7/17/89

ALAMEDA COUNTY
ENVIRONMENTAL HEALTH
HAZARDOUS MATERIALS

**Harding Lawson Associates**

**Transmittal/Memorandum**

---

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

Attention: Mr. Lowell Miller

---

**From:** David Leland DL
**Date:** July 11, 1989
**Subject:** March through May 1989 Soil Treatment System Monitoring Report
**Job No.:** 09382,040.02

---

**Remarks:** Please find attached a copy of the "Report of System Monitoring: March through May 1989, Soil Treatment System, Pacific Renaissance Plaza, Oakland, California", describing the operations and monitoring of the in situ soil treatment system located at the Pacific Renaissance Plaza site in Oakland.

DFL/dc/df1005#1

---

**cc:**

---

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**
**MARCH THROUGH MAY 1989**
**SOIL TREATMENT SYSTEM**
**PACIFIC RENAISSANCE PLAZA**
**OAKLAND, CALIFORNIA**

**HLA Job No. 9382,040.02**

Submitted on behalf of:

City of Oakland Redevelopment Agency
1417 Clay Street
Oakland, California 94612

by

John D. Skalbeck
Project Hydrogeologist

David F. Leland
Associate Hydrologist

Harding Lawson Associates
7655 Redwood Boulevard
P.O. Box 578
Novato, California 94948
415/892-0821

July 10, 1989

# TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

# LIST OF TABLES

# LIST OF ILLUSTRATIONS

## 1.0 INTRODUCTION

This report presents the operating and monitoring data for the in situ soil treatment system at the Pacific Renaissance Plaza (PRP) site in Oakland, California for the month from May 1 to June 6, 1989 and discusses the performance of the system during its first quarter of operation, from March 4 to June 7, 1989. The report also includes a plan for characterizing the extent of off-site soil and ground-water contamination originating from sources located within PRP site boundaries. The PRP site is bounded by 9th, Franklin, and Webster streets and the East Bay Municipal Utilities District (EBMUD) property line approximately 100 feet north of the centerline of 10th Street (Plate 1). The site is part of the Oakland Chinatown Redevelopment Project Area. The soil treatment system is designed to remove petroleum hydrocarbons from soil within site boundaries before it is excavated during construction of the Pacific Renaissance Plaza complex. Construction is scheduled to begin in September 1989.

This report was prepared by Harding Lawson Associates (HLA) on behalf of the City of Oakland Redevelopment Agency (Agency). It is submitted in accordance with monitoring, reporting, and characterization requirements originally set forth by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB), in a letter to the City of Oakland dated February 22, 1989, and amended by a letter dated March 17, 1989, from HLA to the RWQCB, that clarified several items, including reporting periods and report submittal dates.

This report is organized as follows. Section 2.0 provides background on previous reports describing the site, the objective of the soil treatment, and the treatment system designed for the site. Section 3.0 summarizes treatment system operations in May 1989. System monitoring in May is described in Section 4.0. A discussion of the performance

of the system from March through May is presented in Section 5.0. Activities planned for June are described in Section 6.0. In Section 7.0, a work plan for characterizing off-site soil and ground-water contamination is proposed.

# 2.0 BACKGROUND

## 2.1 Previous Reports

Site history and characterization activities completed by HLA in 1988 are reported in *Site Characterization, Pacific Renaissance Plaza, Chinatown Redevelopment Project Area, Oakland, California (HLA, 1988)*. The site characterization report also presents a preliminary screening of soil treatment alternatives and an evaluation of the potential for biodegradation to effectively remove hydrocarbons from soil at the site. The *Report of Waste Discharge, Pacific Renaissance Plaza, Chinatown Redevelopment Project Area, Oakland, California (HLA, 1989a)* discusses soil treatment system design and presents the results of the biodegradation treatability study and the proposed operations and monitoring plan for the system. Site background, environmental setting, and previous investigations are also discussed in that report.

Characterization of the extent of soil contamination at the PRP site was updated in the *Report of System Monitoring: March 1989, Soil Treatment System, Pacific Renaissance Plaza, Oakland, California (HLA, 1989b)* using results of analysis of soil samples collected during system well installation activities. The operation and monitoring of the system in March and April are described in *HLA (1989b)* and *HLA (1989c)*, respectively.

## 2.2 Objective of Soil Treatment

A portion of the soil at the PRP site contains elevated levels of petroleum hydrocarbons (identified as gasoline) and benzene, toluene, ethylbenzene and xylenes (BTEX). Guidance used by the RWQCB classifies soil with total petroleum hydrocarbon (TPH) values exceeding 1,000 parts per million (ppm) as hazardous waste *(Leaking Underground Fuel Tank Task Force, 1987)* and soil with TPH values between 100 and

1,000 ppm as designated waste. There is soil at this site which falls into both categories and would require landfill disposal at Class I (hazardous waste), Class II (designated waste), or Class III facilities (less than 100 ppm TPH).

The Agency wishes to treat soils in place prior to excavation to reduce concentrations to levels acceptable for Class III disposal. In situ biological treatment using a system of injection and extraction wells was the treatment method selected to accomplish this objective.

## 2.3 Treatment System Description

The soil treatment process involves circulating nutrient- and oxygen-enriched water through the contaminated soil to enhance the growth of microorganisms existing in soils at the site. These microorganisms utilize hydrocarbons as an energy source, producing carbon dioxide and water as by-products. This process reduces the concentration of petroleum hydrocarbons in the subsurface.

The treatment system, shown schematically on Plate 2, consists of:

- A 3,000-gallon mixing tank and appurtenances for addition of nutrients and hydrogen peroxide to water to stimulate indigenous microorganisms capable of degrading petroleum hydrocarbons.
- Eleven injection wells, to introduce the nutrient-enriched and oxygenated water to the contaminated zone, and 22 extraction wells, to hydraulically contain and collect ground water after it passes through the contaminated zone.
- Associated piping and controls.
- The existing carbon adsorption system, which is used to treat extracted ground water to reduce petroleum hydrocarbons and other organic compounds to discharge limits specified in the Agency's existing NPDES permit number CA0029394.

The system can operate in two basic modes. In the start-up operational mode, which began on March 4, the PRP biotreatment system operates in an "open loop". The

source of freshwater to the system in start-up mode is an EBMUD fire hydrant located at 10th and Webster streets. The water supply is piped through a backflow preventer and a water meter to the mixing tank. Separate solutions of nutrients (nitrate, ammonia, and phosphates) and hydrogen peroxide are injected in measured quantities into the water as it enters a mixing tank. The nutrients and hydrogen peroxide are stored in separate 300-gallon tanks adjacent to the mixing tank, and are injected into the influent water stream as necessary to achieve target concentrations in injection water.

A pump delivers the water, nutrients, and hydrogen-peroxide solution from the mixing tank to the injection wells for introduction to the subsurface. A solenoid valve at each wellhead is controlled by liquid level probes in the well and regulates the flow of water into the well. The flow within the well itself is by gravity; once water is inside the well casing, it is no longer under pressure from the pump.

Injected water travels from the injection wells to the extraction wells through the soil. Submersible pumps in the extraction wells surrounding the injection wells on the site are also controlled by liquid level probes. All extracted water is collected and then pumped to the first of five 21,000-gallon storage tanks (Baker tanks) at the site, filtered to remove fine sediments, and treated by carbon adsorption to reduce hydrocarbon concentrations to NPDES permit limits. Treated extraction water is either discharged to the storm drain ("open loop" mode) or pumped to the nutrient mixing tank to be used for reinjection.

The long-term system operation mode returns water treated by the carbon adsorption system to the mixing/injection system. Recycling ground water in this manner enhances the potential for growth of microbial populations and reduces the quantity of potable water required for operation. Operation in this "closed loop" mode began during the latter part of April.

## 3.0 TREATMENT SYSTEM OPERATIONS: MAY 1989

System operational activities and adjustments made in May are summarized in the following paragraphs.

Redevelopment of the injection wells was performed to maintain flow rates. HLA used a swab and pump method to redevelop IW-5, IW-10, and IW-11 on May 1, and IW-1, IW-4, IW-6, IW-8, and IW-11 on May 23. On May 24, Layne Western of Woodland, California used an airlift method to remove 6 to 8 feet and 3 feet of silt from IW-5 and IW-10, respectively.

Extraction well water-level probes were lowered by 1 to 1.5 feet on May 2 to increase the flow rates at each well. Further extraction well probe adjustments (primarily probe lowering, with the exception of probe raising at EW-22) were performed on various dates throughout the month.

A tank cleaning contractor, HydroTech of Benicia, California, removed accumulated sediment from two of the Baker tanks on May 3 and from a third Baker tank on May 5.

Problems were encountered in May with clogging of bag filters of the carbon adsorption system, biofouling of extraction well probes and pumps, and formation of crystals in the nutrient tanks and pump. The bag filter problem began immediately after Baker tank cleaning and persisted throughout the month. It is suspected that filter clogging is associated with both the sediment remaining in the system after tank cleaning and microbial growth in the tanks. The crystallization problem, which persisted from May 9 to 22, has since been eliminated by an adjustment in the nutrient formulation. Problems associated with microbial growth on extraction well pumps and probes began in

the middle of the month and extended through the remainder of the month. These problems included reduced pumping rates and short-circuiting of liquid-level probe contacts because of microbe accumulations.

The hydrogen peroxide concentration in the injection water was increased to 500 ppm on May 31, completing the staged increase in hydrogen peroxide concentrations from a value of zero at startup.

## 4.0 TREATMENT SYSTEM MONITORING: MAY 1989

### 4.1 Flow and Water-Level Monitoring

Each extraction well (EW series) and injection well (IW series) except EW-22 is equipped with a Neptune totalizing flowmeter to monitor water volume extracted or injected. Meter accuracy is reported by the manufacturer to be within plus/minus 1-1/2 percent down to flows of 1/4 gallon per minute (gpm). Totalizing meter readings in gallons, along with time in minutes, are recorded daily by an HLA engineering technician on a Daily Maintenance Data Sheet (DMDS). The previous totalizer reading, the elapsed time between readings, and the calculated daily average flow rate (gpm) for each well are also recorded on the DMDS.

Depth to water is measured using a graduated steel tape and repeated until two measurements with a difference of no more than 0.02 feet are obtained. Water-level elevations are calculated using depth-to-water data and surveyed top-of-casing elevations.

### 4.2 Sample Collection and Analysis

Water samples are collected from selected extraction wells, injection wells, and monitoring wells and analyzed for inorganic and organic constituents and microbial populations. For each well, the frequency of sampling in May, analytical parameters, and EPA Test Methods (for organic constituents) are presented in Table 1. Samples are collected from extraction wells using the sampling port at each wellhead. Representative samples of the water distributed to the injection wells are collected from the nutrient and hydrogen peroxide mixing tank on a weekly basis.

For monitoring wells from which a water sample is collected for analysis, the following procedure is used. After water levels are measured, each well is purged using

a submersible pump placed near the bottom of the well or by bailing with a stainless steel bailer. During purging, a volume of water equal to at least three times the static-water volume in the casing is removed. Water produced during well purging is collected and stored on site in a Baker tank prior to its treatment by the carbon treatment system. Ground-water samples are collected using a clean stainless steel bailer. Samples for TPH analyses are transferred to clean 1-liter amber glass bottles. Samples for purgeable aromatics and purgeable halocarbons analyses are transferred to 40-milliliter glass volatile organic analysis (VOA) vials. Samples for inorganic and microbiological analyses are transferred to 1-liter plastic bottles. All ground-water samples are stored on blue ice and submitted under chain of custody to Pace Laboratories of Novato, California, for organic analysis, or to HLA's microbiological laboratory for inorganic parameter analyses and microbial evaluations.

As presented in Table 1, the May sampling schedule differs from the sampling schedule proposed in Table 1 of the *Report of Waste Discharge* (*HLA, 1989a*).

- At individual injection and extraction wells, total flow is recorded and flow rates calculated daily throughout the period; the proposed schedule had called for weekly recording.
- Dissolved iron has been added as an analyte.
- For the extraction wells, samples of composite extracted ground water are collected monthly and analyzed for organic constituents by EPA Test Methods 8015 and 8020. Samples for inorganic analysis are collected weekly from selected extraction wells. Specific wells, versus the full set of wells proposed, are selected for sampling at locations near monitoring wells and at other locations to provide a representative subset of the extraction wells in the ring. Specifically, Extraction Wells EW-1, EW-4, EW-8, EW-12, EW-16, and EW-19 are sampled weekly and analyzed for nitrate, ammonia, phosphate, and dissolved oxygen. Additional extraction wells are sampled periodically, as listed in Table 1, for comparison to measurements and observations at the regularly sampled extraction wells.
- Water levels are measured daily, instead of weekly, at the three transect monitoring wells, MW-15, MW-16, and MW-17. Samples from Wells MW-9 through MW-18 are collected and analyzed weekly for nitrate,

ammonia, phosphate, and dissolved oxygen. The proposed schedule called for nitrate and dissolved oxygen analyses on a monthly basis at these wells. Samples are analyzed monthly by EPA Test Method 8015 and 8020.

The sampling schedule may be modified in subsequent months in response to the operation of the system and the need for monitoring data.

## 4.3 Numerical Modeling of Ground-Water Flow

A numerical model of ground-water flow at the site, developed during the design phase of the project, is described in the *Report of Waste Discharge* (*HLA, 1989a*). The model is based on the USGS ground-water flow computer code MODFLOW (*McDonald and Harbaugh, 1984*). The set of input parameters for results reported in the *Report of Waste Discharge* assumed a single value of -1 foot mean sea level (MSL) for the elevation of the bottom of the A-aquifer. Data collected during well installation activities indicate local variations in the elevation of the bottom of the A-aquifer from +2 to -7 feet MSL. To improve the model's representation of the ground-water flow system, and to improve the agreement between observed and simulated ground-water elevation, the bottom elevations input to the model were modified to more closely reflect field observations and to better simulate the effect of varying aquifer thickness on the flow regime. The revised model was used to calculate ground-water elevation contours for May 2 and June 5, 59 and 94 days, respectively, after system start-up. Injection and pumping rates used as input to the model were based on totalizer readings from individual injection and extraction wells, averaged over the time periods from April 4 to May 2, and May 2 to June 5.

