**Harding Lawson Associates**

**Transmittal/Memorandum**

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**To:** Alameda County Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

Attention: Mr. Lowell Miller

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**From:** David F. Leland DL
**Date:** January 16, 1990
**Subject:** December 1989 Ground-Water Treatment System NPDES Monitoring Report
**Job No.:** 09382,040.02

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**Remarks:** Please find attached a copy of the "Report for System Monitoring: December 1989, Dewatering Effluent Treatment System, Pacific Renaissance Plaza, Oakland, California," describing the operations and monitoring of the ground-water treatment system located at the Pacific Renaissance Plaza site in Oakland.

DFL/dc/df1026#1

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**cc:**

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A Report Prepared for

California Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Street, Room 6000
Oakland, California 94607

**REPORT OF SYSTEM MONITORING**
**DECEMBER 1989**
**DEWATERING EFFLUENT TREATMENT SYSTEM**
**CHINATOWN REDEVELOPMENT PROJECT AREA**
**OAKLAND, CALIFORNIA**

**HLA Job No. 9382,040.02**

Submitted on behalf of:

City of Oakland Redevelopment Agency
One City Hall Plaza
Oakland, California 94612

by

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Staff Engineer

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January 15, 1990

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# I INTRODUCTION

This report discusses the operation and monitoring of the ground-water treatment system at 10th and Webster streets, Oakland, California from December 1 to December 31, 1989. The system is treating ground water produced from extraction wells located in the area bounded by 9th, 11th, Webster and Franklin streets. Ground-water extraction is being conducted in conjunction with in situ biological treatment of soil at the Pacific Renaissance Plaza (PRP) site bounded by 9th, Franklin, and Webster streets and the East Bay Municipal Utility District (EBMUD) property line approximately 100 feet north of the centerline of 10th Street.

This report has been prepared by Harding Lawson Associates (HLA) on behalf of the Redevelopment Agency of the City of Oakland (Agency) and is submitted in compliance with NPDES Permit CA 0029394, adopted on July 20, 1988, by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB). Under the NPDES permit, treatment system discharge limits are 50 parts per billion (ppb) for total petroleum hydrocarbons (TPH) identified as gasoline; 5.6 ppb for lead; 5.0 ppb each for chlorobenzene, 1,2-dichloroethane, 1,2-dichloropropane, trichloroethylene, 1,1,2-trichloroethane, benzene, xylenes, and ethylbenzene; 0.5 ppb for toluene; 0.01 ppb for ethylene dibromide; and 0.0 ppb for total residual chlorine. The treatment system is designed to reduce concentrations of hydrocarbons in ground water to less than discharge limits specified in the NPDES permit.

## II TREATMENT SYSTEM OPERATION

The ground-water treatment system was installed March 8, 1988, and has been in operation since March 14, 1988. Water is treated by pumping it through four carbon contactors arranged in pairs. Organic compounds in the influent are adsorbed onto the carbon. Each pair of contactors is arranged in parallel, and together constitute a module; the two modules are arranged in series. The system is configured so that water from the ground-water extraction wells may be pumped through either module first. The system also includes a holding tank for influent water, pumps, filters, piping, and instrumentation. Four water sampling ports -- one influent, two intermediate, and one effluent -- enable water samples to be collected throughout the treatment process. The intermediate ports are located between the two modules so the effectiveness of the first pair of contactors in reducing influent concentrations can be monitored. Depending on the configuration of modules, only one of these ports is intermediate in the system at any one time.

Treated effluent is either recycled to the PRP biological treatment system or discharged to the storm drain. From December 1 to December 31, 1989, total effluent discharged from the system was 1,116,250 gallons, based on readings of the flowmeters located on each extraction well. Average flow through the treatment system for the month was 25.8 gallons per minute (gpm). Of the 1,116,250 gallons of treatment system effluent, approximately 98 percent, or 1,089,150 gallons, were recycled to the PRP biotreatment injection system and 2 percent, or 27,100 gallons were discharged to the storm drain.

The carbon contactors were backwashed on December 12 and December 14. Bag filters were replaced approximately every 2 days as a result of biological fouling. The sand filter was backwashed with fresh water twice a day. Cartridge filters were not changed in December.

