane	ND	2.5	"	"	"	"	"	"	
is-1,3-Dichloropropene	ND	2.5	"	"	"	"	"	"	
ans-1,3-Dichloropropene	ND	2.5	"	"	"	"	"	"	
Methylene chloride	ND	25	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	2.5	"	"	"	"	"	"	
etrachloroethene	ND	2.5	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	2.5	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	2.5	"	"	"	"	"	"	
richloroethene	ND	2.5	"	"	"	"	"	"	
richlorofluoromethane	ND	2.5	"	"	"	"	"	"	
Vinyl chloride	ND	5.0	"	"	"	"	"	"	
urrogate: Dibromodifluoromethane	*96.0 %*	*50-150*			"	"	"	"	
urrogate: 4-Bromofluorobenzene	*62.0 %*	*50-150*			"	"	"	"	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Volatile Organic Compounds by EPA Method 8010B

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
9933MW-7 (W908348-03) Water Sampled: 17-Aug-99 08:45 Received: 17-Aug-99 16:15									
Bromodichloromethane	ND	0.50	ug/l	1	9H20006	23-Aug-99	25-Aug-99	EPA 8010B	
Bromoform	ND	0.50	"	"	"	"	"	"	
Bromomethane	ND	1.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	0.50	"	"	"	"	"	"	
Chlorobenzene	ND	0.50	"	"	"	"	"	"	
Chloroethane	ND	1.0	"	"	"	"	"	"	
Chloroform	ND	0.50	"	"	"	"	"	"	
Chloromethane	ND	1.0	"	"	"	"	"	"	
Dibromochloromethane	ND	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethane	**22**	0.50	"	"	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethene	**9.6**	0.50	"	"	"	"	"	"	
cis-1,2-Dichloroethene	**0.59**	0.50	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.50	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.50	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
Methylene chloride	ND	5.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.50	"	"	"	"	"	"	
Tetrachloroethene	**0.52**	0.50	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.50	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.50	"	"	"	"	"	"	
Trichloroethene	ND	0.50	"	"	"	"	"	"	
Trichlorofluoromethane	ND	0.50	"	"	"	"	"	"	
Vinyl chloride	ND	1.0	"	"	"	"	"	"	
Surrogate: Dibromodifluoromethane		*100 %*	*50-150*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*110 %*	*50-150*		"	"	"	"	

Sequoia Analytical - Walnut Creek

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Volatile Organic Compounds by EPA Method 8010B

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
933MW-6 (W908348-04) Water	**Sampled: 17-Aug-99 09:15**	**Received: 17-Aug-99 16:15**							
Bromodichloromethane	ND	0.50	ug/l	1	9H20006	23-Aug-99	25-Aug-99	EPA 8010B	
Bromoform	ND	0.50	"	"	"	"	"	"	
Bromomethane	ND	1.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	0.50	"	"	"	"	"	"	
Chlorobenzene	ND	0.50	"	"	"	"	"	"	
Chloroethane	ND	1.0	"	"	"	"	"	"	
Chloroform	ND	0.50	"	"	"	"	"	"	
Chloromethane	ND	1.0	"	"	"	"	"	"	
Dibromochloromethane	ND	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethane	ND	0.50	"	"	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethene	ND	0.50	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.50	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.50	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.50	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
Methylene chloride	ND	5.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.50	"	"	"	"	"	"	
Tetrachloroethene	ND	0.50	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.50	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.50	"	"	"	"	"	"	
Trichloroethene	ND	0.50	"	"	"	"	"	"	
Trichlorofluoromethane	ND	0.50	"	"	"	"	"	"	
Vinyl chloride	ND	1.0	"	"	"	"	"	"	
Surrogate: Dibromodifluoromethane		*96.0 %*	*50-150*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*92.0 %*	*50-150*		"	"	"	"	

Melissa Brewer, Project Manager

Sequoia Analytical

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Volatile Organic Compounds by EPA Method 8010B

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
9933MW-2 (W908348-05) Water Sampled: 17-Aug-99 09:50 Received: 17-Aug-99 16:15									
Bromodichloromethane	ND	2.5	ug/l	5	9H20006	23-Aug-99	25-Aug-99	EPA 8010B	
Bromoform	ND	2.5	"	"	"	"	"	"	
Bromomethane	ND	5.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	2.5	"	"	"	"	"	"	
Chlorobenzene	ND	2.5	"	"	"	"	"	"	
Chloroethane	ND	5.0	"	"	"	"	"	"	
Chloroform	ND	2.5	"	"	"	"	"	"	
Chloromethane	ND	5.0	"	"	"	"	"	"	
Dibromochloromethane	ND	2.5	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	2.5	"	"	"	"	"	"	
1,1-Dichloroethane	**70**	2.5	"	"	"	"	"	"	
1,2-Dichloroethane	ND	2.5	"	"	"	"	"	"	
1,1-Dichloroethene	ND	2.5	"	"	"	"	"	"	
cis-1,2-Dichloroethene	**140**	2.5	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	2.5	"	"	"	"	"	"	
1,2-Dichloropropane	ND	2.5	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	2.5	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	2.5	"	"	"	"	"	"	
Methylene chloride	ND	25	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	2.5	"	"	"	"	"	"	
Tetrachloroethene	ND	2.5	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	2.5	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	2.5	"	"	"	"	"	"	
Trichloroethene	ND	2.5	"	"	"	"	"	"	
Trichlorofluoromethane	ND	2.5	"	"	"	"	"	"	
Vinyl chloride	ND	5.0	"	"	"	"	"	"	
Surrogate: Dibromodifluoromethane		*110 %*	*50-150*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*98.0 %*	*50-150*		"	"	"	"	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Volatile Organic Compounds by EPA Method 8010B

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
933MW-1 (W908348-06) Water Sampled: 17-Aug-99 10:28 Received: 17-Aug-99 16:15									
Bromodichloromethane	ND	0.50	ug/l	1	9H20006	23-Aug-99	25-Aug-99	EPA 8010B	
Bromoform	ND	0.50	"	"	"	"	"	"	
Bromomethane	ND	1.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	0.50	"	"	"	"	"	"	
Chlorobenzene	ND	0.50	"	"	"	"	"	"	
Chloroethane	ND	1.0	"	"	"	"	"	"	
Chloroform	ND	0.50	"	"	"	"	"	"	
Chloromethane	ND	1.0	"	"	"	"	"	"	
Dibromochloromethane	ND	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethane	**23**	0.50	"	"	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethene	**2.1**	0.50	"	"	"	"	"	"	
cis-1,2-Dichloroethene	**15**	0.50	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.50	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.50	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
Methylene chloride	ND	5.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.50	"	"	"	"	"	"	
Tetrachloroethene	ND	0.50	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.50	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.50	"	"	"	"	"	"	
Trichloroethene	ND	0.50	"	"	"	"	"	"	
Trichlorofluoromethane	ND	0.50	"	"	"	"	"	"	
Vinyl chloride	ND	1.0	"	"	"	"	"	"	
Surrogate: Dibromodifluoromethane		*110 %*	*50-150*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*110 %*	*50-150*		"	"	"	"	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Volatile Organic Compounds by EPA Method 8010B