## 5.0 RESULTS: MARCH THROUGH MAY 1989

### 5.1 Hydraulic Analysis

Average injection and extraction rates for May are included in Tables 2 and 3. From May 2 to June 5, the average total flow rate for all injection wells was 22.59 gallons per minute (gpm). The flow rate for injection wells located south of Tenth Street, IW-1 to IW-9, was 21.21 gpm. During the same period, the average total flow rate for extraction wells located south of Tenth Street, EW-1 through EW-20, was 21.14 gpm. The flow rate for Extraction Well EW-21 was 0.09 gpm during this period, reflecting only partial operation time because of low water levels. Extraction Well EW-22 was operational, but is not equipped with a separate totalizing flowmeter. All flow rates were calculated based on readings from the flowmeters on the wellheads.

Injection and extraction flow rate data indicate that injection rates exceeded extraction rates in March and April (Tables 2 and 3). The difference in rates is attributable largely to the necessary addition of water to storage in the formation so that the water table could be raised to operating levels. For wells located south of Tenth Street, flow rates for May indicate overall hydraulic control, in that total injection rates and total extraction rates are approximately equal.

Measurements of depth to water and calculated water-level elevations from January 3 to May 2, 1989 are presented in Table 4. Ground-water elevations for May 2 and June 5, 1989 are presented on Plates 3 and 4. May 2 and June 5 elevations describe conditions approximately 59 and 94 days after start-up, respectively.

Contours of ground-water elevations simulated using the numerical model are also presented on Plates 3 and 4. In some cases, locations of injection and extraction points used in the model differ slightly from actual well locations because of the nature of discretization of the modeled area. In general, simulated contours show good

agreement with elevations measured at monitoring wells. For May 2, differences between observed and simulated elevations are generally less than 1 foot for wells located outside of the treatment area with the exception of MW-3 which shows a difference of less than 2 feet. Observed ground-water elevations from the transect wells (MW-15, MW-16, MW-17) within the treatment area were generally 1 to 1-1/2 feet higher than simulated ground-water elevations. For June 5, observed and simulated ground-water elevations differ by less than 2 feet.

Water-level contours calculated using the site model can be used to assess the degree of hydraulic control of injected water. Simulated contours for April, May and June indicate overall hydraulic control of injected water. Most injected water is recovered by the extraction wells without traveling off site. At the western end of the site, a small portion of the injected water may travel off site as it moves toward the extraction wells. This appears to be the case along Ninth Street where simulations show that the capture zone of Well EW-16 extends off site.

On the northern side of the site, simulated contours indicate that a portion of injected water is drawn to the EBMUD dewatering wells. These wells have been operating continuously during soil treatment system operations with pumping levels set to maintain a water level in the EBMUD excavation at approximately -1 foot MSL, substantially lower than pumping levels in PRP extraction wells. These lower pumping levels induce movement of some injected water to the EBMUD wells. Because the discharge from these wells is collected and treated by the carbon adsorption system at the site, they are functioning as a part of the soil treatment system; the area of treatment effectively extends to the northern boundary of the site.

## 5.2 Distribution of Inorganic Constituents and Microbial Populations in Ground Water

Tables 5 and 6 present the inorganic chemical and microbiological results for the bioremediation treatment system from start-up through June 6, 1989. Nitrate concentrations in ground water at the site during the June 5-7 sampling round are presented on Plate 5. These results indicate that the injected nutrients are being disseminated throughout the subsurface within the treatment zone. The average nitrate concentration within the treatment zone (Wells MW-9, MW-11, MW-15, MW-16, and MW-17) has ranged from 2 to 6 times higher than the average outside the treatment zone (Wells MW-7, MW-12, and MW-18), suggesting hydraulic control of injected water. Nitrate concentrations at MW-13 and MW-14 (40.5 and 44.7 ppm, respectively) in samples collected June 5 are close to concentrations observed at MW-15, MW-16, and MW-17, and support the hydraulic results that indicate movement of some injection water to the EBMUD wells, within the context of overall hydraulic control of injected water.

Nitrate concentrations at Well MW-11, located at the west end of the treatment zone (Plate 6), show an increasing trend with time. Concentrations outside the treatment zone (MW-12 and MW-18) in this area are generally stable. This suggests that within the treatment zone, nitrate concentrations are increasing as a result of transport of the nutrient-enriched injection water and that outside the treatment zone, nitrate concentrations have remained at pre-injection levels.

The average phosphate concentration within the treatment zone has ranged from approximately 3 to 7 times higher than the average concentration outside the treatment zone (Plate 8). Phosphate has low mobility in ground-water systems, is depleted in the

subsurface at this site, and therefore may be adsorbed by soils or utilized by microorganisms in areas close to the injection wells.

Plate 9 shows phosphate concentrations for Wells MW-11, MW-12, and MW-18 at the west end of the treatment zone. The increasing trend in MW-11 shows phosphate transport from the injection wells (probably IW-1) to MW-11. The phosphate concentrations in MW-12 and MW-18 (outside the treatment zone) exhibit stable, low concentrations. As shown on Plate 10, MW-16 shows an increasing trend similar to that of MW-11, while MW-15 and MW-14 show little change with time.

Plate 11 is a time concentration plot of dissolved oxygen for Wells MW-11, MW-12, and MW-18. Well MW-11 shows a rapid increase from April 11 to May 2 and a decrease from May 2 to May 17. (MW-11 was not tested on May 23 and June 6.) Results at MW-11 suggest that the hydrogen peroxide added to the injection water is providing oxygen to the system.

MW-12 and MW-18 show little change in dissolved oxygen levels with time. The similarity of operational period concentrations to pre-start-up values at these locations suggests that injected water is not reaching these locations, and that hydraulic control is being maintained. Dissolved oxygen concentrations for MW-14, MW-15 and MW-16 (Plate 12) all show increases with time. The concentrations are highest at MW-16 and decrease with distance from the injection wells.

Ammonia has been detected at only three wells during the reporting period: EW-15, EW-16, and MW-9. The low concentrations at these wells and the absence of ammonia at other observation points indicate that ammonia is being retarded or utilized or both in areas close to the injection wells.

Plate 13 is a time concentration plot of the microbial counts of hydrocarbon utilizing bacteria (HCU) for monitoring wells within the treatment zone. The counts are

stable to slightly decreasing until April 17. After April 17, the HCU populations in each of the five wells show a trend of increase with time. The initial decreasing trend may be the result of hydrogen peroxide ($H_2O_2$) conditioning during the early portion of system operation; $H_2O_2$ added to the system may be toxic to some of the bacteria. Once system bacteria have acclimated to hydrogen peroxide and have the proper kinds and concentrations of nutrients (nitrogen, phosphorus, oxygen) then microbe populations increase, as indicated by the more recent data.

## 5.3 Distribution of Petroleum Hydrocarbons in Ground Water

Results of laboratory analysis of ground-water samples for organic parameters are presented in Table 7. Laboratory data sheets are presented in Appendix A. Reported values of TPH at Extraction Wells EW-1, EW-4, EW-8, and EW-12 increased between the May and June sampling rounds, while concentrations at EW-16 and EW-19 decreased slightly.

For monitoring wells, the highest TPH values are within the treatment area. In addition, reported TPH values from monitoring wells within the treatment area are generally higher for the June round when compared to May results. The maximum increase (for all monitoring wells), from 2.7 to 22 ppm, occurred at MW-15. The only decrease, from 4.6 to 1.6 ppm, occurred at MW-9. The transect wells (MW-15, MW-16, and MW-17) show increasing TPH values with distance away from the injection wells.

Reported TPH values for wells outside the treatment zone are similar for May and June results with slight increases at MW-7, MW-10, MW-12, MW-13, and MW-14, and no change at MW-18. Petroleum hydrocarbons as TPH were not detected in the sample from Monitoring Well MW-18. TPH values from the early June sampling round are presented on Plate 14.

Patterns of concentration variation for BTEX compounds are generally similar to TPH trends, although behavior of individual compounds at particular wells shows some differences. For wells inside the treatment zone, trends of data during the reporting period indicated substantially elevated levels of all BTEX compounds at most monitoring wells, suggesting transfer of these compounds from soil or from a separate phase, by dissolution and/or microbial activity.

For wells outside the treatment zone, BTEX concentrations have shown slight increases over time at most wells, with no change at MW-18, where BTEX compounds have not been detected.

## 6.0 ACTIVITIES PLANNED: JUNE 1989

On the basis of observed performance, selected injection wells will be redeveloped to improve injection rates and efficiency. Wells will be swabbed over the entire screen interval to remove silt from the filter pack adjacent to the slotted sections. The wells will be bailed to remove the silt and then pumped until the water is clear.

As described in a letter from HLA to the RWQCB dated June 22, 1989, installation and start-up of infiltration basins in the area east of Webster Street, in the vicinity of the previously existing gasoline station, is planned for the latter part of June and July (Plate 1). The basins are intended to extend biological treatment to soil zones that show elevated levels of hydrocarbons that are currently above the water table.

# 7.0 WORK PLAN FOR CHARACTERIZATION OF OFF-SITE EXTENT OF HYDROCARBONS IN SOIL AND GROUND WATER

## 7.1 Summary of Existing Information

### 7.1.1 Extent of Hydrocarbons in Soil

The lateral and vertical extent of petroleum hydrocarbons in soils as characterized with currently available data developed from field tests and laboratory analyses is presented on Plate 15. The information presented on this plate was developed from results presented in HLA (*1989a*) and HLA (*1989b*). Review of available data indicates three areas where elevated levels of hydrocarbons may extend beyond the boundaries of the site. At the corner of Tenth and Franklin streets, an area with elevated hydrocarbon levels was identified at a depth of 30 feet bgs during excavation activities at the adjacent EBMUD site. Elevated hydrocarbon levels were also measured in a sample from the 30-foot depth at Boring B-1. On the basis of field screening for volatile organic compounds using an OVA, this area does not extend as far as the locations of Boring B-2 to the south, or Monitoring Well MW-7 to the west. Because the ambient ground-water gradient is generally toward the west, it is estimated that the lateral extent of elevated hydrocarbon levels in soils does not extend to the west side of Franklin Street.

The potential lateral extent of gasoline in soils at the other two areas can be better understood with some background information on the BART tunnels along Ninth Street. Two tunnels were constructed as part of the BART system in the late 1960's below Ninth Street, immediately adjacent to the PRP site. The section of the upper tunnel adjacent to the PRP site is located from elevations of approximately 0 to 20 feet MSL (17 to 37 feet bgs). Water-level elevations in the shallow aquifer along Ninth Street prior to the start of dewatering activities at the EBMUD site are estimated to have

been approximately 15 feet MSL (23 feet bgs). Thus, the upper tunnel is partly submerged below the water table, but extends above it into the unsaturated zone. Elevated levels of hydrocarbons in soils were measured at depths of 20 to 30 feet bgs. Because gasoline is less dense than water, its downward movement as a separate phase will be limited by the water table. This is born out by a comparison of observed water levels and observed depths of elevated levels of hydrocarbons along Ninth Street. Therefore, because the upper BART tunnel intersects the water table, it is postulated that the upper tunnel has acted as a barrier to the off-site lateral migration of floating gasoline.

At the corner of Ninth and Webster streets, the off-site lateral extent of an area with elevated levels of hydrocarbons at a depth of 20 feet bgs has not been assessed. On the basis of available information regarding the time of construction of the gasoline station (sometime between 1963 and 1966) suspected as being the source of the hydrocarbons and the construction of the BART tunnels below Ninth Street (late 1960's), it is likely that the upper tunnel has acted as a barrier to the lateral migration of gasoline in this area.

At the corner of Ninth and Franklin streets, soil with elevated levels of petroleum hydrocarbons occurs at a depth of approximately 30 feet bgs. The lateral extent of this area is delimited to the north by the locations of Boring B-14 and Monitoring Well MW-12, but is not characterized to the west below Franklin Street or to the south below Ninth Street. On the basis of the relationship between construction dates of the gasoline station suspected as the source for gasoline hydrocarbons of the BART tunnels, it is considered unlikely that gasoline could have migrated as a separate phase from the former locations of the underground gasoline storage tanks to beyond the corner of Ninth and Franklin streets prior to construction of the BART tunnels. Given

this interpretation, gasoline would not be suspected to occur south of the BART tunnels in this area. Field screening and laboratory analysis of soil samples collected during the installation of Monitoring Well MW-18 did not indicate the presence of volatile organic compounds in this area, and support this interpretation.

### 7.1.2 Extent of Hydrocarbons in Ground Water

Results of laboratory analysis of ground-water samples collected from monitoring wells on and in the vicinity of the PRP site in February 1989 (prior to the start-up of the PRP soil treatment system) indicated the presence of petroleum hydrocarbons and BTEX compounds as a dissolved phase at Monitoring Wells MW-9, MW-10, and MW-11, and did not indicate the presence of these compounds at Wells MW-5, MW-7, MW-12, or MW-18. The lateral extent of hydrocarbons occurring as a dissolved phase in ground water is not well defined off site to the east of MW-10 or to the west of MW-11.

## 7.2 Work Plan

### 7.2.1 Soil Characterization

To characterize the lateral extent of hydrocarbons in soils at the two areas adjacent to the southern boundary of the site discussed in Section 7.1.1, two additional borings are proposed at locations presented on Plate 15. Characterization of lateral extent of hydrocarbons at the northwestern corner of the site is considered adequate, and no further borings are proposed in this area.

Six-inch-diameter borings will be drilled using a truck-mounted hollow-stem auger drill rig to the first predominant clay layer, if possible. Previous borings in this area indicate an areally continuous clay layer at 35 to 45 feet bgs.

An HLA field engineer or geologist will log each boring. Drive samples will be collected continuously in the interval of interest, from approximately 5 feet above to

5 feet below the zone of contamination as identified in previous borings. These samples will be screened for organic vapors using a portable organic vapor analyzer (OVA) and for discoloration and odor. If all samples from a given boring appear uncontaminated based on field screening, then one sample per boring from the vicinity of the ambient water table will be submitted to a state-certified laboratory for confirmatory analysis. If field screening of samples indicates potential contamination, then up to three samples per boring will be analyzed.

Provisions will be made for stockpiling drill cuttings and decontaminating drilling equipment. Cuttings and water generated during equipment decontamination will be handled and disposed properly, based on the results of laboratory analyses.

Soil samples will be submitted under chain of custody to a state-certified analytical laboratory, and will be analyzed for TPH as gasoline and diesel by EPA Test Method 8015, for purgeable halocarbons by EPA Test Method 8010, and purgeable aromatic compounds by EPA Test Method 8020. HLA estimates that up to six samples will be submitted for these analyses. Samples indicating the presence of hydrocarbons will also be tested for lead. For purposes of this work plan, HLA estimates that two soil samples will be analyzed for lead.

If results of field screening and laboratory analysis indicate the presence of elevated levels of petroleum hydrocarbons, additional borings may be required to characterize the lateral extent. Results of this proposed program and locations of any additional proposed borings will be reviewed with RWQCB staff prior to initiating any additional characterization activities.

