USPCI
A Subsidiary of
Union Pacific Corporation

Quarterly Monitoring Report
Hydrocarbon Recovery System
Union Pacific Railroad Yard
Oakland, California
Third Quarter, 1993

Prepared for
Union Pacific Railroad
by

USPCI
Remedial Services
5665 Flatiron Parkway
Boulder, Colorado 80301
October 11, 1993

DM\October 6, 1993\OAK\QTR393.RPT

CC: Ray Balcon
California Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, Ca. 94612

Jeff Asay - Law - Los Angeles
Joe Beardon - Supt. Stockton, Ca.
Jerry Everett - Room 1200
Avery Grimes - Room 930

File: Oakland, Ca.
Environmental

October 12, 1993

Mr. Safa Toma
East Bay Municipal Utility District
Source Control Division, Mail Slot 702
Post Office Box 24055
Oakland, Ca. 94623-1056

Dear Mr. Toma:

QUARTERLY REPORT for Groundwater Discharge Permit account number 502-51231, for Union Pacific Railroad's Hydrocarbon Recovery System in Oakland, Ca.

Attached is the Third Quarter 1993 "Quarterly Monitoring Report" for our Hydrocarbon Recovery System in Oakland.

If you have any questions on the report, please call me at (402) 271-4078.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true , accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Yours truly,

Harry P. Patterson, P.E.
Manager Environmental Site Remediation

QUARTERLY MONITORING REPORT
HYDROCARBON RECOVERY SYSTEM
UNION PACIFIC RAILROAD YARD
OAKLAND, CALIFORNIA
THIRD QUARTER, 1993

Prepared for
Union Pacific Railroad
by

USPCI
Remedial Services
5665 Flatiron Parkway
Boulder, Colorado 80301
Project Number 96199
October 11, 1993

CONTENTS

1. INTRODUCTION

In accordance to the East Bay Municipal Utility District (EBMUD) permit number 502-51231, this report was prepared by USPCI to provide quarterly monitoring information pertaining to the hydrocarbon recovery and treatment system, and the groundwater monitoring wells located in the Union Pacific Railroad (UPRR) Oakland Trailer on Flat Car (TOFC) rail yard at 1717 Middle Harbor Road in Oakland, California. Background information about the site was presented in the report, "**Hydrocarbon Investigation and Remedial Design**", dated June 10, 1991. The results of the hydrocarbon investigation and a conceptual design of the hydrocarbon recovery and treatment system were also presented in the report. The system design was outlined in the, "**Preliminary Design Report**", dated September 5, 1991. As-built information for the groundwater recovery and treatment system have been presented in the "**Hydrocarbon Recovery System, As-Built Construction Report**", dated July 20, 1992. Any process changes in the hydrocarbon recovery and treatment system were presented in the letter from UPRR dated March 22, 1993, which represented the permit renewal document.

2. GROUNDWATER RECOVERY AND TREATMENT SYSTEM MONITORING

The recovery of floating non aqueous-phase liquid hydrocarbons as diesel (diesel) is accomplished by depressing the groundwater table with total fluids pumps and creating a cone of depression surrounding the recovery wells. The recovered groundwater is treated and discharged to the EBMUD sanitary sewer. The recovery and treatment system consists of three recovery wells, an oil/water separator, a recovered oil storage tank, and an activated carbon treatment system. The location of the three recovery wells and the water treatment facility are indicated on Figure 1.

2.1 SYSTEM OPERATION

During the operating period of June 10 to August 31, 1993, the groundwater recovery and treatment system recovered approximately 430 gallons of diesel and treated more than 335,000 gallons of groundwater. Since start-up on May 12, 1992 until June 10, 1993, the system has recovered approximately 2,330 gallons of diesel. Copies of the field log for the Hydrocarbon Recovery System have been included as Appendix A.

2.2 SYSTEM SAMPLING

On June 30, July 28, and August 31, 1993, water samples were collected from sampling ports located before and after the granular activated carbon vessels. The samples were analyzed for total petroleum hydrocarbons as diesel (TPHd) using EPA method 8015 modified, and EPA method 8020 for benzene, toluene, ethylbenzene, and xylenes (BTEX). On June 14, June 30, July 13, July 28, and August 31, 1993 water samples were collected from between the two granular activated carbon vessels to monitor the breakthrough of organics on the first of two vessels. All analytical results are included as Appendix B.

2.3 ANALYTICAL RESULTS

Analytical results of BTEX and TPHd from the influent to the activated carbon system are indicated in Table 1. The EBMUD discharge limits for BTEX, as well as the analytical results from the sampling of the effluent from the water treatment system are listed in Table 2. A summary of the between carbon results has been included as Table 3.

2.3.1 INFLUENT WATER STREAM TO CARBON UNITS

Total influent BTEX concentrations of the water stream to the carbon units ranged from below analytical detection limits of <0.0003 to <0.0009 milligrams per liter (mg/L) to a high of 0.040 mg/L. Influent TPHd concentrations ranged from 1.2 to 3.2 mg/L.

2.3.2 EFFLUENT WATER STREAM FROM CARBON UNITS

Analytical results indicate that BTEX concentrations for all sampling events were below the analytical detection limit, which ranged from 0.0003 to 0.0009 mg/L. All TPHd concentrations were below detection limits of <0.050 and 0.100 mg/L. The effluent was below the discharge limits in all cases. The discharge limits for BTEX are included in Table 2 with the analytical results.

2.4 GRANULAR ACTIVATED CARBON USAGE

This section provides an estimate of carbon usage for the first or "lead" vessel. Two 2,000 pound granular activated carbon vessels are connected in series to remove organic compounds dissolved in the recovered groundwater. The second vessel prevents a release of water above the discharge limits once the first carbon vessel is loaded with organics or "breakthrough" occurs.

Table 4 presents the estimated amount of spent carbon (adsorption sites loaded with contaminants) and the expected life of the vessel. The estimate in Table 4 indicates that breakthrough should have occurred soon after May 27, 1993. As indicated from the analytical results of the lead vessel,

concentrations of BTEX (Table 3), were detected in the water stream on June 14, 1993. On June 30, 1993, the influent concentrations to the lead vessel, as well as after the lead vessel, were below detection limits. On July 13, 1993, effluent concentrations from the lead vessel were again detected (indicates that the influent concentrations of the lead vessel had returned to above detection limits). On July 21, 1993, the lead carbon vessel was changed out. The second vessel is now plumbed as the lead vessel, and the new carbon vessel has replaced the second vessel. Sample calculations, that are represented in Table 4, were presented with the "**Hydrocarbon Recovery System Quarterly Monitoring Report, Second Quarter, 1992**".

3. GROUNDWATER MONITORING

As requested by EBMUD, groundwater monitoring information has been included as part of the quarterly report. The water levels in the monitor wells and recovery wells were measured on July 13, 1993. The field log of these measurements is included in Appendix A and results of groundwater elevation measuring activities are presented in Table 5.

On May 14, 1993, groundwater samples were collected from monitoring wells OMW-1, OMW-2, OMW-3, OMW-5, OMW-6, and OMW-8 (see Table 6). The samples were analyzed for TPHd and BTEX. The analytical results were included with the previous Quarterly Monitoring Report. The next sampling event is scheduled for November 1993. The location of groundwater monitoring wells are indicated on Figure 1. To provide a detailed view of monitoring wells in the spill area, OMW-6 has been omitted from Figure 1. The location of OMW-6 is indicated on Figure 2 in the "**Hydrocarbon Investigation and Remedial Design**" report, dated June 10, 1993.

