



# PORT OF OAKLAND

June 6, 1996

Mr. Dale Klettke  
Alameda County Health Care Services Agency  
1131 Harbor Bay Parkway  
Alameda, CA 94502

*2485*  
SUBJECT: STID #~~3777~~ - GROUNDWATER SAMPLING REPORT, AMERICAN  
PRESIDENT LINES TERMINAL, 1395 MIDDLE HARBOR ROAD,  
OAKLAND, CALIFORNIA

Dear Mr. Klettke:

Enclosed please find the enclosed report titled, Groundwater Monitoring And Sampling Report, American President Lines (APL) Terminal, Berths 60-63, Port of Oakland, 1395 Middle Harbor Road, Oakland, California, dated June 4, 1996. This report addresses the first quarter 1996 monitoring and sampling of three monitoring wells. These wells were constructed in the vicinity of four former underground storage tanks designated by the Port as EF-06, EF-07, EF-08, and EF-09.

If you have any questions regarding the report or need additional information, please contact the undersigned at 272-1373.

Sincerely,

John Prall, R.G.

Associate Environmental Scientist

Enclosure

cc: Neil Werner  
Dave Adams

96 JUN -7 PM 1:45  
ENVIRONMENTAL  
PROTECTION



June 4, 1996

Project No.: 95-113.07

Mr. John Prall, R.G.  
Associate Environmental Scientist  
Port of Oakland  
530 Water Street  
Oakland, California 94607

**Groundwater Monitoring and Sampling Report**  
**American President Lines (APL) Terminal, Berths 60-63, Port of Oakland**  
**1395 Middle Harbor Road**  
**Oakland, California**  
**(Work Order No. 201476)**

Dear Mr. Prall:

This Groundwater Monitoring and Sampling Report (Report) has been prepared by Innovative Technical Solutions, Inc. (ITSI), on behalf of the Port of Oakland, for the first quarter 1996 groundwater monitoring and sampling performed on March 28, 1996, at the American President Lines (APL) Terminal, Berths 60-63, located at 1395 Middle Harbor Road in Oakland, California. A site location map is shown on Figure 1.

The scope of work included monitoring and sampling of three groundwater monitoring wells, MW-1, MW-2 and MW-3, installed in January 1993. The wells were installed in the vicinity of four former underground storage tanks: a 10,000-gallon diesel tank (EF-06), a 5,000-gallon diesel tank (EF-07), a 1,000-gallon gasoline tank (EF-08), and a 550-gallon waste oil tank (EF-09).

**SAMPLING OF MONITORING WELLS**

The groundwater monitoring and sampling was performed on March 28, 1996. The monitoring wells were initially gauged for depth to water and checked for the presence of separate phase hydrocarbons. No separate phase hydrocarbons were observed in the monitoring wells. Depth to water measurements were recorded on Monitoring Well Purge and Sample Forms. Copies of the Monitoring Well Purge and Sample Forms are provided in Attachment A.

After depth to water measurements were recorded, the monitoring wells were purged using clean disposable bailers. Approximately three casing volumes of water were removed, or until pH, conductivity, and temperature readings stabilized indicating formation water has entered the monitoring well. Field parameters were recorded on the Monitoring Well Purge and Sample Forms.

Groundwater samples from each monitoring well were collected using the disposable bailer and transferred into laboratory provided containers. Samples were properly labeled with the sample number, date and time of collection, and samplers initials, and were placed on ice in an insulated cooler. Purge water was stored in properly labeled drums onsite.

### GROUNDWATER LEVELS IN MONITORING WELLS

Depth to water results are summarized in Table 1. Groundwater elevations were calculated using the measured depth to water and survey elevations of top of casing<sup>1</sup>, and are provided in Table 1. This survey used the Port of Oakland datum, which is 3.2 feet below mean sea level.

Figure 2 shows the elevation contours and groundwater flow direction for the site. The calculated groundwater flow direction is generally to the southeast at a groundwater gradient of approximately 0.025 ft/ft.

### LABORATORY ANALYSIS OF GROUNDWATER SAMPLES

The samples were then sent under chain-of-custody procedures to Pace Analytical in Petaluma, California, the current Port of Oakland contract laboratory. The samples were analyzed according to the following schedule:

Monitoring Well ID	Analyses					
	TPHg <sup>(1)</sup>	BTEX <sup>(2)</sup>	TPHd <sup>(3)</sup>	TPHmo <sup>(4)</sup>	HVOCs <sup>(5)</sup>	TDS <sup>(6)</sup>
MW-1	x	x	x	x	x	x
MW-2			x	x	x	x
MW-3			x	x	x	x

<sup>(1)</sup>TPH as gasoline by Modified EPA Method 8015

<sup>(2)</sup>Benzene, toluene, ethylbenzene, and xylenes by EPA Method 602

<sup>(3)</sup>TPH as diesel by Modified EPA Method 8015

<sup>(4)</sup>TPH as motor oil by Modified EPA Method 8015

<sup>(5)</sup>Halogenated volatile organic compounds by EPA Method 8010

<sup>(6)</sup>Total dissolved solids by EPA Method 160.1

<sup>1</sup> Top of Casing elevations obtained from Table 1, Summary of Groundwater Monitoring and Petroleum Hydrocarbons in Groundwater, Port of Oakland, American President Lines Terminal, dated November 3, 1995, by Alisto Engineering Group.

The laboratory results for the groundwater samples are summarized in Table 2, and shown in Figure 3. Copies of the laboratory results and chain-of-custodies are provided in Attachment B.

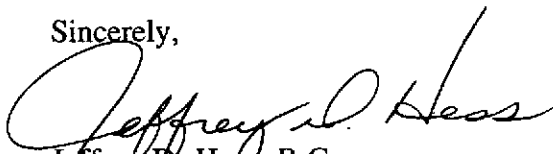
### FINDINGS

Results of the March 28, 1996 groundwater monitoring and sampling are summarized below:

- TPHg was reported at a concentration of 430 µg/l in MW-1.
- Benzene was reported at a concentration of 6.6 µg/l in MW-1.
- TPHd was reported at a concentration of 710 µg/l in MW-1, and reportedly ranged from 200 to 280 µg/l in the other two monitoring wells.
- TPHmo reportedly ranged from 820 µg/l in MW-1, and reportedly ranged from 300 to 380 µg/l in the other two monitoring wells.
- Low levels of HVOCs were reported in MW-1 and MW-3. No HVOCs were reported in MW-2.

Please give us a call if you have any questions or comments.

Sincerely,



Jeffrey D. Hess, R.G.  
Project Director

Attachments



TABLE 1

**GROUNDWATER ELEVATIONS  
AMERICAN PRESIDENT LINES (APL) TERMINAL, BERTHS 60-63, PORT OF OAKLAND  
1395 MIDDLE HARBOR ROAD  
OAKLAND, CALIFORNIA**

Monitoring Well ID	Elevation of Top of Casing (feet)	Date of Monitoring	Measured Depth to Water (feet)	Groundwater Elevation (feet)	Note
MW-1	10.37	2/5/93	-	-	1
		3/8/93	3.30	7.07	1
		5/11/93	3.29	7.06	1
		8/19/93	4.10	6.27	1
		11/24/93	4.48	5.89	1
		2/24/94	3.51	6.86	1
		6/14/94	3.54	6.83	1
		8/23/94	3.32	7.05	1
		11/4/94	3.52	6.85	1
		3/7/95	3.04	7.33	1
		9/25/95	3.87	6.50	1
		3/28/96	2.35	8.02	
MW-2	10.03	2/5/93	-	-	1
		3/8/93	3.45	6.58	1
		5/11/93	3.24	6.79	1
		8/19/93	3.73	6.30	1
		11/24/93	4.01	6.02	1
		2/24/94	3.49	6.54	1
		6/14/94	3.69	6.34	1
		8/23/94	3.51	6.52	1
		11/4/94	3.65	6.38	1
		3/7/95	3.01	7.02	1
		9/25/95	3.48	6.55	1
		3/28/96	2.35	7.68	
MW-3	9.84	2/5/93	-	-	1
		3/8/93	3.08	6.76	1
		5/11/93	2.89	6.95	1
		8/19/93	3.50	6.34	1
		11/24/93	3.79	6.05	1
		2/24/94	3.08	6.76	1
		6/14/94	3.41	6.43	1
		8/23/94	3.22	6.62	1
		11/4/94	3.51	6.33	1
		3/7/95	2.69	7.15	1
		9/25/95	3.19	6.65	1
		3/28/96	3.17	6.67	

1 Data from Table 1, Summary of Groundwater Monitoring and Petroleum Hydrocarbons in Groundwater, Port of Oakland, American President Lines Terminal, dated November 3, 1995, by Alisto Engineering Group.

