

**SEMI-ANNUAL MONITORING REPORT
HYDROCARBON RECOVERY SYSTEM
UNION PACIFIC RAILROAD YARD
OAKLAND, CALIFORNIA
JULY 1 TO NOVEMBER 30, 1997**

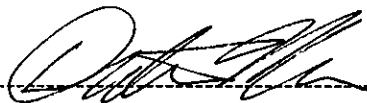
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Consulting Services
5665 Flatiron Parkway
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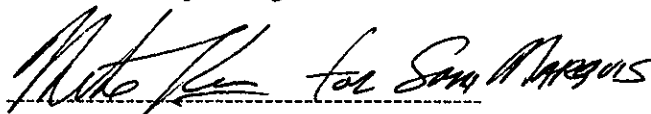
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December 23, 1997

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1. INTRODUCTION

This report presents the results from the semi-annual monitoring program conducted at the fueling area of the Union Pacific Railroad (UPRR) Oakland trailer-on-flat-car (TOFC) railyard at 1717 Middle Harbor Road in Oakland, California for the period of July 1, 1997 to November 30, 1997. The report was prepared by Consulting Services of Laidlaw Environmental Services, Inc. (Laidlaw) for UPRR in accordance with the East Bay Municipal Utility District (EBMUD) permit number 502-51231. The objective of the monitoring program is to evaluate the distribution and movement of petroleum hydrocarbons in groundwater and the effectiveness of the hydrocarbon recovery system.

The purpose of this report is to provide semi-annual monitoring information pertaining to the hydrocarbon recovery and groundwater treatment system and the groundwater monitoring wells at the fueling area. This report also contains quarterly groundwater monitoring information requested in a letter by Alameda County Department of Environmental Health (ACDEH), dated September 21, 1994.

2. BACKGROUND INFORMATION

The fueling area is located in the northern portion of the UPRR Oakland TOFC Yard, which is adjacent to the Oakland Inner Harbor or Oakland Estuary (Figure 1). The area surrounding the site is used for heavy to light commerce. Residential areas are located approximately one-half mile north of the site and across the Oakland Estuary one-half mile south of the site.

Previous investigations (described below) indicated the presence of light non-aqueous-phase liquid petroleum hydrocarbons (diesel) floating on the groundwater near the fueling area. A hydrocarbon recovery and groundwater treatment system (system) was installed to remove diesel on the groundwater near the fueling area. Operation of the system commenced on May 12, 1992.

The results from prior investigations and environmental engineering activities conducted by Laidlaw have been documented in previous reports. Background information about the site was presented in the report, Hydrocarbon Investigation and Remediation Design, dated June 10, 1991. The results of the hydrocarbon investigation and a conceptual design of the system were also presented in this report. The system design was outlined in the Preliminary Design Report, dated September 5, 1991. As-built information for the system has been presented in the Hydrocarbon Recovery System, As-Built Construction Report, dated July 20, 1992. Process changes to the system were presented in a letter from UPRR dated March 22, 1993 to the EBMUD, which represented the permit renewal application.

On March 14, 1997, Laidlaw submitted the Additional Remediation Workplan to ACDEH, which proposed the recovery of total fluids (water and diesel) from groundwater monitoring well OMW-9 and piezometer OP-4 and treatment at the existing system. On March 21, 1997, ACDEH approved the workplan. On June 24 and 25, 1997, Burns & McDonnell implemented the workplan. The two pumps in OMW-9 and OP-4 were started on June 26, 1997. Due to an operational problem with the air compressor (supplies pressurized air for the recovery pumps), the system has remained inoperable since the end of September 1997.

3. CURRENT ACTIVITIES

The current activities at the site consist of performing the system and groundwater monitoring activities described in the following sections.

3.1. SYSTEM MONITORING

Samples are collected from the water stream of the system to assess the performance of the system and to compare discharge concentrations with limits established by the EBMUD. At varying frequencies, water samples are collected from sampling ports located before (influent), between (midfluent), and after (effluent) the two granular activated carbon vessels. On a quarterly basis, samples are collected from the influent and effluent water streams through the carbon vessels. The samples are analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 8020 and total petroleum hydrocarbons as diesel (TPH-D) using EPA Method 8015 Modified.

On a monthly basis, water samples are collected from the influent and midfluent of the water stream through the carbon vessels. The influent samples are analyzed for TPH-D and used for estimating the loading of contaminants on the first vessel. Midfluent water samples are collected and analyzed for BTEX and used to monitor for the breakthrough of organics from the first vessel.

System maintenance consists of changing particulate filters (typically weekly), back-washing the carbon, and checking the chlorine feed system. Operational readings (cumulative flow, hydrocarbon storage volume, and pressure drop across the particle filters) are collected during each site visit.

3.2. GROUNDWATER MONITORING

Groundwater monitoring activities consist of collecting fluid-level measurements in the groundwater monitoring wells on a bi-monthly basis and collecting groundwater samples on a semi-annual basis. In

accordance with a letter dated March 21, 1997, groundwater sampling activities are performed during the first and third quarters of each year.

Fluid-level measurements are used to generate potentiometric surface maps, which provide information about the groundwater gradient and the operation of the recovery wells. The data used in these maps include wells with diesel. The groundwater elevations in these wells are corrected to account for the diesel overlying the water column in the well. This correction is performed by multiplying the specific gravity of the diesel by the diesel thickness and adding this value to the water elevation measurement from the well.

During a sampling event, groundwater samples are collected from wells in which diesel is absent. The samples are submitted to a state-certified laboratory and analyzed for BTEX and TPH-D. Diesel is first recovered by hand using disposable bailers from wells containing measurable amounts of diesel.

4. SYSTEM MONITORING

The recovery of diesel is accomplished by depressing the groundwater table with total-fluids pumps to recover diesel and water and creating a cone of depression surrounding the recovery wells. The recovery and treatment system consists of five recovery wells, a diesel/water separator, a recovered diesel storage tank, and an activated carbon treatment system. The recovered groundwater is treated and discharged to the EBMUD sanitary sewer. The locations of the five recovery wells (ORW-1, ORW-2, ORW-3, OMW-9, and OP-4) and the water treatment facility are indicated on Figure 2.

4.1. SYSTEM OPERATION

During the operating period of July 1, 1996 to November 30, 1997, the groundwater recovery and treatment system treated approximately 386,000 gallons of groundwater. Since start-up on May 12, 1992, until June 30, 1997, the system has recovered approximately 5,870,000 gallons of water and 10,500 gallons of diesel (Table 6).

Until September 29, 1997, the system operated with only minor down time for required periodic maintenance. On September 29, 1997, the air compressor which supplies pressurized air to the recovery pumps became inoperable. An alternative air supply for the recovery pumps is being evaluated.

Combined pumping rates for ORW-1, ORW-2, ORW-3, OMW-9, and OP-4 averaged approximately 1.5 gallons per minute (gpm) for the semi-annual period. Copies of the field logs for the hydrocarbon recovery system are included in Appendix A.

4.2. ANALYTICAL RESULTS

Analytical results of BTEX and TPH-D from the influent to the activated carbon system are presented 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 results from the samples collected between carbon vessels are included as Table 3. Laboratory analytical reports from the system sampling are included in Appendix B.

4.2.1. INFLUENT WATER STREAM TO CARBON UNITS

For the July 18, 1997 sampling event the analytical results for BTEX from the influent water stream to the carbon units indicated the presence of benzene at a concentration of 0.0024 milligrams per liter (mg/l) and xylenes at 0.0011 mg/l. Toluene and ethylbenzene were not detected above the method detection limit (MDL) of 0.0005 mg/l. Influent TPH-D concentrations ranged from 12 to 18 mg/l during the months of July, August, and September 1997.

4.2.2. EFFLUENT WATER STREAM TO CARBON UNITS

Analytical results indicate that all BTEX concentrations in the effluent samples were below the MDLs of 0.0005 mg/l for benzene, toluene, and ethylbenzene and below 0.001 mg/l for xylenes during the July 18, 1997 sampling event. The effluent TPH-D concentration was 0.0096 mg/l during the sampling event.

4.2.3. WATER STREAM BETWEEN CARBON UNITS

Analytical results indicate that all BTEX concentrations in the midfluent samples were below the MDLs of 0.0005 mg/l for benzene, toluene, and ethylbenzene and 0.001 mg/l for xylenes during the months of July, August, and September 1997.

4.3. 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 "lead" carbon vessel was replaced with fresh activated carbon on August 8, 1997, as noted in the table. Estimates and analytical results (Table 3) indicate that breakthrough occurred in the lead vessel in August 1997. The methodologies for performing calculations, that are represented in Table 4, were originally presented in the Hydrocarbon Recovery System Quarterly Monitoring Report, Second Quarter, 1992.

5. GROUNDWATER MONITORING

The following sections present information that has been collected since the most recent ACDEH submittal. Groundwater sampling results from August 1997 were included in the Semi-Annual Monitoring Report (April to September 1997), and submitted to ACDEH on October 30, 1997. Historical fluid levels and groundwater sampling results are presented in Tables 5 and 6, respectively.

5.1. FLUID-LEVEL MEASUREMENTS

Corrected groundwater elevations increased in all of the groundwater monitoring wells and piezometers between September and November, 1997. The average change in corrected groundwater elevations was an increase of approximately 1.5 feet. The largest increase was 2.79 feet in monitoring well OMW-2. In previous years during the same time period, decreases in groundwater levels were observed. The increase in groundwater levels is most likely due to the lack of groundwater depression by the recovery pumps.

Fluid levels measured in September 1997 were used to generate the potentiometric surface map presented in Figure 3. Groundwater depressions created by the recovery wells (ORW-1, ORW-2, ORW-3, OMW-9, and OP-4) are evident on the potentiometric surface map. The contours lines show an increased hydraulic gradient or convergent flow towards each individual recovery well. The increased flow towards the recovery well network indicates that groundwater and diesel within the area of influence of the wells tend to be recovered from the portion of the site where diesel is present. Groundwater flow outside the influence of the recovery wells has historically been to the south towards the Oakland Estuary.

Fluid levels measured in November 1997 were used to generate the potentiometric surface map presented in Figure 4. In the area of the recovery wells (ORW-1, ORW-2, ORW-3, OMW-9, and OP-4) the potentiometric surface indicates a groundwater high, which is most likely due to the lack of recovery pump operation.

The presence of diesel was observed in monitoring wells OMW-4 and OMW-7, piezometers OP-1, OP-2, and OP-3, and recovery wells OMW-2 and OMW-3 during the September 1997 event. During the September 1997 event, diesel was not observed in recovery wells OMW-9 and OP-4. The presence of diesel was observed in monitoring wells OMW-4 and OMW-7, piezometers OP-1, OP-2, and OP-3, and recovery wells OMW-1, OMW-2, and OMW-3 during the November 1997 event. The approximate extent of diesel did not change significantly during the September and November 1997 monitoring events, which are presented in Figures 5 and 6, respectively.

5.2. GROUNDWATER SAMPLING

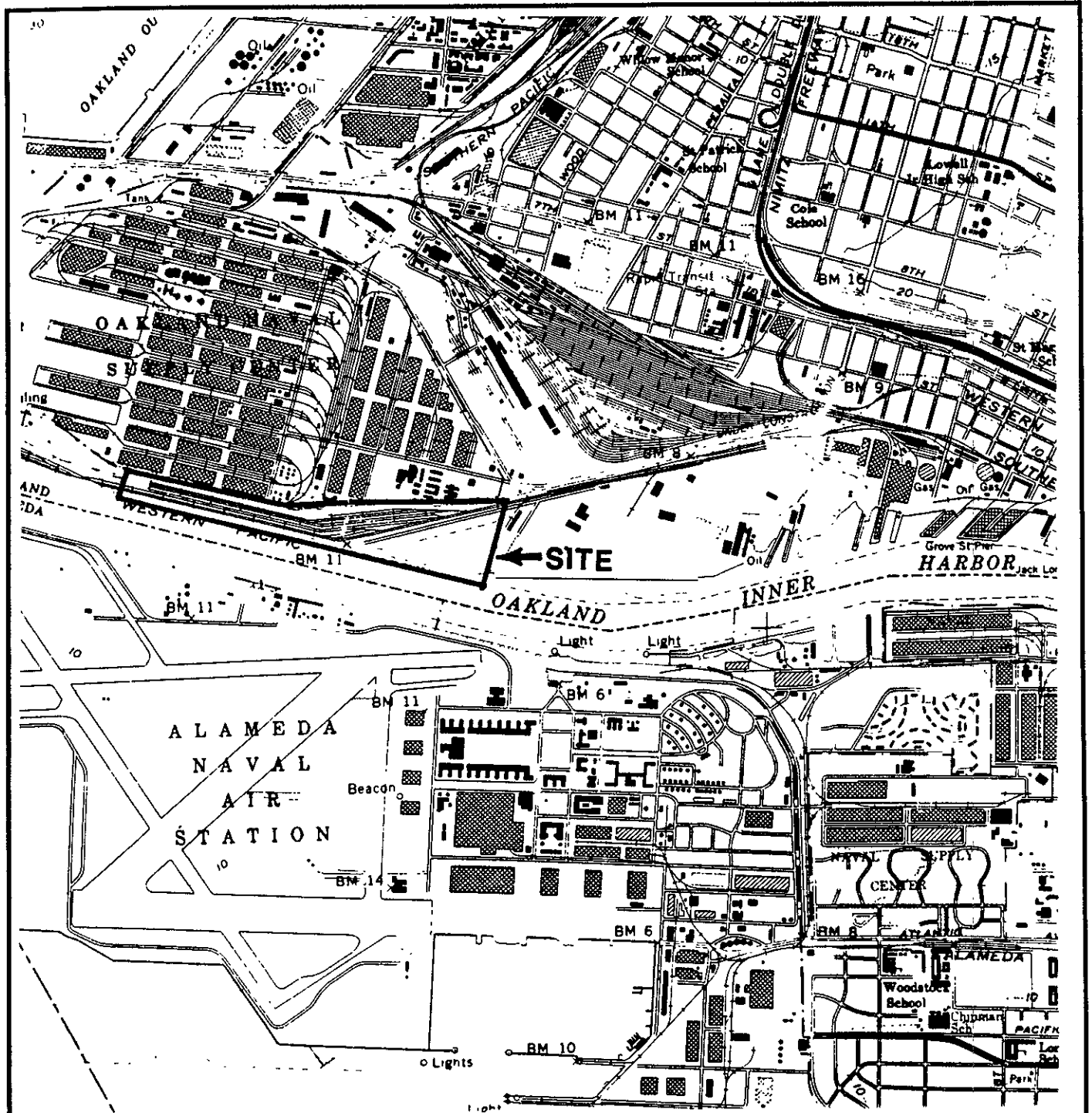
The most recent semi-annual groundwater sampling event was conducted on August 28, 1997. A discussion of the groundwater analytical results from this event was included with the monitoring report that was submitted for the third quarter of 1997. The analytical results are included in Table 2. The next sampling event is scheduled for February 1998.

6. CONCLUSIONS

The following conclusions have been drawn from the system and groundwater monitoring data collected from July 1 to November 30, 1997:

- Water discharge from the system did not exceed the EBMUD discharge limits during the monitoring period.
- When the recovery wells were operating, the potentiometric surface indicated groundwater depression in the locations of the recovery wells, which is consistent with previous monitoring events.
- Fluid level measurements in the area of the recovery system indicate that drawdown is occurring in the vicinity of each recovery well and that the diesel plume is being controlled.
- An increase in groundwater elevations was observed after the recovery pumps became inoperable.
- The system has removed 10,500 gallons of diesel between the start-up on May 12, 1992 and November 30, 1997.
- The system has removed diesel consistently and effectively over its operational life.