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
9933MW-4 (W908348-07) Water Sampled: 17-Aug-99 11:00 Received: 17-Aug-99 16:15									
Bromodichloromethane	ND	0.50	ug/l	1	9H20006	23-Aug-99	24-Aug-99	EPA 8010B	
Bromoform	ND	0.50	"	"	"	"	"	"	
Bromomethane	ND	1.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	0.50	"	"	"	"	"	"	
Chlorobenzene	ND	0.50	"	"	"	"	"	"	
Chloroethane	**4.3**	1.0	"	"	"	"	"	"	
Chloroform	ND	0.50	"	"	"	"	"	"	
Chloromethane	ND	1.0	"	"	"	"	"	"	
Dibromochloromethane	ND	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethane	**37**	0.50	"	"	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethene	**2.0**	0.50	"	"	"	"	"	"	
cis-1,2-Dichloroethene	**22**	0.50	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.50	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.50	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
Methylene chloride	ND	5.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.50	"	"	"	"	"	"	
Tetrachloroethene	**1.8**	0.50	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.50	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.50	"	"	"	"	"	"	
Trichloroethene	**0.70**	0.50	"	"	"	"	"	"	
Trichlorofluoromethane	ND	0.50	"	"	"	"	"	"	
Vinyl chloride	ND	1.0	"	"	"	"	"	"	
Surrogate: Dibromodifluoromethane		*76.0 %*		*50-150*	"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*55.0 %*		*50-150*	"	"	"	"	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Volatile Organic Compounds by EPA Method 8010B

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
933MW-4D (W908348-08) Water	**Sampled: 17-Aug-99 11:20**		**Received: 17-Aug-99 16:15**						
Bromodichloromethane	ND	0.50	ug/l	1	9H20006	23-Aug-99	24-Aug-99	EPA 8010B	
Bromoform	ND	0.50	"	"	"	"	"	"	
Bromomethane	ND	1.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	0.50	"	"	"	"	"	"	
Chlorobenzene	ND	0.50	"	"	"	"	"	"	
Chloroethane	**13**	1.0	"	"	"	"	"	"	
Chloroform	ND	0.50	"	"	"	"	"	"	
Chloromethane	ND	1.0	"	"	"	"	"	"	
Dibromochloromethane	ND	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethane	**45**	0.50	"	"	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethene	**2.8**	0.50	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.50	"	"	"	"	"	"	
trans-1,2-Dichloroethene	**0.77**	0.50	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.50	"	"	"	"	"	"	
cis-1,3-Dichloropropene	**27**	0.50	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
Methylene chloride	ND	5.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.50	"	"	"	"	"	"	
Tetrachloroethene	**2.0**	0.50	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.50	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.50	"	"	"	"	"	"	
Trichloroethene	**5.5**	0.50	"	"	"	"	"	"	
Trichlorofluoromethane	ND	0.50	"	"	"	"	"	"	
Vinyl chloride	ND	1.0	"	"	"	"	"	"	
Surrogate: Dibromodifluoromethane		*100 %*	*50-150*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*130 %*	*50-150*		"	"	"	"	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Volatile Organic Compounds by EPA Method 8010B

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
9933MW-5 (W908348-09) Water Sampled: 17-Aug-99 11:45 Received: 17-Aug-99 16:15									
Bromodichloromethane	ND	0.50	ug/l	1	9H20006	23-Aug-99	24-Aug-99	EPA 8010B	
Bromoform	ND	0.50	"	"	"	"	"	"	
Bromomethane	ND	1.0	"	"	"	"	"	"	
Carbon tetrachloride	ND	0.50	"	"	"	"	"	"	
Chlorobenzene	ND	0.50	"	"	"	"	"	"	
Chloroethane	ND	1.0	"	"	"	"	"	"	
Chloroform	ND	0.50	"	"	"	"	"	"	
Chloromethane	ND	1.0	"	"	"	"	"	"	
Dibromochloromethane	ND	0.50	"	"	"	"	"	"	
1,3-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,4-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,2-Dichlorobenzene	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethane	ND	0.50	"	"	"	"	"	"	
1,2-Dichloroethane	ND	0.50	"	"	"	"	"	"	
1,1-Dichloroethene	ND	0.50	"	"	"	"	"	"	
cis-1,2-Dichloroethene	ND	0.50	"	"	"	"	"	"	
trans-1,2-Dichloroethene	ND	0.50	"	"	"	"	"	"	
1,2-Dichloropropane	ND	0.50	"	"	"	"	"	"	
cis-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
trans-1,3-Dichloropropene	ND	0.50	"	"	"	"	"	"	
Methylene chloride	ND	5.0	"	"	"	"	"	"	
1,1,2,2-Tetrachloroethane	ND	0.50	"	"	"	"	"	"	
Tetrachloroethene	ND	0.50	"	"	"	"	"	"	
1,1,1-Trichloroethane	ND	0.50	"	"	"	"	"	"	
1,1,2-Trichloroethane	ND	0.50	"	"	"	"	"	"	
Trichloroethene	ND	0.50	"	"	"	"	"	"	
Trichlorofluoromethane	ND	0.50	"	"	"	"	"	"	
Vinyl chloride	ND	1.0	"	"	"	"	"	"	
Surrogate: Dibromodifluoromethane		*50.0 %*	*50-150*		"	"	"	"	
Surrogate: 4-Bromofluorobenzene		*96.0 %*	*50-150*		"	"	"	"	

Sequoia Analytical - Walnut Creek

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Conventional Chemistry Parameters by APHA/EPA Methods

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
9933MW-8 (W908348-02) Water	**Sampled: 17-Aug-99 08:10**		**Received: 17-Aug-99 16:15**						
Orthophosphate as PO4	ND	1.0	mg/l	2	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	R-01
9933MW-7 (W908348-03) Water	**Sampled: 17-Aug-99 08:45**		**Received: 17-Aug-99 16:15**						
Orthophosphate as PO4	**0.68**	0.50	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
9933MW-6 (W908348-04) Water	**Sampled: 17-Aug-99 09:15**		**Received: 17-Aug-99 16:15**						
Orthophosphate as PO4	**0.64**	0.50	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
9933MW-2 (W908348-05) Water	**Sampled: 17-Aug-99 09:50**		**Received: 17-Aug-99 16:15**						
Orthophosphate as PO4	ND	0.50	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
9933MW-1 (W908348-06) Water	**Sampled: 17-Aug-99 10:28**		**Received: 17-Aug-99 16:15**						
Orthophosphate as PO4	**1.3**	0.50	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
9933MW-4 (W908348-07) Water	**Sampled: 17-Aug-99 11:00**		**Received: 17-Aug-99 16:15**						
Orthophosphate as PO4	**2.4**	0.50	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
9933MW-4D (W908348-08) Water	**Sampled: 17-Aug-99 11:20**		**Received: 17-Aug-99 16:15**						
Orthophosphate as PO4	**2.4**	0.50	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
9933MW-5 (W908348-09) Water	**Sampled: 17-Aug-99 11:45**		**Received: 17-Aug-99 16:15**						
Orthophosphate as PO4	ND	0.50	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Anions by EPA Method 300.0