### 7.2.2 Ground-Water Characterization

To define the lateral extent of dissolved hydrocarbons in the unconfined aquifer, one additional monitoring well is proposed, and the need for another monitoring well

will be evaluated in conjunction with soil boring activities. Monitoring Well MW-19 is proposed for installation at the northeast corner of Webster and Ninth streets, at the proposed location of the soil boring at that corner, to characterize the lateral extent east of MW-10. An additional monitoring well, which would be designated MW-20, may be installed west of Franklin Street and near the BART tunnel, if the results of field screening indicate the presence of petroleum hydrocarbons or associated compounds in the soil or ground water.

Results of soil sampling and ground-water monitoring activities proposed here will be presented to the RWQCB and discussed prior to initiating any further characterization activities. Remedial measures, if needed, will be evaluated after the off-site characterization activities are complete.

Table 1. Schedule for Sampling, Measurement, and Analysis
Soil Treatment System
Pacific Renaissance Plaza

| Sampling Station | Flow/Water Levels | Measurement/Analysis | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Nitrate | Ammonia | Phosphate | Microbial Enumeration | Dissolved Iron | Dissolved Oxygen | EPA 8015 (TPH) | EPA 8010 | EPA 8020 (BTEX) |
| Injection Wells | | | | | | | | | | |
| Composite | D | W | W | W | -- | -- | -- | -- | -- | -- |
| IW-1 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| IW-2 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| IW-3 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| IW-4 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| IW-5 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| IW-6 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| IW-7 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| IW-8 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| IW-9 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| IW-10 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| IW-11 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Extraction Wells | | | | | | | | | | |
| Composite | D | W | W | W | -- | -- | -- | M | M | M |
| EW-1 | D | W | W | W | W | -- | W | M | -- | M |
| EW-2 | D | -- | -- | -- | -- | -- | W | -- | -- | -- |
| EW-3 | D | -- | -- | -- | -- | -- | W | -- | -- | -- |
| EW-4 | D | W | W | W | W | -- | W | M | -- | M |
| EW-5 | D | -- | -- | -- | -- | -- | W | -- | -- | -- |

Table 1. Schedule for Sampling, Measurement, and Analysis
Soil Treatment System
Pacific Renaissance Plaza

| Sampling Station | Flow/Water Levels | Measurement/Analysis | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Nitrate | Ammonia | Phosphate | Microbial Enumeration | Dissolved Iron | Dissolved Oxygen | EPA 8015 (TPH) | EPA 8010 | EPA 8020 (BTEX) |
| EW-6 | D | -- | -- | -- | -- | -- | W | -- | -- | -- |
| EW-7 | D | -- | -- | -- | -- | -- | W | -- | -- | -- |
| EW-8 | D | W | W | W | W | -- | W | -- | -- | -- |
| EW-9 | D | -- | -- | -- | -- | -- | W | -- | -- | -- |
| EW-10 | D | -- | -- | -- | -- | -- | W | -- | -- | -- |
| EW-11 | D | -- | -- | -- | -- | -- | W | -- | -- | -- |
| EW-12 | D | W | W | W | W | -- | W | M | -- | M |
| EW-13 | D | -- | -- | -- | -- | -- | W | -- | -- | -- |
| EW-14 | D | W | W | W | W | -- | W | -- | -- | -- |
| EW-15 | D | W | W | W | W | -- | W | -- | -- | -- |
| EW-16 | D | W | W | W | W | B | B | M | -- | M |
| EW-17 | D | W | W | W | W | -- | W | -- | -- | -- |
| EW-18 | D | W | W | W | W | -- | W | -- | -- | -- |
| EW-19 | D | W | W | W | W | -- | W | -- | -- | -- |
| EW-20 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| EW-21 | D | M | M | M | -- | -- | -- | M | -- | M |
| EW-22 | D | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Monitoring Wells | | | | | | | | | | |
| MW-2 | W | -- | -- | -- | -- | -- | -- | -- | Q | Q |
| MW-3 | W | -- | -- | -- | -- | -- | -- | -- | Q | Q |

Table 1. Schedule for Sampling, Measurement, and Analysis
Soil Treatment System
Pacific Renaissance Plaza

| Sampling Station | Flow/Water Levels | Measurement/Analysis | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Nitrate | Ammonia | Phosphate | Microbial Enumeration | Dissolved Iron | Dissolved Oxygen | EPA 8015 (TPH) | EPA 8010 | EPA 8020 (BTEX) |
| MW-5 | W | M | M | M | -- | -- | -- | M | Q | M |
| MW-6 | W | -- | -- | -- | -- | -- | -- | -- | Q | Q |
| MW-7 | W | M | M | M | -- | -- | -- | M | Q | M |
| MW-8 | W | -- | -- | -- | -- | -- | -- | -- | Q | Q |
| MW-9 | W | W | W | W | W | -- | W | M | Q | M |
| MW-10 | W | W | W | W | -- | -- | W | M | Q | M |
| MW-11 | W | W | W | W | M | -- | W | M | Q | M |
| MW-12 | W | W | W | W | -- | -- | W | M | Q | M |
| MW-13 | W | W | W | W | -- | -- | B | M | Q | M |
| MW-14 | W | W | W | W | -- | -- | M | M | Q | M |
| MW-15 | D | W | W | W | W | W | W | M | -- | M |
| MW-16 | D | W | W | W | W | W | W | M | Q | M |
| MW-17 | D | W | W | W | W | W | W | M | -- | M |
| MW-18 | W | W | W | W | M | -- | W | M | Q | M |

Notes:
D = daily
W = weekly
B = biweekly
M = monthly
-- = no analysis or measurement

Table 2. Injection Well Flow Rates

March 4-18

| Meter No. | 18-Mar-89 Totalizer Reading | 04-Mar-89 Totalizer Reading | Elapsed Time (min) | 14-Day Avg. Flow Rate (gpm) |
|---|---|---|---|---|
| IW-1 | 53061 | 10 | 20370 | 2.60 |
| IW-2 | 67920 | 10 | 20370 | 3.33 |
| IW-3 | 48799 | 10 | 20370 | 2.40 |
| IW-4 | 55616 | 10 | 20370 | 2.73 |
| IW-5 | 26112 | 10 | 20370 | 1.28 |
| IW-6 | 39013 | 10 | 20370 | 1.91 |
| IW-7 | 104464 | 10 | 20370 | 5.13 |
| IW-8 | 29057 | 10 | 20370 | 1.43 |
| IW-9 | 45688 | 10 | 20370 | 2.24 |
| IW-10 | 24567 | 10 | 20370 | 1.21 |
| IW-11 | 16008 | 10 | 20370 | 0.79 |
| Total (1-9) | 469730 | 90 | 20370 | 23.06 |
| Total (10,11) | 40575 | 20 | 20370 | 1.99 |
| Total (1-11) | 510305 | 110 | 20370 | 25.05 |

March 18-April 4

| Meter No. | 04-Apr-89 Totalizer Reading | 18-Mar-89 Totalizer Reading | Elapsed Time (min) | 17-Day Avg. Flow Rate (gpm) |
|---|---|---|---|---|
| IW-1 | 149809 | 53061 | 24300 | 3.98 |
| IW-2 | 135156 | 67920 | 24300 | 2.77 |
| IW-3 | 112611 | 48799 | 24300 | 2.63 |
| IW-4 | 118017 | 55616 | 24300 | 2.57 |
| IW-5 | 43268 | 26112 | 24300 | 0.71 |
| IW-6 | 82650 | 39013 | 24300 | 1.80 |
| IW-7 | 203639 | 104464 | 24300 | 4.08 |
| IW-8 | 59773 | 29057 | 24300 | 1.26 |
| IW-9 | 98729 | 45688 | 24300 | 2.18 |
| IW-10 | 42237 | 24567 | 24300 | 0.73 |
| IW-11 | 44523 | 16008 | 24300 | 1.17 |
| Total (1-9) | 1003652 | 469730 | 24300 | 21.97 |
| Total (10,11) | 86760 | 40575 | 24300 | 1.90 |
| Total (1-11) | 1090412 | 510305 | 24300 | 23.87 |

April 4-May 2

| Meter No. | 02-May-89 Totalizer Reading | 04-Apr-89 Totalizer Reading | Elapsed Time (min) | Average Flow Rate (gpm) |
|---|---|---|---|---|
| IW-1 | 292280 | 149809 | 40610 | 3.51 |
| IW-2 | 246385 | 135156 | 40610 | 2.74 |
| IW-3 | 208550 | 112611 | 40610 | 2.36 |
| IW-4 | 208866 | 118017 | 40610 | 2.24 |
| IW-5 | 65484 | 43268 | 40610 | 0.55 |
| IW-6 | 154781 | 82650 | 40610 | 1.78 |
| IW-7 | 336571 | 203639 | 40610 | 3.27 |
| IW-8 | 110940 | 59773 | 40610 | 1.26 |
| IW-9 | 179982 | 98729 | 40610 | 2.00 |
| IW-10 | 51826 | 42237 | 40610 | 0.24 |
| IW-11 | 74539 | 44523 | 40610 | 0.74 |
| Total (1-9) | 1803839 | 1003652 | 40610 | 19.70 |
| Total (10,11) | 126365 | 86760 | 40610 | 0.98 |
| Total (1-11) | 1930204 | 1090412 | 40610 | 20.68 |

May 2 - June 5

| Meter No. | 05-Jun-89 Totalizer Reading | 02-May-89 Totalizer Reading | Elapsed Time (min) | Average Flow Rate (gpm) |
|---|---|---|---|---|
| IW-1 | 466788 | 292280 | 48735 | 3.58 |
| IW-2 | 403085 | 246385 | 48735 | 3.22 |
| IW-3 | 345199 | 208550 | 48735 | 2.80 |
| IW-4 | 299193 | 208866 | 48735 | 1.85 |
| IW-5 | 89546 | 65484 | 48735 | 0.49 |
| IW-6 | 254974 | 154781 | 48735 | 2.06 |
| IW-7 | 508644 | 336571 | 48735 | 3.53 |
| IW-8 | 182214 | 110940 | 48735 | 1.46 |
| IW-9 | 287649 | 179982 | 48735 | 2.21 |
| IW-10 | 66921 | 51826 | 48735 | 0.31 |
| IW-11 | 126930 | 74539 | 48735 | 1.08 |
| Total (1-9) | 2837292 | 1803839 | 48735 | 21.21 |
| Total (10,11) | 193851 | 126365 | 48735 | 1.38 |
| Total (1-11) | 3031143 | 1930204 | 48735 | 22.59 |

Notes:

Totalizer readings in gallons.

Table 3. Extraction Well Flow Rates

| Meter No. | March 4-18: 18-Mar-89 Totalizer Reading | March 4-18: 04-Mar-89 Totalizer Reading | March 4-18: Elapsed Time (min) | March 4-18: 14-Day Avg. Flow Rate (gpm) | March 18-April 4: 04-Apr-89 Totalizer Reading | March 18-April 4: 18-Mar-89 Totalizer Reading | March 18-April 4: Elapsed Time (min) | March 18-April 4: 17-Day Avg. Flow Rate (gpm) |
|---|---|---|---|---|---|---|---|---|
| EW-1 | 6933 | 10 | 20360 | 0.34 | 21538 | 6933 | 24305 | 0.60 |
| EW-2 | 7238 | 10 | 20360 | 0.36 | 22947 | 7238 | 24305 | 0.65 |
| EW-3 | 10691 | 10 | 20360 | 0.52 | 32993 | 10691 | 24305 | 0.92 |
| EW-4 | 5133 | 10 | 20360 | 0.25 | 17386 | 5133 | 24305 | 0.50 |
| EW-5 | 17339 | 10 | 20360 | 0.85 | 48529 | 17339 | 24305 | 1.28 |
| EW-6 | 3570 | 10 | 20360 | 0.17 | 13236 | 3570 | 24305 | 0.40 |
| EW-7 | 4467 | 10 | 20360 | 0.22 | 15623 | 4467 | 24305 | 0.46 |
| EW-8 | 3787 | 10 | 20360 | 0.19 | 13012 | 3787 | 24305 | 0.38 |
| EW-9 | 11942 | 10 | 20360 | 0.59 | 32634 | 11942 | 24305 | 0.85 |
| EW-10 | 10408 | 10 | 20360 | 0.51 | 28287 | 10408 | 24305 | 0.74 |
| EW-11 | 8967 | 10 | 20360 | 0.44 | 24207 | 8967 | 24305 | 0.63 |
| EW-12 | 9853 | 10 | 20360 | 0.48 | 25533 | 9853 | 24305 | 0.65 |
| EW-13 | 10813 | 10 | 20360 | 0.53 | 28393 | 10813 | 24305 | 0.72 |
| EW-14 | 8407 | 10 | 20360 | 0.41 | 21611 | 8407 | 24305 | 0.54 |
| EW-15 | 7845 | 10 | 20360 | 0.38 | 26021 | 7845 | 24305 | 0.75 |
| EW-16 | 44527 | 10 | 20360 | 2.19 | 133422 | 44527 | 24305 | 3.66 |
| EW-17 | 25198 | 10 | 20360 | 1.24 | 64775 | 25198 | 24305 | 1.63 |
| EW-18 | 29571 | 10 | 20360 | 1.45 | 78656 | 29571 | 24305 | 2.02 |
| EW-19 | 10434 | 10 | 20360 | 0.51 | 42468 | 10434 | 24305 | 1.32 |
| EW-20 | 2166 | 10 | 20360 | 0.11 | 14044 | 2166 | 24305 | 0.49 |
| EW-21 | | | 20360 | 0.00 | | | 24305 | 0.00 |
| EW-22 * | | | 20360 | 0.00 | | | 24305 | 0.00 |
| Total (1-20) | 239289 | 200 | 20360 | 11.74 | 705315 | 239289 | 24305 | 19.17 |
| Total (21-22)* | 0 | 0 | 20360 | 0.00 | 0 | 0 | 24305 | 0.00 |
| Total (1-22) | 239289 | 200 | 20360 | 11.74 | 705315 | 239289 | 24305 | 19.17 |

Notes:

* Well EW-22 is not equipped with a totalizing flow meter.

Totalizer readings in gallons.