FIGURES



LOCMAP

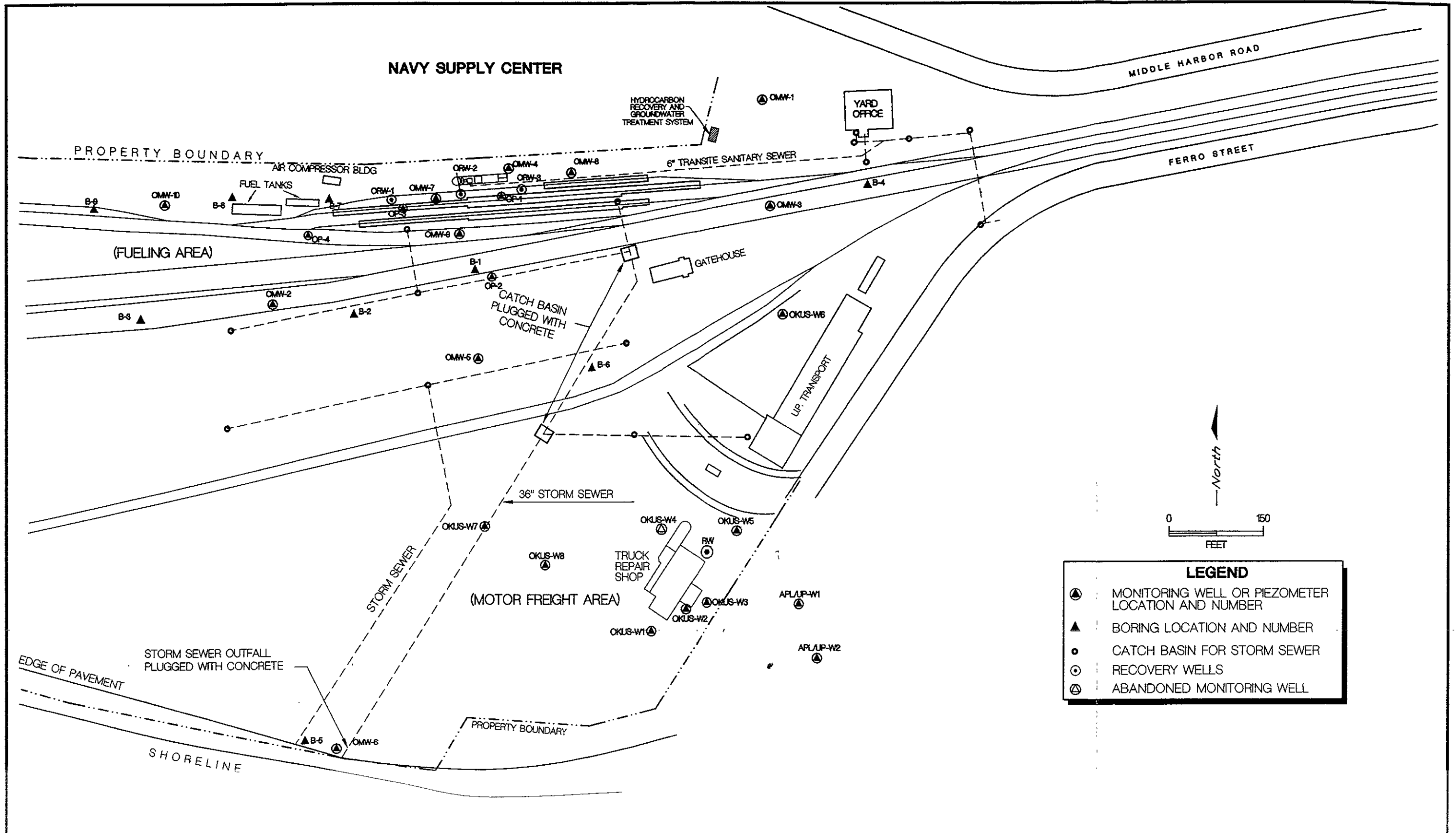
North

USPCI
 A LAIDLAW COMPANY

UPRR TOFC RAILYARD - OAKLAND, CALIFORNIA

FIGURE 1
 SITE LOCATION MAP

SCALE 1" = 2000' DATE: 10/29/96



LEGEND

- ⊙ MONITORING WELL OR PIEZOMETER LOCATION AND NUMBER
- ▲ BORING LOCATION AND NUMBER
- CATCH BASIN FOR STORM SEWER
- ⊙ RECOVERY WELLS
- ⊙ ABANDONED MONITORING WELL

| By | DATE |
|-----------|----------|
| DRAWN CWJ | 10/15/97 |
| CHECKED | |
| APPROVED | |
| APPROVED | |
| APPROVED | |



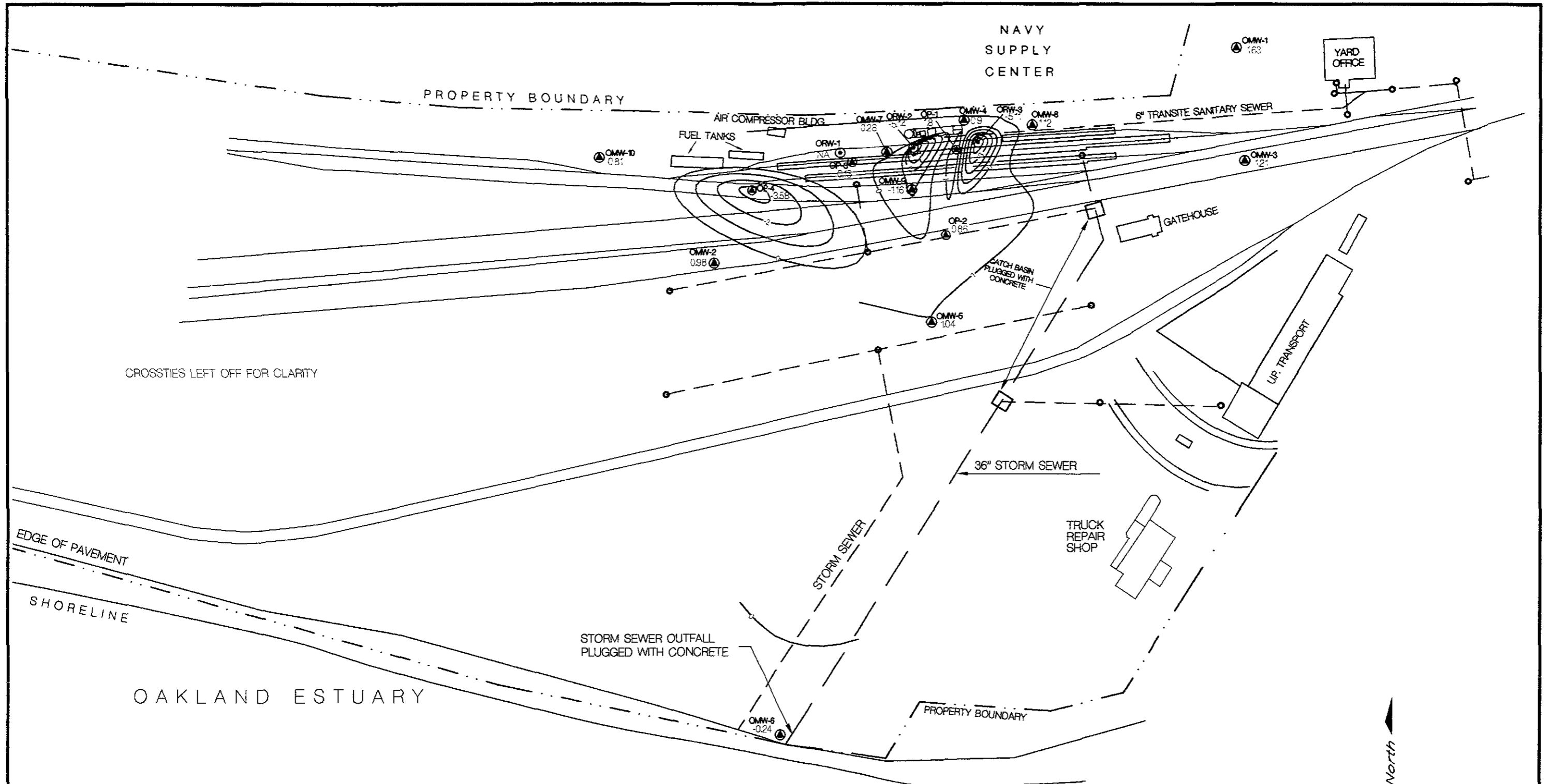
UPRR TOFC RAILYARD
UPMF REPAIR SHOP- OAKLAND, CALIFORNIA

FIGURE 2
SITE VICINITY MAP

SCALE 1" = 150'

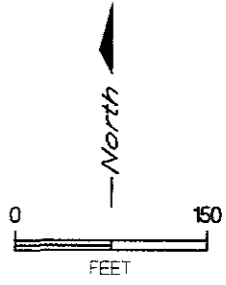
DWG NO. 96120-861

OAKLAND ESTUARY



CROSSTIES LEFT OFF FOR CLARITY

OAKLAND ESTUARY

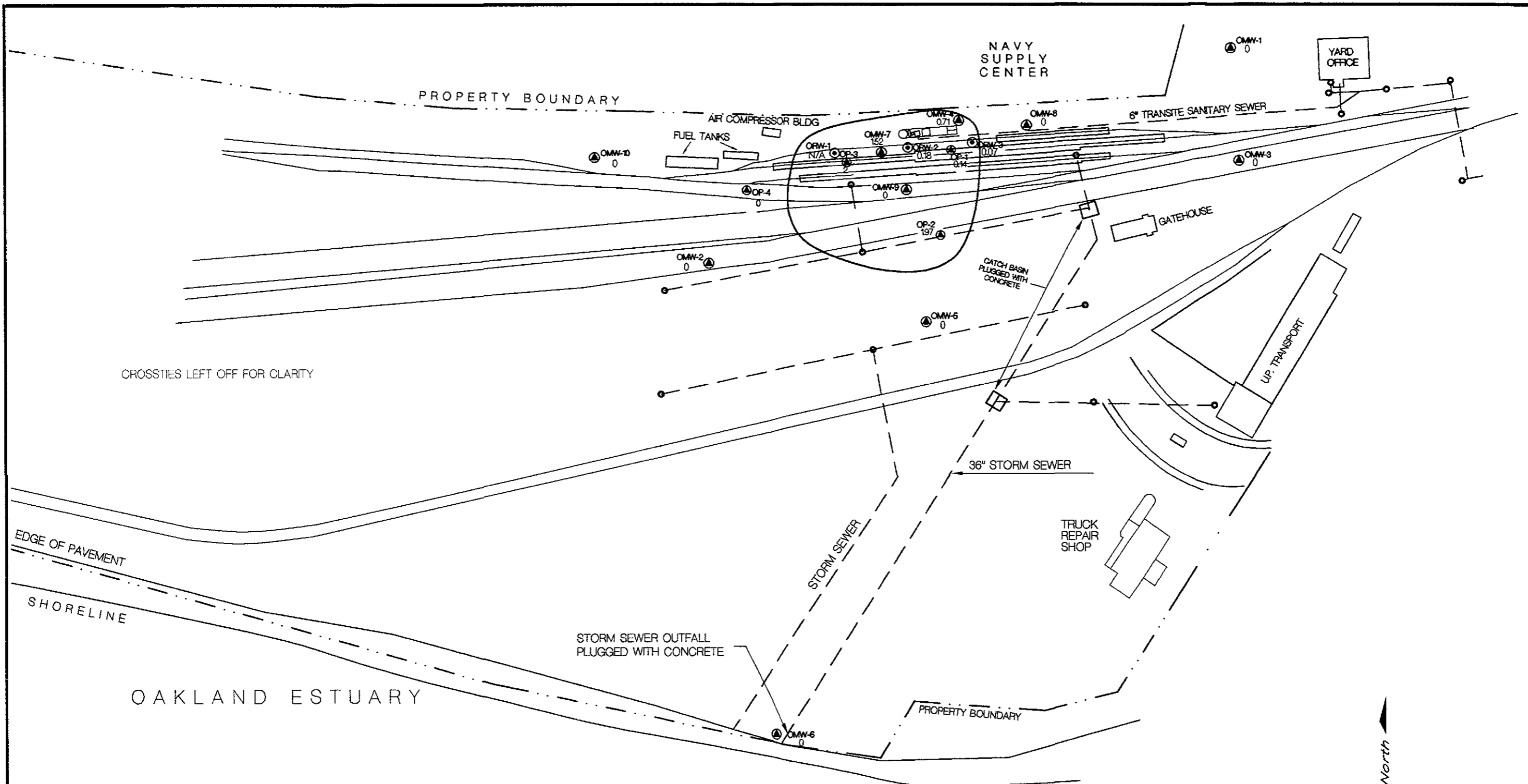


| LEGEND | |
|--------|--|
| | MONITORING WELL OR PEZOMETER LOCATION AND NUMBER |
| | CATCH BASIN FOR STORM SEWER |
| | RECOVERY WELLS |
| | GROUNDWATER ELEVATION IN FEET |

| BY | DATE |
|-----------|----------|
| DRAWN WRB | 12/22/97 |
| CHECKED | |
| APPROVED | |
| APPROVED | |
| APPROVED | |



| | |
|--|------------|
| UPRR TOFC RAILYARD - OAKLAND CALIFORNIA | |
| FIGURE 3 POTENTIOMETRIC SURFACE MAP SEPTEMBER 1997 | |
| SCALE | 1" = 150' |
| DWG NO | 96199-0001 |

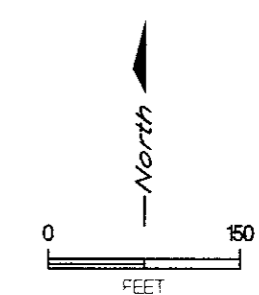


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OAKLAND ESTUARY

LEGEND

- ▲ MONITORING WELL OR PIEZOMETER LOCATION AND NUMBER
- CATCH BASIN FOR STORM SEWER
- RECOVERY WELLS
- PRODUCT THICKNESS (FT)
- APPROXIMATE LATERAL EXTENT OF DIESEL (NOT AVAILABLE)



| BY | DATE |
|-----------|----------|
| DRAWN WRB | 12/20/97 |
| CHECKED | |
| APPROVED | |
| APPROVED | |
| APPROVED | |

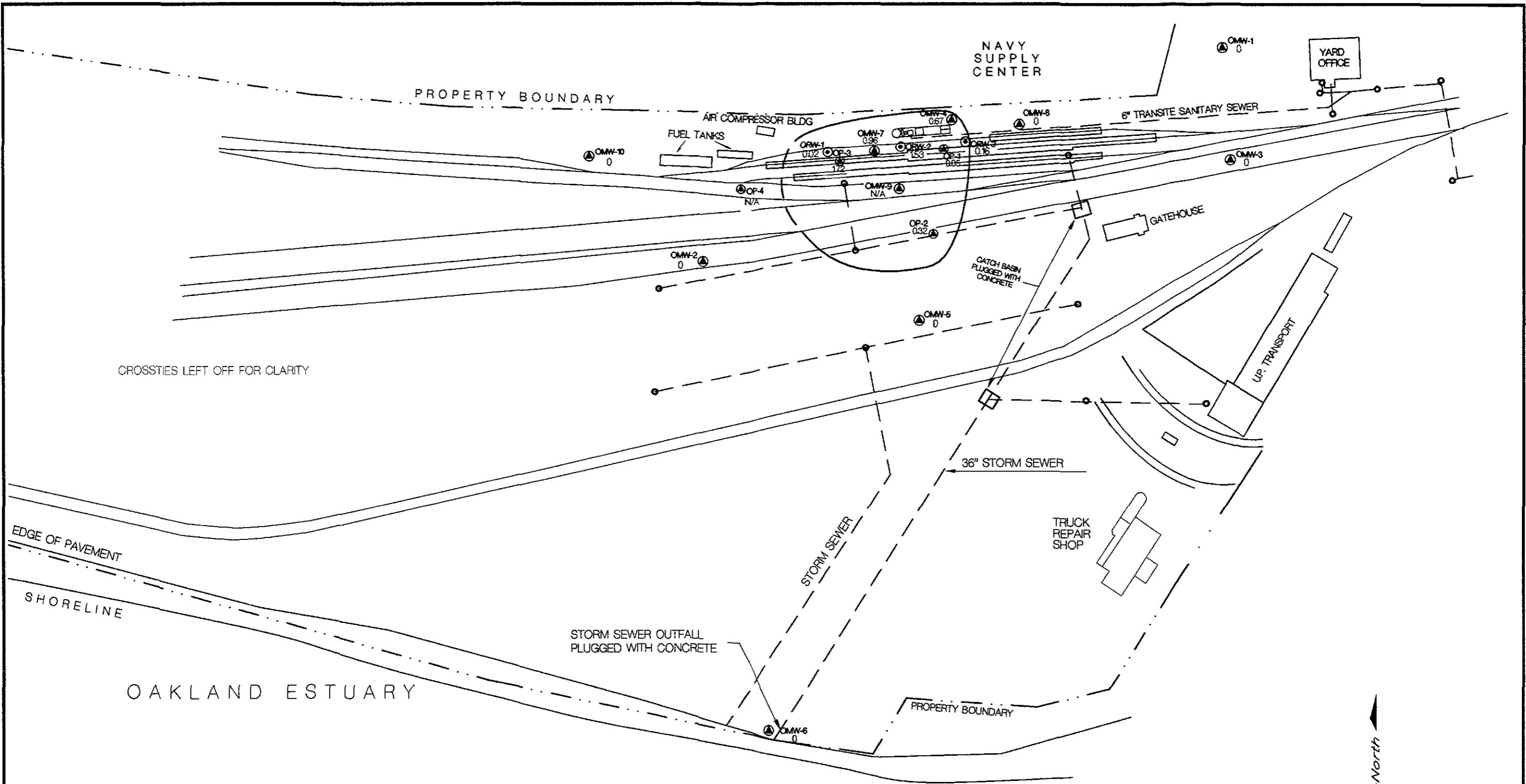


UPRR TOFC RAILYARD - OAKLAND CALIFORNIA

FIGURE 5
APPROXIMATE LATERAL EXTENT OF DIESEL
SEPTEMBER 1997

SCALE 1" = 150'