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
9933MW-8 (W908348-02) Water	**Sampled: 17-Aug-99 08:10**		**Received: 17-Aug-99 16:15**						
Nitrate as NO3	ND	0.20	mg/l	2	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	R-01
Sulfate as SO4	**580**	5.0	"	50	"	"	"	"	
9933MW-7 (W908348-03) Water	**Sampled: 17-Aug-99 08:45**		**Received: 17-Aug-99 16:15**						
Nitrate as NO3	**3.4**	0.10	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
Sulfate as SO4	**160**	1.0	"	10	"	"	"	"	
9933MW-6 (W908348-04) Water	**Sampled: 17-Aug-99 09:15**		**Received: 17-Aug-99 16:15**						
Nitrate as NO3	**2.1**	0.10	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
Sulfate as SO4	**470**	5.0	"	50	"	"	"	"	
9933MW-2 (W908348-05) Water	**Sampled: 17-Aug-99 09:50**		**Received: 17-Aug-99 16:15**						
Nitrate as NO3	**0.15**	0.10	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
Sulfate as SO4	**33**	0.57	"	5.71	"	"	"	"	
9933MW-1 (W908348-06) Water	**Sampled: 17-Aug-99 10:28**		**Received: 17-Aug-99 16:15**						
Nitrate as NO3	ND	0.10	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
Sulfate as SO4	**100**	1.0	"	10	"	"	"	"	
9933MW-4 (W908348-07) Water	**Sampled: 17-Aug-99 11:00**		**Received: 17-Aug-99 16:15**						
Nitrate as NO3	ND	0.10	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
Sulfate as SO4	**13**	0.10	"	"	"	"	"	"	
9933MW-4D (W908348-08) Water	**Sampled: 17-Aug-99 11:20**		**Received: 17-Aug-99 16:15**						
Nitrate as NO3	ND	0.10	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
Sulfate as SO4	**14**	0.10	"	"	"	"	"	"	

Sequoia Analytical - Walnut Creek

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Anions by EPA Method 300.0

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
933MW-5 (W908348-09) Water Sampled: 17-Aug-99 11:45 Received: 17-Aug-99 16:15									
Nitrate as NO3	ND	0.10	mg/l	1	9H27018	19-Aug-99	19-Aug-99	EPA 300.0	
Sulfate as SO4	**350**	2.0	"	20	"	"	"	"	

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Diesel Hydrocarbons (C9-C24) and Motor Oil by DHS LUFT - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 9H30014: Prepared 30-Aug-99 Using EPA 3510B										
LCS (9H30014-BS1)										
Diesel Range Hydrocarbons	510	50	ug/l	500		102	60-140			
Diesel Range Hydrocarbons	510	50	"	500		102	60-140			
Surrogate: n-Pentacosane	*26.3*		"	*33.3*		*79.0*	*50-150*			
Surrogate: n-Pentacosane	*26.3*		"	*33.3*		*79.0*	*50-150*			
LCS Dup (9H30014-BSD1)										
Diesel Range Hydrocarbons	492	50	ug/l	500		98.4	60-140	3.59	50	
Diesel Range Hydrocarbons	492	50	"	500		98.4	60-140	3.59	50	
Surrogate: n-Pentacosane	*24.3*		"	*33.3*		*73.0*	*50-150*			
Surrogate: n-Pentacosane	*24.3*		"	*33.3*		*73.0*	*50-150*			
Matrix Spike (9H30014-MS1)										
Diesel Range Hydrocarbons	483	50	ug/l	500		96.6	50-150			
Diesel Range Hydrocarbons	483	50	"	500		96.6	50-150			
Surrogate: n-Pentacosane	*24.0*		"	*33.3*		*72.1*	*50-150*			
Surrogate: n-Pentacosane	*24.0*		"	*33.3*		*72.1*	*50-150*			
Matrix Spike Dup (9H30014-MSD1)										
Diesel Range Hydrocarbons	565	50	ug/l	500		113	50-150	15.6	50	
Diesel Range Hydrocarbons	565	50	"	500		113	50-150	15.6	50	
Surrogate: n-Pentacosane	*28.0*		"	*33.3*		*84.1*	*50-150*			
Surrogate: n-Pentacosane	*28.0*		"	*33.3*		*84.1*	*50-150*			

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Total Metals by EPA 6000/7000 Series Methods - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 9H27007: Prepared 27-Aug-99 Using 200.7										
LCS (9H27007-BS1)										
Ferrous Iron	1.10	0.010	mg/l	1.00		110	80-120			
Iron	1.10	0.010	"	1.00		110	80-120			
LCS Dup (9H27007-BSD1)										
Ferrous Iron	0.990	0.010	mg/l	1.00		99.0	80-120	10.5	20	
Iron	0.990	0.010	"	1.00		99.0	80-120	10.5	20	
Matrix Spike (9H27007-MS1)					**Source: W908348-06**					**Q-01**
Ferrous Iron	1.90	0.010	mg/l	1.00	0.31	159	80-120			
Iron	1.90	0.010	"	1.00	0.88	102	80-120			
Matrix Spike Dup (9H27007-MSD1)					**Source: W908348-06**					**Q-01**
Ferrous Iron	1.90	0.010	mg/l	1.00	0.31	159	80-120	0	20	
Iron	1.90	0.010	"	1.00	0.88	102	80-120	0	20	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Volatile Organic Compounds by EPA Method 8010B - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 9H20006: Prepared 23-Aug-99 Using EPA 5030B [P/T]										
LCS (9H20006-BS1)										
Chlorobenzene	23.0	0.50	ug/l	20.0		115	70-130			
1,1-Dichloroethene	26.0	0.50	"	20.0		130	65-135			
Trichloroethene	25.0	0.50	"	20.0		125	70-130			
Surrogate: Dibromodifluoromethane	*9.30*		"	*10.0*		*93.0*	*50-150*			
Surrogate: 4-Bromofluorobenzene	*11.0*		"	*10.0*		*110*	*50-150*			
LCS (9H20006-BS2)										
Chlorobenzene	15.0	0.50	ug/l	20.0		75.0	70-130			
1,1-Dichloroethene	16.0	0.50	"	20.0		80.0	65-135			
Trichloroethene	16.0	0.50	"	20.0		80.0	70-130			
Surrogate: Dibromodifluoromethane	*9.60*		"	*10.0*		*96.0*	*50-150*			
Surrogate: 4-Bromofluorobenzene	*6.80*		"	*10.0*		*68.0*	*50-150*			
LCS (9H20006-BS3)										
Chlorobenzene	23.0	0.50	ug/l	20.0		115	70-130			
1,1-Dichloroethene	26.0	0.50	"	20.0		130	65-135			
Trichloroethene	25.0	0.50	"	20.0		125	70-130			
Surrogate: Dibromodifluoromethane	*13.0*		"	*10.0*		*130*	*50-150*			
Surrogate: 4-Bromofluorobenzene	*14.0*		"	*10.0*		*140*	*50-150*			
LCS (9H20006-BS4)										
Chlorobenzene	18.0	0.50	ug/l	20.0		90.0	70-130			
1,1-Dichloroethene	19.0	0.50	"	20.0		95.0	65-135			
Trichloroethene	20.0	0.50	"	20.0		100	70-130			
Surrogate: Dibromodifluoromethane	*10.0*		"	*10.0*		*100*	*50-150*			
Surrogate: 4-Bromofluorobenzene	*11.0*		"	*10.0*		*110*	*50-150*			
LCS Dup (9H20006-BSD1)										
Chlorobenzene	24.0	0.50	ug/l	20.0		120	70-130	4.26	25	
1,1-Dichloroethene	26.0	0.50	"	20.0		130	65-135	0	25	
Trichloroethene	26.0	0.50	"	20.0		130	70-130	3.92	25	
Surrogate: Dibromodifluoromethane	*10.0*		"	*10.0*		*100*	*50-150*			
Surrogate: 4-Bromofluorobenzene	*9.30*		"	*10.0*		*93.0*	*50-150*			