Table 3. Extraction Well Flow Rates

| | April 4-May 2 | | | | May 2-June 5 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Meter No. | 02-May-89 Totalizer Reading | 04-Apr-89 Totalizer Reading | Elapsed Time (min) | Average Flow Rate (gpm) | Meter No. | 05-Jun-89 Totalizer Reading | 02-May-89 Totalizer Reading | Elapsed Time (min) | Average Flow Rate (gpm) |
| EW-1 | 42766 | 21538 | 40605 | 0.52 | EW-1 | 77049 | 42766 | 48740 | 0.70 |
| EW-2 | 46357 | 22947 | 40605 | 0.58 | EW-2 | 84876 | 46357 | 48740 | 0.79 |
| EW-3 | 62163 | 32993 | 40605 | 0.72 | EW-3 | 109131 | 62163 | 48740 | 0.96 |
| EW-4 | 40643 | 17386 | 40605 | 0.57 | EW-4 | 85262 | 40643 | 48740 | 0.92 |
| EW-5 | 84915 | 48529 | 40605 | 0.90 | EW-5 | 140324 | 84915 | 48740 | 1.14 |
| EW-6 | 33083 | 13236 | 40605 | 0.49 | EW-6 | 61277 | 33083 | 48740 | 0.58 |
| EW-7 | 31126 | 15623 | 40605 | 0.38 | EW-7 | 60719 | 31126 | 48740 | 0.61 |
| EW-8 | 33639 | 13012 | 40605 | 0.51 | EW-8 | 77697 | 33639 | 48740 | 0.90 |
| EW-9 | 65133 | 32634 | 40605 | 0.80 | EW-9 | 100790 | 65133 | 48740 | 0.73 |
| EW-10 | 55698 | 28287 | 40605 | 0.68 | EW-10 | 94758 | 55698 | 48740 | 0.80 |
| EW-11 | 46118 | 24207 | 40605 | 0.54 | EW-11 | 80219 | 46118 | 48740 | 0.70 |
| EW-12 | 45159 | 25533 | 40605 | 0.48 | EW-12 | 76046 | 45159 | 48740 | 0.63 |
| EW-13 | 53029 | 28393 | 40605 | 0.61 | EW-13 | 89490 | 53029 | 48740 | 0.75 |
| EW-14 | 38649 | 21611 | 40605 | 0.42 | EW-14 | 69940 | 38649 | 48740 | 0.64 |
| EW-15 | 42162 | 26021 | 40605 | 0.40 | EW-15 | 94578 | 42162 | 48740 | 1.08 |
| EW-16 ** | 45777 | 133422 | 40605 | 3.51 | EW-16 | 221331 | 45777 | 48740 | 3.15 |
| EW-17 | 138890 | 64775 | 40605 | 1.83 | EW-17 | 214111 | 138890 | 48740 | 1.54 |
| EW-18 | 169966 | 78656 | 40605 | 2.25 | EW-18 | 278484 | 169966 | 48740 | 2.23 |
| EW-19 | 86444 | 42468 | 40605 | 1.08 | EW-19 | 148117 | 86444 | 48740 | 1.27 |
| EW-20 | 29983 | 14044 | 40605 | 0.39 | EW-20 | 57636 | 29983 | 48740 | 0.57 |
| EW-21 | | | 40605 | 0.00 | EW-21 | 4598 | 10 | 48740 | 0.09 |
| EW-22 * | | | 40605 | 0.00 | EW-22 * | | | | 0.00 |
| Total (1-20) | 1191700 | 705315 | 40605 | 17.65 | Total (1-20) | 2221835 | 1191700 | 48740 | 21.14 |
| Total (21-22)* | 0 | 0 | 40605 | 0.00 | Total (21-22)* | 4598 | 10 | 48740 | 0.09 |
| Total (1-22) | 1191700 | 705315 | 40605 | 17.65 | Total (1-22) | 2226433 | 1191710 | 48740 | 21.23 |

Notes:

* Well EW-22 is not equipped with a totalizing flow meter.

** Meter was replaced on 4/19/89. Totalizer reading for 5/2/89 reflects old meter reading of 230,178 and starting new meter reading at 10 gallons. Actual volume extracted between 4/4/89 and 5/2/89 is 142,533 gallons.

Totalizer readings in gallons.

Harding Lawson Associates

Table 4. Water-Level Elevations

| Well No. | MW-2 | | MW-3 | | MW-5 | | MW-6 | | MW-7 | | MW-8 | | MW-9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING |
| | 40.05 | 39.55 | 39.02 | 38.35 | 38.45 | 37.86 | 39.95 | 39.59 | 39.35 | 39.10 | 40.63 | 40.47 | 38.65 | 38.50 |
| DATE | Depth to Water | Elevation | Depth to Water | Elevation | Depth to Water | Elevation | Depth to Water | Elevation | Depth to Water | Elevation | Depth to Water | Elevation | Depth to Water | Elevation |
| 03-Jan-89 | 33.10 | 6.45 | 32.35 | 6.00 | 33.00 | 4.86 | 30.22 | 9.37 | 31.15 | 7.95 | 32.78 | 7.69 | 30.58 | 7.92 |
| 05-Jan-89 | - | - | 32.35 | 6.00 | 33.00 | 4.86 | 30.22 | 9.37 | 31.15 | 7.95 | 32.78 | 7.69 | 30.58 | 7.92 |
| 02-Feb-89 | 33.05 | 6.50 | 33.01 | 5.34 | 31.82 | 6.04 | 30.23 | 9.36 | 30.51 | 8.59 | 32.62 | 7.85 | 31.67 | 6.83 |
| 08-Feb-89 | 33.83 | 5.72 | 32.21 | 6.14 | 32.02 | 5.84 | 31.05 | 8.54 | 31.44 | 7.66 | 33.03 | 7.44 | 30.65 | 7.85 |
| 15-Feb-89 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 18-Feb-89 | 30.59 | 8.96 | 29.26 | 9.09 | 31.90 | 5.96 | 30.05 | 9.54 | 30.21 | 8.89 | 31.96 | 8.51 | 30.16 | 8.34 |
| 25-Feb-89 | 29.85 | 9.70 | 28.68 | 9.67 | 30.32 | 7.54 | 30.57 | 9.02 | 31.10 | 8.00 | 31.90 | 8.57 | 30.80 | 7.70 |
| 02-Mar-89 | - | - | - | | - | - | - | - | - | - | - | - | 30.05 | 8.45 |
| 11-Mar-89 | - | - | - | | - | - | - | - | - | - | - | - | 23.06 | 15.44 |
| 18-Mar-89 | - | - | 32.20 | 6.15 | 32.01 | 5.85 | - | - | 31.52 | 7.58 | - | - | 22.45 | 16.05 |
| 25-Mar-89 | - | - | 27.76 | 10.59 | 27.53 | 10.33 | - | - | 30.08 | 9.02 | - | - | 22.62 | 15.88 |
| 30-Mar-89 | - | - | - | - | - | - | - | - | - | - | - | - | 23.00 | 15.50 |
| 04-Apr-89 | 28.52 | 11.03 | 27.56 | 10.79 | - | - | 28.00 | 11.59 | 29.00 | 10.10 | 30.45 | 10.02 | 22.61 | 15.89 |
| 08-Apr-89 | - | - | - | - | - | - | - | - | - | - | - | - | 23.12 | 15.38 |
| 11-Apr-89 | - | - | - | - | - | - | - | - | - | - | - | - | 23.37 | 15.13 |
| 12-Apr-89 | 28.59 | 10.96 | 27.63 | 10.72 | - | - | 27.17 | 12.42 | 28.96 | 10.14 | 30.45 | 10.02 | - | - |
| 18-Apr-89 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 19-Apr-89 | - | - | - | - | - | - | - | - | 28.13 | 10.97 | - | - | 23.36 | 15.14 |
| 25-Apr-89 | - | - | - | - | - | - | - | - | - | - | - | - | 22.80 | 15.70 |
| 02-May-89 | 28.71 | 10.84 | 26.84 | 11.51 | - | - | 27.49 | 12.10 | 28.54 | 10.56 | 29.80 | 10.67 | 22.73 | 15.77 |
| 09-May-89 | 27.99 | 11.56 | 26.58 | 11.77 | 26.11 | 11.75 | 27.34 | 12.25 | 28.34 | 10.76 | 29.68 | 10.79 | 23.04 | 15.46 |
| 17-May-89 | 27.80 | 11.75 | 26.62 | 11.73 | - | - | 27.11 | 12.48 | 28.16 | 10.94 | 29.27 | 11.20 | 23.33 | 15.17 |
| 22-May-89 | 27.52 | 12.03 | 28.17 | 10.18 | 25.98 | 11.88 | 26.89 | 12.70 | 27.69 | 11.41 | 28.68 | 11.79 | 23.94 | 14.56 |
| 31-May-89 | 27.99 | 11.56 | 26.28 | 12.07 | - | - | 27.11 | 12.48 | 28.28 | 10.82 | 29.31 | 11.16 | 24.17 | 14.33 |
| 05-Jun-89 | 27.60 | 11.95 | 25.83 | 12.52 | 24.96 | 12.90 | 27.00 | 12.59 | 28.18 | 10.92 | 29.41 | 11.06 | 19.72 | 18.78 |

Notes:

Elevations are in feet above Mean Sea Level (MSL).
Depth to water measured from top of casing.

**Harding Lawson Associates**

Table 4. Water-Level Elevations

| Well No. | MW-10 | | MW-11 | | MW-12 | | MW-13 | | MW-14 | | MW-15 | | MW-16 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING |
| | 36.74 | 36.35 | 37.98 | 37.55 | 37.70 | 37.00 | 39.79 | 40.77 | 39.27 | 40.26 | 39.69 | 40.73 | 39.55 | 40.53 |
| DATE | Depth to Water | Elevation | Depth to Water | Elevation | Depth to Water | Elevation | Depth to Water | Elevation | Depth to Water | Elevation | Depth to Water | Elevation | Depth to Water | Elevation |
| 03-Jan-89 | 27.34 | 9.01 | 30.30 | 7.25 | - | - | - | - | - | - | - | - | - | - |
| 05-Jan-89 | 27.34 | 9.01 | 30.30 | 7.25 | - | - | - | - | - | - | - | - | - | - |
| 02-Feb-89 | 28.11 | 8.24 | 30.03 | 7.52 | - | - | - | - | - | - | - | - | - | - |
| 08-Feb-89 | 27.65 | 8.70 | 29.52 | 8.03 | - | - | - | - | - | - | - | - | - | - |
| 15-Feb-89 | - | - | - | - | 28.89 | 8.11 | - | - | - | - | - | - | - | - |
| 18-Feb-89 | 27.65 | 8.70 | 28.02 | 9.53 | - | - | - | - | - | - | - | - | - | - |
| 25-Feb-89 | 27.12 | 9.23 | 29.05 | 8.50 | 30.87 | 6.13 | 32.63 | 8.14 | 31.07 | 9.19 | 32.83 | 7.90 | 32.43 | 8.10 |
| 02-Mar-89 | 27.23 | 9.12 | 28.98 | 8.57 | 28.46 | 8.54 | 32.79 | 7.98 | 32.28 | 7.98 | 32.40 | 8.33 | 32.50 | 8.03 |
| 11-Mar-89 | 23.59 | 12.76 | 28.93 | 8.62 | 28.22 | 8.78 | 30.12 | 10.65 | 28.64 | 11.62 | 27.10 | 13.63 | 25.64 | 14.89 |
| 18-Mar-89 | 23.17 | 13.18 | 27.79 | 9.76 | 27.85 | 9.15 | 30.29 | 10.48 | 28.20 | 12.06 | 26.62 | 14.11 | 24.74 | 15.79 |
| 25-Mar-89 | 23.19 | 13.16 | 28.10 | 9.45 | 27.47 | 9.53 | 29.76 | 11.01 | 27.79 | 12.47 | 26.28 | 14.45 | 24.88 | 15.65 |
| 30-Mar-89 | 23.56 | 12.79 | 28.48 | 9.07 | 27.43 | 9.57 | 30.12 | 10.65 | 27.99 | 12.27 | 26.50 | 14.23 | 25.48 | 15.05 |
| 04-Apr-89 | 23.34 | 13.01 | 28.61 | 8.94 | 28.44 | 8.56 | 29.60 | 11.17 | 27.84 | 12.42 | 26.84 | 13.89 | 25.53 | 15.00 |
| 08-Apr-89 | 23.50 | 12.85 | 29.31 | 8.24 | - | - | 30.49 | 10.28 | 27.81 | 12.45 | 26.81 | 13.92 | 25.74 | 14.79 |
| 11-Apr-89 | 23.64 | 12.71 | 29.45 | 8.10 | - | - | 30.62 | 10.15 | 28.04 | 12.22 | 27.21 | 13.52 | 26.24 | 14.29 |
| 12-Apr-89 | - | - | - | - | 28.64 | 8.36 | - | - | - | - | - | - | - | - |
| 18-Apr-89 | - | - | - | - | - | - | - | - | - | - | 27.08 | 13.65 | 26.02 | 14.51 |
| 19-Apr-89 | 23.41 | 12.94 | 26.77 | 10.78 | 26.98 | 10.02 | 30.19 | 10.58 | 27.13 | 13.13 | - | - | - | - |
| 25-Apr-89 | 23.39 | 12.96 | 29.18 | 8.37 | 27.47 | 9.53 | 30.40 | 10.37 | 27.75 | 12.51 | 27.01 | 13.72 | 25.97 | 14.56 |
| 02-May-89 | 23.54 | 12.81 | 28.44 | 9.11 | 27.36 | 9.64 | 29.42 | 11.35 | 27.50 | 12.76 | 25.91 | 14.82 | 24.42 | 16.11 |
| 09-May-89 | 23.86 | 12.49 | 27.09 | 10.46 | 26.85 | 10.15 | 29.86 | 10.91 | 27.38 | 12.88 | 26.63 | 14.10 | 25.37 | 15.16 |
| 17-May-89 | 23.63 | 12.72 | 28.88 | 8.67 | 27.63 | 9.37 | 29.10 | 11.67 | 27.73 | 12.53 | 27.25 | 13.48 | 26.23 | 14.30 |
| 22-May-89 | 23.54 | 12.81 | 28.56 | 8.99 | 27.62 | 9.38 | 30.24 | 10.53 | 27.95 | 12.31 | 27.25 | 13.48 | 26.34 | 14.19 |
| 31-May-89 | 24.54 | 11.81 | 29.18 | 8.37 | 28.16 | 8.84 | 30.34 | 10.43 | 27.99 | 12.27 | 27.42 | 13.31 | 26.31 | 14.22 |
| 05-Jun-89 | 23.22 | 13.13 | 28.92 | 8.63 | 28.08 | 8.92 | 29.88 | 10.89 | 26.18 | 14.08 | 25.83 | 14.90 | 24.67 | 15.86 |

Notes:

Elevations are in feet above Mean Sea Level (MSL).

Depth to water measured from top of casing.