DWG NO 96199-0003

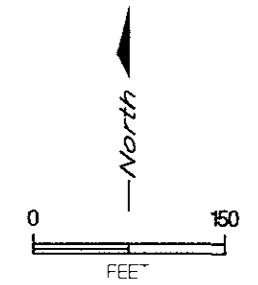


CROSSTIES LEFT OFF FOR CLARITY

OAKLAND ESTUARY

LEGEND

- ▲ MONITORING WELL OR PIEZOMETER LOCATION AND NUMBER
- CATCH BASIN FOR STORM SEWER
- ⊙ RECOVERY WALLS
- PRODUCT THICKNESS (FT)
- - - APPROXIMATE LATERAL EXTENT OF DIESEL NOT AVAILABLE



| | |
|----------|----------|
| BY | DATE |
| WRB | 12/20/97 |
| CHECKED | |
| APPROVAL | |
| APPROVED | |
| APPROVED | |

LANDTEAM
ENVIRONMENTAL SERVICES

UPRR TOFC RAILYARD - OAKLAND CALIFORNIA

FIGURE 6
 APPROXIMATE LATERAL EXTENT OF DIESEL
 NOVEMBER 1997

SCALE: 1" = 150'
 DWG NO: 96199-0004

TABLES

TABLE 1
Analytical Results
Influent Water Stream to Carbon Units
Hydrocarbon Treatment System
Oakland Fueling Area

| Date Collected | Benzene (mg/L) | Toluene (mg/L) | Ethylbenzene (mg/L) | Xylenes (mg/L) | Total Petroleum Hydrocarbons as Diesel (mg/L) |
|----------------|----------------|----------------|---------------------|----------------|---|
| 01/05/95 | NA | NA | NA | NA | 140 |
| 01/25/95 | <0.03 | <0.03 | <0.03 | <0.03 | 550 |
| 04/12/95 | 0.0015 | <0.0003 | <0.0003 | 0.0023 | 3.7 |
| 05/29/95 | NA | NA | NA | NA | <0.02* |
| 06/30/95 | NA | NA | NA | NA | 25 |
| 07/19/95 | 0.011 | 0.0006 | 0.005 | 0.015 | 13 |
| 08/08/95 | NA | NA | NA | NA | 11 |
| 09/08/95 | NA | NA | NA | NA | 11 |
| 10/13/95 | 0.009 | 0.0006 | 0.010 | 0.020 | 66 |
| 11/22/95 | NA | NA | NA | NA | 38 |
| 12/15/95 | NA | NA | NA | NA | 19 |
| 01/08/96 | 0.013 | <0.0005 | 0.010 | 0.021 | <0.05 |
| 02/12/96 | NA | NA | NA | NA | 56 |
| 03/12/96 | NA | NA | NA | NA | 42 |
| 04/10/96 | 0.0097 | <0.0005 | 0.0067 | 0.010 | 36 |
| 05/13/96 | NA | NA | NA | NA | 14 |
| 06/13/96 | NA | NA | NA | NA | 18 |
| 07/17/96 | <0.0005 | <0.0005 | <0.0005 | <0.002 | 9.7 |
| 08/19/96 | NA | NA | NA | NA | 14 |
| 09/16/96 | NA | NA | NA | NA | 14 |
| 10/17/96 | <0.0005 | <0.0005 | <0.0005 | <0.001 | 11 |
| 11/25/96 | NA | NA | NA | NA | 13 |
| 12/13/96 | NA | NA | NA | NA | 14 |
| 01/14/97 | 0.0061 | <0.0005 | <0.0005 | 0.0039 | 22 |
| 02/11/97 | NA | NA | NA | NA | 13 |
| 03/10/97 | NA | NA | NA | NA | 16 |
| 04/04/97 | 0.003 | <0.0005 | <0.0005 | <0.001 | 8.7 |
| 05/15/97 | NA | NA | NA | NA | 8.5 |
| 07/18/97 | 0.0024 | <0.0005 | <0.0005 | 0.0011 | 18 |
| 08/15/97 | NA | NA | NA | NA | 12 |
| 09/05/97 | NA | NA | NA | NA | 14 |

NA - Not Analyzed

*Unknown hydrocarbon in the Diesel range reported concentration of 14 mg/L

TABLE 2
Analytical Results
Effluent Water Stream from Carbon Units
Hydrocarbon Treatment System
Oakland Fueling Area

| 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 | 0.005 | 0.005 | 0.005 | 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 |
| 09/30/93 | <0.0003 | <0.0003 | <0.0003 | <0.0009 | <0.050 |
| 10/28/93 | <0.0003 | <0.0003 | <0.0003 | <0.0009 | <0.050 |
| 11/30/93 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.050 |
| 12/28/93 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.050 |
| 01/31/94 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.050 |
| 02/25/94 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.050 |
| 03/30/94 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.050 |
| 05/03/94 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.050 |
| 06/01/94 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.050 |
| 07/29/94 | <0.0005 | <0.0005 | <0.0005 | 0.0007 | <0.050 |
| 10/27/94 | <0.0005 | <0.0005 | <0.0005 | 0.0006 | <0.050 |
| 01/25/95 | <0.03 | <0.03 | <0.03 | <0.03 | 470 |
| 04/12/95 | <0.0003 | <0.0003 | <0.0003 | <0.0003 | <0.050 |
| 07/19/95 | <0.0005 | <0.0005 | <0.0005 | <0.002 | 1.5 |
| 10/13/95 | <0.0005 | <0.0005 | <0.0005 | <0.002 | <0.050 |
| 01/08/96 | <0.0005 | <0.0005 | <0.0005 | <0.002 | 36 |
| 04/10/96 | <0.0005 | <0.0005 | <0.0005 | <0.002 | 1.8 |
| 07/17/96 | <0.0005 | <0.0005 | <0.0005 | <0.002 | 0.12 |
| 10/17/96 | <0.0005 | <0.0005 | <0.0005 | <0.001 | <0.050 |
| 01/11/97 | <0.0005 | <0.0005 | <0.0005 | <0.001 | <0.050 |
| 04/04/97 | <0.0005 | <0.0005 | <0.0005 | <0.001 | <0.050 |
| 07/18/97 | <0.0005 | <0.0005 | <0.0005 | <0.001 | 0.096 |

* - Discharge limits updated on July 1, 1996.

N/A - Not Applicable

TABLE 3
Analytical Results
Water Stream Between Carbon Units
Hydrocarbon Treatment System
Oakland Fueling Area

| Date Collected | Benzene (mg/L) | Toluene (mg/L) | Ethylbenzene (mg/L) | Xylenes (mg/L) |
|-----------------------|-----------------------|-----------------------|----------------------------|-----------------------|
| 01/05/95 | 0.0048 | 0.0035 | <0.003 | 0.015 |
| 01/25/95 | <0.03 | <0.03 | <0.03 | <0.03 |
| 04/12/95 | 0.0013 | <0.0003 | <0.0003 | <0.0003 |
| 05/29/95 | 0.0032 | <0.0005 | <0.0005 | <0.0005 |
| 06/30/95 | 0.002 | <0.0005 | <0.0005 | <0.002 |
| 07/19/95 | 0.002 | <0.0005 | <0.0005 | <0.002 |
| 08/08/95 | <0.0005 | <0.0005 | <0.0005 | <0.002 |
| 09/08/95 | <0.0005 | 0.0008 | <0.0005 | <0.002 |
| 11/22/95 | <0.0005 | <0.0005 | <0.0005 | <0.002 |
| 12/15/95 | <0.0005 | <0.0005 | <0.0005 | <0.002 |
| 01/08/96 | 0.0008 | <0.0005 | <0.0005 | <0.002 |
| 02/12/96 | 0.0012 | 0.0005 | <0.0005 | <0.002 |
| 03/12/96 | <0.0005 | <0.0005 | <0.0005 | <0.002 |
| 04/10/96 | 0.0018 | <0.0005 | 0.0005 | <0.002 |
| 05/13/96 | <0.0005 | <0.0005 | <0.0005 | <0.002 |
| 06/13/96 | <0.0005 | <0.0005 | <0.0005 | <0.002 |
| 07/17/96 | <0.0005 | <0.0005 | <0.0005 | <0.002 |
| 08/19/96 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| 09/16/96 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| 10/17/96 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| 11/25/96 | 0.023 | 0.0037 | <0.0005 | 0.031 |
| 12/13/96 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| 01/14/97 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| 02/11/97 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| 03/10/97 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| 04/04/97 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| 05/15/97 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| 07/18/97 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| 08/15/97 | <0.0005 | <0.0005 | <0.0005 | <0.001 |
| 09/05/97 | <0.0005 | <0.0005 | <0.0005 | <0.001 |

TABLE 4
Hydrocarbon Treatment System
Granular Activated Carbon Usage
Oakland Fueling Area

| Date | Time | Volume (gallons) | Periodic Flowrate (gpm) | Average Flowrate (gpm) | nfl Conc TPHd (mg/l) | Carbon Used (pounds) | Spent Carbon (pounds) | Remaining Pumpable (gallons) | Remaining Pumpable (days) | Projected Breakthru Date |
|----------|----------|---------------------|-------------------------------|------------------------------|----------------------------|----------------------------|-----------------------------|------------------------------------|---------------------------------|--------------------------------|
| 01/25/95 | 01:30 PM | 2468180 | 2.11 | 1.44 | 35 ** | 812 | 812 | 203706 | 99 | May-95 |
| 04/12/95 | 10:50 AM | 2549270 | 0.73 | 1.20 | 3.7 | 246 | 1059 | 1527342 | 883 | Sep-97 |
| 05/29/95 | 03:30 PM | 2732640 | 2.70 | 1.58 | 0 | 418 | 1476 | 1527342 | 673 | Apr-97 |
| 06/30/95 | 02:00 PM | 2830380 | 2.13 | 1.69 | 25 | 259 | 1736 | 63424 | 26 | Jul-95 |
| 07/19/95 | 02:30 PM | 2882550 | 1.90 | 1.72 | 13 | 134 | 1870 | 59968 | 24 | Aug-95 |
| 07/21/95 | 11:00 AM | 2890500 | 2.98 | 2.98 | 12 * | 0 + | 0 | 1000655 | 233 | Mar-96 |
| 08/08/95 | 04:00 PM | 2986700 | 3.67 | 3.32 | 11 | 184 | 184 | 991051 | 207 | Mar-96 |
| 09/08/95 | 02:00 PM | 3108110 | 2.73 | 3.12 | 11 | 229 | 413 | 865962 | 192 | Mar-96 |
| 10/13/95 | 10:30 AM | 3206500 | 1.96 | 2.83 | 66 | 410 | 823 | 107058 | 26 | Nov-95 |
| 11/22/95 | 03:30 PM | 3318600 | 1.94 | 2.65 | 38 | 515 | 1338 | 104523 | 27 | Dec-95 |
| 12/15/95 | 08:00 AM | 3369800 | 1.57 | 2.47 | 19 | 223 | 1562 | 138533 | 39 | Jan-96 |
| 01/08/96 | 11:45 AM | 3554790 | 5.32 | 2.88 | 0.05 | 691 | 2253 | 255074 | 62 | Mar-96 |
| 02/12/96 | 08:00 AM | 3714500 | 3.18 | 2.92 | 56 | 708 | 2961 | 4150 | 1 | Feb-96 |
| 03/12/96 | 11:00 AM | 3814170 | 2.38 | 2.86 | 42 | 470 | 3432 | 2610 | 1 | Mar-96 |
| 04/10/96 | 08:00 AM | 3927670 | 2.73 | 2.84 | 36 | 550 | 3982 | 3011 | 1 | Apr-96 |
| 05/06/96 | 08:00 AM | 4035290 | 2.87 | 2.87 | 25 * | 0 + | 0 | 480314 | 116 | Aug-96 |
| 05/13/96 | 08:00 AM | 4055530 | 2.69 | 2.78 | 14 | 66 | 66 | 829513 | 207 | Dec-96 |
| 06/13/96 | 07:00 AM | 4172140 | 2.62 | 2.73 | 18 | 369 | 435 | 522088 | 133 | Oct-96 |
| 07/17/96 | 07:50 AM | 4343300 | 3.49 | 2.92 | 9.7 | 475 | 910 | 674587 | 161 | Dec-96 |
| 08/19/96 | 08:00 AM | 4478300 | 2.84 | 2.90 | 14 | 363 | 1273 | 311757 | 75 | Nov-96 |
| 09/16/96 | 10:00 AM | 4556200 | 1.93 | 2.74 | 14 | 205 | 1478 | 223934 | 57 | Nov-96 |
| 10/17/96 | 02:55 PM | 4645700 | 1.99 | 2.63 | 11 | 225 | 1703 | 162148 | 43 | Nov-96 |
| 11/25/96 | 10:25 AM | 4781700 | 2.43 | 2.61 | 13 | 336 | 2039 | -18021 | -5 | Nov-96 |
| 12/13/96 | 09:35 AM | 4829600 | 1.85 | 2.52 | 14 | 118 | 2157 | -67181 | -18 | Nov-96 |
| 12/19/96 | 09:40 AM | 4840900 | 1.31 | 2.40 | 17 * | 0 + | 0 | 706345 | 204 | Jul-97 |
| 01/14/97 | 01:00 PM | 4914200 | 1.95 | 2.36 | 22 | 191 | 191 | 493805 | 145 | Jun-97 |
| 02/11/97 | 02:30 PM | 5072700 | 3.92 | 2.49 | 13 | 406 | 597 | 648010 | 181 | Aug-97 |
| 03/10/97 | 10:00 AM | 5186800 | 2.96 | 2.53 | 16 | 293 | 890 | 416413 | 114 | Jul-97 |
| 04/04/97 | 11:00 AM | 5288500 | 2.82 | 2.55 | 8.7 | 253 | 1144 | 590973 | 161 | Sep-97 |
| 05/15/97 | 07:30 AM | 5435800 | 2.50 | 2.54 | 8.5 | 356 | 1500 | 353139 | 96 | Aug-97 |
| 06/30/97 | 11:25 AM | 5484800 | 0.74 | 2.43 | 8.5 * | 115 | 1616 | 271569 | 78 | Sep-97 |
| 07/18/97 | 01:00 PM | 5580700 | 3.69 | 2.51 | 18 | 230 | 1845 | 51646 | 14 | Aug-97 |
| 08/08/97 | 09:00 AM | 5666400 | 2.86 | 2.53 | 18 * | 0 + | 0 | 667103 | 183 | Feb-98 |
| 08/15/97 | 11:00 AM | 5679200 | 1.25 | 2.46 | 12 | 31 | 31 | 985250 | 278 | May-98 |
| 09/05/97 | 11:00 AM | 5790000 | 3.66 | 2.52 | 14 | 266 | 297 | 730376 | 201 | Mar-98 |

* - Concentration estimate ** - Concentration represents the average estimated value from January to the next sampling event.