TABLE 2

**SUMMARY OF LABORATORY RESULTS FOR PETROLEUM HYDROCARBONS  
AMERICAN PRESIDENT LINES (APL) TERMINAL, BERTHS 60-63, PORT OF OAKLAND  
1395 MIDDLE HARBOR ROAD  
OAKLAND, CALIFORNIA**

Monitoring Well ID	Date of Sampling	TPHg (µg/l)	B (µg/l)	T (µg/l)	E (µg/l)	X (µg/l)	TPHd (µg/l)	TPHmo (µg/l)	TOG (µg/l)	TDS (mg/l)	Note
MW-1	2/5/93	1,800	9.2	1.6	8.9	2.7	4,700	-	5,000	3,000	1
	5/11/93	260	3.2	2.3	0.7	0.5	4,800	-	7,000	-	1
	8/19/93	60	9.0	ND	ND	ND	2,300	-	ND	-	1
	11/24/93	50	8.8	1.5	ND	3.0	280	-	ND	-	1
	2/24/94	360	12	ND	2	ND	2,000	-	-	-	1
	6/14/94	ND	9.4	ND	ND	0.7	ND	-	ND	-	1
	8/23/94	80	13	2.4	ND	9.0	3,000	-	ND	-	1
	11/4/94	ND	15	2.4	ND	11.2	1,600	-	ND	-	1
	3/7/95	<50	1.3	0.4	<0.3	<0.4	420	7,200	<5,000	9,000	1
	3/7/95	<50	0.9	0.3	<0.3	<0.4	-	-	-	-	1
	9/25/95	310	12	8.0	<0.3	22.5	<500	1,300	-	2,200	1
	3/28/96	430	6.6	2.4	12	8.5	710	820	-	433	
	QC-1	3/28/96	480	6.9	3	14	9.7	-	-	-	-
MW-2	2/5/93	ND	ND	ND	ND	ND	840	-	2,000	23,000	1
	5/11/93	ND	ND	ND	ND	ND	3,700	-	ND	-	1
	8/19/93	ND	ND	ND	ND	ND	620	-	ND	-	1
	11/24/93	ND	ND	ND	ND	ND	80	-	ND	-	1
	2/24/94	ND	ND	ND	ND	ND	ND	-	-	-	1
	6/14/94	-	-	-	-	-	ND	-	ND	-	1
	8/23/94	-	-	-	-	-	620	-	ND	-	1
	11/4/94	-	-	-	-	-	1,400	-	ND	-	1
	3/7/95	<50	<0.4	<0.3	<0.3	<0.4	310	7,100	<5,000	20,000	1
	9/25/95	-	-	-	-	-	<300	880	-	11,000	1
	3/28/96	-	-	-	-	-	280	380	-	1,190	

1 Data from Table 1, Summary of Groundwater Monitoring and Petroleum Hydrocarbons in Groundwater, Port of Oakland, American President Lines Terminal, dated November 3, 1995, by Alisto Engineering Group.

TABLE 2 (continued)

**SUMMARY OF LABORATORY RESULTS FOR PETROLEUM HYDROCARBONS  
 AMERICAN PRESIDENT LINES (APL) TERMINAL, BERTHS 60-63, PORT OF OAKLAND  
 1395 MIDDLE HARBOR ROAD  
 OAKLAND, CALIFORNIA**

Monitoring Well ID	Date of Sampling	TPHg (µg/l)	B (µg/l)	T (µg/l)	E (µg/l)	X (µg/l)	TPHd (µg/l)	TPHmo (µg/l)	TOG (µg/l)	TDS (mg/l)	Note
MW-3	2/5/93	ND	2.1	0.9	1.7	3.1	3,400	-	2,000	1,600	1
	3/8/93	-	-	-	-	-	-	-	-	-	1
	5/11/93	ND	ND	ND	ND	ND	3,300	-	ND	-	1
	8/19/93	ND	ND	ND	ND	ND	840	-	ND	-	1
	11/24/93	ND	ND	ND	ND	ND	100	-	ND	-	1
	2/24/94	ND	ND	ND	ND	ND	890	-	-	-	1
	6/14/94	-	ND	ND	ND	ND	440	-	ND	-	1
	8/23/94	-	ND	ND	ND	ND	ND	-	ND	-	1
	11/4/94	-	ND	ND	ND	ND	630	-	ND	-	1
	3/7/95	<50	1.4	<0.3	<0.3	<0.4	330	3,200	<5,000	12,000	1
	9/25/95	-	-	-	-	-	200	1,300	-	19,000	1
	3/28/96	-	-	-	-	-	200	300	-	7,600	

1 Data from Table 1, Summary of Groundwater Monitoring and Petroleum Hydrocarbons in Groundwater, Port of Oakland, American President Lines Terminal, dated November 3, 1995, by Alisto Engineering Group.

TABLE 3

SUMMARY OF LABORATORY RESULTS FOR HALOGENATED VOLATILE ORGANIC COMPOUNDS  
 AMERICAN PRESIDENT LINES (APL) TERMINAL, BERTHS 60-63, PORT OF OAKLAND  
 1395 MIDDLE HARBOR ROAD  
 OAKLAND, CALIFORNIA

MCL  
5ppb

MCL  
2ppb

Monitoring Well ID	Date of Sampling	BDM (µg/l)	Chloroform (µg/l)	1,1-DCA (µg/l)	1,2-DCA (µg/l)	1,1-DCE (µg/l)	1,2-DCE (µg/l)	cis 1,2-DCE (µg/l)	1,2-DCB (µg/l)	1,4-DCB (µg/l)	VC (µg/l)	Note
MW-1	2/5/93	ND	ND	0.8	ND	ND	ND	ND	ND	ND	ND	1
	5/11/93	ND	ND	0.6	ND	ND	ND	ND	ND	ND	ND	1
	8/19/93	ND	ND	2.0	ND	2.0	ND	ND	ND	ND	ND	1
	11/24/93	ND	ND	0.7	ND	ND	ND	ND	ND	ND	ND	1
	2/24/94	ND	ND	2.0	ND	ND	ND	ND	ND	ND	ND	1
	6/14/94	ND	ND	1.0	ND	ND	ND	ND	ND	ND	ND	1
	8/23/94	ND	ND	2.3	0.3	ND	0.4	ND	ND	ND	1.1	1
	11/4/94	ND	ND	2.2	0.8	ND	ND	ND	ND	ND	0.7	1
	3/7/95	ND	ND	1.5	ND	ND	ND	ND	ND	ND	ND	1
	9/25/95	ND	ND	1.7	ND	ND	ND	0.6	ND	ND	1.8	1
	3/28/96	ND	ND	1.2	ND	ND	ND	ND	ND	ND	4	
QC-1	3/28/96	ND	ND	1.1	ND	ND	ND	ND	ND	ND	4.2	
MW-2	2/5/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
	5/11/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
	8/19/93	ND	ND	ND	ND	ND	ND	ND	1.0	3.0	ND	1
	11/24/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
	2/24/94	ND	ND	ND	ND	ND	ND	ND	ND	1.0	ND	1
	6/14/94	ND	ND	ND	ND	ND	ND	ND	ND	0.8	ND	1
	8/23/94	ND	ND	ND	ND	ND	0.4	ND	ND	1.3	ND	1
	11/4/94	ND	ND	ND	ND	ND	2.2	ND	ND	0.9	ND	1
	3/7/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
	9/25/95	ND	ND	ND	ND	ND	ND	0.4	ND	ND	ND	1
	3/28/96	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

1 Data from Table 2, Summary of Halogenated Volatile Organic Compounds in Groundwater, Port of Oakland, American President Lines Terminal, dated November 3, 1995, by Alisto Engineering Group.

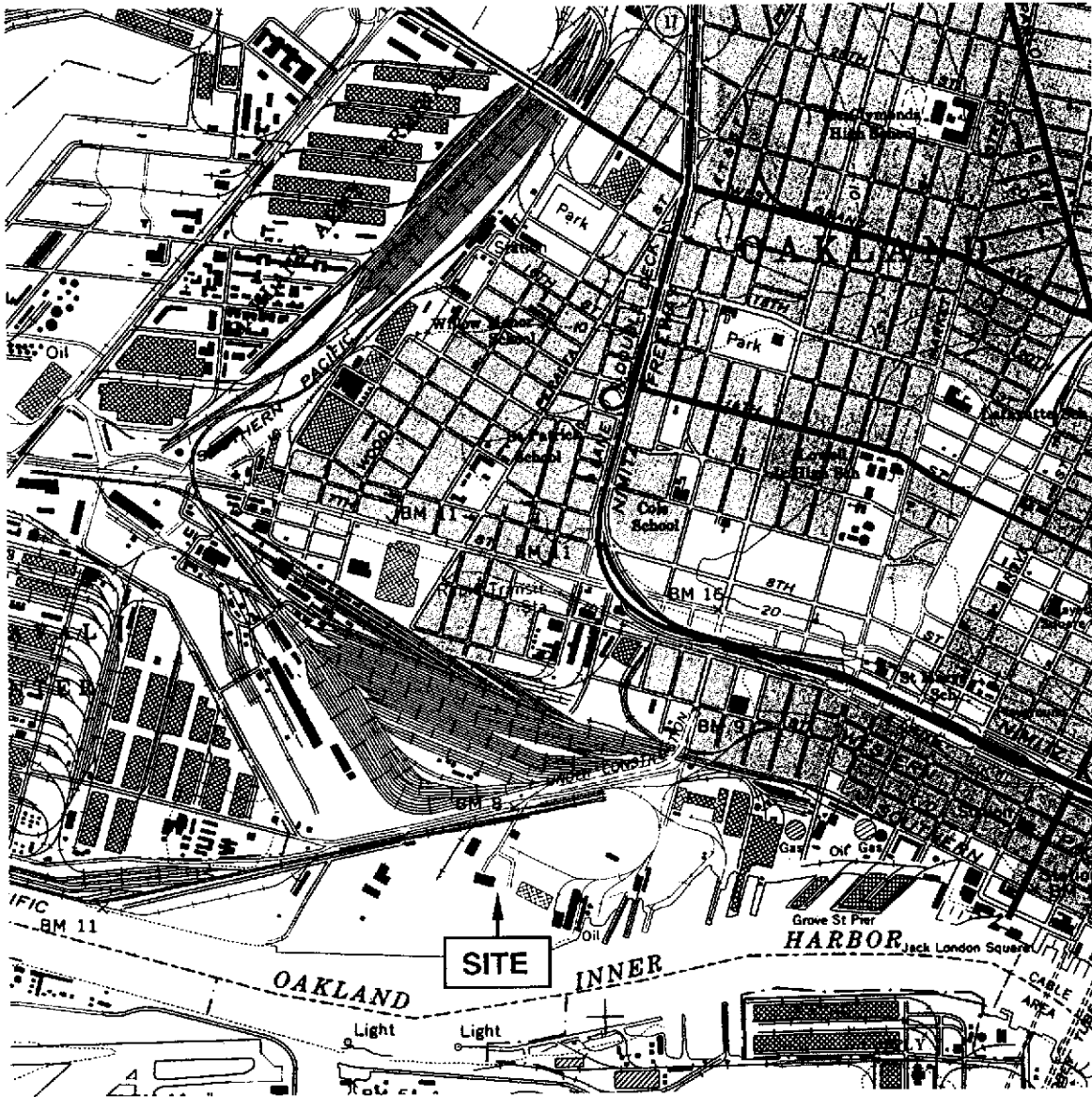


TABLE 3 (continued)