4. CONCLUSIONS

Water discharge from the Hydrocarbon Recovery System did not exceed the EBMUD discharge limits during the third quarter of 1993.

FIGURE

NAVY
SUPPLY
CENTER

WATER TREATMENT FACILITY

YARD OFFICE

OMW-1

6" TRANSITE SANITARY SEWER

EXIST. SUMP

EXIST. OIL/WATER SEPERATOR

EXIST. DISCHARGE

OMW-8

OMW-4

OMW-7

ORW-3

ORW-2

ORW-1

OMW-9

B-4

OMW-3

B-7

AIR COMPRESSOR BLDG

FUEL TANKS

B-8

PROPERTY BOUNDARY

OWM-10

B-9

B-1

GATEHOUSE

CATCH BASIN PLUGGED WITH CONCRETE

B-6

OMW-5

OMW-2

B-2

B-3

CROSSTIES LEFT OFF FOR CLARITY

UP: TRANSPORT

PROPERTY BOUNDARY

TRUCK REPAIR SHOP

STORM SEWER

36" STORM SEWER

LEGEND

- RECOVERY WELL
- OMW-1 — MONITORING WELL LOCATION AND NUMBER
- B-1 — BORING LOCATION AND NUMBER
- MANHOLES FOR STORM SEWER

North

0 120

FEET

	BY	DATE
DRAWN	C.W.	12-92
CHECKED		
APPROVED		
APPROVED		
APPROVED		

USPCI
A Subsidiary of Union Pacific Corporation

UPRR TOFC RAILYARD - OAKLAND, CALIFORNIA

FIGURE 1
SITE MAP

SCALE 1" = 120'

DWG NO 26'99-23

TABLES

TABLE 1

Analytical Results
Influent Water Stream to Carbon Units
Hydrocarbon Treatment System
Oakland TOFC

Date Collected	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	Total Petroleum Hydrocarbons as Diesel (mg/L)
05/12/92	0.023	0.022	0.029	0.200	45
05/19/92	<0.002	0.007	0.003	0.064	59
05/27/92	<0.005	<0.005	0.006	0.059	61
06/02/92	<0.005	<0.005	<0.005	0.025	100
07/07/92	<0.005	<0.005	0.005	0.026	200
08/11/92	0.0091	<0.003	0.013	0.051	6.1
09/25/92	0.0085	<0.003	0.0055	0.024	17
11/16/92	<0.050	<0.050	<0.050	<0.050	100
12/04/92	0.0042	<0.001	<0.001	0.009	8.7
02/02/93	0.0083	<0.001	<0.001	0.0012	6.9
03/30/93	0.0095	0.0015	0.0087	0.030	44
04/30/93	0.0007	0.0012	0.001	0.0069	14
05/27/93	0.0054	0.019	0.0092	0.040	120
06/30/93	<0.0003	<0.0003	<0.0003	<0.0009	1.2
07/28/93	0.014	0.0006	0.0054	0.025	2.2
08/31/93	0.012	0.0007	0.0041	0.023	3.2

TABLE 2

Analytical Results
Effluent Water Stream from Carbon Units
Hydrocarbon Treatment System
Oakland TOFC

Date Collected	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)	Total Petroleum Hydrocarbons as Diesel (mg/L)
EDMUD Discharge Limit	0.005	0.007	0.005	0.008	N/A
05/12/92	<0.0005	<0.0005	<0.0005	<0.0005	<0.050
05/19/92	<0.0005	<0.0005	<0.0005	<0.0005	<0.050
05/27/92	<0.0005	<0.0005	<0.0005	<0.0005	<0.050
06/02/92	<0.0005	<0.0005	<0.0005	<0.0005	0.12
07/07/92	<0.0005	<0.0005	<0.0005	0.0011	18
08/11/92	<0.0005	<0.0005	<0.0005	<0.0005	1.3
09/25/92	<0.001	<0.001	<0.001	0.0014	9.7
11/16/92	<0.0005	<0.0005	<0.0005	<0.0005	0.53
12/04/92	<0.0005	<0.0005	<0.0005	<0.0005	0.24
02/02/93	<0.0005	<0.0005	<0.0005	<0.0005	<0.050
03/30/93	<0.0005	<0.0005	<0.0005	<0.0005	0.074
04/30/93	<0.0003	<0.0003	<0.0003	<0.0009	<0.050
05/27/93	<0.0003	<0.0003	<0.0003	<0.0009	<0.050
06/30/93	<0.0003	<0.0003	<0.0003	<0.0009	<0.050
07/28/93	<0.0003	<0.0003	<0.0003	<0.0009	<0.100
08/31/93	<0.0003	<0.0003	<0.0003	<0.0009	<0.050

N/A – Not Applicable

TABLE 3

Analytical Results
Water Stream Between Carbon Units
Hydrocarbon Treatment System
Oakland TOFC

Date Collected	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)
08/11/92	<0.0005	<0.0005	<0.0005	<0.0005
09/14/92	<0.003	<0.003	<0.003	<0.003
11/06/92	<0.0005	<0.001	<0.0005	<0.0005
12/04/92	<0.003	<0.003	<0.003	<0.003
12/18/92	<0.005	<0.005	<0.005	<0.005
01/20/93	0.0012	0.0005	<0.0005	0.0015
02/02/93	0.00077	<0.0005	<0.0005	<0.0005
02/16/93	0.0043	<0.0005	0.0012	0.0038
03/30/93	<0.0005	<0.0005	<0.0005	<0.0005
04/22/93	<0.0005	<0.0005	<0.0005	<0.0005
04/30/93	<0.0003	<0.0003	<0.0003	<0.0009
05/27/93	<0.003	<0.003	<0.003	<0.009
06/14/93	0.0004	0.0004	0.0004	0.0023
06/30/93	<0.0003	<0.0003	<0.0003	<0.0009
07/13/93	0.0007	0.0004	<0.0003	<0.0009
07/28/93	<0.0003	<0.0003	<0.0003	<0.0009
08/31/93	<0.0003	<0.0003	<0.0003	<0.0009