+ - Changed carbon vessel on this date.

TABLE 5
Fluid Level Measurements
Union Pacific Railroad - Oakland Fueling Area

| Well No. | Date | Well Elev. Above MSL (FT) | Depth to Product (FT) | Depth to Water (FT) | Water Level Elevation (FT) | Product Thickness (FT) | Corr Water Level Elevation* (FT) | |
|----------|----------|---------------------------|-------------------------------|---------------------|----------------------------|------------------------|----------------------------------|--|
| OMW-1 | | 8.79 | | | | | | |
| | 01/25/95 | | | 2.52 | 6.27 | | 6.27 | |
| | 05/09/95 | | | 5.55 | 3.24 | | 3.24 | |
| | 05/17/95 | | | 4.43 | 4.36 | | 4.36 | |
| | 07/31/95 | | | 6.43 | 2.36 | | 2.36 | |
| | 09/07/95 | | | 6.86 | 1.93 | | 1.93 | |
| | 11/30/95 | | | 7.69 | 1.10 | | 1.10 | |
| | 01/10/96 | | | 6.48 | 2.31 | | 2.31 | |
| | 03/25/96 | | | 5.00 | 3.79 | | 3.79 | |
| | 05/17/96 | | | 2.98 | 5.81 | | 5.81 | |
| | 07/25/96 | | | 6.29 | 2.50 | | 2.50 | |
| | 09/16/96 | | | 7.05 | 1.74 | | 1.74 | |
| | 11/12/96 | | | 7.51 | 1.28 | | 1.28 | |
| | 01/20/97 | | | 4.26 | 4.53 | | 4.53 | |
| | 03/06/97 | | | 4.65 | 4.14 | | 4.14 | |
| | 05/20/97 | | | 6.11 | 2.68 | | 2.68 | |
| | 07/15/97 | | | 6.66 | 2.13 | | 2.13 | |
| | 08/28/97 | | | 6.58 | 2.21 | | 2.21 | |
| | 09/15/97 | | | 7.16 | 1.63 | | 1.63 | |
| | 11/18/97 | | | 6.58 | 2.21 | | 2.21 | |
| OMW-2 | | 5.88 | | | | | | |
| | 01/25/95 | | | 3.35 | 2.53 | | 2.53 | |
| | 05/09/95 | | NOT GAUGED | | | | | |
| | 05/17/95 | | | 2.44 | 3.44 | | 3.44 | |
| | 07/31/95 | | NOT GAUGED | | | | | |
| | 09/07/95 | | | 4.35 | 1.53 | | 1.53 | |
| | 11/30/95 | | | 5.12 | 0.76 | | 0.76 | |
| | 01/10/96 | | | 2.60 | 3.28 | | 3.28 | |
| | 03/25/96 | | | 2.35 | 3.53 | | 3.53 | |
| | 05/17/96 | | | 1.73 | 4.15 | | 4.15 | |
| | 07/25/96 | | | 4.07 | 1.81 | | 1.81 | |
| | 09/16/96 | | | 4.60 | 1.28 | | 1.28 | |
| | 11/12/96 | | | 4.93 | 0.95 | | 0.95 | |
| | 01/20/97 | | | 2.44 | 3.44 | | 3.44 | |
| | 03/06/97 | | | 4.26 | 1.62 | | 1.62 | |
| | 05/20/97 | | | 4.65 | 1.23 | | 1.23 | |
| | 07/15/97 | | | 4.64 | 1.24 | | 1.24 | |
| | 08/28/97 | | | 4.58 | 1.30 | | 1.30 | |
| | 09/15/97 | | | 4.90 | 0.98 | | 0.98 | |
| | 11/18/97 | | | 2.11 | 3.77 | | 3.77 | |
| OMW-3 | | 7.16 | | | | | | |
| | 01/25/95 | | NOT GAUGED - WELL UNDER WATER | | | | | |
| | 05/09/95 | | | 4.37 | 2.79 | | 2.79 | |
| | 05/17/95 | | | 4.46 | 2.70 | | 2.70 | |
| | 07/31/95 | | | 5.22 | 1.94 | | 1.94 | |
| | 09/07/95 | | | 5.64 | 1.52 | | 1.52 | |
| | 11/30/95 | | | 6.36 | 0.80 | | 0.80 | |
| | 01/10/96 | | | 5.13 | 2.03 | | 2.03 | |

TABLE 5
Fluid Level Measurements
Union Pacific Railroad - Oakland Fueling Area

| Well No. | Date | Well Elev. Above MSL (FT) | Depth to Product (FT) | Depth to Water (FT) | Water Level Elevation (FT) | Product Thickness (FT) | Corr Water Level Elevation* (FT) |
|----------|----------|---------------------------------|-----------------------------|---------------------------|----------------------------------|------------------------------|--|
| OMW-3 | 03/25/96 | | | 4.08 | 3.08 | | 3.08 |
| | 05/17/96 | | | 2.61 | 4.55 | | 4.55 |
| | 07/25/96 | | | 5.26 | 1.90 | | 1.90 |
| | 09/16/96 | | | 5.90 | 1.26 | | 1.26 |
| | 11/12/96 | | | 6.22 | 0.94 | | 0.94 |
| | 01/20/97 | | | 3.79 | 3.37 | | 3.37 |
| | 03/06/97 | | | 4.02 | 3.14 | | 3.14 |
| | 05/20/97 | | | 5.34 | 1.82 | | 1.82 |
| | 07/15/97 | | | 5.64 | 1.52 | | 1.52 |
| | 08/28/97 | | | 5.79 | 1.37 | | 1.37 |
| | 09/15/97 | | | 5.95 | 1.21 | | 1.21 |
| | 11/18/97 | | | 5.27 | 1.89 | | 1.89 |
| OMW-4 | | 7.41 | | | | | |
| OMW-4 | 01/25/95 | | 6.23 | 7.12 | 0.29 | 0.89 | 1.04 |
| | 05/09/95 | | 4.99 | 6.38 | 1.03 | 1.39 | 2.20 |
| | 05/17/95 | | 5.19 | 6.58 | 0.83 | 1.39 | 2.00 |
| | 07/31/95 | | 5.78 | 6.99 | 0.42 | 1.21 | 1.44 |
| | 09/07/95 | | 6.01 | 6.92 | 0.49 | 0.91 | 1.25 |
| | 11/30/95 | | 6.60 | 7.06 | 0.35 | 0.46 | 0.74 |
| | 01/10/96 | | 5.73 | 6.48 | 0.93 | 0.75 | 1.56 |
| | 03/25/96 | | 5.22 | 6.19 | 1.22 | 0.97 | 2.03 |
| | 05/17/96 | | 5.23 | 6.26 | 1.15 | 1.03 | 2.02 |
| | 07/25/96 | | TRACE | 5.82 | 1.59 | | 1.59 |
| | 09/16/96 | | 6.11 | 7.55 | -0.14 | 1.44 | 1.07 |
| | 11/12/96 | | 6.58 | 8.12 | -0.71 | 1.54 | 0.58 |
| | 01/20/97 | | 4.75 | 6.45 | 0.96 | 1.70 | 2.39 |
| | 03/06/97 | | 5.25 | 6.24 | 1.17 | 0.99 | 2.00 |
| | 05/20/97 | | 5.83 | 6.35 | 1.06 | 0.52 | 1.50 |
| | 07/15/97 | | 6.24 | 6.75 | 0.66 | 0.51 | 1.09 |
| | 08/28/97 | | 6.46 | 7.05 | 0.36 | 0.59 | 0.86 |
| | 09/15/97 | | 6.40 | 7.11 | 0.30 | 0.71 | 0.90 |
| 11/18/97 | | 4.76 | 5.43 | 1.98 | 0.67 | 2.54 | |
| OMW-5 | | 7.62 | | | | | |
| OMW-5 | 01/25/95 | | NOT GAUGED | | | | |
| | 05/09/95 | | NOT GAUGED | | | | |
| | 05/18/95 | | | 4.84 | 2.78 | | 2.78 |
| | 07/31/95 | | NOT GAUGED | | | | |
| | 09/07/95 | | | 5.85 | 1.77 | | 1.77 |
| | 11/30/95 | | | 6.55 | 1.07 | | 1.07 |
| | 01/10/96 | | | 5.46 | 2.16 | | 2.16 |
| | 03/25/96 | | | 4.63 | 2.99 | | 2.99 |
| | 05/17/96 | | | 4.83 | 2.79 | | 2.79 |
| | 07/25/96 | | | 5.66 | 1.96 | | 1.96 |
| | 09/16/96 | | | 6.17 | 1.45 | | 1.45 |
| | 11/12/96 | | TRACE | 6.59 | 1.03 | | 1.03 |
| | 01/20/97 | | | 3.73 | 3.89 | | 3.89 |
| | 03/06/97 | | | 5.34 | 2.28 | | 2.28 |
| | 05/20/97 | | | 5.59 | 2.03 | | 2.03 |

TABLE 5
Fluid Level Measurements
Union Pacific Railroad - Oakland Fueling Area

| Well No. | Date | Well Elev. Above MSL (FT) | Depth to Product (FT) | Depth to Water (FT) | Water Level Elevation (FT) | Product Thickness (FT) | Corr Water Level Elevation* (FT) |
|----------|----------|---------------------------------|-----------------------------|---------------------------|----------------------------------|------------------------------|--|
| OMW-5 | 07/15/97 | | | 6.15 | 1.47 | | 1.47 |
| | 08/28/97 | | | 6.36 | 1.26 | | 1.26 |
| | 09/15/97 | | | 6.58 | 1.04 | | 1.04 |
| | 11/18/97 | | | 5.33 | 2.29 | | 2.29 |
| OMW-6 | | 5.78 | | | | | |
| OMW-6 | 01/25/95 | | | 6.91 | -1.13 | | -1.13 |
| | 05/09/95 | | | 7.19 | -1.41 | | -1.41 |
| | 05/17/95 | | | 6.84 | -1.06 | | -1.06 |
| | 07/31/95 | | | 5.65 | 0.13 | | 0.13 |
| | 09/07/95 | | | 5.51 | 0.27 | | 0.27 |
| | 11/30/95 | | | 6.71 | -0.93 | | -0.93 |
| | 01/10/96 | | | 6.72 | -0.94 | | -0.94 |
| | 03/25/96 | | | 6.73 | -0.95 | | -0.95 |
| | 05/17/96 | | | 6.50 | -0.72 | | -0.72 |
| | 07/25/96 | | | 6.62 | -0.84 | | -0.84 |
| | 09/16/96 | | | 6.44 | -0.66 | | -0.66 |
| | 11/12/96 | | | 5.65 | 0.13 | | 0.13 |
| | 01/20/97 | | | 5.52 | 0.26 | | 0.26 |
| | 03/06/97 | | | 7.17 | -1.39 | | -1.39 |
| | 05/20/97 | | | 6.39 | -0.61 | | -0.61 |
| | 07/15/97 | | | 6.77 | -0.99 | | -0.99 |
| | 08/28/97 | | | 6.59 | -0.81 | | -0.81 |
| 09/15/97 | | | 6.02 | -0.24 | | -0.24 | |
| 11/18/97 | | | 4.89 | 0.89 | | 0.89 | |
| OMW-7 | | 7.03 | | | | | |
| OMW-7 | 01/25/95 | | 3.31 | 9.53 | -2.50 | 6.22 | 2.72 |
| | 05/09/95 | | 5.22 | 9.25 | -2.22 | 4.03 | 1.17 |
| | 05/17/95 | | 5.41 | 8.38 | -1.35 | 2.97 | 1.14 |
| | 07/31/95 | | 5.61 | 8.83 | -1.80 | 3.22 | 0.90 |
| | 09/07/95 | | 5.80 | 7.97 | -0.94 | 2.17 | 0.88 |
| | 11/30/95 | | 6.49 | 7.54 | -0.51 | 1.05 | 0.37 |
| | 01/10/96 | | 5.40 | 8.33 | -1.30 | 2.93 | 1.16 |
| | 03/25/96 | | 5.46 | 9.60 | -2.57 | 4.14 | 0.91 |
| | 05/17/96 | | 5.40 | 8.79 | -1.76 | 3.39 | 1.09 |
| | 07/25/96 | | 5.92 | 9.32 | -2.29 | 3.40 | 0.57 |
| | 09/16/96 | | 6.18 | 8.86 | -1.83 | 2.68 | 0.42 |
| | 11/12/96 | | 6.50 | 8.79 | -1.76 | 2.29 | 0.16 |
| | 01/20/97 | | 4.95 | 10.76 | -3.73 | 5.81 | 1.15 |
| | 03/06/97 | | 5.26 | 7.70 | -0.67 | 2.44 | 1.38 |
| | 05/20/97 | | 5.71 | 8.26 | -1.23 | 2.55 | 0.91 |
| | 07/15/97 | | 6.21 | 9.67 | -2.64 | 3.46 | 0.27 |
| | 08/28/97 | | 6.39 | 9.10 | -2.07 | 2.71 | 0.21 |
| 09/15/97 | | 6.51 | 8.03 | -1.00 | 1.52 | 0.28 | |
| 11/18/97 | | 4.58 | 5.54 | 1.49 | 0.96 | 2.30 | |
| OMW-8 | | 7.52 | | | | | |
| OMW-8 | 01/25/95 | | TRACE | 3.55 | 3.97 | | 3.97 |
| | 05/09/95 | | | 5.00 | 2.52 | | 2.52 |
| | 05/17/95 | | | 5.16 | 2.36 | | 2.36 |

TABLE 5
Fluid Level Measurements
Union Pacific Railroad - Oakland Fueling Area

| Well No. | Date | Well Elev. Above MSL (FT) | Depth to Product (FT) | Depth to Water (FT) | Water Level Elevation (FT) | Product Thickness (FT) | Corr Water Level Elevation* (FT) |
|----------|----------|---------------------------------|-----------------------------|---------------------------|----------------------------------|------------------------------|--|
| OMW-8 | 07/31/95 | | | 5.70 | 1.82 | | 1.82 |
| | 09/07/95 | | | 5.99 | 1.53 | | 1.53 |
| | 11/30/95 | | | 6.53 | 0.99 | | 0.99 |
| | 01/10/96 | | | 5.87 | 1.65 | | 1.65 |
| | 03/25/96 | | | 5.01 | 2.51 | | 2.51 |
| | 05/17/96 | | | 5.18 | 2.34 | | 2.34 |
| | 07/25/96 | | | 5.77 | 1.75 | | 1.75 |
| | 09/16/96 | | | 6.21 | 1.31 | | 1.31 |
| | 11/12/96 | | | 6.69 | 0.83 | | 0.83 |
| | 01/20/97 | | | 4.84 | 2.68 | | 2.68 |
| | 03/06/97 | | | 5.15 | 2.37 | | 2.37 |
| | 05/20/97 | | | 5.81 | 1.71 | | 1.71 |
| | 07/15/97 | | | 6.12 | 1.40 | | 1.40 |
| | 08/28/97 | | | 6.29 | 1.23 | | 1.23 |
| | 09/15/97 | | | 6.40 | 1.12 | | 1.12 |
| 11/18/97 | | | 5.27 | 2.25 | | 2.25 | |
| OMW-9 | | 6.64 | | | | | |
| OMW-9 | 01/25/95 | | 3.83 | 6.25 | 0.39 | 2.42 | 2.42 |
| | 05/09/95 | | 4.94 | 9.02 | -2.38 | 4.08 | 1.05 |
| | 05/17/95 | | 4.18 | 8.95 | -2.31 | 4.77 | 1.70 |
| | 07/31/95 | | 6.07 | 8.46 | -1.82 | 2.39 | 0.19 |
| | 09/07/95 | | 5.23 | 6.89 | -0.25 | 1.66 | 1.14 |
| | 11/30/95 | | 5.76 | 7.25 | -0.61 | 1.49 | 0.64 |
| | 01/10/96 | | 4.45 | 9.00 | -2.36 | 4.55 | 1.46 |
| | 03/25/96 | | 4.19 | 8.96 | -2.32 | 4.77 | 1.69 |
| | 05/17/96 | | 5.41 | 7.40 | -0.76 | 1.99 | 0.91 |
| | 07/25/96 | | 5.16 | 8.41 | -1.77 | 3.25 | 0.96 |
| | 09/16/96 | | 5.75 | 6.19 | 0.45 | 0.44 | 0.82 |
| | 11/12/96 | | 5.84 | 8.37 | -1.73 | 2.53 | 0.40 |
| | 01/20/97 | | 4.10 | 9.42 | -2.78 | 5.32 | 1.69 |
| | 03/06/97 | | 4.55 | 7.95 | -1.31 | 3.40 | 1.55 |
| | 05/20/97 | | 5.09 | 7.11 | -0.47 | 2.02 | 1.23 |
| | 07/15/97 | | | * 8.8 | -2.16 | | -2.16 |
| | 08/28/97 | | | * 8.8 | -2.16 | | -2.16 |
| 09/15/97 | | | 7.80 | -1.16 | | -1.16 | |
| 11/18/97 | | | NA | NA | | NA | |
| OMW-10 | | 7.56 | | | | | |
| OMW-10 | 01/25/95 | | NOT GAUGED - WELL COVERED | | | | |
| | 05/09/95 | | NOT GAUGED - WELL COVERED | | | | |
| | 05/17/95 | | TRACE | 4.64 | 2.92 | | 2.92 |
| | 07/31/95 | | NOT GAUGED - WELL COVERED | | | | |
| | 09/07/95 | | | 6.02 | 1.54 | | 1.54 |
| | 11/30/95 | | TRACE | 7.78 | -0.22 | | -0.22 |
| | 01/10/96 | | TRACE | 4.68 | 2.88 | | 2.88 |
| | 03/25/96 | | | 4.58 | 2.98 | | 2.98 |
| | 05/17/96 | | | 4.75 | 2.81 | | 2.81 |
| | 07/25/96 | | | 5.79 | 1.77 | | 1.77 |
| | 09/16/96 | | | 6.33 | 1.23 | | 1.23 |