Sequoia Analytical - Walnut Creek

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383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Volatile Organic Compounds by EPA Method 8010B - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 9H20006: Prepared 23-Aug-99 Using EPA 5030B [P/T]										
LCS Dup (9H20006-BSD2)										
Chlorobenzene	16.0	0.50	ug/l	20.0		80.0	70-130	6.45	25	
1,1-Dichloroethene	17.0	0.50	"	20.0		85.0	65-135	6.06	25	
Trichloroethene	17.0	0.50	"	20.0		85.0	70-130	6.06	25	
Surrogate: Dibromodifluoromethane	*9.10*		"	*10.0*		*91.0*	*50-150*			
Surrogate: 4-Bromofluorobenzene	*7.60*		"	*10.0*		*76.0*	*50-150*			
LCS Dup (9H20006-BSD3)										
Chlorobenzene	24.0	0.50	ug/l	20.0		120	70-130	4.26	25	
1,1-Dichloroethene	26.0	0.50	"	20.0		130	65-135	0	25	
Trichloroethene	26.0	0.50	"	20.0		130	70-130	3.92	25	
Surrogate: Dibromodifluoromethane	*13.0*		"	*10.0*		*130*	*50-150*			
Surrogate: 4-Bromofluorobenzene	*12.0*		"	*10.0*		*120*	*50-150*			
LCS Dup (9H20006-BSD4)										
Chlorobenzene	18.0	0.50	ug/l	20.0		90.0	70-130	0	25	
1,1-Dichloroethene	21.0	0.50	"	20.0		105	65-135	10.0	25	
Trichloroethene	20.0	0.50	"	20.0		100	70-130	0	25	
Surrogate: Dibromodifluoromethane	*13.0*		"	*10.0*		*130*	*50-150*			
Surrogate: 4-Bromofluorobenzene	*11.0*		"	*10.0*		*110*	*50-150*			

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Harding-Lawson Associates - Oakland	Project: Port of Oakland	
383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 9H27018: Prepared 19-Aug-99 Using General Preparation										
LCS (9H27018-BS1)										
Orthophosphate as PO4	20.3	0.50	mg/l	20.0		101	80-120			
LCS (9H27018-BS2)										
Orthophosphate as PO4	20.5	0.50	mg/l	20.0		103	80-120			
Matrix Spike (9H27018-MS1)					**Source: W908348-08**					
Orthophosphate as PO4	21.6	1.0	mg/l	20.0	2.4	96.0	75-125			
Matrix Spike Dup (9H27018-MSD1)					**Source: W908348-08**					
Orthophosphate as PO4	21.6	1.0	mg/l	20.0	2.4	96.0	75-125	0	20	

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383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Anions by EPA Method 300.0 - Quality Control

Sequoia Analytical - Walnut Creek

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 9H27018: Prepared 19-Aug-99 Using General Preparation										
LCS (9H27018-BS1)										
Nitrate as NO3	10.3	0.10	mg/l	10.0		103	80-120			
Sulfate as SO4	10.6	0.10	"	10.0		106	80-120			
LCS (9H27018-BS2)										
Nitrate as NO3	10.4	0.10	mg/l	10.0		104	80-120			
Sulfate as SO4	10.5	0.10	"	10.0		105	80-120			
Matrix Spike (9H27018-MS1)					**Source: W908348-08**					
Nitrate as NO3	10.9	0.20	mg/l	10.0	ND	109	75-125			
Sulfate as SO4	24.0	0.20	"	10.0	14	100	75-125			
Matrix Spike (9H27018-MS2)					**Source: W908347-03**					
Nitrate as NO3	10.8	0.20	mg/l	10.0	0.39	104	75-125			
Matrix Spike (9H27018-MS3)					**Source: W908347-04**					
Sulfate as SO4	1750	10	mg/l	500	1200	110	75-125			
Matrix Spike Dup (9H27018-MSD1)					**Source: W908348-08**					
Nitrate as NO3	10.9	0.20	mg/l	10.0	ND	109	75-125	0	20	
Sulfate as SO4	24.0	0.20	"	10.0	14	100	75-125	0	20	
Matrix Spike Dup (9H27018-MSD2)					**Source: W908347-03**					
Nitrate as NO3	10.8	0.20	mg/l	10.0	0.39	104	75-125	0	20	
Matrix Spike Dup (9H27018-MSD3)					**Source: W908347-04**					
Sulfate as SO4	1760	10	mg/l	500	1200	112	75-125	0.570	20	

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383 Fourth Street	Project Number: 43145.4	**Reported:**
Oakland CA, 94607	Project Manager: Mike Sides	07-Sep-99 15:42

Notes and Definitions

D-04	Chromatogram Pattern: Jet Fuel C9-C17.
D-09	Surrogate diluted out below control limits due to high concentrations of hydrocarbons.
D-13	Chromatogram Pattern: Diesel C9-C24
Q-01	The spike recovery for this QC sample is outside of established control limits. Review of associated batch QC indicates the recovery for this analyte does not represent an out-of-control condition for the batch.
R-01	The reporting limit for this analyte has been raised to account for matrix interference.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Melissa Brewer