## III TREATMENT SYSTEM MONITORING

During this reporting period, treatment system samples were collected on December 5 from the influent, intermediate, and effluent sampling ports. A field blank was submitted with the samples collected.

All samples were analyzed by Pace Laboratories, Novato, California, a California-certified laboratory. All samples were analyzed for halogenated organics by EPA Test Method 8010, for benzene, toluene, ethylbenzene, and xylenes by EPA Test Method 8020, and for TPH as gasoline by EPA Test Method 8015. Influent and effluent samples were analyzed for ethylene dibromide by EPA Test Method 504, for residual chlorine by Standard Method 408E, and for dissolved oxygen by EPA Test Method 360.2.

Results of analyses of samples collected April 6 through December 5, 1989 are summarized in Tables 1 through 4. Analytical results for samples collected in December are discussed in this report.

## IV RESULTS

Results of treatment system water sample analyses for TPH and for the EPA Test Method 8010, 8020, and 504 compounds analyzed indicate that on the sampling date (December 5, 1989), the carbon treatment system removed most individual constituents to below detection levels in discharge water. Toluene, chloroform, methylene chloride, and 1,2-dichloroethane were detected in the effluent sample at concentrations of 1.2 ppb, 1.6 ppb, 0.53 ppb, and 3.0 ppb, respectively.

The toluene concentration exceeds the 0.5 ppb effluent limit. The effluent toluene concentration has fluctuated in the past, but has been mostly nondetectable. The analytical results from treatment system samples collected in January will be evaluated for consistent exceedences and any corrective action that may be necessary will be proposed at that time.

TABLE 1. TREATMENT SYSTEM WATER ANALYSIS: INFLUENT SAMPLES



| HLA SAMPLE ID # | 89140601 | 89180330 | 89230801 | 89270503 | 8930CSIN | 89090741 | 8910CSIN | 89451124 | 89490017 |
|---|---|---|---|---|---|---|---|---|---|
| DATE | 04/06/89 | 05/03/89 | 06/08/89 | 07/05/89 | 08/01/89 | 09/07/89 | 10/05/89 | 11/02/89 | 12/05/89 |
| TEST METHOD/ COMPOUNDS | | | | | | | | | |
| EPA 8020 | | | | | | | | | |
| Benzene | ND < 0.2 | 0.5 | 1.2 | 11.5 | 710 | 6.3 | 2.2 | ND < 0.2 | 3.7 |
| Toluene | ND < 0.2 | 0.2 | 0.9 | 2.5 | 610 | 0.7 | 1.7 | ND < 0.2 | 0.7 |
| Ethylbenzene | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | 46 | ND < 2.0 | ND < 0.2 | ND < 0.2 | ND < 0.2 |
| Xylenes | ND < 0.2 | ND < 0.2 | 26 | 71 | 1100 | 39 | 38 | 12 | 25 |
| Chlorobenzene | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 2.0 | NT | NT | NT | NT |
| 1,2-Dichlorobenzene | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 2.0 | NT | NT | NT | NT |
| All other 8020 compounds | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 2.0 | NT | NT | NT | NT |
| EPA 8015 | | | | | | | | | |
| TPH (Gasoline) | 70 | 70 | 110 | 220 | 6200 | ND < 50 | 120 | ND < 50 | 50 |
| EPA 8010 | | | | | | | | | |
| 1,1-dichloroethene | 0.8 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Methylene chloride | ND < 0.5 | 9.8 | 0.6 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| 1,1-dichloroethane | 1.1 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Chloroform | 8.8 | ND < 0.5 | 4.5 | 2.5 | ND < 5.0 | 4.3 | ND < 0.5 | 5.5 | 3.3 |
| 1,1,1-trichloroethane | 0.7 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| 1,2-dichloroethane | 16.2 | 6.8 | 8.1 | 8.3 | ND < 5.0 | 7.6 | 6.6 | 10 | 7.1 |
| Trichloroethene | 3.6 | 4.4 | 10.3 | 9.8 | ND < 5.0 | 14 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| 1,2-dichloropropane | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Bromodichloromethane | ND < 0.5 | 0.7 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Cis-1,3-dichloropropene | 0.65 | 1.0 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Tetrachloroethene | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Chlorobenzene | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Bromoform | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| 1,1,2,2-tetrachloroethane | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Dibromochloromethane | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | 0.63 |
| All other 8010 compounds | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| EPA 504 | | | | | | | | | |
| Ethylene dibromide | 0.47 | ND < 0.01 | ND < 0.01 | 0.09 | 0.09 | ND < 0.02 | 1.6 | 2.8 | LT 4.0 |
| Standard Method 408E | | | | | | | | | |
| Residual chlorine (mg/l) | 0.05 | ND < 0.01 | ND < 0.05 | ND < 0.01 | ND < 0.05 | 0.5 | ND < 0.05 | 0.1 | ND < 0.05 |
| EPA 360.2 | | | | | | | | | |
| Dissolved oxygen (mg/l) | 7.9 | NT | 14 | 6.9 | 20 | 6.8 | 5.6 | 3.4 | 5.6 |