TABLE 5
Fluid Level Measurements
Union Pacific Railroad - Oakland Fueling Area

| Well No | Date | Well Elev Above MSL (FT) | Depth to Product (FT) | Depth to Water (FT) | Water Level Elevation (FT) | Product Thickness (FT) | Corr Water Level Elevation* (FT) |
|---------|----------|--------------------------------|-----------------------------|---------------------------|----------------------------------|------------------------------|--|
| OMW-10 | 11/12/96 | | TRACE | 6.50 | 1.06 | | 1.06 |
| | 01/20/97 | | | 4.33 | 3.23 | | 3.23 |
| | 03/06/97 | | | 5.05 | 2.51 | | 2.51 |
| | 05/20/97 | | | 5.69 | 1.87 | | 1.87 |
| | 07/15/97 | | | 6.71 | 0.85 | | 0.85 |
| | 08/28/97 | | | 6.11 | 1.45 | SHEEN | 1.45 |
| | 09/15/97 | | | 6.75 | 0.81 | SHEEN | 0.81 |
| | 11/18/97 | | | 4.63 | 2.93 | | 2.93 |
| ORW-1 | | 6.59 | | | | | |
| | 01/25/95 | | NOT GAUGED | | | | |
| | 05/09/95 | | NOT GAUGED | | | | |
| | 05/18/95 | | 8.77 | 9.76 | -3.17 | 0.99 | -2.34 |
| | 07/31/95 | | 8.35 | 10.55 | -3.96 | 2.20 | -2.11 |
| | 09/07/95 | | 8.55 | 11.03 | -4.44 | 2.48 | -2.36 |
| | 11/30/95 | | 5.92 | 5.98 | 0.61 | 0.06 | 0.66 |
| | 01/10/96 | | TRACE | 11.20 | -4.61 | | -4.61 |
| | 03/25/96 | | | 11.20 | -4.61 | | -4.61 |
| | 05/17/96 | | | 11.40 | -4.81 | | -4.81 |
| | 07/25/96 | | TRACE | 10.90 | -4.31 | | -4.31 |
| | 09/16/96 | | | 9.60 | -3.01 | | -3.01 |
| | 11/12/96 | | | 9.60 | -3.01 | | -3.01 |
| | 01/20/97 | | NOT GAUGED | | | | |
| | 03/06/97 | | 9.55 | 9.75 | -3.16 | 0.20 | -2.99 |
| | 05/20/97 | | 9.75 | 9.86 | -3.27 | 0.11 | -3.18 |
| | 07/15/97 | | | 7.98 | -1.39 | SHEEN | -1.39 |
| | 08/28/97 | | NOT GAUGED | | | | |
| | 09/15/97 | | NOT GAUGED | | | | |
| | 11/18/97 | | 3.94 | 3.96 | 2.63 | 0.02 | 2.65 |
| ORW-2 | | 6.79 | | | | | |
| | 01/25/95 | | NOT GAUGED | | | | |
| | 05/09/95 | | NOT GAUGED | | | | |
| | 05/18/95 | | 9.55 | 9.56 | -2.77 | 0.01 | -2.76 |
| | 07/31/95 | | 9.30 | 9.45 | -2.66 | 0.15 | -2.53 |
| | 09/07/95 | | 9.45 | 9.50 | -2.71 | 0.05 | -2.67 |
| | 11/30/95 | | 9.66 | 9.68 | -2.89 | 0.02 | -2.87 |
| | 01/10/96 | | 9.55 | 9.60 | -2.81 | 0.05 | -2.77 |
| | 03/25/96 | | 10.75 | 11.85 | -5.06 | 1.10 | -4.14 |
| | 05/17/96 | | 10.60 | 11.60 | -4.81 | 1.00 | -3.97 |
| | 07/25/96 | | 11.70 | 12.30 | -5.51 | 0.60 | -5.01 |
| | 09/16/96 | | 10.95 | 12.30 | -5.51 | 1.35 | -4.38 |
| | 11/12/96 | | 9.63 | 10.87 | -4.08 | 1.24 | -3.04 |
| | 01/20/97 | | 9.61 | 11.00 | -4.21 | 1.39 | -3.04 |
| | 03/06/97 | | 10.05 | 11.09 | -4.30 | 1.04 | -3.43 |
| | 05/20/97 | | 10.70 | 11.46 | -4.67 | 0.76 | -4.03 |
| | 07/15/97 | | 11.68 | 12.01 | -5.22 | 0.33 | -4.94 |
| | 08/28/97 | | 11.60 | 11.87 | -5.08 | 0.27 | -4.85 |
| | 09/15/97 | | 11.90 | 12.08 | -5.29 | 0.18 | -5.14 |
| | 11/18/97 | | 4.09 | 5.62 | 1.17 | 1.53 | 2.46 |

TABLE 5
Fluid Level Measurements
Union Pacific Railroad - Oakland Fueling Area

| Well No. | Date | Well Elev. Above MSL (FT) | Depth to Product (FT) | Depth to Water (FT) | Water Level Elevation (FT) | Product Thickness (FT) | Corr. Water Level Elevation* (FT) |
|----------|----------|---------------------------------|-----------------------------|---------------------------|----------------------------------|------------------------------|---|
| ORW-3 | | 6.30 | | | | | |
| | 01/25/95 | | NOT GAUGED | | | | |
| | 05/09/95 | | NOT GAUGED | | | | |
| | 05/18/95 | | 9.45 | 9.48 | -3.18 | 0.03 | -3.15 |
| | 07/31/95 | | TRACE | 9.68 | -3.38 | | -3.38 |
| | 09/07/95 | | 9.57 | 9.60 | -3.30 | 0.03 | -3.27 |
| | 11/30/95 | | TRACE | 9.67 | -3.37 | | -3.37 |
| | 01/10/96 | | TRACE | 9.55 | -3.25 | | -3.25 |
| | 03/25/96 | | 11.55 | 12.05 | -5.75 | 0.50 | -5.33 |
| | 05/17/96 | | 11.60 | 12.10 | -5.80 | 0.50 | -5.38 |
| | 07/25/96 | | | 11.60 | -5.30 | | -5.30 |
| | 09/16/96 | | 11.40 | 11.90 | -5.60 | 0.50 | -5.18 |
| | 11/12/96 | | 11.63 | 11.87 | -5.57 | 0.24 | -5.37 |
| | 01/20/97 | | NOT GAUGED | | 6.30 | 0.00 | 6.30 |
| | 03/06/97 | | 11.20 | 11.50 | -5.20 | 0.30 | -4.95 |
| | 05/20/97 | | 8.60 | 11.49 | -5.19 | 2.89 | -2.76 |
| | 07/15/97 | | | 11.46 | -5.16 | SHEEN | -5.16 |
| | 08/28/97 | | | 11.55 | -5.25 | | -5.25 |
| 09/15/97 | | 11.40 | 11.47 | -5.17 | 0.07 | -5.11 | |
| 11/18/97 | | 3.36 | 3.52 | 2.78 | 0.16 | 2.91 | |
| OP-1 | 05/18/95 | 6.71 | 3.84 | 5.05 | 1.66 | 1.21 | 2.68 |
| | 07/31/95 | | 5.23 | 5.35 | 1.36 | 0.12 | 1.46 |
| | 09/07/95 | | 5.55 | 6.13 | 0.58 | 0.58 | 1.07 |
| | 11/30/95 | | 5.81 | 9.36 | -2.65 | 3.55 | 0.33 |
| | 01/10/96 | | TRACE | 4.41 | 2.30 | | 2.30 |
| | 03/25/96 | | | 3.78 | 2.93 | | 2.93 |
| | 05/17/96 | | | 2.18 | 4.53 | | 4.53 |
| | 07/25/96 | | | 3.71 | 3.00 | | 3.00 |
| | 09/16/96 | | | 3.15 | 3.56 | | 3.56 |
| | 11/12/96 | | TRACE | 2.90 | 3.81 | | 3.81 |
| | 01/20/97 | | TRACE | 3.90 | 2.81 | | 2.81 |
| | 03/06/97 | | TRACE | 4.19 | 2.52 | | 2.52 |
| | 05/20/97 | | 4.87 | 4.94 | 1.77 | 0.07 | 1.83 |
| | 07/15/97 | | 4.91 | 5.18 | 1.53 | 0.27 | 1.76 |
| | 08/28/97 | | 4.55 | 4.64 | 2.07 | 0.09 | 2.15 |
| 09/15/97 | | 4.89 | 5.03 | 1.68 | 0.14 | 1.80 | |
| 11/18/97 | | 3.33 | 3.38 | 3.33 | 0.05 | 3.37 | |
| OP-2 | 05/18/95 | 7.80 | 5.15 | 6.97 | 0.83 | 1.82 | 2.36 |
| | 07/31/95 | | NOT GAUGED | | | | |
| | 09/07/95 | | 6.04 | 7.85 | -0.05 | 1.81 | 1.47 |
| | 11/30/95 | | 6.85 | 7.26 | 0.54 | 0.41 | 0.88 |
| | 01/10/96 | | 5.70 | 6.25 | 1.55 | 0.55 | 2.01 |
| | 03/25/96 | | 5.00 | 6.67 | 1.13 | 1.67 | 2.53 |
| | 05/17/96 | | 5.30 | 6.45 | 1.35 | 1.15 | 2.32 |
| | 07/25/96 | | 5.97 | 6.62 | 1.18 | 0.65 | 1.73 |
| | 09/16/96 | | 6.25 | 8.15 | -0.35 | 1.90 | 1.25 |
| | 11/12/96 | | 6.66 | 8.79 | -0.99 | 2.13 | 0.80 |
| | 01/20/97 | | 4.74 | 6.35 | 1.45 | 1.61 | 2.80 |
| | 03/06/97 | | 5.38 | 6.40 | 1.40 | 1.02 | 2.26 |

TABLE 5
Fluid Level Measurements
Union Pacific Railroad - Oakland Fueling Area

| Well No | Date | Well Elev. Above MSL (FT) | Depth to Product (FT) | Depth to Water (FT) | Water Level Elevation (FT) | Product Thickness (FT) | Corr. Water Level Elevation* (FT) |
|----------|----------|---------------------------|-----------------------|---------------------|----------------------------|------------------------|-----------------------------------|
| OP-2 | 05/20/97 | | 5.92 | 7.26 | 0.54 | 1.34 | 1.67 |
| | 07/15/97 | | 6.34 | 8.37 | -0.57 | 2.03 | 1.14 |
| | 08/28/97 | | 6.55 | 8.45 | -0.65 | 1.90 | 0.95 |
| | 09/15/97 | | 6.62 | 8.59 | -0.79 | 1.97 | 0.86 |
| | 11/18/97 | | 5.55 | 5.87 | 1.93 | 0.32 | 2.20 |
| OP-3 | 05/18/95 | 6.48 | 4.88 | 9.86 | -3.38 | 4.98 | 0.80 |
| | 07/31/95 | | 5.32 | 8.46 | -1.98 | 3.14 | 0.66 |
| | 09/07/95 | | 5.16 | 8.22 | -1.74 | 3.06 | 0.83 |
| | 11/30/95 | | 5.75 | 6.52 | -0.04 | 0.77 | 0.61 |
| | 01/10/96 | | 4.84 | 10.20 | -3.72 | 5.36 | 0.78 |
| | 03/25/96 | | 5.12 | 9.84 | -3.36 | 4.72 | 0.60 |
| | 05/17/96 | | 5.03 | 10.29 | -3.81 | 5.26 | 0.61 |
| | 07/25/96 | | TRACE | 5.61 | 0.87 | | 0.87 |
| | 09/16/96 | | 5.75 | 9.29 | -2.81 | 3.54 | 0.16 |
| | 11/12/96 | | 6.14 | 8.89 | -2.41 | 2.75 | -0.10 |
| | 01/20/97 | | 4.96 | 8.20 | -1.72 | 3.24 | 1.00 |
| | 03/06/97 | | 4.75 | 8.42 | -1.94 | 3.67 | 1.14 |
| | 05/20/97 | | 6.38 | 6.95 | -0.47 | 0.57 | 0.01 |
| | 07/15/97 | | 5.87 | 7.64 | -1.16 | 1.77 | 0.33 |
| | 08/28/97 | | 6.89 | 8.65 | -2.17 | 1.76 | -0.69 |
| | 09/15/97 | | 6.03 | 8.03 | -1.55 | 2.00 | 0.13 |
| 11/18/97 | | 3.89 | 5.61 | 0.87 | 1.72 | 2.31 | |
| OP-4 | 05/18/95 | 6.32 | 3.28 | 7.15 | -0.83 | 3.87 | 2.42 |
| | 07/31/95 | | NOT GAUGED | | | | |
| | 09/07/95 | | 4.64 | 6.17 | 0.15 | 1.53 | 1.44 |
| | 11/30/95 | | 5.56 | 5.75 | 0.57 | 0.19 | 0.73 |
| | 01/10/96 | | 3.43 | 6.45 | -0.13 | 3.02 | 2.41 |
| | 03/25/96 | | 3.11 | 6.89 | -0.57 | 3.78 | 2.61 |
| | 05/17/96 | | 3.30 | 6.43 | -0.11 | 3.13 | 2.52 |
| | 07/25/96 | | 4.30 | 7.58 | -1.26 | 3.28 | 1.50 |
| | 09/16/96 | | 4.71 | 8.09 | -1.77 | 3.38 | 1.07 |
| | 11/12/96 | | 5.10 | 8.56 | -2.24 | 3.46 | 0.67 |
| | 01/20/97 | | 3.30 | 6.49 | -0.17 | 3.19 | 2.51 |
| | 03/06/97 | | 3.80 | 4.99 | 1.33 | 1.19 | 2.33 |
| | 05/20/97 | | 4.59 | 5.28 | 1.04 | 0.69 | 1.62 |
| | 07/15/97 | | | * 6.32 | -1.68 | | -1.68 |
| | 08/28/97 | | | * 6.32 | -1.68 | | -1.68 |
| | 09/15/97 | | | 9.90 | -3.58 | | -3.58 |
| 11/18/97 | | | NA | 6.32 | | NA | |