**SUMMARY OF LABORATORY RESULTS FOR HALOGENATED VOLATILE ORGANIC COMPOUNDS  
AMERICAN PRESIDENT LINES (APL) TERMINAL, BERTHS 60-63, PORT OF OAKLAND  
1395 MIDDLE HARBOR ROAD  
OAKLAND, CALIFORNIA**

Monitoring Well ID	Date of Sampling	BDM (µg/l)	Chloroform (µg/l)	1,1-DCA (µg/l)	1,2-DCA (µg/l)	1,1-DCE (µg/l)	1,2-DCE (µg/l)	cis 1,2-DCE (µg/l)	1,2-DCB (µg/l)	1,4-DCB (µg/l)	VC (µg/l)	Note
MW-3	2/5/93	ND	ND	ND	ND	ND	ND	0.4	ND	ND	ND	1
	5/11/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
	8/19/93	ND	ND	ND	ND	ND	ND	ND	ND	1.0	ND	1
	11/24/93	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
	2/24/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
	6/14/94	ND	ND	ND	ND	ND	ND	ND	ND	0.6	ND	1
	8/23/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
	11/4/94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
	3/7/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
	9/25/95	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1
3/28/96	ND	ND	ND	ND	ND	ND	ND	ND	1.6	ND		

1 Data from Table 2, Summary of Halogenated Volatile Organic Compounds in Groundwater, Port of Oakland, American President Lines Terminal, dated November 3, 1995, by Alisto Engineering Group.



Approximate Scale

**FIGURE 1**  
**SITE LOCATION**

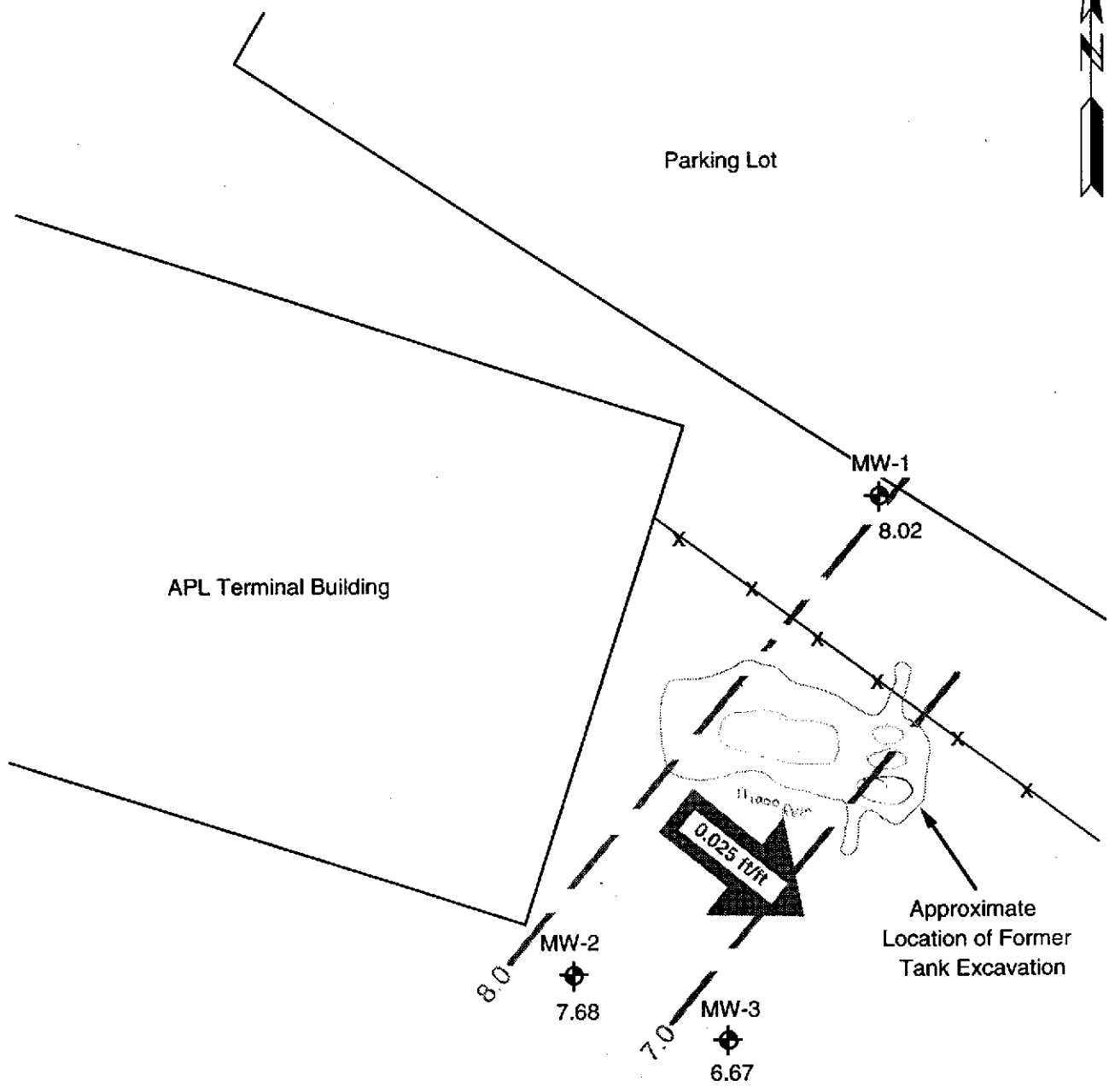
American Presidents Line Terminal, Berths 60-63  
1395 Middle Harbor Road






**PORT OF OAKLAND**

**INNOVATIVE TECHNICAL SOLUTIONS, INC.**

Source: Oakland West 7.5-minute U.S.G.S. Quadrangle, dated 1959, and photorevised in 1980.



Approximate Scale

- Legend**
-  Monitoring Well
  - 7.68 Groundwater Elevation on 3/28/96
  -  Groundwater Elevation Contour Lines
  -  Groundwater Flow Direction and Gradient

**FIGURE 2**

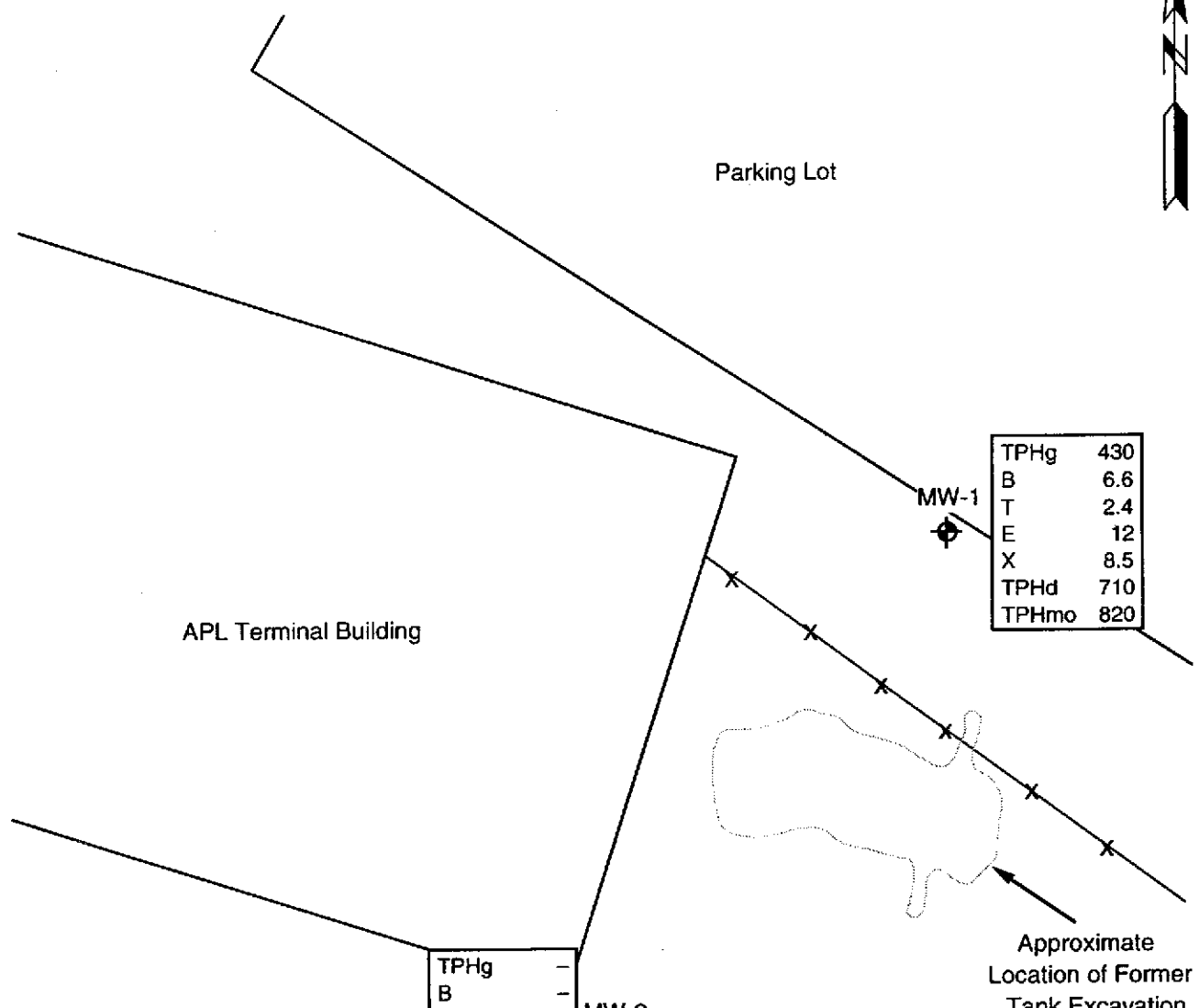
**GROUNDWATER ELEVATIONS AND FLOW DIRECTION FOR MARCH 28, 1996**

American President Lines Terminal, Berths 60-63  
1395 Middle Harbor Road

**PORT OF OAKLAND**

**ITSI**  
**INNOVATIVE TECHNICAL SOLUTIONS, INC.**

Source: Adapted from Figure 3, Concentrations of Petroleum Hydrocarbons in Groundwater, September 25, 1995, Alisto Engineering Group.