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ND - Not detected at stated detection limit.
NT - Not Tested.
LT - Less than.
All results reported in parts per billion (ppb) except where indicated.

TABLE 1. TREATMENT SYSTEM WATER ANALYSIS: INFLUENT SAMPLES



| HLA SAMPLE ID # | 89140601 | 89180330 | 89230801 | 89270503 | 8930CSIN | 89090741 | 8910CSIN | 89451124 | 89490017 |
|---|---|---|---|---|---|---|---|---|---|
| DATE | 04/06/89 | 05/03/89 | 06/08/89 | 07/05/89 | 08/01/89 | 09/07/89 | 10/05/89 | 11/02/89 | 12/05/89 |
| TEST METHOD/ COMPOUNDS | | | | | | | | | |
| EPA 8020 | | | | | | | | | |
| Benzene | ND < 0.2 | 0.5 | 1.2 | 11.5 | 710 | 6.3 | 2.2 | ND < 0.2 | 3.7 |
| Toluene | ND < 0.2 | 0.2 | 0.9 | 2.5 | 610 | 0.7 | 1.7 | ND < 0.2 | 0.7 |
| Ethylbenzene | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | 46 | ND < 2.0 | ND < 0.2 | ND < 0.2 | ND < 0.2 |
| Xylenes | ND < 0.2 | ND < 0.2 | 26 | 71 | 1100 | 39 | 38 | 12 | 25 |
| Chlorobenzene | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 2.0 | NT | NT | NT | NT |
| 1,2-Dichlorobenzene | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 2.0 | NT | NT | NT | NT |
| All other 8020 compounds | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 2.0 | NT | NT | NT | NT |
| EPA 8015 | | | | | | | | | |
| TPH (Gasoline) | 70 | 70 | 110 | 220 | 6200 | ND < 50 | 120 | ND < 50 | 50 |
| EPA 8010 | | | | | | | | | |
| 1,1-dichloroethene | 0.8 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Methylene chloride | ND < 0.5 | 9.8 | 0.6 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| 1,1-dichloroethane | 1.1 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Chloroform | 8.8 | ND < 0.5 | 4.5 | 2.5 | ND < 5.0 | 4.3 | ND < 0.5 | 5.5 | 3.3 |
| 1,1,1-trichloroethane | 0.7 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| 1,2-dichloroethane | 16.2 | 6.8 | 8.1 | 8.3 | ND < 5.0 | 7.6 | 6.6 | 10 | 7.1 |
| Trichloroethene | 3.6 | 4.4 | 10.3 | 9.8 | ND < 5.0 | 14 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| 1,2-dichloropropane | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Bromodichloromethane | ND < 0.5 | 0.7 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Cis-1,3-dichloropropene | 0.65 | 1.0 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Tetrachloroethene | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Chlorobenzene | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Bromoform | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| 1,1,2,2-tetrachloroethane | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Dibromochloromethane | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 5.0 | ND < 0.5 | ND < 0.5 | ND < 0.5 | 0.63 |
| All other 8010 compounds | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| EPA 504 | | | | | | | | | |
| Ethylene dibromide | 0.47 | ND < 0.01 | ND < 0.01 | 0.09 | 0.09 | ND < 0.02 | 1.6 | 2.8 | LT 4.0 |
| Standard Method 408E | | | | | | | | | |
| Residual chlorine (mg/l) | 0.05 | ND < 0.01 | ND < 0.05 | ND < 0.01 | ND < 0.05 | 0.5 | ND < 0.05 | 0.1 | ND < 0.05 |
| EPA 360.2 | | | | | | | | | |
| Dissolved oxygen (mg/l) | 7.9 | NT | 14 | 6.9 | 20 | 6.8 | 5.6 | 3.4 | 5.6 |