TABLE 4

Hydrocarbon Treatment System
Granular Activated Carbon Usage
Oakland TOFC

Date	Time	Volume (gallons)	Periodic Flowrate (gpm)	Average Flowrate (gpm)	Influent Conc–TPH (mg/l)	Carbon Used (pounds)	Spent Carbon Estimate (pounds)	Remaining Pumpable (gallons)	Remaining Pumpable (days)	Projected Breakthru Date
05/07/92	11:35 PM	2020	1.74	1.74	45.00 *	7.57	7.57	531662.59	212.54	12/05/92
05/12/92	08:30 AM	12980	1.74	1.74	45.00	41.07	48.64	520702.59	207.75	12/05/92
05/19/92	01:30 PM	24990	1.16	1.55	59.00	49.68	98.32	387035.93	173.85	11/08/92
05/27/92	10:50 AM	45350	1.79	1.61	61.00	89.02	187.34	356823.27	154.14	10/28/92
06/02/92	03:00 PM	73150	3.13	1.91	100.00	143.54	330.87	200426.20	72.81	08/13/92
07/07/92	05:35 PM	166500	1.85	1.90	200.00	660.80	991.67	60539.35	22.12	07/29/92
08/11/92	11:56 AM	232370	1.32	1.82	6.10	0.00 +	0.00	1968501.30	752.30	09/02/94
09/25/92	09:55 AM	388390	2.41	1.89	17.00	300.14	300.14	600342.76	220.41	05/03/93
11/16/92	09:55 AM	484380	1.28	1.82	100.00	656.04	956.18	62670.37	23.86	12/09/92
12/04/92	09:55 AM	518160	1.30	1.77	8.70	185.39	1141.56	592412.22	232.20	07/24/93
02/02/93	02:30 PM	673180	1.79	1.77	6.90	716.24	1857.80	123729.20	48.46	03/22/93
03/10/93	03:00 PM	741070	1.31	1.73	44.00 *	0.00 +	0.00	272905.86	109.26	06/27/93
03/30/93	09:00 AM	743950	0.10	1.61	44.00	21.11	21.11	270025.86	116.55	07/24/93
04/30/93	04:00 PM	755900	0.27	1.51	14.00	67.67	88.78	819631.28	376.22	05/11/94
05/27/93	01:40 PM	854610	2.55	1.58	120.00	912.47	1001.25	49970.27	21.94	06/17/93
06/30/93	07:30 AM	1007200	3.14	1.68	1.20	1134.53	2135.78	−679320.55	−280.92	09/22/92
07/21/93	07:30 AM	1094630	2.89	1.75	2.20 *	0.00 +	0.00	5458117.25	2165.15	06/25/99
07/28/93	08:30 AM	1125630	3.06	1.82	2.20	11.36	11.36	5427117.25	2067.14	03/26/99
08/31/93	01:55 PM	1256910	2.66	1.87	3.20	55.39	66.75	3627213.11	1348.85	05/10/97

* – Concentration estimate

+ – Changed carbon vessel on this date.

TABLE 5

Well Gauging Data
Union Pacific Railyard
Oakland TOFC

Well No.	Date	Well Head Elevation Above M.S.L. (ft)	Depth to Product (ft)	Depth to Water (ft)	Water Level Elevation (ft)	Product Thickness (ft)	Corrected Water Level Elevation* (ft)
OMW-1	04/09/91	8.79		5.54	3.25		3.25
	06/19/91			6.89	1.90		1.90
	05/11/92			6.34	2.45		2.45
	06/09/92			6.91	1.88		1.88
	07/07/92			7.21	1.58		1.58
	08/11/92			7.55	1.24		1.24
	09/04/92			7.82	0.97		0.97
	10/13/92			7.96	0.83		0.83
	11/12/92			7.64	1.15		1.15
	12/17/92			6.64	2.15		2.15
	03/18/93			5.98	2.81		2.81
	05/14/93			6.39	2.40		2.40
	07/13/93			7.12	1.67		1.67
OMW-2	04/09/91	5.88		2.10	3.78		3.78
	06/19/91			3.59	2.29		2.29
	05/11/92			3.22	2.66		2.66
	06/09/92			3.97	1.91		1.91
	07/07/92			4.21	1.67		1.67
	08/11/92			4.46	1.42		1.42
	09/04/92			4.77	1.11		1.11
	10/13/92			4.96	0.92		0.92
	11/12/92			4.08	1.80		1.80
	12/17/92			1.70	4.18		4.18
	03/18/93			1.94	3.94		3.94
	05/14/93			3.29	2.59		2.59
	07/13/93			4.28	1.60		1.60
OMW-3	04/09/91	7.16		3.93	3.23		3.23
	06/19/91			5.33	1.83		1.83
	05/11/92			5.92	1.24		1.24
	06/09/92			5.48	1.68		1.68
	07/07/92			5.78	1.38		1.38
	08/11/92			6.09	1.07		1.07
	09/04/92			6.33	0.83		0.83
	10/13/92			6.55	0.61		0.61
	11/12/92			6.16	1.00		1.00
	12/17/92			5.15	2.01		2.01
	03/18/93			2.58	4.58		4.58
	05/14/93			4.91	2.25		2.25
	07/13/93			5.70	1.46		1.46
OMW-4	04/09/91	7.41	3.79	6.23	1.18	2.44	3.23
	06/19/91		4.44	8.68	−1.27	4.24	2.29
	05/11/92						not available
	06/09/92		5.88	9.81	−2.40	3.93	0.90
	07/07/92		6.00	9.88	−2.47	3.88	0.79
	08/11/92		6.13	8.23	−0.82	2.10	0.94
	09/04/92		6.78	8.37	−0.96	1.59	0.38
	10/13/92**			6.58	0.83		0.83
	11/12/92		5.74	7.33	0.08	1.59	1.42
	12/17/92		5.77	7.28	0.13	1.51	1.40
	03/18/93		3.82	5.73	1.68	1.91	3.28
	05/14/93		5.76	8.45	−1.04	2.69	1.22
	07/13/93		5.94	7.78	−0.37	1.84	1.18
OMW-5	04/09/91	7.62		4.64	2.98		2.98
	06/19/91			5.35	2.27		2.27
	05/11/92			5.18	2.44		2.44
	06/09/92			5.85	1.77		1.77
	07/07/92			6.02	1.60		1.60
	08/11/92			6.18	1.44		1.44
	09/04/92			6.59	1.03		1.03

TABLE 5

Well Gauging Data
Union Pacific Railyard
Oakland TOFC

Well No.	Date	Well Head Elevation Above M.S.L. (ft)	Depth to Product (ft)	Depth to Water (ft)	Water Level Elevation (ft)	Product Thickness (ft)	Corrected Water Level Elevation* (ft)
	10/13/92			6.54	1.08		1.08
	11/12/92			6.23	1.39		1.39
	12/17/92			5.23	2.39		2.39
	03/18/93			3.33	4.29		4.29
	05/14/93			5.06	2.56		2.56
	07/13/93			5.96	1.66		1.66
OMW-6	04/09/91	5.78		7.60	-1.82		-1.82
	06/19/91			6.98	-1.20		-1.20
	05/11/92			7.41	-1.63		-1.63
	06/09/92			7.18	-1.40		-1.40
	07/07/92			6.61	-0.83		-0.83
	08/11/92			7.14	-1.36		-1.36
	09/04/92			6.58	-0.80		-0.80
	10/13/92**			6.16	-0.38		-0.38
	11/12/92			6.91	-1.13		-1.13
	12/17/92			6.16	-0.38		-0.38
	03/18/93			7.31	-1.53		-1.53
	05/14/93			6.59	-0.81		-0.81
	07/13/93			6.58	-0.80		-0.80
OMW-7	04/09/91	7.03	3.26	7.48	-0.45	4.22	3.09
	06/19/91		4.13	7.66	-0.63	3.53	2.34
	05/11/92		3.70	7.32	-0.29	3.62	2.75
	06/09/92		5.79	7.78	-0.75	1.99	0.92
	07/07/92		5.98	7.88	-0.85	1.90	0.75
	08/11/92		6.01	9.22	-2.19	3.21	0.51
	09/04/92		6.53	8.92	-1.89	2.39	0.12
	10/13/92		5.97	8.00	-0.97	2.03	0.74
	11/12/92		5.29	8.69	-1.66	3.40	1.20
	12/17/92		5.60	8.66	-1.63	3.06	0.94
	03/18/93		3.93	7.97	-0.94	4.04	2.45
	05/14/93		5.34	8.21	-1.18	2.87	1.23
	07/13/93		5.95	7.49	-0.46	1.54	0.83
OMW-8	04/09/91	7.52		4.25	3.27		3.27
	06/19/91			5.27	2.25		2.25
	05/11/92			5.05	2.47		2.47
	06/09/92			6.25	1.27		1.27
	07/07/92			6.33	1.19		1.19
	08/11/92			6.48	1.04		1.04
	09/04/92			7.00	0.52		0.52
	10/13/92			6.23	1.29		1.29
	11/12/92			6.34	1.18		1.18
	12/17/92			6.10	1.42		1.42
	03/18/93			4.51	3.01		3.01
	05/14/93			5.78	1.74		1.74
	07/13/93			6.26	1.26		1.26
OMW-9	05/11/92	6.64	3.41	7.65	-1.01	4.24	2.55
	06/09/92		5.09	8.17	-1.53	3.08	1.06
	07/07/92		5.28	8.42	-1.78	3.14	0.86
	08/11/92		5.29	9.45	-2.81	4.16	0.68
	09/04/92		5.70	9.56	-2.92	3.86	0.32
	10/13/92		5.70	6.88	-0.24	1.18	0.75
	11/12/92		5.23	6.44	0.20	1.21	1.22
	12/17/92		5.08	6.40	0.24	1.32	1.35
	03/18/93		3.01	6.69	-0.05	3.68	3.04
	05/14/93		4.38	10.37	-3.73	5.99	1.30
	07/13/93		5.57	6.79	-0.15	1.22	0.87