TPHg	430
B	6.6
T	2.4
E	12
X	8.5
TPHd	710
TPHmo	820

TPHg	--
B	--
T	--
E	--
X	--
TPHd	280
TPHmo	380

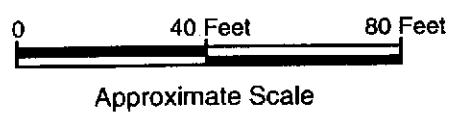
TPHg	--
B	--
T	--
E	--
X	--
TPHd	200
TPHmo	300

Legend  
Monitoring Well

TPHg	430
B	6.6
T	2.4
E	12
X	8.5
TPHd	710
TPHmo	820

Groundwater Concentration in µg/l on 3/28/96

TPHg - TPH as gasoline  
 B - Benzene  
 T - Toluene  
 E - Ethylbenzene  
 X - Total xylenes  
 TPHd - TPH as diesel  
 TPHmo - TPH as motor oil



**FIGURE 3**  
**CONCENTRATIONS OF PETROLEUM**  
**HYDROCARBONS IN GROUNDWATER ON**  
**MARCH 28, 1996**

American President Lines Terminal, Berths 60-63  
 1395 Middle Harbor Road



**PORT OF OAKLAND**

**INNOVATIVE TECHNICAL SOLUTIONS, INC.**

Source: Adapted from Figure 3, Concentrations of Petroleum Hydrocarbons in Groundwater, September 25, 1995, Alisto Engineering Group.

**ATTACHMENT A**  
**COPY OF MONITORING WELL PURGE AND SAMPLE FORMS**

# MONITORING WELL PURGE AND SAMPLE FORM

PROJECT NAME: Part of Oakland - A.P.L. Terminal PROJECT NO.: 95-113.07

WELL NO.: MW1 TESTED BY: J. Schallard DATE: 3/28/96

Measuring Point Description: N. Side Top of Casing Static Water Level (ft.): 2.35

Total Well Depth (ft.): 9.46 Sample Method: 2" disposable bailer (reflow)

Water Level Measurement Method: Salinist DTU tube Time Sampled: 1735

Purge Method: 2" disposable bailer (reflow) Sample Depth (ft.): ~ 2.5'

Time Start Purge: 1719 Field Filtering: N.A.

Time End Purge: 1729 Field Preservation: H<sub>2</sub>O ice

Comments: water over top of casing (baited off); well box lid cracked w/gaps; replaced well lock (collected QCS sample from MW1 @ 1730)

Well Volume Calculation (fill in before purging)	Total Depth (ft)	Depth to Water (ft)	Water Column (ft)	x	Multiplier for Casing Diameter (in)			Casing Volume (gal)
					2	4	6	
	9.46	2.35	7.11	=	0.16	0.64	1.44	= 1.14 (3 Vols = 3.42 gal.)
Time	1722	1725	1729					
Volume Purged (gals)	1.20	1.20	1.20					
Cumulative Volume Purged (gals)	1.20	2.40	3.60					
Cumulative Number of Casing Volumes	1.05	2.10	3.15					
Purge Rate (gpm)	0.40	0.40	0.30					
Temperature (F°) or (C°)	58.6	59.8	59.6					
pH	6.33	6.03	5.56					
Specific Conductivity (µmhos/cm) x1000	4.01	2.46	7.48					
Dissolved Oxygen (mg/L)	—	—	—					
Turbidity/Color (NTU)	sl. Cloudy	clear	clear					
Odor	None	None	None					
Dewatered?	No	No	No					

CHECKED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

# MONITORING WELL PURGE AND SAMPLE FORM

PROJECT NAME: Port of Oakland - A.P.L. Terminal PROJECT NO.: 95-113.07  
 WELL NO.: MW2 TESTED BY: J. Schollard DATE: 3/28/96

Measuring Point Description: N. side of top of casing Static Water Level (ft.): 2.35  
 Total Well Depth (ft.): 9.46 Sample Method: 2" disposable teflon bailer  
 Water Level Measurement Method: Solinst DTW Probe Time Sampled: 1633  
 Purge Method: 2" disposable teflon bailer Sample Depth (ft.): ~ 2.5'  
 Time Start Purge: 1618 Field Filtering: N.A.  
 Time End Purge: 1629 Field Preservation: H<sub>2</sub>O Ice  
 Comments: Well box lid shattered → not usable; replaced lock

Well Volume Calculation (fill in before purging)	Total Depth (ft)	Depth to Water (ft)	Water Column (ft)	x	Multiplier for Casing Diameter (in)			Casing Volume (gal)
					2	4	6	
	9.46	2.35	7.11	x	0.16	0.64	1.44	= 1.14 (3 vols = 3.4 gal.)
Time	1622	1625	1629					
Volume Purged (gals)	1.20	1.20	1.20					
Cumulative Volume Purged (gals)	1.20	2.4	3.6					
Cumulative Number of Casing Volumes	1.05	2.10	3.15					
Purge Rate (gpm)	0.3	0.4	0.3					
Temperature (F° or C°)	61.7	61.8	61.1					
pH	6.66	6.60	6.19					
Specific Conductivity (µmhos/cm) X1000	8.87	8.33	9.83					
Dissolved Oxygen (mg/L)	—	—	—					
Turbidity/Color (NTU)	Clear	orange brn. <del>clear ss</del>	orange brown					
Odor	None	None	None					
Dewatered?	No	No	No					

CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_

# MONITORING WELL PURGE AND SAMPLE FORM

PROJECT NAME: Port of Oakland - A.P.L. Terminal PROJECT NO.: 95-113.07  
 WELL NO.: MW3 TESTED BY: J. Schollard DATE: 3/28/96

Measuring Point Description: N. side Top of casing Static Water Level (ft.): 3.17  
 Total Well Depth (ft.): 9.40 Sample Method: 2" disposable teflon bailer  
 Water Level Measurement Method: Solinst DTW Probe Time Sampled: 1532  
 Purge Method: 2" disposable Teflon bailer Sample Depth (ft.): ~ 3.0'  
 Time Start Purge: 1516 Field Filtering: N.A.  
 Time End Purge: 1529 Field Preservation: H<sub>2</sub>O ice

Comments: broken well box lid (cracked + in sections); water over top of casing; replaced lock  
collected QC-1 from MW3 (1530) 33

Well Volume Calculation (fill in before purging)	Total Depth (ft)	Depth to Water (ft)	Water Column (ft)	x	Multiplier for Casing Diameter (in)			Casing Volume (gal)
					2	4	6	
	9.40	3.17	= 6.23	x	0.16	0.64	1.44	= 1.0 (3 vols = 3 gal)
Time	1520	1526	1529					
Volume Purged (gals)	1.0	1.0	1.0					
Cumulative Volume Purged (gals)	1.0	2.0	3.0					
Cumulative Number of Casing Volumes	1.0	2.0	3.0					
Purge Rate (gpm)	0.25	0.17	0.33					
Temperature (F°) or (C°)	61.4	60.2	60.5					
pH	6.01	5.84	5.85					
Specific Conductivity (µmhos/cm) >1000	out of scale →							
Dissolved Oxygen (mg/L)	—	—	—					
Turbidity/Color (NTU)	clear	clear	clear					
Odor	None	None	None					
Dewatered?	No	No	No					

CHECKED BY: \_\_\_\_\_

DATE: \_\_\_\_\_



**ATTACHMENT B**

**COPY OF LABORATORY REPORTS AND CHAIN-OF-CUSTODY FORM  
FOR GROUNDWATER SAMPLES**

# Pace Analytical

April 12, 1996

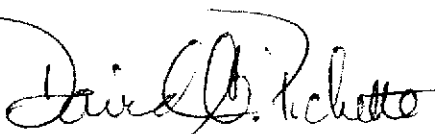
Mr. Jeff Hess  
Innovative Technical Solutions  
2855 Mitchell Drive, Suite 118  
Walnut Creek, CA 94598

RE: PACE Project Number: 705365  
Client Project ID: Port of Oakland/A.P.L. Terminal

Dear Mr. Hess:

Enclosed are the results of analyses for sample(s) received on March 29, 1996. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



David A. Pichette  
Project Manager

Enclosures

## REPORT OF LABORATORY ANALYSIS

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Pace Analytical Services, Inc.  
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Fax: 707-792-0342