Table 4. Water-Level Elevations

| Well No. | MW-17 | | MW-18 | |
|---|---|---|---|---|
| | GROUND SURFACE | TOP OF CASING | GROUND SURFACE | TOP OF CASING |
| | 39.16 | 40.16 | 36.56 | 35.88 |
| DATE | Depth to Water | Elevation | Depth to Water | Elevation |
| 03-Jan-89 | - | - | - | - |
| 05-Jan-89 | - | - | - | - |
| 02-Feb-89 | - | - | - | - |
| 08-Feb-89 | - | - | - | - |
| 15-Feb-89 | - | - | 26.89 | 8.99 |
| 18-Feb-89 | - | - | - | - |
| 25-Feb-89 | 32.02 | 8.14 | 26.90 | 8.98 |
| 02-Mar-89 | - | - | 26.66 | 9.22 |
| 11-Mar-89 | 23.45 | 16.71 | 26.28 | 9.60 |
| 18-Mar-89 | 23.35 | 16.81 | 26.18 | 9.70 |
| 25-Mar-89 | 23.35 | 16.81 | 25.70 | 10.18 |
| 30-Mar-89 | - | - | - | - |
| 04-Apr-89 | 24.18 | 15.98 | 26.10 | 9.78 |
| 08-Apr-89 | 24.28 | 15.88 | 25.82 | 10.06 |
| 11-Apr-89 | 24.83 | 15.33 | - | - |
| 12-Apr-89 | - | - | 26.16 | 9.72 |
| 18-Apr-89 | 24.64 | 15.52 | - | - |
| 19-Apr-89 | - | - | 25.89 | 9.99 |
| 25-Apr-89 | 24.57 | 15.59 | 27.91 | 7.97 |
| 02-May-89 | 22.71 | 17.45 | 25.76 | 10.12 |
| 09-May-89 | 23.89 | 16.27 | 25.38 | 10.50 |
| 17-May-89 | 24.85 | 15.31 | 25.59 | 10.29 |
| 22-May-89 | 25.28 | 14.88 | 25.27 | 10.61 |
| 31-May-89 | 24.91 | 15.25 | 26.04 | 9.84 |
| 05-Jun-89 | 22.62 | 17.54 | 25.98 | 9.90 |

Notes:

Elevations are in feet above Mean Sea Level (MSL).
Depth to water measured from top of casing.

Table 5. Results of Inorganic Chemical and Microbial Analyses of Ground-Water Samples from System Wells

| WELL | DATE | NITRATE | PHOSPHATE | DISSOLVED OXYGEN | DISSOLVED IRON | AMMONIA | MICROBIAL ENUMERATION TC | MICROBIAL ENUMERATION HCU |
|---|---|---|---|---|---|---|---|---|
| LOD | | 0.5(ppm) | 0.5(ppm) | 0.1(ppm) | 0.1(ppm) | 0.5(ppm) | NA (CFU/ml) | NA (CFU/ml) |
| EW-1 | | | | | | | | |
| | 15-Mar-89 | 17.6 | ND | NT | ND | ND | 7.8E+6 | 1.2E+2 |
| | 29-Mar-89 | 9.7 | 3.5 | NT | NT | ND | 1.8E+6 | 3.8E+2 |
| | 04-Apr-89 | 13.2 | 3.8 | NT | ND | ND | 3.3E+5 | 2.2E+2 |
| | 11-Apr-89 | 24.6 | 2.8 | NT | NT | ND | NT | NT |
| | 18-Apr-89 | 30.8 | 1.0 | 4.1 | ND | ND | 3.3E+5 | 7.8E+1 |
| | 25-Apr-89 | 33.4 | 3.0 | 4.8 | NT | ND | 6.8E+4 | 2.1E+1 |
| | 02-May-89 | 37.0 | 5.0 | 4.9 | NT | ND | 4.5E+5 | 9.5E+1 |
| | 09-May-89 | 22.9 | 2.5 | 9.8* | NT | ND | 5.2E+5 | 7.0E+2 |
| | 17-May-89 | 37.0 | 1.5 | 7.5 | NT | ND | 2.6E+5 | 1.4E+2 |
| | 23-May-89 | 15.8 | 5.3 | 11.1 | NT | ND | NT | NT |
| | 31-May-89 | 52.8 | 2.8 | 5.9 | NT | ND | 7.6E+5 | 4.9E+3 |
| | 05-Jun-89 | 25.9 | ND | 14.5 | NT | ND | -- | -- |
| EW-2 | | | | | | | | |
| | 23-May-89 | NT | NT | 15.8 | NT | NT | NT | NT |
| | 31-May-89 | NT | NT | 12.7 | NT | NT | NT | NT |
| | 05-Jun-89 | NT | NT | 16.3 | NT | NT | NT | NT |
| EW-3 | | | | | | | | |
| | 23-May-89 | NT | NT | 20.0 | NT | NT | NT | NT |
| | 31-May-89 | NT | NT | 18.3 | NT | NT | NT | NT |
| | 05-Jun-89 | NT | NT | >20.0 | NT | NT | NT | NT |
| EW-4 | | | | | | | | |
| | 15-Mar-89 | 16.7 | 0.6 | NT | ND | ND | 5.1E+6 | 9.5E+1 |
| | 29-Mar-89 | 25.5 | 2.8 | NT | NT | ND | 5.3E+5 | 1.7E+2 |
| | 04-Apr-89 | 31.7 | 4.0 | NT | ND | ND | 2.5E+5 | 6.8E+1 |
| | 11-Apr-89 | 34.1 | 3.3 | NT | NT | ND | 4.3E+4 | 4.5E+1 |
| | 18-Apr-89 | 43.6 | 5.3 | 7.9 | ND | ND | 4.3E+4 | 1.1E+2 |
| | 25-Apr-89 | 49.3 | 5.0 | 4.8 | NT | ND | 9.0E+4 | 1.7E+2 |
| | 02-May-89 | 48.4 | 9.0 | 4.9 | NT | ND | 2.5E+5 | 2.0E+3 |
| | 09-May-89 | 70.4 | 11.8 | 9.8* | NT | ND | NT | NT |
| | 17-May-89 | 50.6 | 16.0 | 7.5 | NT | ND | NT | NT |
| | 23-May-89 | 52.8 | 17.0 | NT | NT | ND | 5.8E+6 | 7.8E+1 |
| | 31-May-89 | 47.9 | 17.0 | 18.9 | NT | ND | NT | NT |
| | 05-Jun-89 | 49.1 | 16.6 | >20.0 | NT | ND | -- | -- |
| EW-5 | | | | | | | | |
| | 29-Mar-89 | 28.0 | 3.8 | NT | NT | ND | NT | NT |
| | 18-Apr-89 | NT | NT | 8.6 | NT | NT | NT | NT |
| | 25-Apr-89 | NT | NT | 12.8 | NT | NT | NT | NT |
| | 02-May-89 | NT | NT | NT | NT | NT | NT | NT |
| | 09-May-89 | NT | NT | 15.0* | NT | NT | NT | NT |

Table 5. Results of Inorganic Chemical and Microbial Analyses of Ground-Water Samples from System Wells

| WELL | DATE | NITRATE | PHOSPHATE | DISSOLVED OXYGEN | DISSOLVED IRON | AMMONIA | MICROBIAL ENUMERATION TC | MICROBIAL ENUMERATION HCU |
|---|---|---|---|---|---|---|---|---|
| LOD | | 0.5(ppm) | 0.5(ppm) | 0.1(ppm) | 0.1(ppm) | 0.5(ppm) | NA (CFU/ml) | NA (CFU/ml) |
| | 17-May-89 | NT | NT | -- | NT | NT | NT | NT |
| | 23-May-89 | NT | NT | >20.0 | NT | NT | NT | NT |
| | 31-May-89 | NT | NT | 17.8 | NT | NT | NT | NT |
| | 05-Jun-89 | NT | NT | >20.0 | NT | NT | NT | NT |
| EW-6 | | | | | | | | |
| | 23-May-89 | NT | NT | 7.6 | NT | NT | NT | NT |
| | 31-May-89 | NT | NT | 17.5 | NT | NT | NT | NT |
| | 05-Jun-89 | NT | NT | 14.5 | NT | NT | NT | NT |
| EW-7 | | | | | | | | |
| | 23-May-89 | NT | NT | 1.8 | NT | NT | NT | NT |
| | 31-May-89 | NT | NT | 11.2 | NT | NT | NT | NT |
| | 05-Jun-89 | NT | NT | 5.3 | NT | NT | NT | NT |
| EW-8 | | | | | | | | |
| | 15-Mar-89 | 11.4 | 0.5 | NT | ND | ND | NT | NT |
| | 29-Mar-89 | 28.0 | 3.5 | NT | NT | ND | NT | NT |
| | 04-Apr-89 | 33.0 | 3.8 | NT | ND | ND | 3.1E+5 | 1.4E+2 |
| | 11-Apr-89 | 37.8 | 2.8 | NT | NT | ND | 2.0E+4 | 4.5E+1 |
| | 18-Apr-89 | 33.4 | 3.8 | 4.0 | NT | ND | 4.1E+5 | 1.4E+2 |
| | 25-Apr-89 | 47.5 | 8.0 | 10.9 | NT | ND | 3.4E+4 | 9.5E+1 |
| | 02-May-89 | 39.6 | 11.0 | 9.8 | NT | ND | 6.8E+4 | 5.6E+2 |
| | 09-May-89 | 39.6 | 15.5 | 12.1* | NT | ND | 6.5E+5 | 1.8E+2 |
| | 17-May-89 | 57.2 | 14.3 | 6.9 | NT | ND | NT | NT |
| | 23-May-89 | 47.5 | 13.3 | 14.9 | NT | ND | NT | NT |
| | 31-May-89 | 57.2 | 13.0 | NT | NT | ND | 2.5E+5 | 3.8E+2 |
| | 05-Jun-89 | 57.2 | 15.8 | 15.9 | NT | ND | -- | -- |
| EW-9 | | | | | | | | |
| | 23-May-89 | NT | NT | 11.9 | NT | NT | NT | NT |
| | 31-May-89 | NT | NT | 17.2 | NT | NT | NT | NT |
| | 05-Jun-89 | NT | NT | 12.7 | NT | NT | NT | NT |
| EW-10 | | | | | | | | |
| | 23-May-89 | NT | NT | 10.7 | NT | NT | NT | NT |
| | 31-May-89 | NT | NT | 11.1 | NT | NT | NT | NT |
| | 05-Jun-89 | NT | NT | 13.0 | NT | NT | NT | NT |
| EW-11 | | | | | | | | |
| | 23-May-89 | NT | NT | 11.9 | NT | NT | NT | NT |
| | 31-May-89 | NT | NT | 15.5 | NT | NT | NT | NT |
| | 05-Jun-89 | NT | NT | 16.5 | NT | NT | NT | NT |
| EW-12 | | | | | | | | |
| | 15-Mar-89 | 13.2 | 1.0 | NT | ND | ND | NT | NT |
| | 29-Mar-89 | 22.0 | 3.3 | NT | NT | ND | NT | NT |

Table 5. Results of Inorganic Chemical and Microbial Analyses of Ground-Water Samples from System Wells

| WELL | DATE | NITRATE | PHOSPHATE | DISSOLVED OXYGEN | DISSOLVED IRON | AMMONIA | MICROBIAL ENUMERATION TC | MICROBIAL ENUMERATION HCU |
|---|---|---|---|---|---|---|---|---|
| LOD | | 0.5(ppm) | 0.5(ppm) | 0.1(ppm) | 0.1(ppm) | 0.5(ppm) | NA (CFU/ml) | NA (CFU/ml) |
| | 04-Apr-89 | 22.9 | 3.8 | NT | ND | ND | NT | NT |
| | 11-Apr-89 | 20.2 | 3.8 | NT | NT | ND | NT | NT |
| | 18-Apr-89 | 28.6 | 1.3 | 5.6 | NT | ND | NT | NT |
| | 25-Apr-89 | 39.2 | 2.8 | 2.6 | NT | ND | NT | NT |
| | 02-May-89 | 33.4 | 3.0 | 4.9 | NT | ND | 1.0E+6 | 3.5E+2 |
| | 09-May-89 | 31.7 | 2.3 | 5.1* | NT | ND | 4.6E+5 | 2.4E+2 |
| | 17-May-89 | 52.0 | 1.0 | 3.5 | NT | ND | NT | NT |
| | 23-May-89 | 34.3 | 1.3 | 9.1 | NT | ND | NT | NT |
| | 31-May-89 | 30.3 | 2.5 | 11.3 | NT | ND | NT | NT |
| | 05-Jun-89 | 31.5 | ND | 13.6 | NT | ND | -- | -- |
| EW-13 | | | | | | | | |
| | 23-May-89 | NT | NT | 14.6 | NT | NT | NT | NT |
| | 31-May-89 | NT | NT | 16.4 | NT | NT | NT | NT |
| | 05-Jun-89 | NT | NT | 17.9 | NT | NT | NT | NT |
| EW-14 | | | | | | | | |
| | 18-Apr-89 | NT | NT | NT | NT | NT | 1.1E+7 | 1.4E+3 |
| | 25-Apr-89 | NT | NT | 4.9 | NT | NT | NT | NT |
| | 02-May-89 | NT | NT | NT | NT | NT | NT | NT |
| | 09-May-89 | NT | NT | 9.6* | NT | NT | NT | NT |
| | 17-May-89 | 48.4 | 5.0 | 7.0 | NT | ND | 2.5E+5 | 1.1E+3 |
| | 23-May-89 | 39.2 | 5.8 | 14.6 | NT | ND | 3.3E+5 | 7.9E+2 |
| | 31-May-89 | 44.0 | 6.8 | 14.1 | NT | ND | NT | NT |
| | 05-Jun-89 | 46.2 | 4.8 | 14.3 | NT | ND | -- | -- |
| EW-15 | | | | | | | | |
| | 18-Apr-89 | NT | NT | NT | NT | NT | 1.1E+6 | 1.4E+2 |
| | 25-Apr-89 | 45.8 | 23.0 | 1.1 | ND | NT | 1.6E+5 | 4.7E+2 |
| | 02-May-89 | NT | NT | NT | NT | NT | NT | NT |
| | 09-May-89 | 58.1 | 26.5 | >20.0* | NT | 1.2 | 1.8E+6 | 1.6E+4 |
| | 17-May-89 | 45.4 | 22.4 | 8.9 | NT | 1.8 | 3.9E+6 | 3.5E+3 |
| | 23-May-89 | 41.0 | 19.1 | >20.0 | NT | 2.7 | 1.3E+7 | 1.3E+4 |
| | 31-May-89 | 63.8 | 21.5 | >20.0 | NT | 3.5 | 6.6E+6 | 2.4E+5 |
| | 05-Jun-89 | 43.6 | 28.1 | >20.0 | NT | 3.7 | -- | -- |
| EW-16 | | | | | | | | |
| | 15-Mar-89 | 1.8 | 0.5 | NT | ND | ND | NT | NT |
| | 29-Mar-89 | 18.4 | 3.0 | NT | NT | ND | NT | NT |
| | 04-Apr-89 | 31.7 | 5.0 | NT | ND | ND | 5.7E+5 | 3.9E+2 |
| | 11-Apr-89 | 28.6 | 4.8 | NT | NT | ND | 1.2E+5 | 2.2E+2 |
| | 18-Apr-89 | 37.8 | 14.0 | 1.0 | ND | 1.2 | 3.2E+6 | 1.4E+3 |
| | 25-Apr-89 | 47.5 | 11.0 | NT | NT | ND | 8.4E+5 | 7.0E+2 |
| | 02-May-89 | 46.2 | 15.0 | 9.3 | NT | ND | 3.5E+5 | 1.4E+4 |