TABLE 5

Well Gauging Data
Union Pacific Railyard
Oakland TOFC

Well No.	Date	Well Head Elevation Above M.S.L. (ft)	Depth to Product (ft)	Depth to Water (ft)	Water Level Elevation (ft)	Product Thickness (ft)	Corrected Water Level Elevation* (ft)
OMW-10	05/11/92	7.56		4.76	2.80		2.80
	06/09/92			5.42	2.14		2.14
	07/07/92			5.58	1.98		1.98
	08/11/92			5.83	1.73		1.73
	09/04/92			6.18	1.38		1.38
	10/13/92**			5.30	2.26		2.26
	11/12/92			5.41	2.15		2.15
	12/17/92			4.20	3.36		3.36
	03/18/93		3.93	4.00	3.56	0.07	3.62
	05/14/93		4.83	4.92	2.64	0.09	2.72
	07/13/93		5.64	5.67	1.89	0.03	1.92
ORW-1	06/19/91	6.59	3.91	9.36	-2.77	5.45	1.81
	05/11/92		NOT GAUGED				
	06/09/92		NOT GAUGED				
	07/07/92		NOT GAUGED				
	08/11/92			8.39	-1.80		-1.80
	09/04/92			8.35	-1.76		-1.76
	10/13/92		6.95	8.15	-1.56	1.20	-0.55
	11/12/92		NOT GAUGED				
	12/17/92		8.30	8.35	-1.76	0.05	-1.72
	03/18/93		3.60	7.39	-0.80	3.79	2.38
	05/14/93			8.63	-2.04		-2.04
	07/13/93			8.60	-2.01		-2.01
ORW-2	06/19/91	6.79	4.36	4.38	2.41	0.02	2.43
	05/11/92		3.55	6.34	0.45	2.79	2.79
	06/09/92		NOT GAUGED				
	07/07/92		NOT GAUGED				
	08/11/92			9.30	-2.51		-2.51
	09/04/92			9.31	-2.52		-2.52
	10/13/92		8.20	9.20	-2.41	1.00	-1.57
	11/12/92		NOT GAUGED				
	12/17/92			9.45	-2.66		-2.66
	03/18/93		2.94	7.48	-0.69	4.54	3.12
	05/14/93			8.21	-1.42		-1.42
	07/13/93		9.30	9.41	-2.62	0.11	-2.53
ORW-3	06/19/91	6.30	4.07	4.10	2.20	0.03	2.23
	05/11/92		3.24	5.31	0.99	2.07	2.73
	06/09/92		NOT GAUGED				
	07/07/92		NOT GAUGED				
	08/11/92			8.90	-2.60		-2.60
	09/04/92			8.75	-2.45		-2.45
	10/13/92			8.59	-2.29		-2.29
	11/12/92		NOT GAUGED				
	12/17/92			8.35	-2.05		-2.05
	03/18/93		2.90	5.71	0.59	2.81	2.95
	05/14/93			8.16	-1.86		-1.86
	07/13/93		9.08	9.46	-3.16	0.38	-2.84

* Corrected water level elevation assumes product density of 0.84 g/cm3
M.S.L. = Mean Sea Level

** Guaging data for these may have been switched.

TABLE 6

Analytical Results for Oakland TOFC

Well Number	Date Sampled	Total Petroleum Hydrocarbons (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)
OMW–1	05/11/92	<0.050	<0.0005	<0.0005	<0.0005	<0.0005
	08/11/92	0.060	<0.0005	<0.0005	<0.0005	<0.0005
	11/13/92	0.067	<0.0005	0.00061*	<0.0005	<0.0005
	05/14/93	<0.050	<0.0003	<0.0003	<0.0003	<0.0009
OMW–2	05/11/92	4.5	<0.0005	<0.0005	<0.0005	<0.0005
	08/11/92	2.7	<0.0005	<0.0005	<0.0005	<0.0005
	11/13/92	3.4	<0.0005	0.00057*	0.0011	0.0033
	05/14/93	<0.050	<0.0003	<0.0003	<0.0003	<0.0009
OMW–3	05/11/92	2.3	.0003J	0.0013	.0003J	0.0034
	08/11/92	5.8	<0.0005	0.00071	<0.0005	.0017
	11/13/92	110	<0.0005	0.00089*	0.0015	.0084
	05/14/93	0.180	<0.0003	0.036	<0.0003	.0027
OMW–5	05/11/92	2.1	<0.0005	.0004J	<0.0005	0.0003
	08/11/92	2.1	<0.0005	<0.0005	<0.0005	<0.0005
	11/13/92	4.4	<0.0005	0.00078*	<0.0005	<0.0005
	05/14/93	11	<0.0003	0.0018	<0.0003	<0.0009
OMW–6	05/11/92	0.52	<0.0005	<0.0005	<0.0005	0.0016
	08/11/92	0.55	<0.0005	<0.0005	<0.0005	<0.0005
	11/13/92	6.0	<0.0005	0.00077*	<0.0005	<0.0005
	05/14/93	0.18	<0.0003	<0.0003	<0.0003	<0.0009
OMW–8	05/11/92	0.24	<0.0005	<0.0005	<0.0005	<0.0005
	08/11/92	0.22	<0.0005	<0.0005	<0.0005	<0.0005
	11/13/92	0.26	<0.0005	0.00058*	<0.0005	<0.0005
	05/14/93	<0.050	<0.0003	<0.0003	<0.0003	<0.0009
OMW–10	05/11/92	2.1	0.033	<0.0005	<0.0005	0.0027
	08/11/92	1.3	0.0096	<0.0005	<0.0005	.00062
	11/13/92	2.8	0.0066	0.00084*	<0.0005	.00062
	05/14/93	****** NOT SAMPLED – Well Contained Product**********				

NOTES J = Estimated value below reporting limit.
Due to the presence of product, recovery wells ORW–1, ORW–2, ORW–3, and monitoring wells OMW–4, OMW–7, and OMW–9 are not sampled.
* 0.00062 mg/L was detected in the Trip Blank.