* Water and product levels below pump housing - reported value is depth to pump.
 Data collected prior to 1995 was submitted in previous reports.
 M.S.L. = Mean Sea Level

TABLE 6
Diesel Recovery
Union Pacific Railroad
Oakland Fueling Area

| DATE | TOTAL VOLUME RECOVERED (gallons) | RECOVERY RATE (gal/day) | NOTES |
|----------|--|-------------------------------|-----------------------------|
| 03/02/93 | 1500 | -- | VOLUME ESTIMATED FROM GAUGE |
| 05/11/93 | 1700 | 2.9 | TANK EMPTIED |
| 06/10/93 | 1900 | 6.7 | VOLUME ESTIMATED FROM GAUGE |
| 09/03/93 | 2700 | 9.4 | TANK EMPTIED |
| 11/30/93 | 3400 | 8.0 | VOLUME ESTIMATED FROM GAUGE |
| 02/25/94 | 4200 | 9.2 | VOLUME ESTIMATED FROM GAUGE |
| 06/01/94 | 4800 | 6.3 | VOLUME ESTIMATED FROM GAUGE |
| 06/27/94 | 4900 | 3.8 | TANK EMPTIED |
| 09/23/94 | 5500 | 6.8 | TANK EMPTIED |
| 12/27/94 | 6000 | 5.3 | TANK EMPTIED |
| 03/17/95 | 6300 | 3.8 | TANK EMPTIED |
| 07/14/95 | 6900 | 5.0 | TANK EMPTIED |
| 10/18/95 | 7500 | 6.3 | TANK EMPTIED |
| 01/30/96 | 8200 | 6.7 | TANK EMPTIED |
| 07/08/96 | 9000 | 5.0 | TANK EMPTIED |
| 01/02/97 | 9800 | 4.5 | TANK EMPTIED |
| 08/05/97 | 10500 | 3.3 | TANK EMPTIED |

APPENDIX A

**FIELD LOGS
GROUNDWATER RECOVERY
AND TREATMENT SYSTEM**

APPENDIX B
ANALYTICAL RESULTS



Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878

2323 Fifth Street, Berkeley, CA 94710. Phone (510) 486-0900

A N A L Y T I C A L R E P O R T

Prepared for:

Burns & McDonnell
P.O. Box 281647
San Francisco, CA 94128

Date: 31-JUL-97
Lab Job Number: 129993
Project ID: 96-071-1
Location: UNPAC

Reviewed by:

Damera Moore

Reviewed by:

[Signature]

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| | |
|---------------------------|----------------------------|
| BTXE | |
| Client: Burns & McDonnell | Analysis Method: EPA 8020A |
| Project#: 96-071-1 | Prep Method: EPA 5030 |
| Location: UNPAC | |

| Sample # | Client ID | Batch # | Sampled | Extracted | Analyzed | Moisture |
|------------|--------------|---------|----------|-----------|----------|----------|
| 129993-001 | INFLUENT_GW | 35177 | 07/18/97 | 07/25/97 | 07/25/97 | |
| 129993-002 | MIDFLUENT_GW | 35177 | 07/18/97 | 07/25/97 | 07/25/97 | |
| 129993-003 | EFFLUENT_GW | 35177 | 07/18/97 | 07/25/97 | 07/25/97 | |

Matrix: Water

| Analyte | Units | 129993-001 | 129993-002 | 129993-003 |
|------------------|-------|------------|------------|------------|
| Diln Fac: | | 1 | 1 | 1 |
| Benzene | ug/L | 2.4 | <0.5 | <0.5 |
| Toluene | ug/L | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | ug/L | <0.5 | <0.5 | <0.5 |
| m,p-Xylenes | ug/L | 1.1 | <0.5 | <0.5 |
| o-Xylene | ug/L | <0.5 | <0.5 | <0.5 |
| Surrogate | | | | |
| Trifluorotoluene | %REC | 102 | 103 | 100 |
| Bromobenzene | %REC | 112 | 105 | 102 |

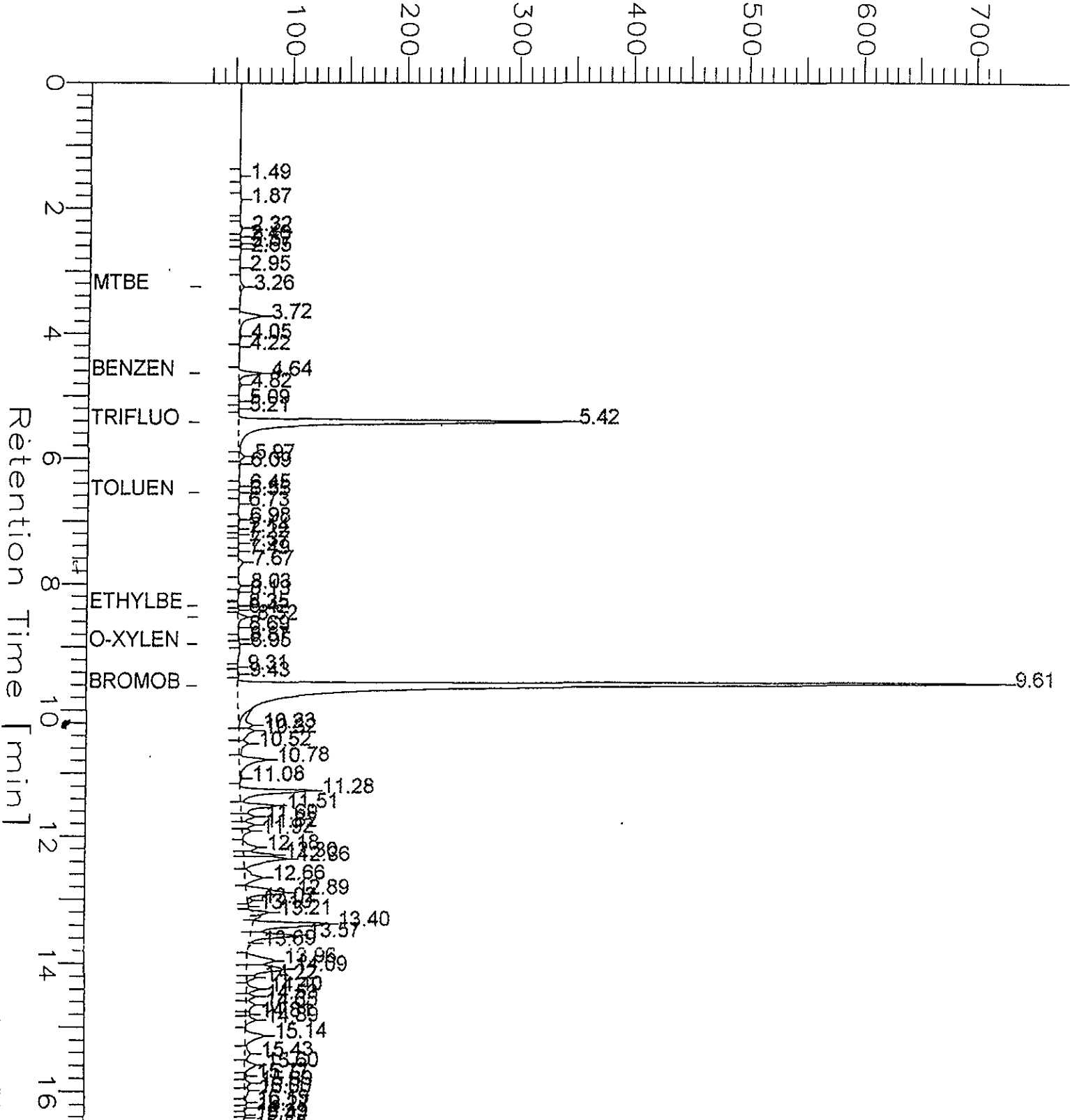
GC04 BTXE 'K' File (Rtx1,PID)

Sample Name : S,129993-001,35177
 FileName : G:\GC04\DATA\205K026.raw
 Method : J_072197
 Start Time : 0.00 min
 Scale Factor : 1.0

End Time : 17.00 min
 Plot Offset : 20 mV

Sample # :
 Date : 7/25/97 02:16 AM
 Time of Injection: 7/25/97 01:59 AM
 Low Point : 20.17 mV
 Plot Scale: 707.3 mV
 High Point : 727.43 mV

Response [mV]





Lab #: 129993

BATCH QC REPORT

Page 1 of 1

| BTXE | | | |
|--------------|-------------------|------------------|-----------|
| Client: | Burns & McDonnell | Analysis Method: | EPA 8020A |
| Project#: | 96-071-1 | Prep Method: | EPA 5030 |
| Location: | UNPAC | | |
| METHOD BLANK | | | |
| Matrix: | Water | Prep Date: | 07/24/97 |
| Batch#: | 35177 | Analysis Date: | 07/24/97 |
| Units: | ug/L | | |
| Diln Fac: | 1 | | |

MB Lab ID: QC50472

| Analyte | Result | | |
|------------------|--------|--|-----------------|
| Benzene | <0.5 | | |
| Toluene | <0.5 | | |
| Ethylbenzene | <0.5 | | |
| m,p-Xylenes | <0.5 | | |
| o-Xylene | <0.5 | | |
| Surrogate | %Rec | | Recovery Limits |
| Trifluorotoluene | 117 | | 58-130 |
| Bromobenzene | 117 | | 62-131 |



Lab #: 129993

BATCH QC REPORT

Page 1 of 1

| | | | |
|---------------------------|----------------------------|----------|--|
| BTXE | | | |
| Client: Burns & McDonnell | Analysis Method: EPA 8020A | | |
| Project#: 96-071-1 | Prep Method: EPA 5030 | | |
| Location: UNPAC | | | |
| LABORATORY CONTROL SAMPLE | | | |
| Matrix: Water | Prep Date: | 07/24/97 | |
| Batch#: 35177 | Analysis Date: | 07/24/97 | |
| Units: ug/L | | | |
| Diln Fac: 1 | | | |

LCS Lab ID: QC50471

| Analyte | Result | Spike Added | %Rec # | Limits |
|------------------|--------|-------------|--------|--------|
| Benzene | 18.39 | 20 | 92 | 80-120 |
| Toluene | 19.06 | 20 | 95 | 80-120 |
| Ethylbenzene | 19.49 | 20 | 97 | 80-120 |
| m,p-Xylenes | 37.31 | 40 | 93 | 80-120 |
| o-Xylene | 21.39 | 20 | 107 | 80-120 |
| Surrogate | %Rec | Limits | | |
| Trifluorotoluene | 102 | 58-130 | | |
| Bromobenzene | 107 | 62-131 | | |

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits

TEH-Tot Ext Hydrocarbons

| | |
|---------------------------|----------------------------|
| Client: Burns & McDonnell | Analysis Method: EPA 8015M |
| Project#: 96-071-1 | Prep Method: EPA 3520 |
| Location: UNPAC | |

| Sample # | Client ID | Batch # | Sampled | Extracted | Analyzed | Moisture |
|------------|-------------|---------|----------|-----------|----------|----------|
| 129993-001 | INFLUENT_GW | 35116 | 07/18/97 | 07/21/97 | 07/24/97 | |
| 129993-003 | EFFLUENT_GW | 35116 | 07/18/97 | 07/21/97 | 07/24/97 | |

Matrix: Water

| Analyte | Units | 129993-001 | 129993-003 |
|----------------|-------|------------|------------|
| Diln Fac: | | 1 | 1 |
| Diesel C12-C22 | ug/L | 18000 | 96 |
| Surrogate | | | |
| Hexacosane | %REC | 108 | 114 |

Chromatogram

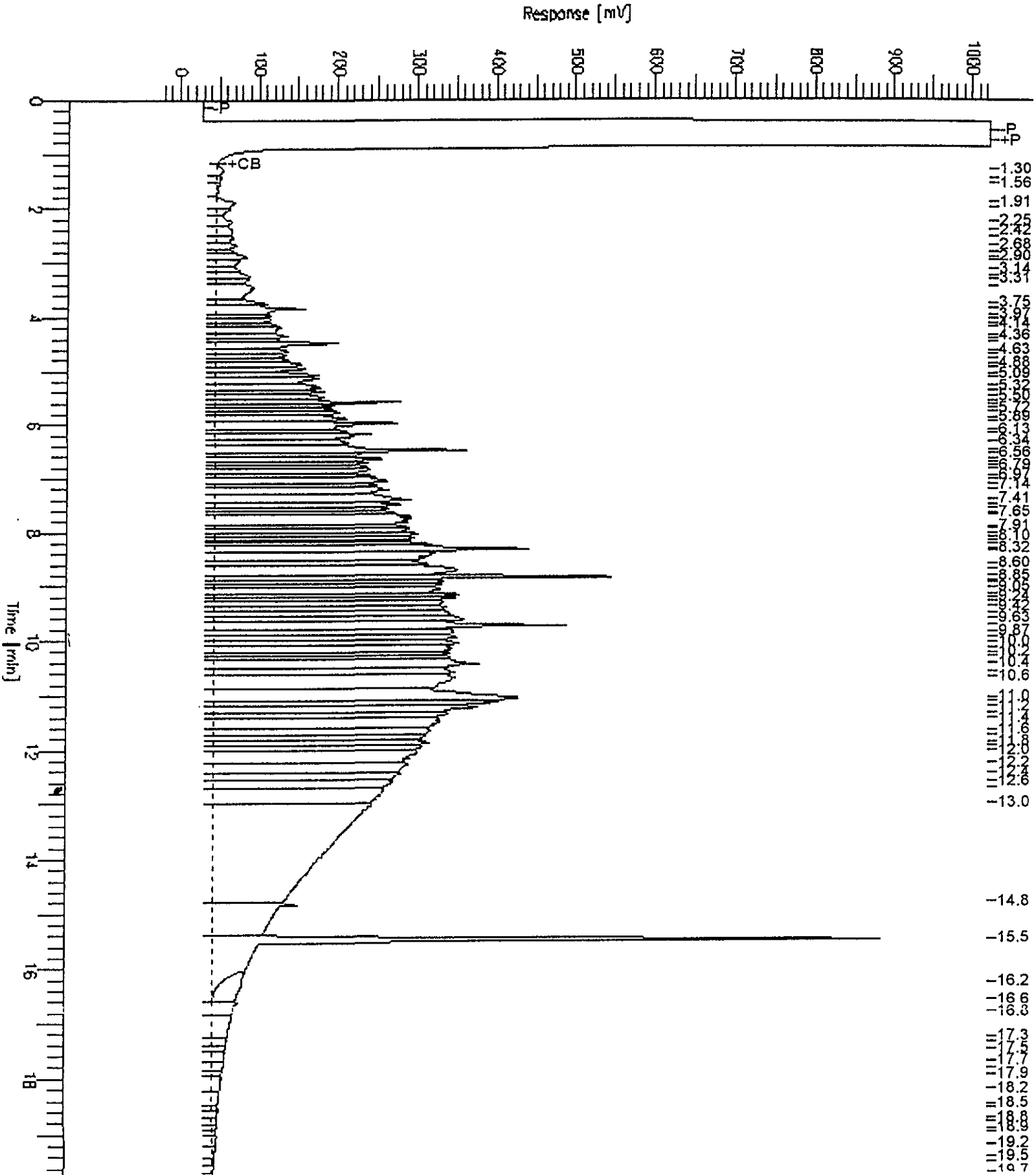
Sample Name : 129993-001,35116
FileName : G:\GC11\CHB\204B034.RAW
Method : BTEH204.MTH
Start Time : 0.00 min
Scale Factor: 0.0

End Time : 19.99 min
Plot Offset: -24 mV

Sample #: 35116
Date : 7/30/97 01:26 PM
Time of Injection: 7/24/97 04:29 AM
Low Point : -23.91 mV
Plot Scale: 1047.9 mV