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ND - Not detected at stated detection limit.
NT - Not Tested.
LT - Less than.
All results reported in parts per billion (ppb) except where indicated.

TABLE 2. TREATMENT SYSTEM WATER ANALYSIS: INTERMEDIATE SAMPLES



| HLA SAMPLE ID # | 89140602 | 89180331 | 89230802 | 89270502 | 8930CSIM | 89090742 | 8910CSIT | 89451126 | 89490018 |
|---|---|---|---|---|---|---|---|---|---|
| DATE | 04/06/89 | 05/03/89 | 06/08/89 | 07/05/89 | 08/01/89 | 09/07/89 | 10/05/89 | 11/02/89 | 12/05/89 |
| TEST METHOD/COMPOUNDS | | | | | | | | | |
| EPA 8020 | | | | | | | | | |
| Benzene | ND < 0.2 | 0.3 | NT | ND < 0.2 | 79 | ND < 0.2 | 1.7 | NT | ND < 0.2 |
| Toluene | ND < 0.2 | ND < 0.2 | NT | 0.7 | 61 | ND < 0.2 | ND < 0.2 | NT | 1.8 |
| Ethylbenzene | ND < 0.2 | 0.4 | NT | ND < 0.2 | 2.6 | ND < 0.2 | ND < 0.2 | NT | ND < 0.2 |
| Xylenes | ND < 0.2 | 0.3 | NT | ND < 0.2 | 140 | ND < 0.2 | ND < 0.2 | NT | ND < 0.2 |
| Chlorobenzene | ND < 0.2 | ND < 0.2 | NT | ND < 0.2 | ND < 0.2 | NT | NT | NT | NT |
| 1,3-Dichlorobenzene | ND < 0.2 | ND < 0.2 | NT | ND < 0.2 | ND < 0.2 | NT | NT | NT | NT |
| All other 8020 compounds | ND < 0.2 | ND < 0.2 | NT | ND < 0.2 | ND < 0.2 | NT | NT | NT | NT |
| EPA 8015 | | | | | | | | | |
| TPH (Gasoline) | NT | NT | NT | NT | NT | NT | ND < 50 | NT | ND < 50 |
| EPA 8010 | | | | | | | | | |
| Methylene chloride | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| 1,1-dichloroethane | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Chloroform | ND < 0.5 | ND < 0.5 | ND < 0.5 | 1.5 | 5.6 | 4.7 | ND < 0.5 | ND < 0.5 | 3.8 |
| 1,1,1-trichloroethane | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| 1,2-dichloroethane | 0.55 | ND < 0.5 | 1.3 | 3.4 | ND < 0.5 | 6.2 | 7.7 | 7.5 | 6.6 |
| Trichloroethene | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | 2.7 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Tetrachloroethene | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Chlorobenzene | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Bromoform | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| 1,3-dichlorobenzene | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| All other 8010 compounds | ND | ND | ND | ND | ND | ND | ND | ND | ND |

ND - Not detected at stated detection limit.
NT - Not Tested.
All results reported in parts per billion (ppb) except where indicated.