APPENDIX A

FIELD LOGS
GROUNDWATER RECOVERY
AND TREATMENT SYSTEM

OFFICE COPY

PROJECT # 96199

RES JOB # 4117

GROUNDWATER TREATMENT SYSTEM FIELD LOG

UNION PACIFIC RAILROAD - OAKLAND TOFC
1717 MIDDLE HARBOR ROAD

DATE [D-M-Y]	TIME [24:00]	FLOW RATE [GPM]	TOTALIZER SIGNET : NEPTUNE [GALLONS:GALLONS]	PRODUCT LEVEL [INCHES]	FILTER INLET [PSIG]	PRESS. OUTLET [PSIG]	PUMP ORW-1 [CYCLES]	CYCLE ORW-2 [CYCLES]	COUNT ORW-3 [CYCLES]	CHLORINE FREE:TOTAL [PPM]:[PPM]	pH [pH]	HARDNESS as $CaCO_3$ [PPM]
29-JUNE93	1800	15.3	100217; 459700	18.5	5.5	6.0	637092	808873	TRAIN - NOT SAFE TO CHECK	<0.4 ; <0.4	≥7.0	
ALERT 3 28-JUNE93	09:40	17.0	99614; 452300	17.5"	5.0	5.5						
22-JUN-93	12:22	12.3	97178; 421400	17."	8.5	9.0				~0.3 ; 0.4	~7.0	
14-JUN-93	10:40	15.0	93689 376600	17"	6.0	7.0				<0.4 ; 0.4		
10 JUN-93	16:48	15.0	92178; 357100	17.0"	4.5	5.5	↓	↓	↓	↓		
10 09-JUN-93	13:15	9.0			9.5	10.5	526544	726975	796775	<0.4 ; 0.4		
08-JUN-93	10:00	9.7	91224 ; 346300	17."	9.5	10.5	518682	718241	786468	0.5 ; 1.0	≥7.0	
01-JUN-93	17:00	9.5	87978; 308800	10."	9.5	10.0				0.5 ; 1.0	≥7.0	reduced stroke 70% from 23%
27-MAY-93	13:40	14.6	85461; 279300	10."	9	8.5	477091	670833	744810	<0.4 ; 0.5	≥7.0	
21	21:18	12.8 SIB	82521 ; 244900	TRACE <2"	7.5	7.5	restart	chlorine	pump (even w/ new housing)			
17	16:30	13.5 SIB / 17.5 SM	80341; 219000	TRACE <2"	6.5	6.5	417268	618100	705095	<0.4 ; <0.4	≥7.0	ND
13	09:30	30	77838; 189400	E	7.5	7.5				0.5 ; 0.9	≥7.0	ND
12	12:40		77079; 183482	E	6.	6.5						
11	14:00	35	76796; 181100	E/M	7.5	≥7	391466	592093	684783	<.4 ; <0.4	≥7.0	ND
10	17:20		76621; 179600	51"								

MAIL COPIES MONTHLY TO: USPCI: 5665 FLATIRON PARKWAY: BOULDER, COLORADO 80301: ATTENTION MR. DENTON MAULDIN

other 07-MAY 10:30 8.9

PROJECT # 96199 **RES JOB # 4117**

GROUNDWATER TREATMENT SYSTEM FIELD LOG

UNION PACIFIC RAILROAD - OAKLAND TOFC
1717 MIDDLE HARBOR ROAD

OFFICE COPY

DATE [D-M-Y]	TIME [24:00]	FLOW RATE [GPM]	TOTALIZER SIGNET : NEPTUNE [GALLONS:GALLONS]	PRODUCT LEVEL [INCHES]	FILTER INLET [PSIG]	PRESS. OUTLET [PSIG]	PUMP ORW-1 [CYCLES]	CYCLE ORW-2 [CYCLES]	COUNT ORW-3 [CYCLES]	CHLORINE FREE:TOTAL [PPM]:[PPM]	pH [pH]	HARDNESS as $CaCO_3$ [PPM]
31-AUG 93	15:30		: 748/00	39 1/2	9.0	6.0	331523	209432				
30-AUG 93	13:55	24.1	125691 : 743300	39	9.0	6.0	25664			<0.4 : =0.4		
3 aug 93	11:00	24.8	119325 : 673195	33	10.0	8.0	—	—	—	=0.6 : 3.0	7.0	—
6 aug 93	10:00	26.5	116397 : 642204	30	9.0	8.2	—	—	—	<0.2 <0.2	—	—
3 aug 93	13:30	26.4	115318 : 631419	29	8.0	7.0	—	—	—	>3.0 : >3.0	—	—
28 JLY 93	8:30	20.0	112563 : 603542	27	7.5	5.5	—	—	—	<0.4 : <0.4	7.0	—
21-JLY-93	7:30	7.0	109465 : 570315	25	11.5	7.5	—	—	—	<0.4 : <0.4	≥7.0	—
19-JLY-93	1300	9.8	~ ~	~~20~~	~~11.5~~ 10	11.5				~ ~	~	
19-JLY-93	1230	0.0	108661 : 561300	~~25~~ 24"	~~7.5~~ 11.0	7.5				<0.4 : 0.6	≥7.0	
13-JLY-93	17.2	14:30	106165 : 530300	22"	9.5	9.5						

MAIL COPIES MONTHLY TO: USPCI: 5665 FLATIRON PARKWAY: BOULDER, COLORADO 80301: ATTENTION MR. DENTON MAULDIN

USPCI
A Subsidiary of Union Pacific Corporation

Maintenance Record

Date 13-JUL-93 | Project # [illegible] | Project Manager [illegible]

Project Name/Location UPRR TOFC OAKLAND / 1717 MIDDLE HARBOR ROAD OAKLAND CA

WELL DATA	LIQ.	WAT.	PROD.
OMW-6	6.58	6.58	0.0
OMW-5	5.96	5.96	0.0
OMW-2	4.28	4.28	0.0
OMW-3	5.70	5.70	0.0
OMW-1	7.12	7.12	0.0
OMW-8	6.26	6.26	0.0
ORW-3	9.08	9.46	0.38
OMW-4	5.94	7.78	1.84
ORW-2	9.30	~~9.30~~ 9.41	0.11
OMW-7	5.95	7.49	1.54
OMW-9	5.57	6.79	1.22
ORW-1	8.60	8.60	0.0
OMW-10	5.64	5.67	0.03

- WELL MEASUREMENT AND PRODUCT BAILING. WELL DATA TO LEFT. BAILED PRODUCT OFF OF OMW-9, 4, 10, 7.
- ☆ MAIN AIR COMPRESSOR SHUT DOWN DURING VISIT CALLED DENTON MAULDIN TO FIND OUT HOW TO HAVE SERVICED! – CALLED BRUCE RAGUSA & JEFF RAFFERTY AS PER D. MAULDIN
- SAMPLED MIDFLUENT STATION 'D'

FIELD LOG DATA:

	GPM	SIGNET	NEPTUNE	PROD	IN	OUT	C/ PPM
13-JLY-93	14:30	17.2	106165 : 530300	22"	9.5	9.5	<0.4 : 0.5

[signature]
Signature

M.E.
Title

5665 Flatiron Parkway • Boulder, Colorado 80301 • 303/938-5500

APPENDIX B

ANALYTICAL RESULTS

Superior Precision Analytical, Inc.
P.O. Box 1545 • Martinez, California 94553 • (510) 229-1590 / fax (510) 229-0916