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High Point : 1024.00 mV



Chromatogram

Sample Name : 129993-002,35116

FileName : G:\GC11\CHB\204B035.RAW

Method : BTEH204.MTH

Start Time : 0.01 min

Scale Factor: 0.0

End Time : 19.99 min

Plot Offset: 5 mV

Sample #: 35116

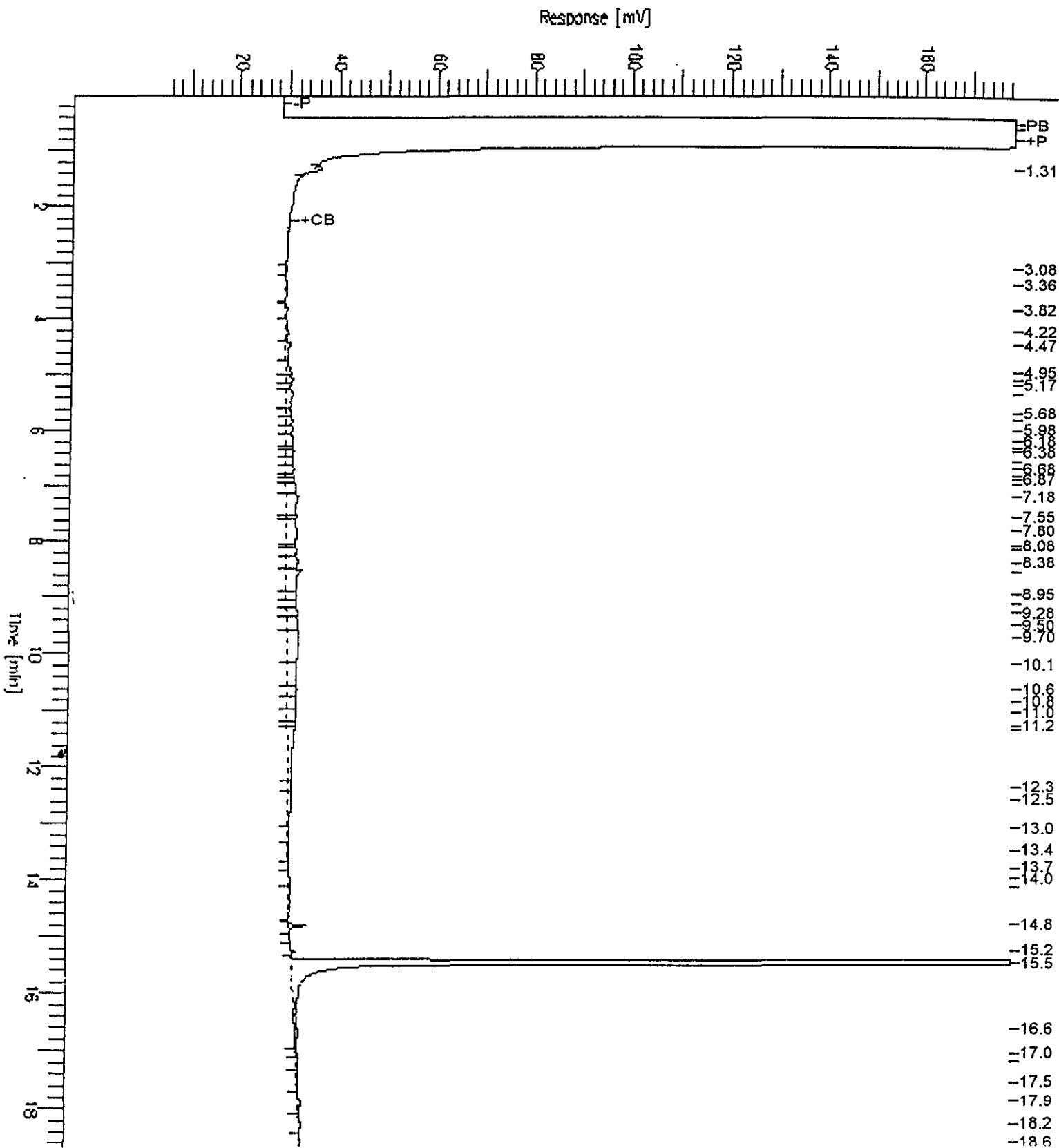
Date : 7/30/97 01:29 PM

Time of Injection: 7/24/97 04:58 AM

Low Point : 4.92 mV

Plot Scale: 173.9 mV

Page 1 of 1





Lab #: 129993

BATCH QC REPORT

Page 1 of 1

TEH-Tot Ext Hydrocarbons

Client: Burns & McDonnell
Project#: 96-071-1
Location: UNPAC

Analysis Method: EPA 8015M
Prep Method: EPA 3520

METHOD BLANK

Matrix: Water
Batch#: 35116
Units: ug/L
Diln Fac: 1

Prep Date: 07/21/97
Analysis Date: 07/23/97

MB Lab ID: QC50262

| Analyte | Result | |
|----------------|--------|-----------------|
| Diesel C12-C22 | <50 | |
| Surrogate | %Rec | Recovery Limits |
| Hexacosane | 96 | 60-140 |



Lab #: 129993

BATCH QC REPORT

| TEH-Tot Ext. Hydrocarbons | | | |
|---------------------------|----------------------------|----------|--|
| Client: Burns & McDonnell | Analysis Method: EPA 8015M | | |
| Project#: 96-071-1 | Prep Method: EPA 3520 | | |
| Location: UNPAC | | | |
| LABORATORY CONTROL SAMPLE | | | |
| Matrix: Water | Prep Date: | 07/21/97 | |
| Batch#: 35116 | Analysis Date: | 07/23/97 | |
| Units: ug/L | | | |
| Diln Fac: 1 | | | |

LCS Lab ID: QC50263

| Analyte | Result | Spike Added | %Rec # | Limits |
|----------------|--------|-------------|--------|--------|
| Diesel C12-C22 | 1767 | 2475 | 71 | 60-140 |
| Surrogate | %Rec | Limits | | |
| Hexacosane | 105 | 60-140 | | |

Column to be used to flag recovery and RPD values with an asterisk
 * Values outside of QC limits
 Spike Recovery: 0 out of 1 outside limits



Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878

2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

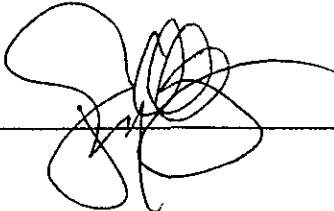
A N A L Y T I C A L R E P O R T

Prepared for:

Burns & McDonnell
P.O.Box 281647
San Francisco, CA 94128

Date: 03-SEP-97
Lab Job Number: 130294
Project ID: M-96-071-1
Location: UNPAC

Reviewed by: Danara Moore

Reviewed by: 

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Curtis Balgord & Associates, Inc.

TEH-Tot Ext Hydrocarbons

Client: Burns & McDonnell
Project#: M-96-071-1
Location: UNPAC

Analysis Method: EPA 8015M
Prep Method: EPA 3520

| Sample # | Client ID | Batch # | Sampled | Extracted | Analyzed | Moisture |
|------------|-------------|---------|----------|-----------|----------|----------|
| 130294-001 | INFLUENT_GW | 35877 | 08/15/97 | 08/25/97 | 08/27/97 | |

Matrix: Water

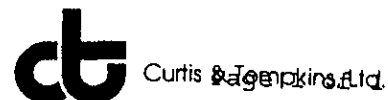
| | | |
|----------------|-------|------------|
| Analyte | Units | 130294-001 |
| Diln Fac: | | 1 |
| Diesel C12-C22 | ug/L | 12000 YH |
| Surrogate | | |
| Hexacosane | %REC | 132 |

Y: Sample exhibits fuel pattern which does not resemble standard

H: Heavier hydrocarbons than indicated standard

Lab #: 130294

BATCH QC REPORT



| TEH-Tot Ext Hydrocarbons | | | |
|--------------------------|-------------------|------------------|-----------|
| Client: | Burns & McDonnell | Analysis Method: | EPA 8015M |
| Project#: | M-96-071-1 | Prep Method: | EPA 3520 |
| Location: | UNPAC | | |
| METHOD BLANK | | | |
| Matrix: | Water | Prep Date: | 08/25/97 |
| Batch#: | 35877 | Analysis Date: | 08/27/97 |
| Units: | ug/L | | |
| Diln Fac: | 1 | | |

MB Lab ID: QC52909

| Analyte | Result | |
|----------------|--------|-----------------|
| Diesel C12-C22 | <50 | |
| Surrogate | %Rec | Recovery Limits |
| Hexacosane | 119 | 60-140 |

Lab #: 130294

BATCH QC REPORT



Curtis & Associates, Ltd.

TEH-Tot Ext Hydrocarbons

Client: Burns & McDonnell
Project#: M-96-071-1
Location: UNPAC

Analysis Method: EPA 8015M
Prep Method: EPA 3520

BLANK SPIKE/BLANK SPIKE DUPLICATE

Matrix: Water
Batch#: 35877
Units: ug/L
Diln Fac: 1

Prep Date: 08/25/97
Analysis Date: 08/29/97

BS Lab ID: QC52910

| Analyte | Spike Added | BS | %Rec # | Limits |
|----------------|-------------|--------|--------|--------|
| Diesel C12-C22 | 2475 | 2089 | 85 | 60-140 |
| Surrogate | %Rec | Limits | | |
| Hexacosane | 132 | 60-140 | | |

BSD Lab ID: QC52911

| Analyte | Spike Added | BSD | %Rec # | Limits | RPD # | Limit |
|----------------|-------------|--------|--------|--------|-------|-------|
| Diesel C12-C22 | 2475 | 2461 | 100 | 60-140 | 16 | 35 |
| Surrogate | %Rec | Limits | | | | |
| Hexacosane | 131 | 60-140 | | | | |

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 1 outside limits

Spike Recovery: 0 out of 2 outside limits

Aromatic Volatile Organics
EPA 8020 Analyte List

| | |
|---------------------------|---------------------------|
| Client: Burns & McDonnell | Analysis Method: EPA 8260 |
| Project#: M-96-071-1 | Prep Method: EPA 5030 |
| Location: UNPAC | |

| | |
|------------------------|---------------------|
| Field ID: MIDFLUENT_GW | Sampled: 08/15/97 |
| Lab ID: 130294-002 | Received: 08/15/97 |
| Matrix: Water | Extracted: 08/21/97 |
| Batch#: 35800 | Analyzed: 08/21/97 |
| Units: ug/L | |
| Diln Fac: 1 | |

| Analyte | Result | Reporting Limit |
|-----------------------|-----------|-----------------|
| MTBE | ND | 2.0 |
| Benzene | ND | 0.5 |
| Toluene | ND | 0.5 |
| Ethylbenzene | ND | 0.5 |
| m,p-Xylenes | ND | 0.5 |
| o-Xylene | ND | 0.5 |
| Surrogate | %Recovery | Recovery Limits |
| Toluene-d8 | 100 | 87-125 |
| Bromofluorobenzene | 105 | 79-122 |
| 1,2-Dichloroethane-d4 | 102 | 68-126 |

Lab #: 130294

BATCH QC REPORT



Purgeable Aromatics by GC/MS
EPA 8020 Analyte List

Client: Burns & McDonnell
Project#: M-96-071-1
Location: UNPAC

Analysis Method: EPA 8260
Prep Method: EPA 5030

METHOD BLANK

Matrix: Water
Batch#: 35800
Units: ug/L
Diln Fac: 1

Prep Date: 08/21/97
Analysis Date: 08/21/97

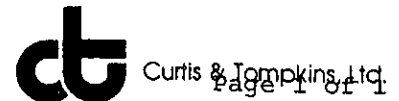
MB Lab ID: QC52658

| Analyte | Result | Reporting Limit |
|--------------|--------|-----------------|
| MTBE | ND | 2.0 |
| Benzene | ND | 0.5 |
| Toluene | ND | 0.5 |
| Ethylbenzene | ND | 0.5 |
| m,p-Xylenes | ND | 0.5 |
| o-Xylene | ND | 0.5 |

| Surrogate | %Rec | Recovery Limits |
|-----------------------|------|-----------------|
| Toluene-d8 | 99 | 87-125 |
| Bromofluorobenzene | 104 | 79-122 |
| 1,2-Dichloroethane-d4 | 97 | 68-126 |

Lab #: 130294

BATCH QC REPORT



| | | | |
|---|---------------------------|----------|--|
| Purgeable Aromatics by GC/MS EPA 8020 Analyte List | | | |
| Client: Burns & McDonnell | Analysis Method: EPA 8260 | | |
| Project#: M-96-071-1 | Prep Method: EPA 5030 | | |
| Location: UNPAC | | | |
| LABORATORY CONTROL SAMPLE | | | |
| Matrix: Water | Prep Date: | 08/21/97 | |
| Batch#: 35800 | Analysis Date: | 08/21/97 | |
| Units: ug/L | | | |
| Diln Fac: 1 | | | |

LCS Lab ID: QC52657

| Analyte | Result | Spike Added | %Rec # | Limits |
|-----------------------|--------|-------------|--------|--------|
| Benzene | 51.65 | 50 | 103 | 78-142 |
| Toluene | 53.06 | 50 | 106 | 76-150 |
| Surrogate | %Rec | Limits | | |
| Toluene-d8 | 98 | 87-125 | | |
| Bromofluorobenzene | 102 | 79-122 | | |
| 1,2-Dichloroethane-d4 | 94 | 68-126 | | |

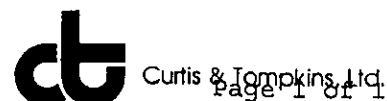
Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 2 outside limits

Lab #: 130294

BATCH QC REPORT



Purgeable Aromatics by GC/MS
EPA 8020 Analyte List

| | |
|---------------------------|---------------------------|
| Client: Burns & McDonnell | Analysis Method: EPA 8260 |
| Project#: M-96-071-1 | Prep Method: EPA 5030 |
| Location: UNPAC | |

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

| | |
|--------------------|-------------------------|
| Field ID: ZZZZZZ | Sample Date: 08/18/97 |
| Lab ID: 130335-001 | Received Date: 08/20/97 |
| Matrix: Water | Prep Date: 08/21/97 |
| Batch#: 35800 | Analysis Date: 08/21/97 |
| Units: ug/L | |
| Diln Fac: 1 | |

MS Lab ID: QC52665

| Analyte | Spike Added | Sample | MS | %Rec # | Limits |
|-----------------------|-------------|--------|-------|--------|--------|
| Benzene | 50 | 0.2186 | 48.73 | 97 | 78-142 |
| Toluene | 50 | 0 | 49.76 | 100 | 76-150 |
| Surrogate | %Rec | Limits | | | |
| Toluene-d8 | 99 | 87-125 | | | |
| Bromofluorobenzene | 102 | 79-122 | | | |
| 1,2-Dichloroethane-d4 | 99 | 68-126 | | | |

MSD Lab ID: QC52666

| Analyte | Spike Added | MSD | %Rec # | Limits | RPD # | Limit |
|-----------------------|-------------|--------|--------|--------|-------|-------|
| Benzene | 50 | 48.78 | 97 | 78-142 | 0 | 21 |
| Toluene | 50 | 49.18 | 98 | 76-150 | 1 | 21 |
| Surrogate | %Rec | Limits | | | | |
| Toluene-d8 | 99 | 87-125 | | | | |
| Bromofluorobenzene | 102 | 79-122 | | | | |
| 1,2-Dichloroethane-d4 | 100 | 68-126 | | | | |

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 2 outside limits

Spike Recovery: 0 out of 4 outside limits

130 294

Request for Chemical Analysis and Chain of Custody Record

Jrns & McDonnell Waste Consultants, Inc.
 100 Ward Parkway
 Kansas City, Missouri 64114
 Phone: (816) 333-8787 Fax: (816) 822-3463

Laboratory Curtis + Tompkins
 Address 23235th Street
 City/State/Zip Berkeley CA 94710
 Telephone 510-486-6090

Document Control No.: 081597
 Lab. Reference No. or Episode No.:

Attention: Scott Keitstet
 Project Number: M-96-071-1

Project Name: UNPAC

Site, Group, or SWMU Name: Union Pacific ; Oakland, CA

Analysis
 IEH-diesel
 BTEX

| Sample Number | | Sample Event | | Sample Depth (in feet) | | Sample Collected | | Matrix | | | Composite | Grab | Number of Containers | Remarks |
|---------------|-------------------|--------------|------|------------------------|----|------------------|------|--------|-------|-----|-----------|------|----------------------|------------|
| Sample Point | Sample Designator | Round | Year | From | To | Date | Time | Liquid | Solid | Gas | | | | |
| Effluent | GW | | | | | 8-15-97 | 1108 | X | | | | 1 | X | |
| Effluent | GW | | | | | 8-15-97 | 1110 | X | | | | 2 | X | |
| | | | | | | | | | | | | | | Standard |
| | | | | | | | | | | | | | | Turnaround |