TABLE 3. TREATMENT SYSTEM WATER ANALYSIS: EFFLUENT SAMPLES



| HLA SAMPLE ID # | 89140603 | 89180332 | 89230803 | 89270501 | 8930CSEF | 89090740 | 8910CSEF | 89451127 | 89490019 |
|---|---|---|---|---|---|---|---|---|---|
| DATE | 04/06/89 | 05/03/89 | 06/08/89 | 07/05/89 | 08/01/89 | 09/07/89 | 10/05/89 | 11/02/89 | 12/05/89 |
| TEST METHOD/COMPOUNDS | | | | | | | | | |
| EPA 8020 | | | | | | | | | |
| Benzene | ND < 0.2 | 0.3 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 |
| Toluene | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | 0.7 | ND < 0.2 | 1.2 |
| Ethylbenzene | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 |
| Xylenes | ND < 0.2 | 0.3 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 |
| Diphenylhydrazine | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | NT | NT |
| All other 8020 compounds | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | ND < 0.2 | NT | NT |
| EPA 8015 | | | | | | | | | |
| TPH (Gasoline) | ND < 50 | ND < 50 | ND < 50 | ND < 50 | ND < 50 | ND < 50 | ND < 50 | ND < 50 | ND < 50 |
| EPA 8010 | | | | | | | | | |
| Dichlorodifluoromethane | ND < 2.0 | ND < 2.0 | ND < 2.0 | ND < 2.0 | ND < 2.0 | ND < 2.0 | ND < 2.0 | ND < 2.0 | ND < 2.0 |
| 1,1-dichlorethene | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Methylene chloride | ND < 0.5 | ND < 0.5 | 0.6 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | 0.53 |
| 1,1-dichloroethane | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Chloroform | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | 1.5 | 1.6 |
| 1,1,1-trichloroethane | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| 1,2-dichloroethane | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | 0.7 | 1.1 | 1.7 | 2.8 | 3.0 |
| Trichloroethene | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| Tetrachloroethene | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 | ND < 0.5 |
| All other 8010 compounds | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| EPA 504 | | | | | | | | | |
| Ethylene dibromide | ND < 0.01 | ND < 0.01 | ND < 0.01 | ND < 0.01 | ND < 0.02 | ND < 0.02 | ND < 0.02 | ND < 0.01 | ND < 0.02 |
| Standard Method 408E | | | | | | | | | |
| Residual chlorine (mg/l) | ND < 0.05 | ND < 0.01 | ND < 0.05 | ND < 0.01 | ND < 0.05 | ND < 0.05 | ND < 0.05 | ND < 0.05 | ND < 0.05 |
| EPA 360.2 | | | | | | | | | |
| Dissolved oxygen (mg/l) | 7.8 | NT | 10 | 3.3 | 1.0 | 1.9 | 1.3 | 1.8 | 5.3 |

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ND - Not detected at stated detection limit.
NT - Not Tested.
All results reported in parts per billion (ppb) except where indicated.

TABLE 4. TREATMENT SYSTEM WATER ANALYSIS: BLANK SAMPLES



| HLA SAMPLE ID # | --- | 89180334 | 89230805 | 89270515 | --- | 89090615 | 8910CST8 | 89451125 | 89490020 |
|---|---|---|---|---|---|---|---|---|---|
| DATE | 04/06/89 | 05/03/89 | 06/08/89 | 07/05/89 | 08/01/89 | 09/07/89 | 10/05/89 | 11/02/89 | 12/05/89 |
| TEST METHOD/COMPOUNDS | | | | | | | | | |
| EPA 8020 | | | | | | | | | |
| Benzene | NT | ND < 0.2 | ND < 0.2 | ND < 0.2 | NT | ND < 0.5 | ND < 0.2 | ND < 0.2 | ND < 0.2 |
| Toluene | NT | ND < 0.2 | ND < 0.2 | ND < 0.2 | NT | ND < 0.5 | ND < 0.2 | ND < 0.2 | ND < 0.2 |
| Ethylbenzene | NT | ND < 0.2 | ND < 0.2 | ND < 0.2 | NT | ND < 0.5 | ND < 0.2 | ND < 0.2 | ND < 0.2 |
| Xylenes | NT | 0.7 | ND < 0.2 | ND < 0.2 | NT | ND < 0.5 | ND < 0.2 | ND < 0.2 | ND < 0.2 |
| All other 8020 compounds | NT | ND < 0.2 | ND < 0.2 | ND < 0.2 | NT | NT | NT | NT | NT |
| EPA 8015 | | | | | | | | | |
| TPH (Gasoline) | NT | NT | ND < 50 | ND < 50 | NT | ND < 250 | ND < 50 | ND < 50 | ND < 50 |
| EPA 8010 | | | | | | | | | |
| Dichlorodifluoromethane | NT | ND < 2.0 | ND < 2.0 | NT | NT | NT | ND < 2.0 | ND < 2.0 | NT |
| 1,1-dichloroethene | NT | ND < 0.5 | ND < 0.5 | NT | NT | NT | ND < 0.5 | ND < 0.5 | NT |
| Methylene chloride | NT | ND < 0.5 | ND < 0.5 | NT | NT | NT | ND < 0.5 | ND < 0.5 | NT |
| 1,1,1-trichloroethane | NT | ND < 0.5 | ND < 0.5 | NT | NT | NT | ND < 0.5 | ND < 0.5 | NT |
| 1,2-dichloroethane | NT | ND < 0.5 | ND < 0.5 | NT | NT | NT | ND < 0.5 | ND < 0.5 | NT |
| All other 8010 compounds | NT | ND | ND | NT | NT | NT | ND | ND | NT |
| EPA 504 | | | | | | | | | |
| Ethylene dibromide | NT | NT | NT | NT | NT | NT | ND < 0.02 | NT | NT |