Melissa Brewer, Project Manager

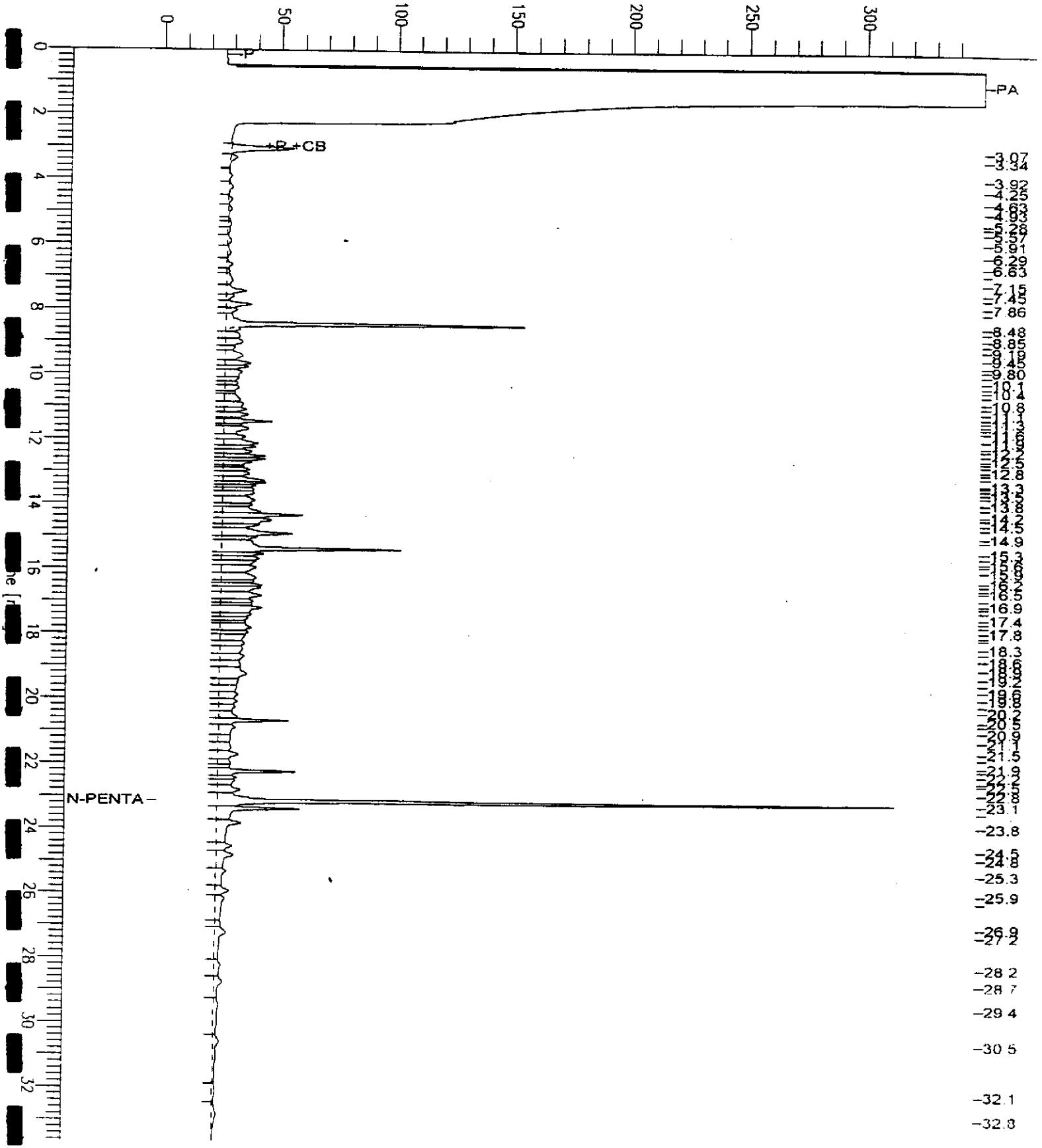
Chromatogram

ple Name : HLA
ileName : J:\HP3DATA\3ASP049.raw
ethod : TPH03A
tart Time : 0.00 min End Time : 33.65 min
cale Factor: 0.0 Plot Offset: 0 mV

Sample #: W908348-02 Page 1 of 1
Date : 9/3/99 03:11 AM
Time of Injection: 9/3/99 02:34 AM
Low Point : 0.00 mV High Point : 350.00 mV
Plot Scale: 350.0 mV

Diesel MW 8

Response [mV]



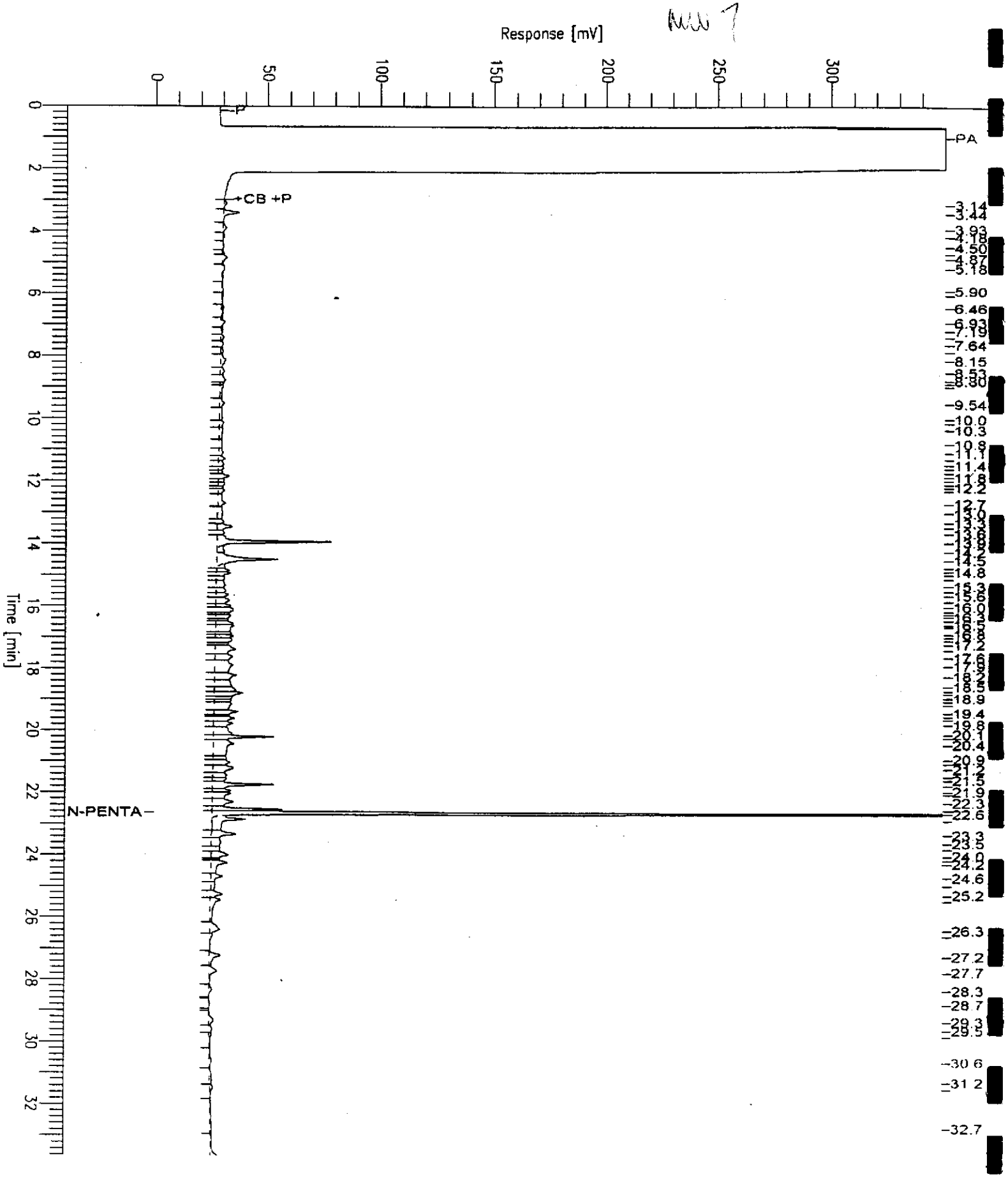
Chromatogram

Diesel

Name : HLA
Name : J:\HP3DATA\3BSP059.raw
Method : TPH03A
Start Time : 0.00 min End Time : 33.65 min
Scale Factor: 0.0 Plot Offset: 0 mV

Sample #: W908348-03 Page 1 of 1
Date : 9/3/99 12:26 PM
Time of Injection: 9/3/99 11:49 AM
Low Point : 0.00 mV High Point : 350.00 mV
Plot Scale: 350.0 mV