Riedel Environmental Services, Inc.
Attn: MIKE SULKA

Project 4117
Reported 06/22/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
88959- 1	STATION 'D'	06/14/93	06/19/93	Water

RESULTS OF ANALYSIS

Laboratory Number: 88959- 1

Benzene:	0.4
Toluene:	0.4
Ethyl Benzene:	0.4
Xylenes:	2.3
Concentration:	ug/L

Superior Precision Analytical, Inc.
P.O. Box 1545 • Martinez, California 94553 • (510) 229-1590 / fax (510) 229-0916

C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 88959

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
ug/L = parts per billion (ppb)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Water: 5000ug/L

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Water: 50ug/L

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Water: 50ug/L

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Water: 0.3ug/L

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Benzene:	84/85	1%	70-130
Toluene:	96/97	1%	70-130
Ethyl Benzene:	98/100	2%	70-130
Xylenes:	101/102	1%	70-130

Richard Srna, Ph.D.
Jelamina V Langinlig (for)
Laboratory Director

Section I

Chain of Custody and Analysis Request

page ___ of ___

Consultant: KES
Address: 4155 LAKESIDE DR
RICHMOND CA 94806
Phone No. 5102227310 Fax No. ___
Project Manager: SULKA
Alternate Contact: LIECHTI
Project No. 4117 P.O. No. QUOTE 93-167

Turn Around Time (circle one)
Same Day 72 Hrs
24 Hrs 48 Hrs
Normal 5 Day

Superior Precision Analytical, Inc.
P.O. Box 1545
Martinez, California 94553
Martinez 1 (510) 229-1512 Martinez 2 (510) 229-0166
SanFrancisco (415) 647-2081

Sampler: [illegible]
Regulatory Agency: ___

Section II: Analysis Request

Laboratory Sample Identification	S = Soil A = Air W = Water Matrix	mod 8015 - Gas	mod 8020 - BTEX	mod 8015 - Diesel	8010	8240	CAM17	TCLP Metals: ___	Metals: ___	418.1 - TPH by IR	O & G	PCBs			Date Sampled	Time Sampled	Number of Containers	Preservative (yes or no)	Sampling Remarks
1																			☐ Bio-remediation
2 STATION 'D'	W		X												14-JUNE	11:00	3	YES	☐ Underground storage tank
3 MIDFLUENT																			☐ Monitoring
4																			☐ Recent Contamination
5																			☐ Unknown Compounds
6																			
7																			
8																			
9																			
10																			
11																			
12																			

Relinquished by [illegible]	Date/Time 14-JUN-93 2015	Received by ___	Date/Time	Lab please initial the following:
Organization KES		Organization ___		Samples Stored in Ice NO
Relinquished by ___	Date/Time	Received by ___	Date/Time	Appropriate Containers YES
Organization ___		Organization ___		Samples Preserved ___
Relinquished by ___	Date/Time	Received by [signature]	Date/Time	VOAs without Headspace ___
				Comments ___

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

Riedel Environmental Services, Inc.
Attn: Mike Sulka

Reported 07/08/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
56714- 1	STATION 'C'	06/30/93	07/07/93	Water
56714- 2	STATION 'D'	06/30/93	07/07/93	Water
56714- 3	STATION 'E'	06/30/93	07/07/93	Water

RESULTS OF ANALYSIS

Laboratory Number:	56714- 1	56714- 2	56714- 3
Gasoline:	ND<50	ND<50	ND<50
Benzene:	ND<0.3	ND<0.3	ND<0.3
Toluene:	ND<0.3	ND<0.3	ND<0.3
Ethyl Benzene:	ND<0.3	ND<0.3	ND<0.3
Xylenes:	ND<0.9	ND<0.9	ND<0.9
Diesel:	1200	NA	ND<50
Concentration:	ug/L	ug/L	ug/L

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 56714

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
ug/L = parts per billion (ppb)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Water: 5000ug/L

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Water: 50ug/L

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Water: 50ug/L

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Water: 0.5ug/L

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Gasoline:	111/114	3%	75-125
Benzene:	96/95	1%	75-125
Toluene:	96/96	0%	75-125
Ethyl Benzene:	98/99	1%	75-125
Xylenes:	99/98	1%	75-125
Diesel:	96/96	0%	75-125

Richard Srna, Ph.D.
Cecilia G. Joaquin (for)
Laboratory Director

5C714

Chain of Custody and Analysis Request

Section I

page__of__

Consultant: RES RIEPEZ
Address: 4138 LAKESIDE DRIVE
RICHMOND CA 94806
Phone No. 5102227810 Fax No. 5102226368
Project Manager: SULKA
Alternate Contact: LIECHTI
Project No. 4117 P.O. No. QUOTE 93 124

Turn Around Time (circle one)
Same Day 72 Hrs
24 Hrs 48 Hrs
(Normal 5 Day)

Superior Precision Analytical, Inc.
P.O. Box 1545
Martinez, California 94553
Martinez 1 (510) 229-1512 Martinez 2 (510) 229-0166
SanFrancisco (415) 647-2081

Sampler: [illegible]
Regulatory Agency: [illegible]

Section II: Analysis Request

Laboratory Sample Identification	Matrix (S = Soil A = Air W = Water)	mod 8015 - Gas	mod 8015 - BTEX	mod 8015 - Diesel	8010	8240	CAM17	TCLP Metals:	Metals:	418.1 - TPH by IR	O & G	PCBs			Date Sampled	Time Sampled	Number of Containers	Preservative (yes or no)	Sampling Remarks
1 STATION 'C'	W		X	X															
2 STATION 'D'	W		X																NO DIESEL HERE
3 STATION 'E'	W		X	X															
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			

Sampling Remarks:
- [ ] Bio-remediation
- [x] Underground storage tank
- [ ] Monitoring
- [ ] Recent Contamination
- [ ] Unknown Compounds

Received [illegible] DM
Samples Stored in Ice YES 4°C
Appropriate containers YES
Samples preserved YES
VOAs without headspace YES
Comments OK

Relinquished by	Date/Time	Received by	Date/Time
[illegible] Organization: RIEPEZ ENV. SRVC	30-JUNE-93 08:18	Organization:	
Relinquished by: Organization:		Received by: Organization:	
Relinquished by:		Received by: [illegible] Borchener	

Lab please initial the following:
Samples Stored in Ice: yes
Appropriate Containers: yes
Samples Preserved: yes
VOAs without Headspace: NO
Comments: OK

Superior Precision Analytical, Inc.
P.O. Box 1545 • Martinez, California 94553 • (510) 229-1590 / fax (510) 229-0916

Riedel Environmental Services, Inc.
Attn: MIKE SULKA

Project # 4117
Reported 07/20/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
89231- 1	STATION 'D' MID	07/13/93	07/19/93	Water

RESULTS OF ANALYSIS

Laboratory Number: 89231- 1

Benzene:	0.7
Toluene:	0.4
Ethyl Benzene:	ND<0.3
Xylenes:	ND<0.9
Concentration:	ug/L

Superior Precision Analytical, Inc.
P.O. Box 1545 • Martinez, California 94553 • (510) 229-1590 / fax (510) 229-0916