---

ND - Not detected at stated detection limit.
NT - Not Tested.
All results reported in parts per billion (ppb) except where indicated.

# Appendix

## LABORATORY ANALYTICAL RESULTS FOR TREATMENT SYSTEM SAMPLES

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# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas
Irvine, California
Asheboro, North Carolina



January 10, 1990
PACE Project Number: 491205503

PRP

| | | | | INFLUENT | INTERMEDIATE |
|---|---|---|---|---|---|
| PACE Sample Number: | | | 800400 | 800410 | 800420 |
| Date Collected: | | | 12/05/89 | 12/05/89 | 12/05/89 |
| Date Received: | | | 12/05/89 | 12/05/89 | 12/05/89 |
| Parameter | Units | MDL | 89490022 | 89490017 | 89490018 |
| **INORGANIC ANALYSIS** | | | | | |
| INDIVIDUAL PARAMETERS | | | | | |
| Chlorine, Total Residual | mg/L | 0.05 | - | ND | - |
| Oxygen, Dissolved | mg/L | 0.1 | - | 5.6 | - |
| **ORGANIC ANALYSIS** | | | | | |
| PURGEABLE FUELS AND AROMATICS | | | | | |
| TOTAL FUEL HYDROCARBONS, (LIGHT): | | | - | - | - |
| Total Purgeable Fuels, as Gasoline | mg/L | 0.05 | 7.6 | 0.05 | ND |
| PURGEABLE AROMATICS (BTXE BY EPA 8020): | | | - | - | - |
| Benzene | mg/L | 0.0002 | 1.3 | 0.0037 | ND |
| Ethylbenzene | mg/L | 0.0002 | 0.084 | ND | ND |
| Toluene | mg/L | 0.0002 | 1.5 | 0.0007 | 0.0018 |
| Xylenes, Total | mg/L | 0.0002 | 1.3 | 0.025 | ND |
| HALOGENATED VOLATILE COMPOUNDS EPA 8010 | | | | | |
| Dichlorodifluoromethane | ug/L | 2.0 | - | ND | ND |
| Chloromethane | ug/L | 2.0 | - | ND | ND |
| Vinyl Chloride | ug/L | 2.0 | - | ND | ND |
| Bromomethane | ug/L | 2.0 | - | ND | ND |
| Chloroethane | ug/L | 2.0 | - | ND | ND |
| Trichlorofluoromethane (Freon 11) | ug/L | 2.0 | - | ND | ND |
| 1,1-Dichloroethene | ug/L | 0.5 | - | ND | ND |
| Methylene Chloride | ug/L | 0.5 | - | ND | ND |
| trans-1,2-Dichloroethene | ug/L | 0.5 | - | ND | ND |
| 1,1-Dichloroethane | ug/L | 0.5 | - | ND | ND |
| Chloroform | ug/L | 0.5 | - | 3.3 | 3.8 |
| 1,1,1-Trichloroethane (TCA) | ug/L | 0.5 | - | ND | ND |
| Carbon Tetrachloride | ug/L | 0.5 | - | ND | ND |
| 1,2-Dichloroethane (EDC) | ug/L | 0.5 | - | 7.1 | 6.6 |
| Trichloroethene (TCE) | ug/L | 0.5 | - | ND | ND |

MDL Method Detection Limit
ND Not detected at or above the MDL.