MW 7



Chromatogram

MW-6

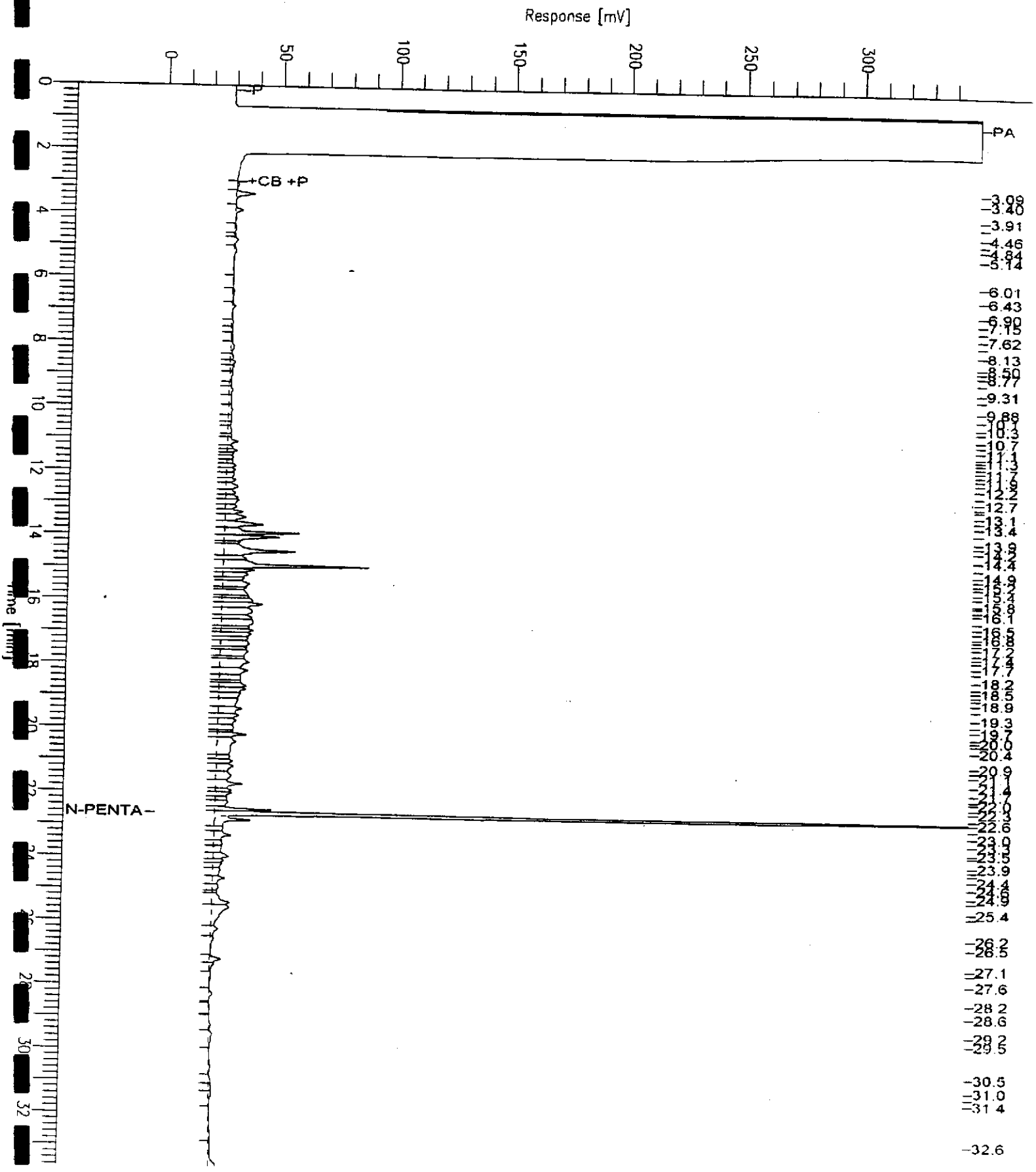
e Name : HLA
Name : J:\HP3DATA\3BSP060.raw
hod : TPH03A
art Time : 0.00 min
cale Factor: 0.0

Diesel

End Time : 33.65 min
Plot Offset: 0 mV

Sample #: W908348-04
Date : 9/3/99 01:52 PM
Time of Injection: 9/3/99 12:54 PM
Low Point : 0.00 mV
Plot Scale: 350.0 mV

High Point : 350.00 mV



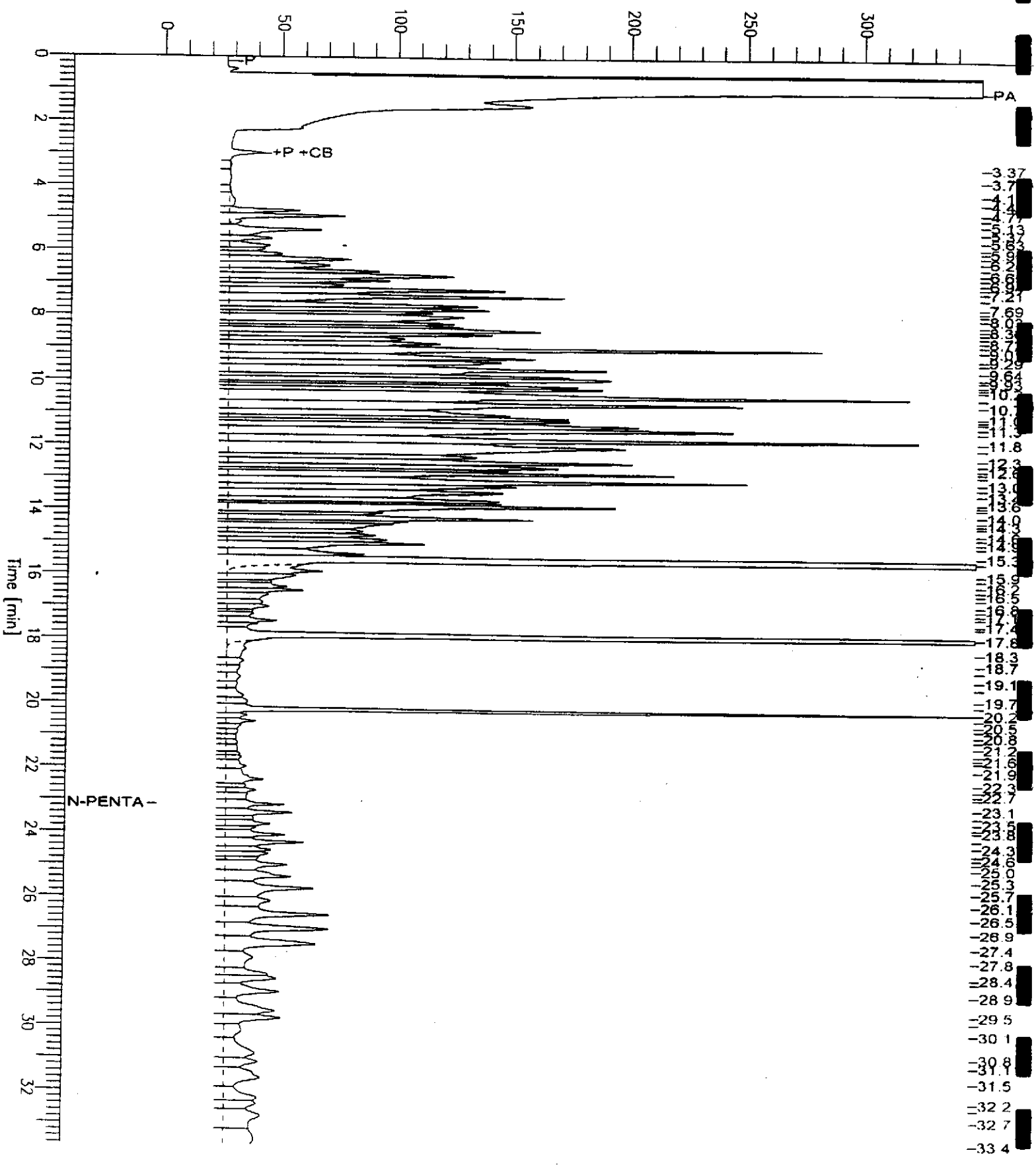
Chromatogram

ample Name : HLA
FileName : J:\HP3DATA\3ASP060.raw
Method : TPH03A
Start Time : 0.00 min End Time : 33.65 min
Scale Factor: 0.0 Plot Offset: 0 mV