DATE: 04/04/96  
PAGE: 1

Innovative Technical Solutions  
2855 Mitchell Drive, Suite 118  
Walnut Creek, CA 94598

PACE Project Number: 705365  
Client Project ID: Port of Oakland/A.P.L.Terminal

Attn: Mr. Jeff Hess  
Phone: (612)951-2519

PACE Sample No: 70561980 Date Collected: 03/28/96  
Client Sample ID: TRIP BLANK Date Received: 03/29/96

Parameters	Results	Units	PRL	Analyzed	Method	Analyst	CAS#	Footnotes
GC -- Volatiles								
Volatile Halogenated Organics								
Chloromethane	ND	ug/L	0.8	04/01/96	EPA 8010	am	74-87-3	
Bromomethane	ND	ug/L	3	04/01/96	EPA 8010	am	74-83-9	
Vinyl Chloride	ND	ug/L	1.8	04/01/96	EPA 8010	am	75-01-4	
Chloroethane	ND	ug/L	5.2	04/01/96	EPA 8010	am	75-00-3	
Methylene Chloride	ND	ug/L	2.5	04/01/96	EPA 8010	am	75-09-2	
Trichlorofluoromethane	ND	ug/L	5	04/01/96	EPA 8010	am	75-69-4	
1,1-Dichloroethene	ND	ug/L	1.3	04/01/96	EPA 8010	am	75-35-4	
1,1-Dichloroethane	ND	ug/L	0.7	04/01/96	EPA 8010	am	75-34-3	
trans-1,2-Dichloroethene	ND	ug/L	1	04/01/96	EPA 8010	am	156-60-5	
Chloroform	ND	ug/L	0.5	04/01/96	EPA 8010	am	67-66-3	
1,2-Dichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	107-06-2	
1,1,1-Trichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	71-55-6	
Carbon Tetrachloride	ND	ug/L	1.2	04/01/96	EPA 8010	am	56-23-5	
Bromodichloromethane	ND	ug/L	1	04/01/96	EPA 8010	am	75-27-4	
1,2-Dichloropropane	ND	ug/L	0.5	04/01/96	EPA 8010	am	78-87-5	
cis-1,3-Dichloropropene	ND	ug/L	3.4	04/01/96	EPA 8010	am	10061-01-5	
Trichloroethene	ND	ug/L	1.2	04/01/96	EPA 8010	am	79-01-6	
Dibromochloromethane	ND	ug/L	0.9	04/01/96	EPA 8010	am	124-48-1	
1,1,2-Trichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	79-00-5	
trans-1,3-Dichloropropene	ND	ug/L	3.4	04/01/96	EPA 8010	am	10061-02-6	
Bromoform	ND	ug/L	2	04/01/96	EPA 8010	am	75-25-2	
Tetrachloroethene	ND	ug/L	0.5	04/01/96	EPA 8010	am	127-18-4	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	79-34-5	
Chlorobenzene	ND	ug/L	0.7	04/01/96	EPA 8010	am	108-90-7	
2-Chloroethyl Vinyl Ether	ND	ug/L	1.3	04/01/96	EPA 8010	am	110-75-8	
1,2-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	106-46-7	
Bromochloromethane (S)	106	%		04/01/96	EPA 8010	am	74-97-5	

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Fax: 707-792-0342

DATE: 04/04/96  
PAGE: 2

PACE Project Number: 705365  
Client Project ID: Port of Oakland/A.P.L.Terminal

PACE Sample No: 70561980  
Client Sample ID: TRIP BLANK

Date Collected: 03/28/96  
Date Received: 03/29/96

Parameters	Results	Units	PRL	Analyzed	Method	Analyst	CAS#	Footnotes
1,4-Dichlorobutane (S)	118	%		04/01/96	EPA 8010	am	110-56-5	
GAS/BTEX by CA LUFT, Water								
Gasoline	ND	ug/L	50	04/01/96	CA LUFT	ADS		
Benzene	ND	ug/L	0.5	04/01/96	CA LUFT	ADS	71-43-2	
Toluene	ND	ug/L	0.5	04/01/96	CA LUFT	ADS	108-88-3	
Ethylbenzene	ND	ug/L	0.5	04/01/96	CA LUFT	ADS	100-41-4	
Xylene (Total)	ND	ug/L	1	04/01/96	CA LUFT	ADS	1330-20-7	
a,a,a-Trifluorotoluene (S)	87	%		04/01/96	CA LUFT	ADS	2164-17-2	
4-Bromofluorobenzene (S)	96	%		04/01/96	CA LUFT	ADS	460-00-4	

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DATE: 04/04/96  
 PAGE: 3

PACE Project Number: 705365  
 Client Project ID: Port of Oakland/A.P.L.Terminal

PACE Sample No: 70561998  
 Client Sample ID: MW3

Date Collected: 03/28/96  
 Date Received: 03/29/96

Parameters	Results	Units	PRL	Analyzed	Method	Analyst	CAS#	Footnotes
<b>Wet Chemistry</b>								
Total Dissolved Solids								
Total Dissolved Solids	7600	mg/L	5	04/01/96	EPA 160.1	am		
<b>GC -- Volatiles</b>								
<b>Volatile Halogenated Organics</b>								
Chloromethane	ND	ug/L	0.8	04/01/96	EPA 8010	am	74-87-3	
Bromomethane	ND	ug/L	3	04/01/96	EPA 8010	am	74-83-9	
Vinyl Chloride	ND	ug/L	1.8	04/01/96	EPA 8010	am	75-01-4	
Chloroethane	ND	ug/L	5.2	04/01/96	EPA 8010	am	75-00-3	
Methylene Chloride	ND	ug/L	2.5	04/01/96	EPA 8010	am	75-09-2	
Trichlorofluoromethane	ND	ug/L	5	04/01/96	EPA 8010	am	75-69-4	
1,1-Dichloroethene	ND	ug/L	1.3	04/01/96	EPA 8010	am	75-35-4	
1,1-Dichloroethane	ND	ug/L	0.7	04/01/96	EPA 8010	am	75-34-3	
trans-1,2-Dichloroethene	ND	ug/L	1	04/01/96	EPA 8010	am	156-60-5	
Chloroform	ND	ug/L	0.5	04/01/96	EPA 8010	am	67-66-3	
1,2-Dichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	107-06-2	
1,1,1-Trichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	71-55-6	
Carbon Tetrachloride	ND	ug/L	1.2	04/01/96	EPA 8010	am	56-23-5	
Bromodichloromethane	ND	ug/L	1	04/01/96	EPA 8010	am	75-27-4	
1,2-Dichloropropane	ND	ug/L	0.5	04/01/96	EPA 8010	am	78-87-5	
cis-1,3-Dichloropropene	ND	ug/L	3.4	04/01/96	EPA 8010	am	10061-01-5	
Trichloroethene	ND	ug/L	1.2	04/01/96	EPA 8010	am	79-01-6	
Dibromochloromethane	ND	ug/L	0.9	04/01/96	EPA 8010	am	124-48-1	
1,1,2-Trichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	79-00-5	
trans-1,3-Dichloropropene	ND	ug/L	3.4	04/01/96	EPA 8010	am	10061-02-6	
Bromoform	ND	ug/L	2	04/01/96	EPA 8010	am	75-25-2	
Tetrachloroethene	ND	ug/L	0.5	04/01/96	EPA 8010	am	127-18-4	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	79-34-5	
Chlorobenzene	ND	ug/L	0.7	04/01/96	EPA 8010	am	108-90-7	
2-Chloroethyl Vinyl Ether	ND	ug/L	1.3	04/01/96	EPA 8010	am	110-75-8	
1,2-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	541-73-1	
1,4-Dichlorobenzene	1.6	ug/L	1	04/01/96	EPA 8010	am	106-46-7	
Bromochloromethane (S)	111	%		04/01/96	EPA 8010	am	74-97-5	
1,4-Dichlorobutane (S)	127	%		04/01/96	EPA 8010	am	110-56-5	
<b>GC</b>								
<b>TPH in Water by 8015 Modified</b>								
Diesel Fuel	0.2	mg/L	0.05	04/03/96	TPH by EPA 8015M	DLL		1
Motor Oil	0.3	mg/L	0.25	04/03/96	TPH by EPA 8015M	DLL		1
n-Pentacosane (S)	92	%		04/03/96	TPH by EPA 8015M	DLL	629-99-2	

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Fax: 707-792-0342

DATE: 04/04/96  
PAGE: 4

PACE Project Number: 705365  
Client Project ID: Port of Oakland/A.P.L.Terminal

PACE Sample No: 70561998  
Client Sample ID: MW3

Date Collected: 03/28/96  
Date Received: 03/29/96

Parameters	Results	Units	PRL	Analyzed	Method	Analyst	CAS#	Footnotes
Date Extracted				04/01/96				

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PACE Project Number: 705365  
 Client Project ID: Port of Oakland/A.P.L.Terminal