C E R T I F I C A T E O F A N A L Y S I S

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 89231

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
ug/L = parts per billion (ppb)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Water: 5000ug/L

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Water: 50ug/L

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Water: 50ug/L

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Water: 0.3ug/L

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Benzene:	86/83	4%	70-130
Toluene:	85/89	5%	70-130
Ethyl Benzene:	100/98	2%	70-130
Xylenes:	108/107	1%	70-130

Richard Srna, Ph.D.
(for) 7/20/93
Laboratory Director

Section I

Chain of Custody and Analysis Request

page__of__

Consultant RIEDEL ENVIRONMENTAL
Address 4139 LAKESIDE DRIVE
Phone No. 5102227810 Fax No. 222 6868
Project Manager SULKA
Alternate Contact LIECHTI
Project No. 4117 P.O. No. 93.0061127

Turn Around Time (circle one)
Same Day 72 Hrs
24 Hrs 48 Hrs
(Normal 5 Day)

Superior Precision Analytical, Inc.
P.O. Box 1545
Martinez, California 94553
Martinez 1 (510) 229-1512 Martinez 2 (510) 229-0166
SanFrancisco (415) 647-2081

Sampler: MIKE SULKA
Regulatory Agency: N/A

Section II: Analysis Request (SEE QUOTE)

Laboratory Sample Identification	S = Soil A = Air W = Water Matrix	mod 8015 - Gas	mod [illegible] - BTEX 8020?	mod 8015 - Diesel	8010	8240	CAM17	TCLP Metals:	Metals:	418.1 - TPH by IR	O & G	PCBs			Date Sampled	Time Sampled	Number of Containers	Preservative (yes or no)
1 STATION 'D' MID	W		X												13-JLY	14:40	3	YES HCl
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		

Sampling Remarks
- ☐ Bio-remediation
- ☒ Underground storage tank
- ☐ Monitoring
- ☐ Recent Contamination
- ☐ Unknown Compounds

Relinquished by MIKE SULKA Organization RES	Date/Time 13-JULY-93 19:40	Received by Organization	Date/Time	Lab please initial the following:
Relinquished by Organization	Date/Time	Received by Organization	Date/Time	Samples Stored in Ice 4 JC Appropriate Containers 4 Samples Preserved 4
Relinquished by Organization	Date/Time	Received by Organization Superior	Date/Time 7/13/93 16:40	VOAs without Headspace 4 Comments 4 and No Trip Blk

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

Riedel Environmental Services, Inc.

Attn: JOHN LIECHTI

Project 4117
Reported 08/02/93

TOTAL PETROLEUM HYDROCARBONS

Lab #	Sample Identification	Sampled	Analyzed	Matrix
89402- 1	STATION "C"	07/28/93	07/30/93	Water
89402- 2	STATION "D"	07/28/93	07/30/93	Water
89402- 3	STATION "E"	07/28/93	07/30/93	Water
89402- 4	STATION "C"	07/28/93	08/03/93	Water
89402- 5	STATION "E"	07/28/93	08/03/93	Water

RESULTS OF ANALYSIS

Laboratory Number:	89402- 1	89402- 2	89402- 3	89402- 4	89402- 5
Benzene:	14	ND<0.3	ND<0.3	NA	NA
Toluene:	0.6	ND<0.3	ND<0.3	NA	NA
Ethyl Benzene:	5.4	ND<0.3	ND<0.3	NA	NA
Xylenes:	25	ND<0.9	ND<0.9	NA	NA
[illegible] sel:	NA	NA	NA	2200	ND<100
Concentration:	ug/L	ug/L	ug/L	ug/L	ug/L

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

CERTIFICATE OF ANALYSIS

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS

QA/QC INFORMATION
SET: 89402

NA = ANALYSIS NOT REQUESTED
ND = ANALYSIS NOT DETECTED ABOVE QUANTITATION LIMIT
ug/L = parts per billion (ppb)

OIL AND GREASE ANALYSIS By Standard Methods Method 5520F:
Minimum Detection Limit in Water: 5000ug/L

Modified EPA SW-846 Method 8015 for Extractable Hydrocarbons:
Minimum Quantitation Limit for Diesel in Water: 50ug/L

EPA SW-846 Method 8015/5030 Total Purgable Petroleum Hydrocarbons:
Minimum Quantitation Limit for Gasoline in Water: 50ug/L

EPA SW-846 Method 8020/BTXE
Minimum Quantitation Limit in Water: 0.3ug/L

ANALYTE	MS/MSD RECOVERY	RPD	CONTROL LIMIT
Benzene:	126/112	12%	70-130
Toluene:	113/101	11%	70-130
Ethyl Benzene:	113/102	10%	70-130
Xylenes:	115/105	9%	70-130
Diesel:	92/92	0%	75-125

Senior Chemist

Superior Precision Analytical, Inc.
825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1517 / fax (510) 229-1526

TEAM QUALITY CONTROL
PROJECT VERIFICATION

Please help us to provide an error free project to you, by reviewing our log-in information. This will insure that we have properly interpreted your analytical requests. If changes are required, please contact me immediately, so that you will receive the service that you expect. Thank you for your assistance!

Rich
Your account advocate

CLIENT INFORMATION

COMPANY:	Riedel Environmental Services, Inc.	CONTACT:	JOHN LIECHTI
ADDRESS:	4138 Lakeside Drive Richmond, CA 94806	PROJECT NO.:	4117
TEL.:	510 2226868	PO NO.:	NA
BILL TO:	Riedel Environmental Services, Inc. 4138 Lakeside Drive Richmond, CA 94806	Quote NO.:	93-00127

LABORATORY INFORMATION - Martinez 1

DATE RECEIVED:	July 28, 1993	DATE DUE:	08/04/93
JOB NUMBER:	89402		(Wednesday)

SAMPLE INFORMATION

Samples will be analyzed utilizing California methods

LAB #	CLIENT IDENTIFICATION	MATRIX	ANALYSIS
1	STATION "C"	WG	BTXE
2	STATION "D"	WG	BTXE
3	STATION "E"	WG	BTXE
4	STATION "C"	WG	DIESEL
5	STATION "E"	WG	DIESEL

COMMENTS: HOLDING TIME UP ON 08/10/93.

See the next page for more

Section I

Chain of Custody and Analysis Request

89-02

page__of__

Consultant	Riedel Environmental Services Inc.
Address	4135 Lakeside Drive, Richmond, Ca. 94806
Phone No.	510 222 7510
Fax No.	510 222 5587
Project Manager	John H. Liechti
Alternate Contact	Mike Su...
Project No.	4117
P.O. No.	Superior Quote # 93-00117

Turn Around Time (circle one)

Same Day | 72 Hrs | 24 Hrs | 48 Hrs | (Normal 5 Day) — circled

Superior Precision Analytical, Inc.
P.O. Box 1545
Martinez, California 94553
Martinez 1 (510) 229-1512 Martinez 2 (510) 229-0166
SanFrancisco (415) 647-2081

Sampler: John H. Liechti

Regulatory Agency: N/A

Section II: Analysis Request

Laboratory Sample Identification	Matrix (S = Soil A = Air W = Water)	mod 8015 - Gas	mod 8020 - BTEX	mod 8015 - Diesel	8010	8240	CAM17	TCLP Metals:	Metals:	418.1 - TPH by IR	O & G	PCBs			Date Sampled	Time Sampled	Number of Containers	Preservative (yes or no)	Sampling Remarks
1 Station "C"	W		X												7/28	932	3	Y	3 VOAS
2 Station "D"	W		X												7/28	931	3	Y	3 VOAS
3 Station "E"	W		X												7/28	930	3	Y	3 VOAS
4 Station "C"	W			X											7/28	933	1	N	1 Amber Liter
5 Station "E"	W			X											7/28	924	1	N	1 Amber Liter
6																			
7																			
8																			
9																			
10																			
11																			
12																			

Sampling Remarks

- [ ] Bio-remediation
- [x] Underground storage tank
- [ ] Monitoring
- [ ] Recent Contamination
- [ ] Unknown Compounds

Relinquished by / Organization	Date/Time	Received by / Organization	Date/Time
John H. Liechti / Riedel Environmental	7/28	Alan Chiff / Aero	7/28/93 1540
Alan Chiff / Aero	7/28/93 1812		
		Maria Manuel / Superior	7/28/93 6:20 P.M.