Sample #: W908348-05 Page 1 of 1
Date : 9/3/99 01:46 PM
Time of Injection: 9/3/99 12:54 PM
Low Point : 0.00 mV High Point : 350.00 mV
Plot Scale: 350.0 mV

Set Fail

MW 2



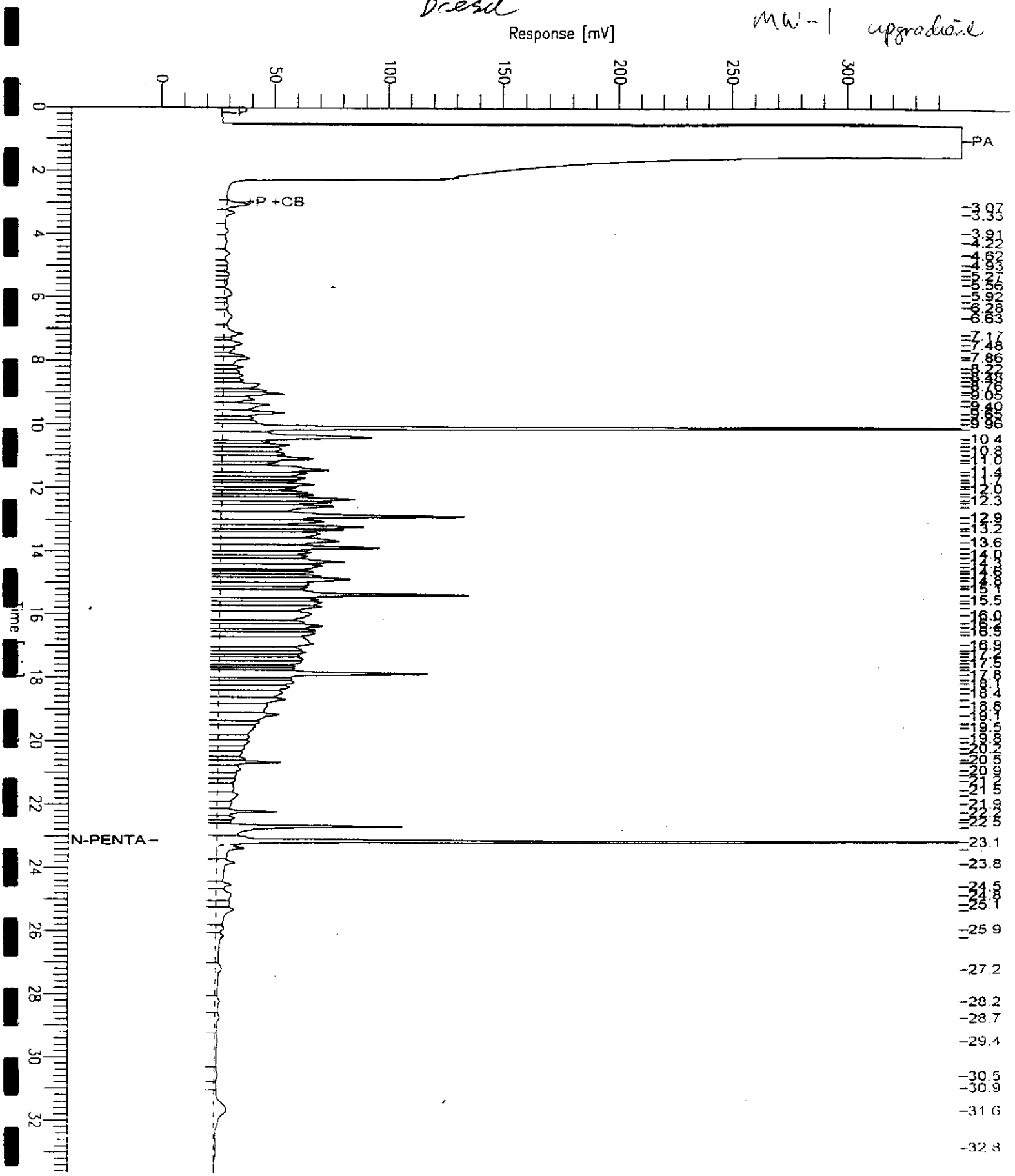
Chromatogram

Name : HLA
Name : J:\HP3DATA\3ASP052.raw
nod : TPH03A
art Time : 0.00 min End Time : 33.65 min
Scale Factor: 0.0 Plot Offset: 0 mV

Sample #: W908348-06 Page 1 of 1
Date : 9/3/99 05:24 AM
Time of Injection: 9/3/99 04:47 AM
Low Point : 0.00 mV High Point : 350.00 mV
Plot Scale: 350.0 mV