PACE Sample No: 70562004  
 Client Sample ID: MW2

Date Collected: 03/28/96  
 Date Received: 03/29/96

Parameters	Results	Units	PRL	Analyzed	Method	Analyst	CAS#	Footnotes
<b>Water Chemistry</b>								
Total Dissolved Solids								
Total Dissolved Solids	1190	mg/L	5	04/01/96	EPA 160.1	am		
<b>GC -- Volatiles</b>								
<b>Volatile Halogenated Organics</b>								
Chloromethane	ND	ug/L	0.8	04/01/96	EPA 8010	am	74-87-3	
Bromomethane	ND	ug/L	3	04/01/96	EPA 8010	am	74-83-9	
Vinyl Chloride	ND	ug/L	1.8	04/01/96	EPA 8010	am	75-01-4	
Chloroethane	ND	ug/L	5.2	04/01/96	EPA 8010	am	75-00-3	
Methylene Chloride	ND	ug/L	2.5	04/01/96	EPA 8010	am	75-09-2	
Trichlorofluoromethane	ND	ug/L	5	04/01/96	EPA 8010	am	75-69-4	
1,1-Dichloroethene	ND	ug/L	1.3	04/01/96	EPA 8010	am	75-35-4	
1,1-Dichloroethane	ND	ug/L	0.7	04/01/96	EPA 8010	am	75-34-3	
trans-1,2-Dichloroethene	ND	ug/L	1	04/01/96	EPA 8010	am	156-60-5	
Chloroform	ND	ug/L	0.5	04/01/96	EPA 8010	am	67-66-3	
1,2-Dichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	107-06-2	
1,1,1-Trichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	71-55-6	
Carbon Tetrachloride	ND	ug/L	1.2	04/01/96	EPA 8010	am	56-23-5	
Bromodichloromethane	ND	ug/L	1	04/01/96	EPA 8010	am	75-27-4	
1,2-Dichloropropane	ND	ug/L	0.5	04/01/96	EPA 8010	am	78-87-5	
cis-1,3-Dichloropropene	ND	ug/L	3.4	04/01/96	EPA 8010	am	10061-01-5	
Trichloroethene	ND	ug/L	1.2	04/01/96	EPA 8010	am	79-01-6	
Dibromochloromethane	ND	ug/L	0.9	04/01/96	EPA 8010	am	124-48-1	
1,1,2-Trichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	79-00-5	
trans-1,3-Dichloropropene	ND	ug/L	3.4	04/01/96	EPA 8010	am	10061-02-6	
Bromoform	ND	ug/L	2	04/01/96	EPA 8010	am	75-25-2	
Tetrachloroethene	ND	ug/L	0.5	04/01/96	EPA 8010	am	127-18-4	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	79-34-5	
Chlorobenzene	ND	ug/L	0.7	04/01/96	EPA 8010	am	108-90-7	
2-Chloroethyl Vinyl Ether	ND	ug/L	1.3	04/01/96	EPA 8010	am	110-75-8	
1,2-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	106-46-7	
Bromochloromethane (S)	107	%		04/01/96	EPA 8010	am	74-97-5	
1,4-Dichlorobutane (S)	124	%		04/01/96	EPA 8010	am	110-56-5	
<b>GC</b>								
<b>TPH in Water by 8015 Modified</b>								
Diesel Fuel	0.28	mg/L	0.05	04/03/96	TPH by EPA 8015M	DLL		1
Motor Oil	0.38	mg/L	0.25	04/03/96	TPH by EPA 8015M	DLL		1
n-Pentacosane (S)	86	%		04/03/96	TPH by EPA 8015M	DLL	629-99-2	

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DATE: 04/04/96  
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PACE Project Number: 705365  
Client Project ID: Port of Oakland/A.P.L.Terminal

PACE Sample No: 70562004  
Client Sample ID: MW2

Date Collected: 03/28/96  
Date Received: 03/29/96

Parameters	Results	Units	PRL	Analyzed	Method	Analyst	CAS#	Footnotes
Date Extracted				04/01/96				

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PACE Project Number: 705365  
 Client Project ID: Port of Oakland/A.P.L. Terminal

PACE Sample No: 70562012  
 Client Sample ID: MW1

Date Collected: 03/28/96  
 Date Received: 03/29/96

Parameters	Results	Units	PRL	Analyzed	Method	Analyst	CAS#	Footnotes
<b>Net Chemistry</b>								
Total Dissolved Solids								
Total Dissolved Solids	453	mg/L	5	04/01/96	EPA 160.1	LMD		
<b>GC -- Volatiles</b>								
<b>Volatile Halogenated Organics</b>								
Chloromethane	ND	ug/L	0.8	04/01/96	EPA 8010	am	74-87-3	
Bromomethane	ND	ug/L	3	04/01/96	EPA 8010	am	74-83-9	
Vinyl Chloride	4	ug/L	1.8	04/01/96	EPA 8010	am	75-01-4	
Chloroethane	ND	ug/L	5.2	04/01/96	EPA 8010	am	75-00-3	
Methylene Chloride	ND	ug/L	2.5	04/01/96	EPA 8010	am	75-09-2	
Trichlorofluoromethane	ND	ug/L	5	04/01/96	EPA 8010	am	75-69-4	
1,1-Dichloroethene	ND	ug/L	1.3	04/01/96	EPA 8010	am	75-35-4	
1,1-Dichloroethane	1.2	ug/L	0.7	04/01/96	EPA 8010	am	75-34-3	
trans-1,2-Dichloroethene	ND	ug/L	1	04/01/96	EPA 8010	am	156-60-5	
Chloroform	ND	ug/L	0.5	04/01/96	EPA 8010	am	67-66-3	
1,2-Dichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	107-06-2	
1,1,1-Trichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	71-55-6	
Carbon Tetrachloride	ND	ug/L	1.2	04/01/96	EPA 8010	am	56-23-5	
Bromodichloromethane	ND	ug/L	1	04/01/96	EPA 8010	am	75-27-4	
1,2-Dichloropropane	ND	ug/L	0.5	04/01/96	EPA 8010	am	78-87-5	
cis-1,3-Dichloropropene	ND	ug/L	3.4	04/01/96	EPA 8010	am	10061-01-5	
Trichloroethene	ND	ug/L	1.2	04/01/96	EPA 8010	am	79-01-6	
Dibromochloromethane	ND	ug/L	0.9	04/01/96	EPA 8010	am	124-48-1	
1,1,2-Trichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	79-00-5	
trans-1,3-Dichloropropene	ND	ug/L	3.4	04/01/96	EPA 8010	am	10061-02-6	
Bromoform	ND	ug/L	2	04/01/96	EPA 8010	am	75-25-2	
Tetrachloroethene	ND	ug/L	0.5	04/01/96	EPA 8010	am	127-18-4	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	79-34-5	
Chlorobenzene	ND	ug/L	0.7	04/01/96	EPA 8010	am	108-90-7	
2-Chloroethyl Vinyl Ether	ND	ug/L	1.3	04/01/96	EPA 8010	am	110-75-8	
1,2-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	106-46-7	
Bromochloromethane (S)	107	%		04/01/96	EPA 8010	am	74-97-5	
1,4-Dichlorobutane (S)	118	%		04/01/96	EPA 8010	am	110-56-5	
<b>GAS/BTEX by CA LUFT, Water</b>								
Gasoline	430	ug/L	50	04/01/96	CA LUFT	ADS		
Benzene	6.6	ug/L	0.5	04/01/96	CA LUFT	ADS	71-43-2	
Toluene	2.4	ug/L	0.5	04/01/96	CA LUFT	ADS	108-88-3	
Ethylbenzene	12	ug/L	0.5	04/01/96	CA LUFT	ADS	100-41-4	

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DATE: 04/04/96  
PAGE: 8

PACE Project Number: 705365  
Client Project ID: Port of Oakland/A.P.L.Terminal

PACE Sample No: 70562012  
Client Sample ID: MW1

Date Collected: 03/28/96  
Date Received: 03/29/96

Parameters	Results	Units	PRL	Analyzed	Method	Analyst	CAS#	Footnotes
Xylene (Total)	8.5	ug/L	1	04/01/96	CA LUFT	ADS	1330-20-7	
a,a,a-Trifluorotoluene (S)	90	%		04/01/96	CA LUFT	ADS	2164-17-2	
4-Bromofluorobenzene (S)	100	%		04/01/96	CA LUFT	ADS	460-00-4	
GC								
TPH in Water by 8015 Modified								
Diesel Fuel	0.71	mg/L	0.05	04/03/96	TPH by EPA 8015M	DLL		
Motor Oil	0.82	mg/L	0.25	04/03/96	TPH by EPA 8015M	DLL		1
n-Pentacosane (S)	83	%		04/03/96	TPH by EPA 8015M	DLL	629-99-2	
Date Extracted				04/01/96				