Sampler (signature): Janice Cross

Special Instructions:

Sampler (signature):

Relinquished By: Janice Cross

Date/Time: 8/15/97

Relinquished By: [Signature] (signature): 8-15-97

Date/Time: 1:20pm

Condition of Shipping Container: Good Fair Poor

Ice Present in Container: Yes No

Relinquished By: [Signature] (signature):

Date/Time:

Relinquished By: [Signature] (signature):

Date/Time:

Comments:



Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878

2323 Fifth Street, Berkeley, CA 94710. Phone (510) 486-0900

A N A L Y T I C A L R E P O R T

Prepared for:

Burns & McDonnell
P.O.Box 281647
San Francisco, CA 94128

Date: 19-SEP-97
Lab Job Number: 130526
Project ID: M-96-071-1
Location: UNPAC

Reviewed by: Danara Moore

Reviewed by: [Signature]

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TEH-Tot Ext Hydrocarbons

| | |
|---------------------------|----------------------------|
| Client: Burns & McDonnell | Analysis Method: EPA 8015M |
| Project#: M-96-071-1 | Prep Method: EPA 3520 |
| Location: UNPAC | |

| Sample # | Client ID | Batch # | Sampled | Extracted | Analyzed | Moisture |
|------------|-------------|---------|----------|-----------|----------|----------|
| 130526-001 | INFLUENT_GW | 36193 | 09/05/97 | 09/10/97 | 09/13/97 | |

Matrix: Water

| | | |
|----------------|-------|------------|
| Analyte | Units | 130526-001 |
| Diln Fac: | | 1 |
| Diesel C12-C22 | ug/L | 14000 YH |
| Surrogate | | |
| Hexacosane | %REC | 96 |

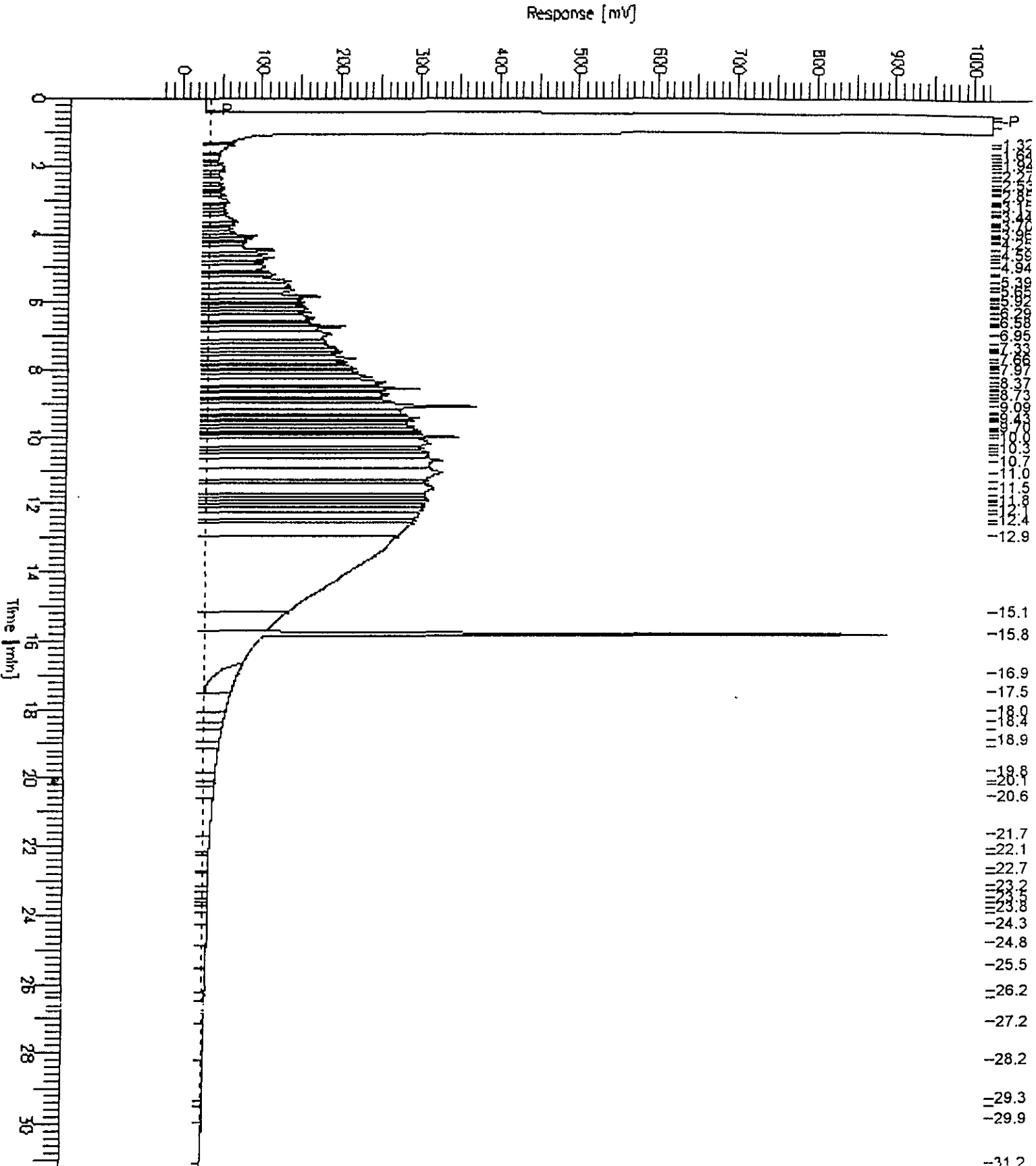
Y: Sample exhibits fuel pattern which does not resemble standard
H: Heavier hydrocarbons than indicated standard

Chromatogram

Sample Name : 130526-001,36193
FileName : G:\GC13\CHA\254A064.RAW
Method : ATEH258.MTH
Start Time : 0.00 min
Scale Factor: 0.0

End Time : 31.90 min
Plot Offset: -24 mV

Sample #: 36193
Date : 9/16/97 12:29 PM
Time of Injection: 9/13/97 11:16 PM
Low Point : -23.56 mV
High Point : 1024.00 mV
Plot Scale: 1047.6 mV



Lab #: 130526

BATCH QC REPORT



| TEH-Tot Ext Hydrocarbons | | | |
|--------------------------|-------------------|------------------|-----------|
| Client: | Burns & McDonnell | Analysis Method: | EPA 8015M |
| Project#: | M-96-071-1 | Prep Method: | EPA 3520 |
| Location: | UNPAC | | |
| METHOD BLANK | | | |
| Matrix: | Water | Prep Date: | 09/10/97 |
| Batch#: | 36193 | Analysis Date: | 09/13/97 |
| Units: | ug/L | | |
| Diln Fac: | 1 | | |

MB Lab ID: QC53987

| Analyte | Result | | |
|----------------|--------|-----------------|--|
| Diesel C12-C22 | <50 | | |
| Surrogate | %Rec | Recovery Limits | |
| Hexacosane | 119 | 60-140 | |

Lab #: 130526

BATCH QC REPORT



Curtis & Forgings, Inc. 1

TEH-Tot Ext Hydrocarbons

Client: Burns & McDonnell
Project#: M-96-071-1
Location: UNPAC

Analysis Method: EPA 8015M
Prep Method: EPA 3520

BLANK SPIKE/BLANK SPIKE DUPLICATE

Matrix: Water
Batch#: 36193
Units: ug/L
Diln Fac: 1

Prep Date: 09/10/97
Analysis Date: 09/14/97

BS Lab ID: QC53988

| Analyte | Spike Added | BS | %Rec # | Limits |
|----------------|-------------|--------|--------|--------|
| Diesel C12-C22 | 2475 | 2139 | 86 | 60-140 |
| Surrogate | %Rec | Limits | | |
| Hexacosane | 123 | 60-140 | | |

BSD Lab ID: QC53989

| Analyte | Spike Added | BSD | %Rec # | Limits | RPD # | Limit |
|----------------|-------------|--------|--------|--------|-------|-------|
| Diesel C12-C22 | 2475 | 2131 | 86 | 60-140 | 0 | 35 |
| Surrogate | %Rec | Limits | | | | |
| Hexacosane | 123 | 60-140 | | | | |

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 1 outside limits

Spike Recovery: 0 out of 2 outside limits

| BTXE | |
|---------------------------|----------------------------|
| Client: Burns & McDonnell | Analysis Method: EPA 8020A |
| Project#: M-96-071-1 | Prep Method: EPA 5030 |
| Location: UNPAC | |

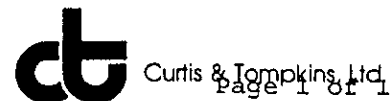
| Sample # | Client ID | Batch # | Sampled | Extracted | Analyzed | Moisture |
|------------|--------------|---------|----------|-----------|----------|----------|
| 130526-002 | MIDFLUENT_GW | 36135 | 09/05/97 | 09/08/97 | 09/08/97 | |

Matrix: Water

| Analyte | Units | 130526-002 |
|------------------|-------|------------|
| Diln Fac: | | 1 |
| Benzene | ug/L | <0.5 |
| Toluene | ug/L | <0.5 |
| Ethylbenzene | ug/L | <0.5 |
| m,p-Xylenes | ug/L | <0.5 |
| o-Xylene | ug/L | <0.5 |
| Surrogate | | |
| Trifluorotoluene | %REC | 96 |
| Bromobenzene | %REC | 112 |

Lab #: 130526

BATCH QC REPORT



| BTXE | | | |
|--------------|-------------------|------------------|-----------|
| Client: | Burns & McDonnell | Analysis Method: | EPA 8020A |
| Project#: | M-96-071-1 | Prep Method: | EPA 5030 |
| Location: | UNPAC | | |
| METHOD BLANK | | | |
| Matrix: | Water | Prep Date: | 09/08/97 |
| Batch#: | 36135 | Analysis Date: | 09/08/97 |
| Units: | ug/L | | |
| Diln Fac: | 1 | | |

MB Lab ID: QC53795

| Analyte | Result | | |
|------------------|--------|--|-----------------|
| Benzene | <0.5 | | |
| Toluene | <0.5 | | |
| Ethylbenzene | <0.5 | | |
| m,p-Xylenes | <0.5 | | |
| o-Xylene | <0.5 | | |
| Surrogate | %Rec | | Recovery Limits |
| Trifluorotoluene | 91 | | 58-130 |
| Bromobenzene | 100 | | 62-131 |

Lab #: 130526

BATCH QC REPORT



| BTXE | | | |
|---------------------------|----------------------------|----------|--|
| Client: Burns & McDonnell | Analysis Method: EPA 8020A | | |
| Project#: M-96-071-1 | Prep Method: EPA 5030 | | |
| Location: UNPAC | | | |
| LABORATORY CONTROL SAMPLE | | | |
| Matrix: Water | Prep Date: | 09/08/97 | |
| Batch#: 36135 | Analysis Date: | 09/08/97 | |
| Units: ug/Kg | | | |
| Diln Fac: 1 | | | |

LCS Lab ID: QC53794

| Analyte | Result | Spike Added | %Rec # | Limits |
|------------------|--------|-------------|--------|--------|
| Benzene | 19.23 | 100 | 96 | 80-120 |
| Toluene | 18.78 | 100 | 94 | 80-120 |
| Ethylbenzene | 20.39 | 100 | 102 | 80-120 |
| m,p-Xylenes | 38.15 | 200 | 95 | 80-120 |
| o-Xylene | 19.81 | 100 | 99 | 80-120 |
| Surrogate | %Rec | Limits | | |
| Trifluorotoluene | 89 | 58-130 | | |
| Bromobenzene | 102 | 62-131 | | |

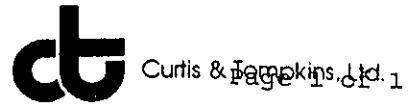
Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Spike Recovery: 0 out of 5 outside limits

Lab #: 130526

BATCH QC REPORT



| BTXE | |
|-------------------------------------|----------------------------|
| Client: Burns & McDonnell | Analysis Method: EPA 8020A |
| Project#: M-96-071-1 | Prep Method: EPA 5030 |
| Location: UNPAC | |
| MATRIX SPIKE/MATRIX SPIKE DUPLICATE | |
| Field ID: ZZZZZZ | Sample Date: 09/04/97 |
| Lab ID: 130530-001 | Received Date: 09/05/97 |
| Matrix: Water | Prep Date: 09/08/97 |
| Batch#: 36135 | Analysis Date: 09/08/97 |
| Units: ug/L | |
| Diln Fac: 1 | |

MS Lab ID: QC53796

| Analyte | Spike Added | Sample | MS | %Rec # | Limits |
|------------------|-------------|--------|-------|--------|--------|
| Benzene | 20 | <0.5 | 20.42 | 102 | 75-125 |
| Toluene | 20 | <0.5 | 19.89 | 99 | 75-125 |
| Ethylbenzene | 20 | <0.5 | 21.67 | 108 | 75-125 |
| m,p-Xylenes | 40 | <0.5 | 40.44 | 101 | 75-125 |
| o-Xylene | 20 | <0.5 | 21.05 | 105 | 75-125 |
| Surrogate | %Rec | Limits | | | |
| Trifluorotoluene | 92 | 58-130 | | | |
| Bromobenzene | 107 | 62-131 | | | |

MSD Lab ID: QC53797

| Analyte | Spike Added | MSD | %Rec # | Limits | RPD # | Limit |
|------------------|-------------|--------|--------|--------|-------|-------|
| Benzene | 20 | 20.52 | 103 | 75-125 | 0 | 20 |
| Toluene | 20 | 20.04 | 100 | 75-125 | 1 | 20 |
| Ethylbenzene | 20 | 22.17 | 111 | 75-125 | 2 | 20 |
| m,p-Xylenes | 40 | 41.66 | 104 | 75-125 | 3 | 20 |
| o-Xylene | 20 | 22.37 | 112 | 75-125 | 6 | 20 |
| Surrogate | %Rec | Limits | | | | |
| Trifluorotoluene | 91 | 58-130 | | | | |
| Bromobenzene | 104 | 62-131 | | | | |

Column to be used to flag recovery and RPD values with an asterisk
 * Values outside of QC limits
 RPD: 0 out of 5 outside limits
 Spike Recovery: 0 out of 10 outside limits

bus 880

130 3 46

Request for Chemical Analysis and Chain of Custody Record

ns & McDonnell Waste Consultants, Inc.
10 Ward Parkway
St. Louis City, Missouri 64114
Phone: (816) 333-8787 Fax: (816) 822-3463

Laboratory Curtis + Tompkins
Address 2323 5th Street
City/State/Zip Berkeley CA 94710
Telephone 510-486-0900

Document Control No.: 090597
Lab. Reference No. or
Episode No.:

Analyst: Scott Kellstedt

Project Number: M-96-071-1

Project Name: UNPAC

Sample Type

Agency, Group, or SWMU Name: Union Pacific ; Oakland CA

Matrix

| Sample Number | | Sample Event | | Sample Depth (in feet) | | Sample Collected | | Matrix | | | Composite | Grab | Number of Containers | Analysis | Remarks |
|---------------|-------------------|--------------|------|------------------------|----|------------------|------|--------|-------|-----|-----------|------|----------------------|---------------------|---------|
| Sample Point | Sample Designator | Round | Year | From | To | Date | Time | Liquid | Solid | Gas | | | | | |
| Fluent | GU | | | | | 9-5-97 | 1015 | X | | | | 1 | X | | |
| Fluent | GW | | | | | 9-5-97 | 1020 | X | | | | 2 | X | | |
| | | | | | | | | | | | | | | Standard Turnaround | |

Analysis
TPH-dioxin
BTEX

Sampler (signature): James Cross

Special Instructions:

Relinquished By: James Cross

Date/Time

Relinquished By:

Date/Time

Condition of Shipping Container:

Ice Present in Container:

Relinquished By:

Date/Time

Relinquished By:

Date/Time

Comments:

(signature):

(signature):