Diesel

MW-1 upgradient

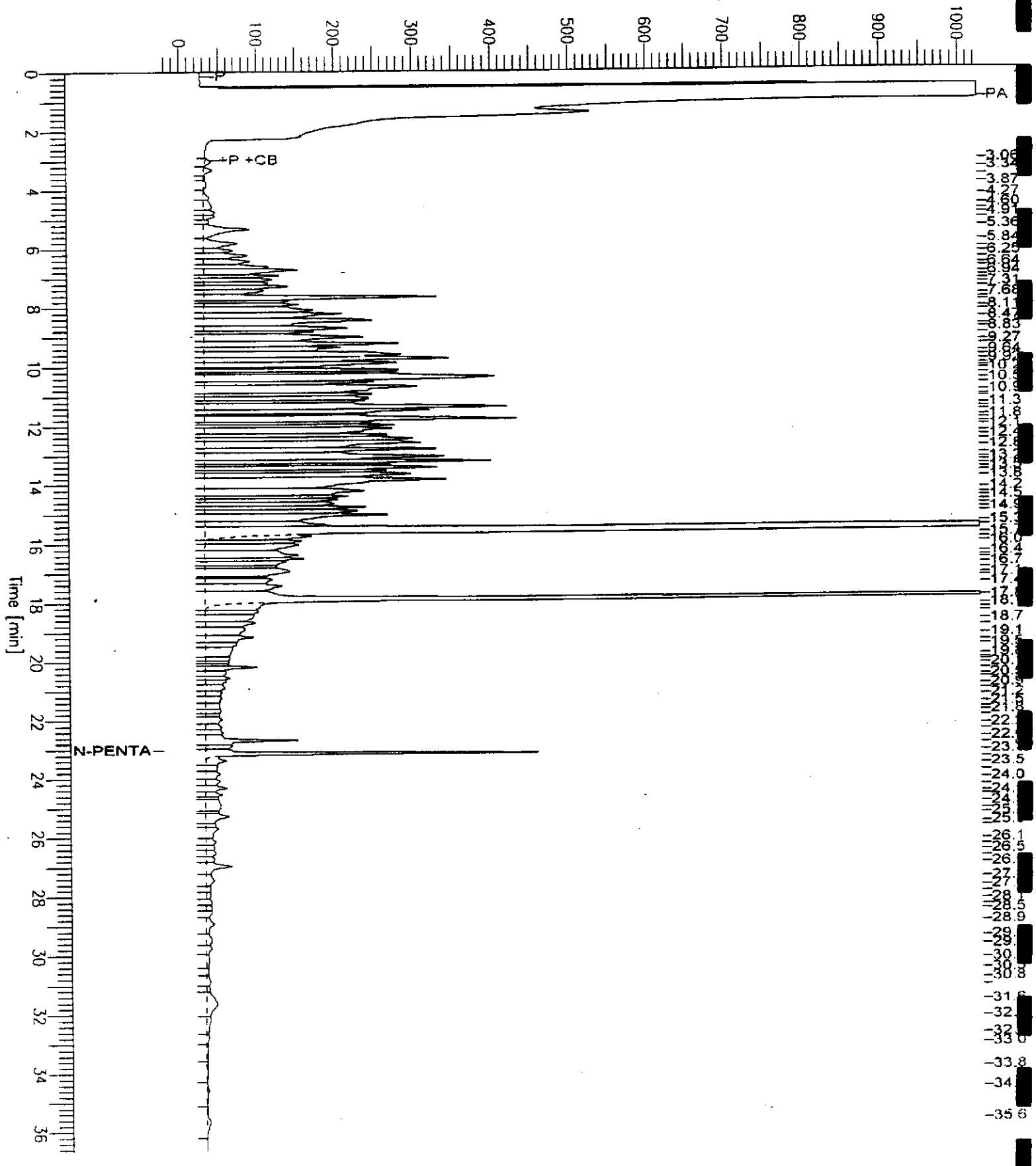


Chromatogram

Sample Name : HLA
File Name : J:\HP3DATA\3ASP053.RAW
Method :
Start Time : 0.00 min End Time : 36.65 min
Scale Factor: 0.0 Plot Offset: -26 mV

Sample #: W908348-07 Page 1 of 1
Date : 9/4/99 03:22 PM
Time of Injection: 9/3/99 05:31 AM
Low Point : -26.12 mV High Point : 1024.00 mV
Plot Scale: 1050.1 mV

Jet Fuel MW 4

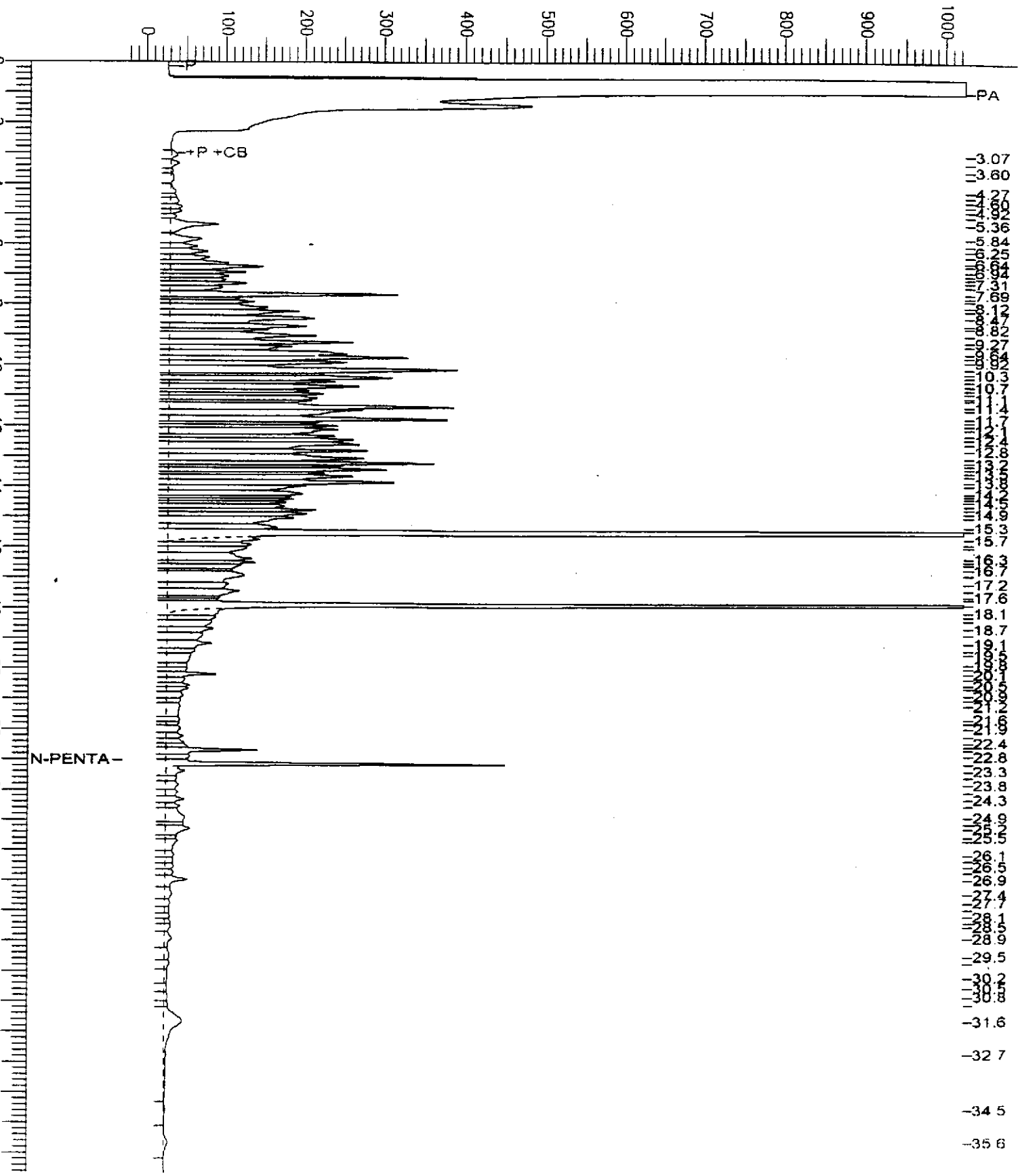


Chromatogram

ple Name : HLA
leName : J:\HP3DATA\3ASP054.RAW
thod :
art Time : 0.00 min End Time : 36.65 min
Scale Factor: 0.0 Plot Offset: -26 mV

Sample #: W908348-08 Page 1 of 1
Date : 9/4/99 03:23 PM
Time of Injection: 9/3/99 06:15 AM
Low Point : -26.17 mV High Point : 1024.00 mV
Plot Scale: 1050.2 mV

Jet Fuel Response [mV] MW 4 d



Chromatogram

e : HLA
: J:\HP3DATA\3ASP056.raw
: TPH03A
Time : 0.00 min End Time : 33.65 min
Factor: 0.0 Plot Offset: 0 mV

Sample #: W908348-09 Page 1 of 1
Date : 9/3/99 08:20 AM
Time of Injection: 9/3/99 07:43 AM
Low Point : 0.00 mV High Point : 350.00 mV
Plot Scale: 350.0 mV

Diesel

MW 5

Response [mV]

0 50 100 150 200 250 300

PA

P +CB

N-PENTA

Time [min]

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32

3.33 4.79 5.29 6.6 7.14 7.63 9.08 9.83 20.9 21.5 23.1 23.8 25.3 27.1 28.2 28.7 29.4 32.1