## REPORT OF LABORATORY ANALYSIS

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DATE: 04/04/96  
 PAGE: 9

PACE Project Number: 705365  
 Client Project ID: Port of Oakland/A.P.L.Terminal

PACE Sample No: 70562020  
 Client Sample ID: QC1

Date Collected: 03/28/96  
 Date Received: 03/29/96

Parameters	Results	Units	PRL	Analyzed	Method	Analyst	CAS#	Footnotes
GC -- Volatiles								
Volatile Halogenated Organics								
Chloromethane	ND	ug/L	0.8	04/01/96	EPA 8010	am	74-87-3	
Bromomethane	ND	ug/L	3	04/01/96	EPA 8010	am	74-83-9	
Vinyl Chloride	4.2	ug/L	1.8	04/01/96	EPA 8010	am	75-01-4	
Chloroethane	ND	ug/L	5.2	04/01/96	EPA 8010	am	75-00-3	
Methylene Chloride	ND	ug/L	2.5	04/01/96	EPA 8010	am	75-09-2	
Trichlorofluoromethane	ND	ug/L	5	04/01/96	EPA 8010	am	75-69-4	
1,1-Dichloroethene	ND	ug/L	1.3	04/01/96	EPA 8010	am	75-35-4	
1,1-Dichloroethane	1.1	ug/L	0.7	04/01/96	EPA 8010	am	75-34-3	
trans-1,2-Dichloroethene	ND	ug/L	1	04/01/96	EPA 8010	am	156-60-5	
Chloroform	ND	ug/L	0.5	04/01/96	EPA 8010	am	67-66-3	
1,2-Dichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	107-06-2	
1,1,1-Trichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	71-55-6	
Carbon Tetrachloride	ND	ug/L	1.2	04/01/96	EPA 8010	am	56-23-5	
Bromodichloromethane	ND	ug/L	1	04/01/96	EPA 8010	am	75-27-4	
1,2-Dichloropropane	ND	ug/L	0.5	04/01/96	EPA 8010	am	78-87-5	
cis-1,3-Dichloropropene	ND	ug/L	3.4	04/01/96	EPA 8010	am	10061-01-5	
Trichloroethene	ND	ug/L	1.2	04/01/96	EPA 8010	am	79-01-6	
Dibromochloromethane	ND	ug/L	0.9	04/01/96	EPA 8010	am	124-48-1	
1,1,2-Trichloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	79-00-5	
trans-1,3-Dichloropropene	ND	ug/L	3.4	04/01/96	EPA 8010	am	10061-02-6	
Bromoform	ND	ug/L	2	04/01/96	EPA 8010	am	75-25-2	
Tetrachloroethene	ND	ug/L	0.5	04/01/96	EPA 8010	am	127-18-4	
1,1,2,2-Tetrachloroethane	ND	ug/L	0.5	04/01/96	EPA 8010	am	79-34-5	
Chlorobenzene	ND	ug/L	0.7	04/01/96	EPA 8010	am	108-90-7	
2-Chloroethyl Vinyl Ether	ND	ug/L	1.3	04/01/96	EPA 8010	am	110-75-8	
1,2-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	1	04/01/96	EPA 8010	am	106-46-7	
Bromochloromethane (S)	111	%		04/01/96	EPA 8010	am	74-97-5	
1,4-Dichlorobutane (S)	119	%		04/01/96	EPA 8010	am	110-56-5	
GAS/BTEX by CA LUFT, Water								
Gasoline	480	ug/L	50	04/01/96	CA LUFT	ADS		
Benzene	6.9	ug/L	0.5	04/01/96	CA LUFT	ADS	71-43-2	
Toluene	3	ug/L	0.5	04/01/96	CA LUFT	ADS	108-88-3	
Ethylbenzene	14	ug/L	0.5	04/01/96	CA LUFT	ADS	100-41-4	
Xylene (Total)	9.7	ug/L	1	04/01/96	CA LUFT	ADS	1330-20-7	
a,a,a-Trifluorotoluene (S)	89	%		04/01/96	CA LUFT	ADS	2164-17-2	
4-Bromofluorobenzene (S)	103	%		04/01/96	CA LUFT	ADS	460-00-4	

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Fax: 707-792-0342

DATE: 04/04/96  
PAGE: 10

PACE Project Number: 705365  
Client Project ID: Port of Oakland/A.P.L.Terminal

---

## PARAMETER FOOTNOTES

ND Not Detected  
NC Not Calculable  
PRL PACE Reporting Limit  
(S) Surrogate  
[1] Hydrocarbons present do not match profile of laboratory standard.

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## QUALITY CONTROL DATA

DATE: 04/04/96  
PAGE: 11

Innovative Technical Solutions  
2855 Mitchell Drive, Suite 118  
Walnut Creek, CA 94598

PACE Project Number: 705365  
Client Project ID: Port of Oakland/A.P.L.Terminal

Attn: Mr. Jeff Hess  
Phone: (612)951-2519

QC Batch ID: 13579      QC Batch Method: EPA 8010      Date of Batch: 03/28/96  
Associated PACE Samples:      70561980      70561998      70562004      70562012      70562020

METHOD BLANK: 70562251  
Associated PACE Samples:

Parameter	70561980	70561998 Method Blank Result	70562004	70562012	70562020
Chloromethane	ug/L	ND	0.8		
Bromomethane	ug/L	ND	3		
Vinyl Chloride	ug/L	ND	1.8		
Chloroethane	ug/L	ND	5.2		
Methylene Chloride	ug/L	ND	2.5		
Trichlorofluoromethane	ug/L	ND	5		
1,1-Dichloroethene	ug/L	ND	1.3		
1,1-Dichloroethane	ug/L	ND	0.7		
trans-1,2-Dichloroethene	ug/L	ND	1		
Chloroform	ug/L	ND	0.5		
1,2-Dichloroethane	ug/L	ND	0.5		
1,1,1-Trichloroethane	ug/L	ND	0.5		
Carbon Tetrachloride	ug/L	ND	1.2		
Bromodichloromethane	ug/L	ND	1		
1,2-Dichloropropane	ug/L	ND	0.5		
cis-1,3-Dichloropropene	ug/L	ND	3.4		
Trichloroethene	ug/L	ND	1.2		
Dibromochloromethane	ug/L	ND	0.9		
1,1,2-Trichloroethane	ug/L	ND	0.5		
trans-1,3-Dichloropropene	ug/L	ND	3.4		
Bromoform	ug/L	ND	2		
Tetrachloroethene	ug/L	ND	0.5		
1,1,2,2-Tetrachloroethane	ug/L	ND	0.5		
Chlorobenzene	ug/L	ND	0.7		
1,2-Chloroethyl Vinyl Ether	ug/L	ND	1.3		
1,2-Dichlorobenzene	ug/L	ND	1		

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QUALITY CONTROL DATA

DATE: 04/04/96  
 PAGE: 12

PACE Project Number: 705365  
 Client Project ID: Port of Oakland/A.P.L.Terminal

METHOD BLANK: 70562251  
 Associated PACE Samples:

Parameter	Units	70561980	70561998 Method Blank Result	70562004 PRL	70562012	70562020 Footnotes
1,3-Dichlorobenzene	ug/L		ND	1		
1,4-Dichlorobenzene	ug/L		ND	1		
Bromochloromethane (S)	%		107			
1,4-Dichlorobutane (S)	%		124			

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 70561576 70561584

Parameter	Units	70559208	Spike Conc.	Matrix Spike Result	Spike % Rec	Matrix Sp. Dup. Result	Spike Dup % Rec	RPD	Footnotes
Chloromethane	ug/L	ND	100	78	78	80	81	4	
Bromomethane	ug/L	ND	100	110	113	120	119	5	
Vinyl Chloride	ug/L	ND	100	90	89	94	92	3	
Chloroethane	ug/L	ND	100	96	96	100	101	5	
Methylene Chloride	ug/L	ND	100	88	83	96	91	9	
Trichlorofluoromethane	ug/L	ND	100	100	102	100	104	2	
1,1-Dichloroethane	ug/L	ND	100	100	95	100	97	2	
1,1-Dichloroethane	ug/L	7.4	100	94	86	94	86	0	
trans-1,2-Dichloroethene	ug/L	ND	100	87	86	88	87	1	
Chloroform	ug/L	ND	100	84	83	86	86	4	
1,2-Dichloroethane	ug/L	ND	100	98	99	88	88	12	
1,1,1-Trichloroethane	ug/L	16	100	110	91	96	80	13	
Carbon Tetrachloride	ug/L	ND	100	98	96	88	87	10	
Bromodichloromethane	ug/L	ND	100	100	104	92	92	12	
1,2-Dichloropropane	ug/L	ND	100	100	102	93	93	9	
cis-1,3-Dichloropropene	ug/L	ND	100	100	101	92	93	8	
Trichloroethene	ug/L	78	100	140	58	130	51	13	
Dibromochloromethane	ug/L	ND	100	95	95	97	97	2	
1,1,2-Trichloroethane	ug/L	ND	100	100	101	91	91	10	
trans-1,3-Dichloropropene	ug/L	ND	100	100	102	94	94	8	
Bromoform	ug/L	ND	100	110	109	100	103	6	
Tetrachloroethene	ug/L	ND	100	90	89	88	86	3	
1,1,2,2-Tetrachloroethane	ug/L	ND	100	94	94	96	96	2	
Chlorobenzene	ug/L	ND	100	100	103	100	102	1	
2-Chloroethyl Vinyl Ether	ug/L	ND	100	ND	0	74	74	200	
1,2-Dichlorobenzene	ug/L	ND	100	98	97	88	86	12	
1,3-Dichlorobenzene	ug/L	ND	100	90	90	93	92	2	
1,4-Dichlorobenzene	ug/L	ND	100	96	96	90	90	6	

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## QUALITY CONTROL DATA

DATE: 04/04/96  
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PACE Project Number: 705365  
Client Project ID: Port of Oakland/A.P.L.Terminal

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 70561576		70561584		Matrix	Matrix	Spike			
Parameter	Units	70559208	Spike Conc.	Spike Result	Spike % Rec	Sp. Dup. Result	Dup % Rec	RPD	Footnotes
Bromochloromethane (S)					94		87		
1,4-Dichlorobutane (S)					90		90		