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# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas
Irvine, California
Asheboro, North Carolina

Mr. David Leland
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January 10, 1990
PACE Project
Number: 491205503

PRP

| | | | | INFLUENT | INTERMEDIATE |
|---|---|---|---|---|---|
| PACE Sample Number: | | | 800400 | 800410 | 800420 |
| Date Collected: | | | 12/05/89 | 12/05/89 | 12/05/89 |
| Date Received: | | | 12/05/89 | 12/05/89 | 12/05/89 |
| Parameter | Units | MDL | 89490022 | 89490017 | 89490018 |
| ORGANIC ANALYSIS | | | | | |
| HALOGENATED VOLATILE COMPOUNDS EPA 8010 | | | | | |
| 1,2-Dichloropropane | ug/L | 0.5 | - | ND | ND |
| Bromodichloromethane | ug/L | 0.5 | - | ND | ND |
| 2-Chloroethylvinyl ether | ug/L | 0.5 | - | ND | ND |
| trans-1,3-Dichloropropene | ug/L | 0.5 | - | ND | ND |
| cis-1,3-Dichloropropene | ug/L | 0.5 | - | ND | ND |
| 1,1,2-Trichloroethane | ug/L | 0.5 | - | ND | ND |
| Tetrachloroethene | ug/L | 0.5 | - | ND | ND |
| Dibromochloromethane | ug/L | 0.5 | - | .63 | ND |
| Chlorobenzene | ug/L | 0.5 | - | ND | ND |
| Bromoform | ug/L | 0.5 | - | ND | ND |
| 1,1,2,2-Tetrachloroethane | ug/L | 0.5 | - | ND | ND |
| 1,3-Dichlorobenzene | ug/L | 0.5 | - | ND | ND |
| 1,4-Dichlorobenzene | ug/L | 0.5 | - | ND | ND |
| 1,2-Dichlorobenzene | ug/L | 0.5 | - | ND | ND |
| Bromochloromethane (Surrogate Recovery) | | | - | 85% | 97% |
| 1,4-Dichlorobutane (Surrogate Recovery) | | | - | 85% | 91% |
| 1,2-DIBROMOETHANE (EDB) EPA METHOD 504 | | | | | |
| 1,2-Dibromoethane | ug/L | 0.02 | - | LT 4.0 | - |
| Date Extracted | | | - | 12/19/89 | - |

MDL Method Detection Limit
ND Not detected at or above the MDL.
LT Less than.

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# REPORT OF LABORATORY ANALYSIS

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January 10, 1990
PACE Project Number: 491205503