Table 5. Results of Inorganic Chemical and Microbial Analyses of Ground-Water Samples from System Wells

| WELL | DATE | NITRATE | PHOSPHATE | DISSOLVED OXYGEN | DISSOLVED IRON | AMMONIA | MICROBIAL ENUMERATION TC | MCU |
|---|---|---|---|---|---|---|---|---|
| LOD | | 0.5(ppm) | 0.5(ppm) | 0.1(ppm) | 0.1(ppm) | 0.5(ppm) | NA (CFU/ml) | NA (CFU/ml) |
| | 09-May-89 | 46.2 | 18.5 | 14.7* | NT | 0.6 | 2.2E+6 | 1.3E+3 |
| | 17-May-89 | 36.3 | 13.3 | 3.7 | NT | ND | 4.4E+5 | 2.2E+3 |
| | 23-May-89 | 29.7 | 11.8 | 10.1 | NT | ND | 8.6E+5 | 1.4E+3 |
| | 31-May-89 | 35.2 | 11.8 | 11.1 | NT | 0.7 | 5.9E+6 | 3.5E+3 |
| | 05-Jun-89 | 31.5 | 12.5 | 12.6 | NT | ND | -- | -- |
| EW-17 | | | | | | | | |
| | 18-Apr-89 | NT | NT | 16.8 | NT | NT | NT | NT |
| | 25-Apr-89 | 6.2 | 8.3 | NT | ND | ND | NT | NT |
| | 02-May-89 | NT | NT | NT | NT | NT | NT | NT |
| | 09-May-89 | 66.0 | 19.8 | 18.0* | NT | ND | 1.2E+6 | 1.6E+4 |
| | 17-May-89 | 46.2 | 15.8 | 7.8 | NT | ND | 8.5E+5 | 3.5E+3 |
| | 23-May-89 | 44.0 | 14.2 | 18.0 | NT | ND | 6.5E+5 | 9.5E+2 |
| | 31-May-89 | 46.2 | 14.0 | 19.6 | NT | ND | 6.5E+5 | 2.8E+3 |
| | 05-Jun-89 | 52.8 | 13.2 | 18.2 | NT | ND | -- | -- |
| EW-18 | | | | | | | | |
| | 18-Apr-89 | NT | NT | 10.5 | NT | NT | NT | NT |
| | 25-Apr-89 | 6.2 | NT | 9.2 | NT | NT | NT | NT |
| | 02-May-89 | NT | NT | NT | NT | NT | NT | NT |
| | 09-May-89 | NT | NT | 18.2* | NT | NT | NT | NT |
| | 17-May-89 | 38.4 | 13.3 | 8.0 | NT | ND | NT | NT |
| | 23-May-89 | 37.0 | 13.3 | 17.8 | NT | ND | 7.0E+5 | NT |
| | 31-May-89 | 46.2 | 13.0 | 17.8 | NT | ND | 5.4E+6 | 1.7E+3 |
| | 05-Jun-89 | NT | NT | 19.1 | NT | NT | -- | -- |
| EW-19 | | | | | | | | |
| | 15-Mar-89 | NT | NT | NT | NT | NT | NT | NT |
| | 29-Mar-89 | NT | NT | NT | NT | NT | NT | NT |
| | 04-Apr-89 | 18.5 | 4.0 | NT | ND | ND | NT | NT |
| | 11-Apr-89 | 33.4 | 4.0 | NT | NT | ND | NT | NT |
| | 18-Apr-89 | 41.8 | 7.0 | 9.0 | NT | ND | NT | NT |
| | 25-Apr-89 | NT | NT | 7.2 | NT | NT | NT | NT |
| | 02-May-89 | 50.6 | 2.5 | 7.2 | NT | ND | NT | NT |
| | 09-May-89 | NT | 6.8 | 13.5* | NT | NT | NT | NT |
| | 17-May-89 | 38.4 | 3.3 | 8.3 | NT | ND | 1.1E+6 | 1.6E+4 |
| | 23-May-89 | 37.0 | 2.5 | 16.5 | NT | ND | NT | NT |
| | 31-May-89 | NT | NT | >20.0 | NT | NT | NT | NT |
| | 05-Jun-89 | 46.2 | 3.5 | 18.5 | NT | ND | -- | -- |
| EW-21 | | | | | | | | |
| | 23-May-89 | NT | NT | NT | NT | NT | NT | NT |
| | 31-May-89 | 17.6 | 5.0 | NT | NT | ND | NT | NT |
| | 05-Jun-89 | 17.6 | 1.3 | NT | NT | ND | NT | NT |

Table 5. Results of Inorganic Chemical and Microbial Analyses of Ground-Water Samples from System Wells

| WELL | DATE | NITRATE | PHOSPHATE | DISSOLVED OXYGEN | DISSOLVED IRON | AMMONIA | MICROBIAL ENUMERATION TC | MICROBIAL ENUMERATION HCU |
|---|---|---|---|---|---|---|---|---|
| LOD | | 0.5(ppm) | 0.5(ppm) | 0.1(ppm) | 0.1(ppm) | 0.5(ppm) | NA (CFU/ml) | NA (CFU/ml) |
| Injection Composite | | | | | | | | |
| | 21-Mar-89 | 26 | 42 | NT | NT | 15 | NT | NT |
| | 18-Apr-89 | 37.8 | 110 | NT | NT | 37.4 | NT | NT |
| | 24-Apr-89 | 24.6 | 45.0 | NT | NT | 22.0 | NT | NT |
| | 01-May-89 | 23.2 | 40.0 | NT | NT | 8.3 | NT | NT |
| | 09-May-89 | 29.9 | 13.5 | NT | NT | 1.5 | NT | NT |
| | 17-May-89 | 24.6 | 37.5 | NT | NT | 6.1 | NT | NT |
| | 23-May-89 | 31.7 | 42.5 | NT | NT | 9.1 | NT | NT |
| | 31-May-89 | 45.1 | 50.0 | NT | NT | 14.5 | NT | NT |
| | 06-Jun-89 | 35.9 | 30.0 | NT | NT | 10.2 | NT | NT |
| Extraction Composite | | | | | | | | |
| | 21-Mar-89 | NT | NT | NT | NT | NT | NT | NT |
| | 18-Apr-89 | NT | NT | NT | NT | NT | NT | NT |
| | 24-Apr-89 | 55 | 6.8 | NT | NT | ND | NT | NT |
| | 01-May-89 | NT | NT | NT | NT | NT | NT | NT |
| | 09-May-89 | 44.0 | 15.6 | NT | NT | ND | NT | NT |
| | 17-May-89 | 44.0 | 13.0 | NT | NT | 0.5 | NT | NT |
| | 23-May-89 | 45.4 | 15.5 | NT | NT | ND | NT | NT |
| | 31-May-89 | 48.4 | 11.0 | NT | NT | ND | NT | NT |
| | 06-Jun-89 | 38.5 | 12.0 | NT | NT | ND | NT | NT |

NOTES:

HCU: Hydrocarbon Utilizers
TC: Total Count
LOD: Limit of Detection.
NA: Limit of Detection not applicable.
ND: Not detected at or above LOD.
NT: Not tested.
*: Dissolved oxygen samples collected on 5/12/89.
--: Results not available.

Inorganic constituents are reported in parts per million (ppm).
Microbial counts are reported in colony-forming units per milliliter of water (CFU/ml).
Analysis performed by HLA Laboratory.

Table 6. Results of Inorganic Chemical and Microbial Analyses of Ground-Water Monitoring Well Samples

| WELL | DATE | NITRATE | PHOSPHATE | DISSOLVED OXYGEN | DISSOLVED IRON (Fe) | AMMONIA | MICROBIAL ENUMERATION TC | MICROBIAL ENUMERATION HCU |
|---|---|---|---|---|---|---|---|---|
| LOD | | 0.5(ppm) | 0.5(ppm) | 0.5(mg/l) | 0.1(ppm) | 0.5(ppm) | NA (CFU/ml) | NA (CFU/ml) |
| MW-5 | | | | | | | | |
| | 06-Jun-89 | 10.1 | 2.5 | 1.7 | NT | ND | NT | NT |
| MW-7 | | | | | | | | |
| | 06-Jun-89 | ND | 4.8 | 1.8 | NT | ND | NT | NT |
| MW-8 | | | | | | | | |
| | 06-Jun-89 | NT | NT | 4.2 | NT | NT | NT | NT |
| MW-9 | | | | | | | | |
| | 03-Mar-89 | 37.0/32.0* | 1.5 | 1.0** | ND | ND | 5.3E+5 | 9.5E+2 |
| | 15-Mar-89 | 6.0 | 6.0 | NT | ND | ND | 5.9E+6 | 1.8E+2 |
| | 29-Mar-89 | 37.0 | 32.0 | NT | NT | ND | 1.8E+6 | 2.1E+2 |
| | 04-Apr-89 | 41.8 | 36.0 | NT | ND | ND | 3.6E+5 | 1.1E+2 |
| | 11-Apr-89 | 42.1 | 60.0 | NT | NT | ND | 3.6E+5 | 1.4E+2 |
| | 18-Apr-89 | 56.3 | 60.0 | 8.4 | ND | 0.9 | 1.2E+6 | 2.2E+2 |
| | 25-Apr-89 | 88.0 | 50.0 | >20.0 | NT | 2.9 | 9.9E+5 | 3.5E+3 |
| | 02-May-89 | 74.8 | 62.5 | 18.2 | NT | 4.8 | 3.5E+6 | 5.4E+3 |
| | 09-May-89 | 44.0 | 37.5 | 16.6 | NT | 6.2 | NT | NT |
| | 17-May-89 | 41.0 | 21.3 | 8.5 | NT | 5.6 | NT | NT |
| | 23-May-89 | 54.1 | 20.0 | NT | NT | 3.9 | NT | NT |
| | 31-May-89 | NT | NT | NT | NT | NT | NT | NT |
| | 06-Jun-89 | 46.2 | 34.0 | -- | NT | 10.8 | -- | -- |
| MW-10 | | | | | | | | |
| | 03-Mar-89 | 8.4/5.5* | 1.0 | 4.0** | ND | ND | 2.3E+5 | 3.5E+2 |
| | 15-Mar-89 | 5.5 | 1.2 | NT | ND | ND | NT | NT |
| | 29-Mar-89 | 11.4 | 4.5 | NT | NT | ND | NT | NT |
| | 04-Apr-89 | 15.0 | 1.3 | NT | ND | ND | NT | NT |
| | 11-Apr-89 | 16.5 | 2.3 | NT | NT | ND | NT | NT |
| | 18-Apr-89 | 16.0 | 5.3 | 5.0 | NT | ND | NT | NT |
| | 25-Apr-89 | 14.1 | 2.0 | 2.2 | NT | ND | NT | NT |
| | 02-May-89 | 19.4 | 6.5 | 2.6 | NT | ND | NT | NT |
| | 09-May-89 | 17.6 | 1.8 | 3.1 | NT | ND | NT | NT |
| | 17-May-89 | 21.1 | 1.5 | 1.9 | NT | ND | NT | NT |
| | 23-May-89 | 17.6 | 1.3 | NT | NT | ND | NT | NT |
| | 31-May-89 | NT | NT | NT | NT | NT | NT | NT |
| | 06-Jun-89 | 17.6 | 2.3 | 2.0 | NT | ND | -- | -- |
| MW-11 | | | | | | | | |
| | 03-Mar-89 | ND/ND* | 0.8 | 2.0** | ND | ND | 1.1E+6 | 2.8E+3 |
| | 15-Mar-89 | ND | 1.0 | NT | ND | ND | NT | NT |
| | 29-Mar-89 | 31.7 | 4.3 | NT | NT | ND | NT | NT |
| | 04-Apr-89 | 37.0 | 5.0 | NT | ND | ND | NT | NT |
| | 11-Apr-89 | 40.7 | 24.0 | NT | NT | ND | 3.8E+5 | 1.1E+2 |
| | 18-Apr-89 | 56.3 | 26.0 | 5.7 | ND | ND | 1.2E+6 | 1.7E+2 |
| | 25-Apr-89 | 44.0 | 29.7 | 11.8 | NT | ND | 4.7E+5 | 1.1E+3 |