LABORATORY CONTROL SAMPLE & LCSD: 70561550		70561568		Spike	LCSD	Spike	LCSD	Spike	
Parameter	Units	Spike Conc.	LCS Result	% Rec	Result	% Rec	Result	RPD	Footnotes
Chloromethane	ug/L	20	16	80	17	84	5		
Bromomethane	ug/L	20	23	114	25	127	11		
Vinyl Chloride	ug/L	20	19	95	19	95	0		
Chloroethane	ug/L	20	21	103	22	108	5		
Ethylene Chloride	ug/L	20	21	106	22	111	5		
Trichlorofluoromethane	ug/L	20	22	108	24	118	9		
1,1-Dichloroethene	ug/L	20	21	105	23	113	7		
1,1-Dichloroethane	ug/L	20	21	106	23	113	6		
trans-1,2-Dichloroethene	ug/L	20	21	104	22	111	7		
Chloroform	ug/L	20	18	89	20	98	10		
1,2-Dichloroethane	ug/L	20	20	102	19	96	6		
1,1,1-Trichloroethane	ug/L	20	21	105	20	98	7		
Carbon Tetrachloride	ug/L	20	21	103	19	96	7		
Bromodichloromethane	ug/L	20	22	108	21	105	3		
1,2-Dichloropropane	ug/L	20	21	105	20	102	3		
cis-1,3-Dichloropropene	ug/L	20	19	97	23	114	16		
1,1,2-Trichloroethane	ug/L	20	20	102	20	98	4		
Bromochloromethane	ug/L	20	21	103	22	112	8		
1,1,2-Trichloroethane	ug/L	20	19	95	20	101	6		
trans-1,3-Dichloropropene	ug/L	20	19	97	21	104	7		
Bromoform	ug/L	20	26	128	23	116	10		
Tetrachloroethene	ug/L	20	19	93	19	96	3		
1,1,2,2-Tetrachloroethane	ug/L	20	22	111	22	109	2		
Chlorobenzene	ug/L	20	23	113	22	112	1		
2-Chloroethyl Vinyl Ether	ug/L	20	30	149	23	116	25		
1,2-Dichlorobenzene	ug/L	20	20	98	20	101	3		
1,3-Dichlorobenzene	ug/L	20	18	93	20	102	9		
1,4-Dichlorobenzene	ug/L	20	19	93	20	102	9		
Bromochloromethane (S)				97		104			
1,4-Dichlorobutane (S)				107		104			

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## QUALITY CONTROL DATA

DATE: 04/04/96  
PAGE: 14

Innovative Technical Solutions  
2855 Mitchell Drive, Suite 118  
Walnut Creek, CA 94598

PACE Project Number: 705365  
Client Project ID: Port of Oakland/A.P.L.Terminal

Attn: Mr. Jeff Hess  
Phone: (612)951-2519

QC Batch ID: 13608  
Associated PACE Samples: 70561998 70562004 70562012

Date of Batch: 04/01/96

METHOD BLANK: 70562269  
Associated PACE Samples:

	70561998	70562004	70562012	
Parameter	Units	Method Blank Result	PRL	Footnotes
Total Dissolved Solids	mg/L	ND	5	

SAMPLE DUPLICATE: 70562947

Parameter	Units	70561998	Dup. Result	RPD	Footnotes
Total Dissolved Solids	mg/L	7600	7610	0	

SAMPLE DUPLICATE: 70562954

Parameter	Units	70562079	Dup. Result	RPD	Footnotes
Total Dissolved Solids	mg/L	1030	1020	0	

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## QUALITY CONTROL DATA

DATE: 04/04/96  
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Innovative Technical Solutions  
 2855 Mitchell Drive, Suite 118  
 Walnut Creek, CA 94598

PACE Project Number: 705365  
 Client Project ID: Port of Oakland/A.P.L.Terminal

Attn: Mr. Jeff Hess  
 Phone: (612)951-2519

QC Batch ID: 13617  
 Associated PACE Samples: 70561998 70562004 70562012

Date of Batch: 04/01/96

METHOD BLANK: 70562392  
 Associated PACE Samples:

Parameter	Units	70561998	70562004	70562012	Footnotes
			Method Blank Result	PRL	
Diesel Fuel	mg/L		ND	0.05	
Motor Oil	mg/L		ND	0.25	
n-Pentacosane (S)	%		95		

LABORATORY CONTROL SAMPLE & LCSD: 70562400

Parameter	Units	70562418		Spike % Rec	LCSD Result	Spike Dup		Footnotes
		Spike Conc.	LCS Result			% Rec	RPD	
Diesel Fuel	mg/L	1	0.86	86	0.8	80	7	
n-Pentacosane (S)				94		91		

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## QUALITY CONTROL DATA

DATE: 04/04/96  
 PAGE: 16

Innovative Technical Solutions  
 2855 Mitchell Drive, Suite 118  
 Walnut Creek, CA 94598

PACE Project Number: 705365  
 Client Project ID: Port of Oakland/A.P.L.Terminal

Attn: Mr. Jeff Hess  
 Phone: (612)951-2519

QC Batch ID: 13619  
 Associated PACE Samples: 70561980 70562012 70562020

QC Batch Method: CA LUFT  
 Date of Batch: 04/01/96

METHOD BLANK: 70562483  
 Associated PACE Samples:

Parameter	Units	70561980	70562012	70562020	Method Blank Result	PRL	Footnotes
Gasoline	ug/L				ND	50	
Benzene	ug/L				ND	0.5	
Toluene	ug/L				ND	0.5	
Ethylbenzene	ug/L				ND	0.5	
Xylene (Total)	ug/L				ND	1	
1,2,4-Trifluorotoluene (S)	%				88		
1-Bromofluorobenzene (S)	%				97		

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 70562905 70562913

Parameter	Units	70562012	Spike Conc.	Matrix Spike Result	Spike % Rec	Matrix Sp. Dup. Result	Spike Dup % Rec	RPD	Footnotes
Benzene	ug/L	6.6	100	110	104	110	105	1	
Toluene	ug/L	2.4	100	100	100	110	101	1	
Ethylbenzene	ug/L	12	100	110	101	110	100	1	
Xylene (Total)	ug/L	8.5	300	310	101	310	101	0	
1,2,4-Trifluorotoluene (S)					89		90		
1-Bromofluorobenzene (S)					110		108		

LABORATORY CONTROL SAMPLE & LCSD: 70562491 70562509

Parameter	Units	Spike Conc.	LCS Result	Spike % Rec	LCSD Result	Spike Dup % Rec	RPD	Footnotes
Benzene	ug/L	100	100	105	110	108	3	

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## QUALITY CONTROL DATA

DATE: 04/04/96  
PAGE: 17

PACE Project Number: 705365  
Client Project ID: Port of Oakland/A.P.L.Terminal

LABORATORY CONTROL SAMPLE & LCSD: 70562491 70562509

Parameter	Units	Spike Conc.	LCS Result	Spike % Rec	LCSD Result	Spike Dup % Rec	RPD	Footnotes
Toluene	ug/L	100	100	100	100	102	2	
Ethylbenzene	ug/L	100	100	101	100	102	1	
Xylene (Total)	ug/L	300	300	101	310	103	2	
1,3,5-Trifluorotoluene (S)				85		84		
4-Bromofluorobenzene (S)				101		101		

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DATE: 04/04/96  
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PACE Project Number: 705365  
Client Project ID: Port of Oakland/A.P.L.Terminal

---

QUALITY CONTROL DATA PARAMETER FOOTNOTES

The Quality Control Sample Final Results listed above have been rounded to reflect an appropriate number of significant figures. Consistent with EPA guidelines unrounded concentrations have been used to calculate % Rec and RPD values.

ND Not Detected  
NC Not Calculable  
PRL PACE Reporting Limit  
RPD Relative Percent Difference  
(S) Surrogate

## REPORT OF LABORATORY ANALYSIS

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**INNOVATIVE TECHNICAL SOLUTIONS, Inc.**



2855 Mitchell Drive, Suite 118  
Walnut Creek, California 94598  
(510) 256-8898 (Tel), (510) 256-8998 (Fax)

705365

PROJECT NAME: Port of Oakland - A.P.L. Terminal

PROJECT NUMBER: 75-113.07

SITE LOCATION: 1395 Middle Harbor Rd, Oakland

**CHAIN OF CUSTODY**

DATE: 3/27/96  
PAGE: 1 of 2

SAMPLE ID	SAMPLE DEPTH	DATE	TIME	NUMBER OF CONTAINERS	TYPE OF CONTAINERS	SAMPLE MATRIX	ANALYSIS											SPECIAL INSTRUCTIONS/ NOTES/COMMENTS	TOTAL NUMBER OF ANALYSES
							TPH as Gas/BTEX - 8015/8020	TPH as Diesel - 8015 <i>Mo Tor Oil</i>	TEPH - 8015	TRPH - 418.1	Oil and Grease - 5520 D&F	LUFT Metals (Cd, Cr, Ni, Pb, Zn)	CAM 17 Metals	VOCs - 8240	SVOCs - 8270	HVOCs - 8010	Total Pesticides		
Trip Blank	—	3/27/96	Lab Provided	2	Voa	W	X											561980	3
MW3			1532	3	Voa	W												561998	1
				1	IRA	W	X												2
				1	IRP	W													1
MW2			1633	3	Voa	W												562004	1
				1	IRA	W	X												2
				1	IRP	W													1
MW1			1735	6	Voa	W	X											562012	3
				1	IRA	W	X												2
				1	IRP	W													1
QC1			1730	6	Voa	W	X											562020	3
TOTAL NUMBER OF CONTAINERS				26	TOTAL TESTS		6	6											
																			20

PACE Analytical  
Petaluma, CA

SAMPLED BY: Jim Schollard  
SIGNATURE: [Signature]

SPECIAL INSTRUCTIONS/COMMENTS: Standard T.A.T

RELINQUISHED BY: Jim Schollard  
Printed Name: ITSI  
Signature: [Signature]  
Date and Time: 3/29/96 11:00

RELINQUISHED BY: \_\_\_\_\_  
Printed Name: \_\_\_\_\_  
Signature: \_\_\_\_\_  
Date and Time: \_\_\_\_\_

RELINQUISHED BY: \_\_\_\_\_  
Printed Name: \_\_\_\_\_  
Signature: \_\_\_\_\_  
Date and Time: \_\_\_\_\_

RECEIVED BY: E Wolscen  
Printed Name: ITSI  
Signature: [Signature]  
Date and Time: 3/29/96 (1:00)

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Signature: \_\_\_\_\_  
Date and Time: \_\_\_\_\_

SEND RESULTS TO: Jeff Hess, ITSI, 2855 Mitchell Dr., Ste 118, Walnut Crk, CA 94598 (510) 256-8898