PRP

| PACE Sample Number: | | | EFFLUENT 800430 | BLANK 800440 |
|---|---|---|---|---|
| Date Collected: | | | 12/05/89 | 12/05/89 |
| Date Received: | | | 12/05/89 | 12/05/89 |
| Parameter | Units | MDL | 89490019 | 89490020 |
| **INORGANIC ANALYSIS** | | | | |
| INDIVIDUAL PARAMETERS | | | | |
| Chlorine, Total Residual | mg/L | 0.05 | ND | - |
| Oxygen, Dissolved | mg/L | 0.1 | 5.3 | - |
| **ORGANIC ANALYSIS** | | | | |
| PURGEABLE FUELS AND AROMATICS | | | | |
| TOTAL FUEL HYDROCARBONS, (LIGHT): | | | - | - |
| Total Purgeable Fuels, as Gasoline | mg/L | 0.05 | ND | ND |
| PURGEABLE AROMATICS (BTXE BY EPA 8020): | | | - | - |
| Benzene | mg/L | 0.0002 | ND | ND |
| Ethylbenzene | mg/L | 0.0002 | ND | ND |
| Toluene | mg/L | 0.0002 | 0.0012 | ND |
| Xylenes, Total | mg/L | 0.0002 | ND | ND |
| HALOGENATED VOLATILE COMPOUNDS EPA 8010 | | | | |
| Dichlorodifluoromethane | ug/L | 2.0 | ND | - |
| Chloromethane | ug/L | 2.0 | ND | - |
| Vinyl Chloride | ug/L | 2.0 | ND | - |
| Bromomethane | ug/L | 2.0 | ND | - |
| Chloroethane | ug/L | 2.0 | ND | - |
| Trichlorofluoromethane (Freon 11) | ug/L | 2.0 | ND | - |
| 1,1-Dichloroethene | ug/L | 0.5 | ND | - |
| Methylene Chloride | ug/L | 0.5 | 0.53 | - |
| trans-1,2-Dichloroethene | ug/L | 0.5 | ND | - |
| 1,1-Dichloroethane | ug/L | 0.5 | ND | - |
| Chloroform | ug/L | 0.5 | 1.6 | - |
| 1,1,1-Trichloroethane (TCA) | ug/L | 0.5 | ND | - |
| Carbon Tetrachloride | ug/L | 0.5 | ND | - |
| 1,2-Dichloroethane (EDC) | ug/L | 0.5 | 3.0 | - |
| Trichloroethene (TCE) | ug/L | 0.5 | ND | - |

MDL Method Detection Limit
ND Not detected at or above the MDL.

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Offices:
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# REPORT OF LABORATORY ANALYSIS

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January 10, 1990
PACE Project
Number: 491205503

PRP

| | | | EFFLUENT | BLANK |
|---|---|---|---|---|
| PACE Sample Number: | | | 800430 | 800440 |
| Date Collected: | | | 12/05/89 | 12/05/89 |
| Date Received: | | | 12/05/89 | 12/05/89 |
| Parameter | Units | MDL | 89490019 | 89490020 |
| ORGANIC ANALYSIS | | | | |
| HALOGENATED VOLATILE COMPOUNDS EPA 8010 | | | | |
| 1,2-Dichloropropane | ug/L | 0.5 | ND | - |
| Bromodichloromethane | ug/L | 0.5 | ND | - |
| 2-Chloroethylvinyl ether | ug/L | 0.5 | ND | - |
| trans-1,3-Dichloropropene | ug/L | 0.5 | ND | - |
| cis-1,3-Dichloropropene | ug/L | 0.5 | ND | - |
| 1,1,2-Trichloroethane | ug/L | 0.5 | ND | - |
| Tetrachloroethene | ug/L | 0.5 | ND | - |
| Dibromochloromethane | ug/L | 0.5 | ND | - |
| Chlorobenzene | ug/L | 0.5 | ND | - |
| Bromoform | ug/L | 0.5 | ND | - |
| 1,1,2,2-Tetrachloroethane | ug/L | 0.5 | ND | - |
| 1,3-Dichlorobenzene | ug/L | 0.5 | ND | - |
| 1,4-Dichlorobenzene | ug/L | 0.5 | ND | - |
| 1,2-Dichlorobenzene | ug/L | 0.5 | ND | - |
| Bromochloromethane (Surrogate Recovery) | | | 94% | - |
| 1,4-Dichlorobutane (Surrogate Recovery) | | | 98% | - |
| 1,2-DIBROMOETHANE (EDB) EPA METHOD 504 | | | | |
| 1,2-Dibromoethane | ug/L | 0.02 | ND | - |
| Date Extracted | | | 12/19/89 | - |

MDL Method Detection Limit
ND Not detected at or above the MDL.

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# REPORT OF LABORATORY ANALYSIS

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January 10, 1990
PACE Project
Number: 491205503

The data contained in this report were obtained using EPA or other approved methodologies. All analyses were performed by me or under my direct supervision.

Stephen F. Nackord
Director, Sampling and Analytical Services

Douglas E. Oram, Ph.D.
Organic Chemistry Manager

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**January 15, 1990**

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QUALITY CONTROL REVIEWER

Tamara L. Williams

Tamara L. Williams
Geologist - 3954