Table 6. Results of Inorganic Chemical and Microbial Analyses of Ground-Water Monitoring Well Samples

| WELL | DATE | NITRATE | PHOSPHATE | DISSOLVED OXYGEN | DISSOLVED IRON (Fe) | AMMONIA | MICROBIAL ENUMERATION TC | HCU |
|---|---|---|---|---|---|---|---|---|
| LOD | | 0.5(ppm) | 0.5(ppm) | 0.5(mg/l) | 0.1(ppm) | 0.5(ppm) | NA (CFU/ml) | NA (CFU/ml) |
| | 02-May-89 | 74.8 | 41.3 | 17.1 | NT | ND | 2.4E+6 | 5.4E+3 |
| | 09-May-89 | 57.2 | 29.7 | 12.5 | NT | ND | 1.4E+6 | 5.4E+3 |
| | 17-May-89 | 46.2 | 21.5 | 9.9 | NT | ND | 3.5E+6 | 1.6E+4 |
| | 23-May-89 | 52.8 | 15.8 | NT | NT | ND | 2.0E+6 | 3.3E+3 |
| | 31-May-89 | 58.3 | 29.7 | >20.0 | NT | ND | 7.0E+5 | 2.4E+5 |
| | 07-Jun-89 | 66.0 | 33.0 | NT | NT | ND | -- | -- |
| MW-12 | | | | | | | | |
| | 03-Mar-89 | 11.4/6.2* | 1.0 | 5.8** | ND | ND | 7.1E+5 | 1.1E+1 |
| | 15-Mar-89 | 12.3 | 1.1 | NT | ND | ND | NT | NT |
| | 29-Mar-89 | 13.6 | 4.8 | NT | NT | ND | NT | NT |
| | 04-Apr-89 | 11.4 | 1.5 | NT | ND | ND | NT | NT |
| | 11-Apr-89 | 7.5 | 5.0 | NT | NT | ND | NT | NT |
| | 18-Apr-89 | 9.2 | 6.8 | 2.1 | ND | ND | NT | NT |
| | 25-Apr-89 | 3.5 | 1.8 | 1.4 | NT | ND | NT | NT |
| | 02-May-89 | 12.3 | 5.0 | 2.3 | NT | ND | NT | NT |
| | 09-May-89 | 9.7 | 2.5 | 2.2 | NT | ND | NT | NT |
| | 17-May-89 | 9.6 | 2.5 | 3.5 | NT | ND | NT | NT |
| | 23-May-89 | 8.3 | 1.3 | 1.8 | NT | ND | NT | NT |
| | 31-May-89 | 10.3 | 2.5 | 2.1 | NT | ND | NT | NT |
| | 07-Jun-89 | 9.2 | 2.8 | NT | NT | ND | -- | -- |
| MW-13 | | | | | | | | |
| | 03-Mar-89 | 11.4/8.6* | 1.0 | 2.0** | 0.25 | ND | 4.1E+6 | 1.7E+2 |
| | 15-Mar-89 | 9.2 | 1.1 | NT | ND | ND | NT | NT |
| | 29-Mar-89 | 8.8 | 6.3 | NT | NT | ND | NT | NT |
| | 04-Apr-89 | 9.7 | 3.5 | NT | ND | ND | NT | NT |
| | 11-Apr-89 | 13.2 | 2.8 | NT | NT | ND | NT | NT |
| | 18-Apr-89 | 15.0 | 8.5 | 6.0 | NT | ND | NT | NT |
| | 25-Apr-89 | 20.2 | 2.5 | NT | NT | ND | NT | NT |
| | 02-May-89 | 37.8 | 2.3 | 6.8 | NT | ND | NT | NT |
| | 09-May-89 | 42.1 | 1.5 | 9.9 | NT | ND | NT | NT |
| | 17-May-89 | 37.0 | 1.5 | 10.3 | NT | ND | NT | NT |
| | 23-May-89 | 33.4 | 1.3 | NT | NT | ND | NT | NT |
| | 31-May-89 | -- | -- | NT | NT | NT | NT | NT |
| | 07-Jun-89 | 40.5 | 3.0 | NT | NT | ND | -- | -- |
| MW-14 | | | | | | | | |
| | 03-Mar-89 | 37.0/22.0* | 0.8 | 3.0** | ND | ND | 3.6E+5 | 2.2E+2 |
| | 15-Mar-89 | 37.0 | 1.0 | NT | ND | ND | NT | NT |
| | 29-Mar-89 | 22.8 | 3.8 | NT | NT | ND | NT | NT |
| | 04-Apr-89 | 29.9 | 3.8 | NT | ND | ND | NT | NT |
| | 11-Apr-89 | 37.4 | 2.8 | NT | NT | ND | NT | NT |
| | 18-Apr-89 | 43.6 | 5.8 | NT | NT | ND | NT | NT |
| | 25-Apr-89 | 35.2 | 1.3 | NT | NT | ND | NT | NT |

Table 6. Results of Inorganic Chemical and Microbial Analyses of Ground-Water Monitoring Well Samples

| WELL | DATE | NITRATE | PHOSPHATE | DISSOLVED OXYGEN | DISSOLVED IRON (Fe) | AMMONIA | MICROBIAL ENUMERATION TC | HCU |
|---|---|---|---|---|---|---|---|---|
| LOD | | 0.5(ppm) | 0.5(ppm) | 0.5(mg/l) | 0.1(ppm) | 0.5(ppm) | NA (CFU/ml) | NA (CFU/ml) |
| | 02-May-89 | 40.5 | 5.3 | 6.7 | NT | ND | NT | NT |
| | 09-May-89 | 45.8 | 1.8 | 11.7 | NT | ND | NT | NT |
| | 17-May-89 | 51.0 | 1.5 | 9.2 | NT | ND | NT | NT |
| | 23-May-89 | 52.4 | 1.5 | NT | NT | ND | NT | NT |
| | 31-May-89 | 70.4 | 2.5 | 16.2 | NT | ND | 4.2E+5 | 2.4E+5 |
| | 07-Jun-89 | 44.7 | 2.0 | NT | NT | ND | -- | -- |
| MW-15 | | | | | | | | |
| | 03-Mar-89 | 42.2/19.0* | 0.9 | 4.0** | ND | ND | 4.5E+5 | 2.8E+2 |
| | 10-Mar-89 | 40.5 | 2.2 | NT | NT | NT | 1.0E+6 | 2.8E+2 |
| | 15-Mar-89 | 35.2 | 1.2 | NT | ND | ND | 6.9E+6 | 2.8E+2 |
| | 29-Mar-89 | 20.2 | 4.2 | NT | NT | ND | 9.1E+5 | 2.1E+2 |
| | 04-Apr-89 | 24.6 | 5.3 | NT | ND | ND | 4.4E+5 | 1.4E+2 |
| | 11-Apr-89 | 23.1 | 4.0 | NT | NT | ND | 2.7E+6 | 1.7E+2 |
| | 18-Apr-89 | 31.9 | 1.3 | 6.3 | ND | ND | 3.1E+6 | 2.9E+1 |
| | 25-Apr-89 | 42.2 | 1.8 | 9.6 | ND | ND | 2.2E+5 | 4.6E+1 |
| | 02-May-89 | 50.6 | 3.5 | 11.4 | NT | ND | 8.5E+5 | 1.2E+2 |
| | 09-May-89 | 33.0 | 1.8 | 9.6 | NT | ND | 2.4E+6 | 2.4E+3 |
| | 17-May-89 | 48.4 | 2.3 | 12.1 | NT | ND | 4.6E+5 | 2.8E+3 |
| | 23-May-89 | 48.4 | 1.8 | 11.3 | NT | ND | 1.0E+6 | 3.3E+2 |
| | 31-May-89 | NT | NT | NT | NT | NT | NT | NT |
| | 07-Jun-89 | 53.9 | 2.5 | NT | NT | ND | -- | -- |
| MW-16 | | | | | | | | |
| | 03-Mar-89 | 49.3/17.0* | 1.2 | 2.0** | ND | ND | 8.4E+5 | 1.4E+2 |
| | 10-Mar-89 | 14.5 | 2.2 | NT | ND | ND | 1.4E+5 | 1.2E+3 |
| | 15-Mar-89 | 11.4 | 3.0 | NT | ND | ND | 6.0E+6 | 1.1E+3 |
| | 29-Mar-89 | 33.4 | 7.2 | NT | NT | ND | 1.6E+6 | 3.5E+3 |
| | 04-Apr-89 | 39.6 | 11.5 | NT | 0.2 | NT | 2.2E+6 | 1.2E+3 |
| | 11-Apr-89 | 37.8 | 16.0 | NT | NT | ND | 6.7E+5 | 1.4E+3 |
| | 18-Apr-89 | 52.8 | 20.0 | 14.0 | ND | ND | 1.3E+6 | 2.3E+2 |
| | 25-Apr-89 | 49.3 | 22.0 | >20.0 | ND | ND | 5.1E+5 | 2.2E+2 |
| | 02-May-89 | 57.2 | 31.3 | 14.6 | NT | ND | 2.2E+6 | 1.7E+3 |
| | 09-May-89 | 59.4 | 23.6 | 15.3 | NT | ND | 4.0E+6 | 9.5E+2 |
| | 17-May-89 | 41.8 | 16.5 | 9.5 | NT | ND | 6.8E+5 | 1.4E+3 |
| | 23-May-89 | 46.2 | 23.9 | 17.3 | NT | ND | 1.0E+6 | 2.2E+3 |
| | 31-May-89 | 61.6 | 15.7 | 16.2 | NT | ND | 4.4E+5 | 4.9E+3 |
| | 07-Jun-89 | 43.6 | 18.2 | NT | NT | ND | -- | -- |
| MW-17 | | | | | | | | |
| | 03-Mar-89 | NT | NT | NT | NT | NT | NT | NT |
| | 10-Mar-89 | 12.3 | 0.8 | NT | ND | ND | 1.6E+5 | 1.1E+3 |
| | 15-Mar-89 | 7.5 | 3.1 | NT | ND | ND | 1.1E+7 | 3.5E+3 |
| | 29-Mar-89 | 25.5 | 3.8 | NT | NT | ND | 2.6E+6 | 1.1E+3 |
| | 04-Apr-89 | 35.2 | 3.5 | NT | ND | ND | 3.3E+6 | 6.8E+2 |

Table 6. Results of Inorganic Chemical and Microbial Analyses of Ground-Water Monitoring Well Samples

| WELL | DATE | NITRATE | PHOSPHATE | DISSOLVED OXYGEN | DISSOLVED IRON (Fe) | AMMONIA | MICROBIAL ENUMERATION TC | MICROBIAL ENUMERATION HCU |
|---|---|---|---|---|---|---|---|---|
| LOD | | 0.5(ppm) | 0.5(ppm) | 0.5(mg/l) | 0.1(ppm) | 0.5(ppm) | NA (CFU/ml) | NA (CFU/ml) |
| | 11-Apr-89 | 49.4 | 8.0 | NT | NT | ND | 1.5E+6 | 3.9E+2 |
| | 18-Apr-89 | 52.8 | 16.0 | 11.8 | ND | ND | 1.2E+6 | 1.4E+2 |
| | 25-Apr-89 | 51.0 | 11.6 | 13.5 | ND | ND | 6.0E+5 | 1.7E+2 |
| | 02-May-89 | 52.8 | 17.0 | 13.3 | NT | ND | 5.1E+6 | 3.5E+2 |
| | 09-May-89 | 44.9 | 5.0 | 6.6 | NT | ND | 6.5E+6 | 9.5E+2 |
| | 17-May-89 | 47.7 | 17.6 | 8.4 | NT | ND | 3.0E+6 | 5.4E+3 |
| | 23-May-89 | 57.2 | 14.5 | 17.0 | NT | ND | 1.1E+6 | 3.9E+2 |
| | 31-May-89 | NT | NT | NT | NT | NT | NT | NT |
| | 07-Jun-89 | 46.2 | 16.0 | NT | NT | ND | -- | -- |
| MW-18 | | | | | | | | |
| | 03-Mar-89 | 15.4/9.3* | 0.5 | 2.9** | ND | ND | 1.3E+6 | 7.9E+1 |
| | 15-Mar-89 | 4.0 | 1.1 | NT | ND | ND | NT | NT |
| | 29-Mar-89 | 8.8 | 3.0 | NT | NT | ND | NT | NT |
| | 04-Apr-89 | 6.6 | 2.8 | NT | ND | ND | NT | NT |
| | 11-Apr-89 | 6.6 | 3.8 | NT | NT | ND | NT | NT |
| | 18-Apr-89 | 6.6 | 5.8 | 5.0 | NT | ND | NT | NT |
| | 25-Apr-89 | 2.2 | 1.3 | 3.0 | NT | ND | NT | NT |
| | 02-May-89 | 8.8 | 4.5 | 3.4 | NT | ND | NT | NT |
| | 09-May-89 | 11.6 | 1.8 | 4.1 | NT | ND | NT | NT |
| | 17-May-89 | 5.8 | 1.8 | 3.3 | NT | ND | NT | NT |
| | 23-May-89 | 14.5 | 1.5 | 3.9 | NT | ND | NT | NT |
| | 31-May-89 | NT | NT | NT | NT | NT | NT | NT |
| | 07-Jun-89 | 17.1 | 1.3 | NT | NT | ND | -- | -- |

NOTES:

HCU: Hydrocarbon Utilizers
TC: Total Count
LOD: Limit of Detection.
NA: Limit of Detection not applicable.
ND: Not detected at or above LOD.
NT: Not tested.
* : First value from HLA laboratory
Second value from Pace Laboratories, Inc.
**: Results from Pace Laboratories, Inc.
--: Results not available.

Inorganic constituents reported in parts per million (ppm).
Microbial counts reported in colony-forming units per milliliter of water (CFU/ml).
Analyses performed by HLA laboratory unless otherwise indicated.