Lab please initial the following:

Samples Stored in Ice ______

Appropriate Containers ______

Samples Preserved ______

VOAs without Headspace ______

Comments ______

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

Riedel Environmental Services, Inc.
Attn: Mike Sulka

Project No:4117
Reported 07-September-1993

PURGEABLE AROMATIC HYDROCARBONS - by EPA SW-846 Methods 5030/8020.

Laboratory Number	Sample Identification	Matrix
57025- 1	STATION C INFLUENT	Water
57025- 2	STATION D MIDFLUENT	Water
57025- 3	STATION E EFFLUENT	Water

RESULTS OF ANALYSIS

Laboratory Number:	57025- 1	57025- 2	57025- 3
Benzene:	12	ND<0.3	ND<0.3
Toluene:	0.7	ND<0.3	ND<0.3
Ethyl Benzene:	4.1	ND<0.3	ND<0.3
Xylenes:	23	ND<0.9	ND<0.9
Concentration:	ug/L	ug/L	ug/L
-- Surrogate Recoveries --			
Surrogate Recovery:	82%	78%	82%

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

Riedel Environmental Services, Inc.
Attn: Mike Sulka

Project No: 4117
Reported 07-September-1993

TOTAL PETROLEUM HYDROCARBONS AS DIESEL

Laboratory Number	Sample Identification	Matrix
57025- 1	STATION C INFLUENT	Water
57025- 3	STATION E EFFLUENT	Water

RESULTS OF ANALYSIS

Laboratory Number:	57025- 1	57025- 3
Diesel:	3200	ND<50
Concentration:	ug/L	ug/L

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

Riedel Environmental Services, Inc.
Attn: Mike Sulka

Project No: 4117
Reported 07-September-1993

TOTAL PETROLEUM HYDROCARBONS AS DIESEL
BY EPA METHOD 8015M

Chronology

Laboratory Number 57025

Identification	Sampled	Received	Extracted	Analyzed	Run #	Lab #
STATION C INFLUENT	08/31/93	08/31/93	09/02/93	09/02/93		1
STATION E EFFLUENT	08/31/93	08/31/93	09/02/93	09/02/93		3

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

TOTAL PETROLEUM HYDROCARBONS AS DIESEL
Quality Assurance and Control Data - Water

Laboratory Number 57025

Compound	Method Blank (ug/L)	PQL (ug/L)	Average Spike Recovery (%)	Limits (%)	RPD (%)
Diesel:	ND<50	50	107%	75-125	15%

Definitions:

ND = Not Detected
PQL = Practical Quantitation Limit

RPD = Relative Percent Difference

QC File No. 57025

Carla G. Joaquin
Senior Chemist
Account Manager

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / Fax (415) 821-7123

Riedel Environmental Services, Inc.
Attn: Mike Sulka

Project No: 4117
Reported 07-September-1993

PURGEABLE AROMATIC HYDROCARBONS - by EPA SW-846 Methods 5030/8020.

Chronology

Laboratory Number 57025

Identification	Sampled	Received	Extracted	Analyzed	Run #	Lab #
STATION C INFLUENT	08/31/93	08/31/93	/ /	09/07/93		1
STATION D MIDFLUENT	08/31/93	08/31/93	/ /	09/07/93		2
STATION E EFFLUENT	08/31/93	08/31/93	/ /	09/08/93		3

Superior Precision Analytical, Inc.
1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 821-7123

PURGEABLE AROMATIC HYDROCARBONS - by EPA SW-846 Methods 5030/8020.
Quality Assurance and Control Data - Water

Laboratory Number 57025

Compound	Method Blank (ug/L)	PQL (ug/L)	Average Spike Recovery (%)	Limits (%)	RPD (%)
Benzene:	ND<0.3	0.3	103%	75-125	2%
Toluene:	ND<0.3	0.3	99%	75-125	2%
Ethyl Benzene:	ND<0.3	0.3	98%	75-125	2%
Xylenes:	ND<0.3	0.3	97%	75-125	2%

Definitions:

ND = Not Detected
PQL = Practical Quantitation Limit

RPD = Relative Percent Difference

QC File No. 57025

Senior Chemist
Account Manager

Certified Laboratories

Chain of Custody and Analysis Request

Section I — page__of__

Consultant: RIEDEL ENVIRONMENTAL
Address: 4138 LAKESIDE DR, RICHMOND CA 94806
Phone No. 5102227810 Fax No. 222 6868
Project Manager: M. SULKA
Alternate Contact: J. LIECHTI
Project No. 4117 P.O. No. QUOTE 93-127

Turn Around Time (circle one): Same Day | 72 Hrs | 24 Hrs | 48 Hrs | **Normal 5 Day** (circled)

Sampler: Mike Sulka
Regulatory Agency: N-A.

Superior Precision Analytical, Inc.
P.O. Box 1545
Martinez, California 94553
Martinez 1 (510) 229-1512 Martinez 2 (510) 229-0166
SanFrancisco (415) 647-2081

Section II: Analysis Request

Laboratory Sample Identification	Matrix (S = Soil A = Air W = Water)	mod 8015 - Gas	mod 8020 - BTEX	mod 8015 - Diesel	8010	8240	CAM17	TCLP Metals:	Metals:	418.1 - TPH by IR	O & G	PCBs			Date Sampled	Time Sampled	Number of Containers	Preservative (yes or no)
1 STATION 'C'	W		X	X													4	
2 INFLUENT																		
3																		
4 STATION 'D'	W		X														3	
5 MIDFLUENT																		
6																		
7 STATION 'E'	W		X	X													4	
8 EFFLUENT																		
9																		
10																		
11																		
12																		

Please Initial: SS
Samples Stored in ice: Hand delivered
Appropriate containers: /
Samples preserved:
VOA's without headspace: X
Comments:

Sampling Remarks
- [ ] Bio-remediation
- [x] Underground storage tank
- [ ] Monitoring
- [ ] Recent Contamination
- [ ] Unknown Compounds

Relinquished by / Organization	Date/Time	Received by / Organization	Date/Time
Mike Sulka / RES	31-AUG-93 1850	Sayetsyed	8/31/93 18:50
R. Vargas / Superior	9-1-93	V. [illegible] / Superior	9/1/93 1715

Lab please initial the following:
Samples Stored in Ice ✓
Appropriate Containers ✓
Samples Preserved ✓
VOAs without Headspace ✓
Comments