Table 7. Results of Organic Chemical Analyses of Monitoring and System Well Samples

Purgeable Aromatics (EPA Method 8020)
Petroleum Hydrocarbons (EPA Method 8015)

| WELL | DATE | BENZENE | TOLUENE | ETHYL-BENZENE | XYLENES, TOTAL | TPH AS GASOLINE |
|---|---|---|---|---|---|---|
| LOD | (mg/l) | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.25/0.05** |
| MW-5 | | | | | | |
| | 03-May-89 | ND | ND | ND | 0.029 | ND |
| | 06-Jun-89 | ND | ND | ND | ND | ND |
| MW-7 | | | | | | |
| | 04-Apr-89 | ND | 0.0007 | 0.0010 | 0.0012 | ND |
| | 03-May-89 | ND | 0.0012 | 0.0018 | 0.0048 | 0.27 |
| | 06-Jun-89 | 0.001 | 0.001 | 0.0022 | 0.0011 | 0.4 |
| MW-9 | | | | | | |
| | 02-Mar-89 | NT | NT | NT | NT | 1.2 |
| | 04-Apr-89 | 0.19 | 0.35 | 0.041 | 0.36 | 1.5 |
| | 01-May-89 | 0.43 | 0.60 | 0.033 | 0.64 | 4.6 |
| | 06-Jun-89 | 0.36 | 0.106 | 0.110 | 0.10 | 1.6 |
| MW-10 | | | | | | |
| | 02-Mar-89 | NT | NT | NT | NT | 2.8 |
| | 04-Apr-89 | 1.6 | 0.76 | 0.13 | 0.68 | 4.2 |
| | 01-May-89 | 1.2 | 0.67 | 0.16 | 0.67 | 3.4 |
| | 06-Jun-89 * | 0.66/0.64 | 0.14/0.14 | 0.11/0.10 | 0.24/0.14 | 4.8/4.3 |
| MW-11 | | | | | | |
| | 02-Mar-89 | NT | NT | NT | NT | 15 |
| | 04-Apr-89 | 2.5 | 3.8 | 0.17 | 2.4 | 10 |
| | 19-Apr-89 | 3.8 | 2.8 | ND | 5.7 | 14 |
| | 01-May-89 | 1.3 | 1.7 | 0.069 | 1.7 | 5.2 |
| | 07-Jun-89 | 0.082 | 0.097 | 0.045 | 0.167 | 12 |
| MW-12 | | | | | | |
| | 15-Feb-89 | ND | ND | ND | ND | ND |
| | 03-Mar-89 | NT | NT | NT | NT | ND |
| | 05-Apr-89 | 0.0014 | 0.0023 | ND | 0.0054 | ND |
| | 02-May-89 | 0.026 | 0.0033 | ND | 0.0063 | 0.10 |
| | 07-Jun-89 | 0.034 | 0.0037 | ND | 0.012 | 0.18 |
| MW-13 | | | | | | |
| | 02-Mar-89 | NT | NT | NT | NT | 1.4 |
| | 04-Apr-89 | 0.041 | 0.039 | 0.0038 | 0.28 | 0.71 |
| | 01-May-89 | 0.048 | 0.049 | 0.013 | 0.13 | 0.34 |
| | 07-Jun-89 | 0.051 | 0.037 | 0.02 | 0.082 | 0.98 |
| MW-14 | | | | | | |
| | 02-Mar-89 | NT | NT | NT | NT | ND |
| | 04-Apr-89 | 0.44 | 0.063 | ND | 0.27 | 1.4 |
| | 01-May-89 | 0.35 | 0.011 | ND | 0.094 | 0.94 |
| | 07-Jun-89 * | 0.057/ND | 0.0022/ND | 0.0005/ND | 0.043/ND | 1.1/0.64 |

Table 7. Results of Organic Chemical Analyses of Monitoring and System Well Samples

Purgeable Aromatics (EPA Method 8020)
Petroleum Hydrocarbons (EPA Method 8015)

| WELL | DATE | | BENZENE | TOLUENE | ETHYL-BENZENE | XYLENES, TOTAL | TPH AS GASOLINE |
|---|---|---|---|---|---|---|---|
| LOD | | (mg/l) | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.25/0.05** |
| MW-15 | | | | | | | |
| | 03-Mar-89 | | NT | NT | NT | NT | 3.9 |
| | 04-Apr-89 | | 0.88 | 0.97 | 0.11 | 0.93 | 3.7 |
| | 02-May-89 | | 1.5 | 1.1 | 0.086 | 0.74 | 2.7 |
| | 07-Jun-89 | | 5.7 | 4.3 | 0.3 | 2.4 | 22 |
| MW-16 | | | | | | | |
| | 02-Mar-89 | | NT | NT | NT | NT | 2.1 |
| | 04-Apr-89 | | 2.1 | 2.2 | 0.18 | 1.4 | 6.7 |
| | 02-May-89 | | 0.74 | 0.94 | 0.11 | 0.95 | 2.7 |
| | 07-Jun-89 | | 0.37 | 0.56 | 0.51 | 0.35 | 14 |
| MW-17 | | | | | | | |
| | 04-Apr-89 | | 3.1 | 2.9 | 0.27 | 3.9 | 12 |
| | 02-May-89 | | 1.2 | 1.0 | 0.11 | 1.4 | 3.9 |
| | 07-Jun-89 | | 1.2 | 1.2 | ND | 1.3 | 6.3 |
| MW-18 | | | | | | | |
| | 15-Feb-89 | | ND | ND | ND | ND | ND |
| | 03-Mar-89 | | NT | NT | NT | NT | ND |
| | 05-Apr-89 | | ND | ND | ND | ND | ND |
| | 02-May-89 | | ND | ND | ND | ND | ND |
| | 07-Jun-89 | | ND | ND | ND | ND | ND |
| EW-1 | | | | | | | |
| | 04-Apr-89 | | 1.6 | 1.0 | 0.087 | 1.8 | 5.9 |
| | 01-May-89 | | 3.2 | 1.2 | 0.15 | 1.4 | 6.3 |
| | 05-Jun-89 | | 7.7 | 5.0 | 0.2 | 3.5 | 24 |
| EW-4 | | | | | | | |
| | 04-Apr-89 | | NT | NT | NT | NT | 2.5 |
| | 01-May-89 | | 0.56 | 0.28 | 0.034 | 0.72 | 2.0 |
| | 05-Jun-89 | | 0.4 | 0.2 | ND | 0.6 | 3.1 |
| EW-8 | | | | | | | |
| | 01-May-89 | | 1.1 | 0.49 | 0.021 | 0.30 | 2.3 |
| | 05-Jun-89 | | 2.5 | 2.0 | ND | 1.4 | 8.3 |
| EW-12 | | | | | | | |
| | 01-May-89 | | 1.8 | 0.66 | 0.048 | 0.62 | 3.6 |
| | 05-Jun-89 | | 25 | 20 | 0.8 | 11 | 71 |
| EW-13 | | | | | | | |
| | 19-Apr-89 | | 0.068 | 0.0064 | ND | 0.20 | 0.79 |
| EW-15 | | | | | | | |
| | 19-Apr-89 # | | 13080 | 61000 | 16000 | 140000 | 660000 |

Table 7. Results of Organic Chemical Analyses of Monitoring and System Well Samples

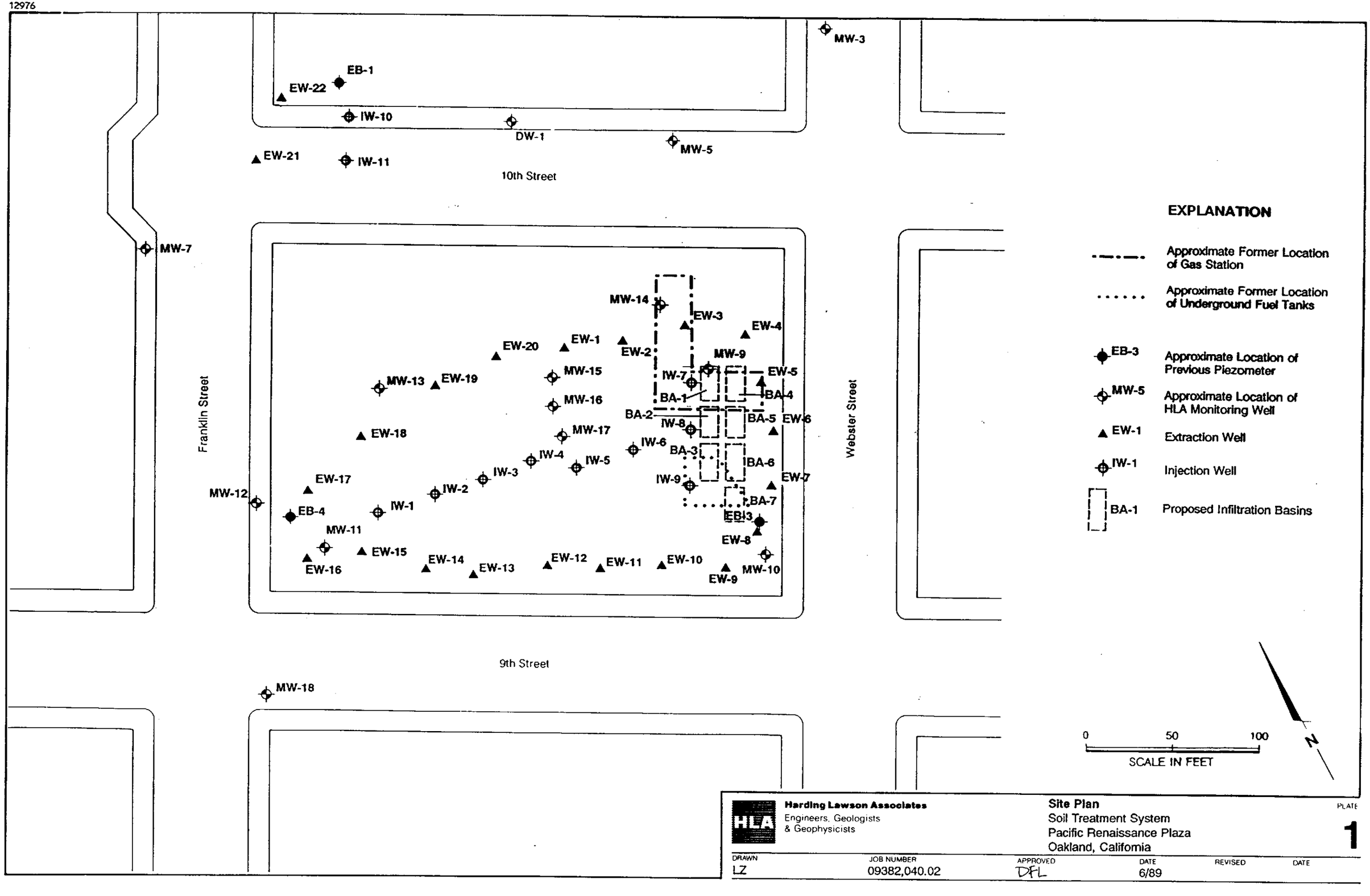
Purgeable Aromatics (EPA Method 8020)
Petroleum Hydrocarbons (EPA Method 8015)

| WELL | DATE | | BENZENE | TOLUENE | ETHYL-BENZENE | XYLENES, TOTAL | TPH AS GASOLINE |
|---|---|---|---|---|---|---|---|
| LOD | | (mg/l) | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.25/0.05** |
| EW-16 | | | | | | | |
| | 04-Apr-89 * | | 2.8/3.3 | 2.0/2.6 | 0.10/0.14 | 0.99/1.2 | 8.9/8.8 |
| | 19-Apr-89 | | 0.002 | 0.0027 | ND | 0.0021 | 0.57 |
| | 01-May-89 | | 5.0 | 4.6 | 0.34 | 2.5 | 12 |
| | 05-Jun-89 | | 2.5 | 2.6 | ND | 1.8 | 9.5 |
| EW-19 | | | | | | | |
| | 01-May-89 | | 1.4 | 1.2 | 0.068 | 0.77 | 3.4 |
| | 05-Jun-89 | | 0.9 | 0.6 | ND | 0.6 | 2.9 |
| EW-21 | | | | | | | |
| | 05-Jun-89 | | ND | ND | ND | 0.3 | 3.2 |
| BLANK | | | | | | | |
| | 05-Apr-89 | | 0.5 | ND | ND | ND | ND |
| | 01-May-89 | | ND | ND | ND | ND | ND |
| | 06-Jun-89 | | ND | ND | ND | ND | ND |

NOTES:

LOD: Limit of Detection.
ND: Not detected at or above LOD.
NT: Not tested.
*: Two values indicate results of duplicate samples
**: LOD Changed to 0.05 after 4/19/89
#: Free product observed in well.
Organic constituents reported in milligrams per liter.
Analyses performed by PACE Laboratories.

12976



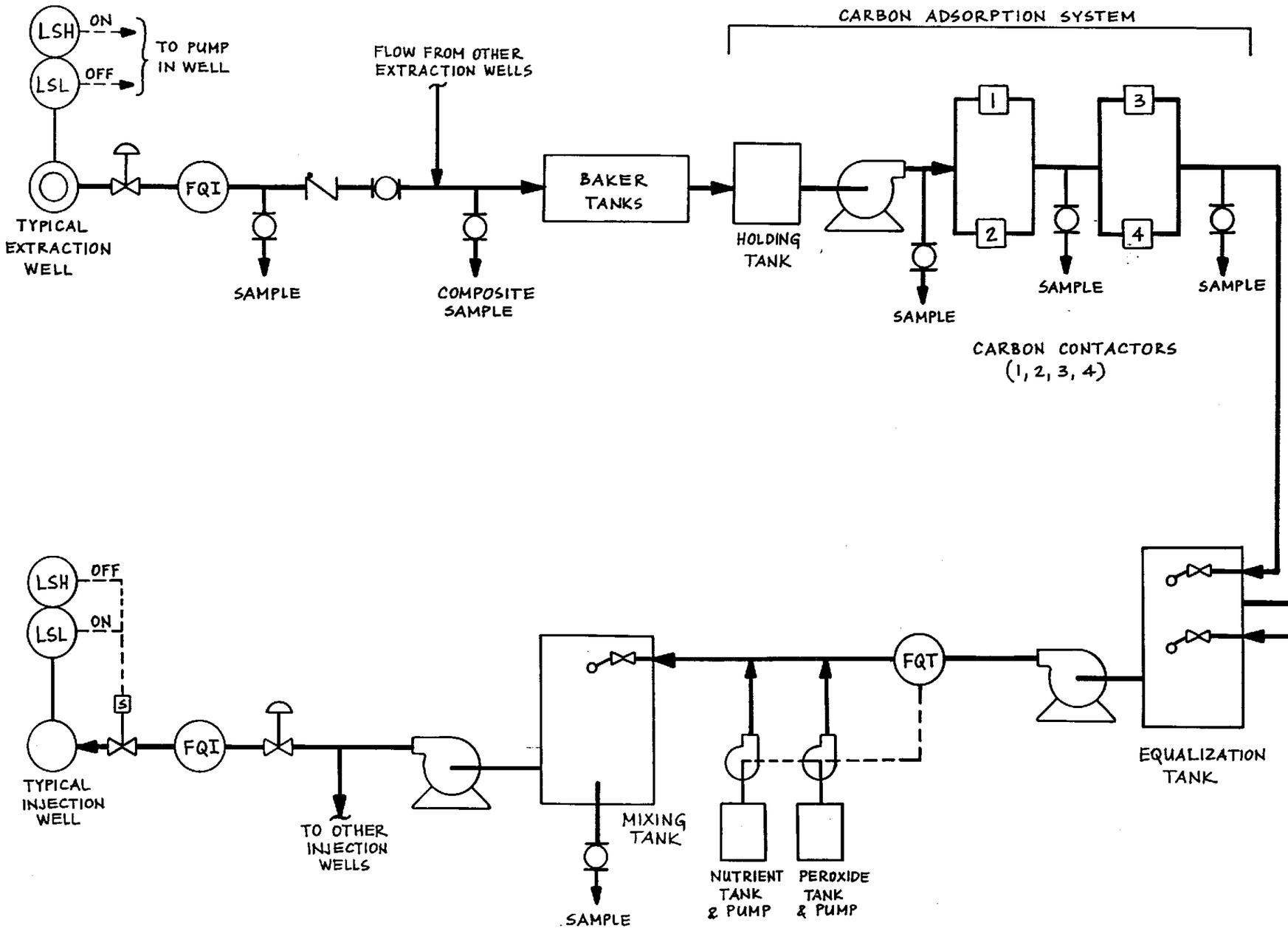

**Harding Lawson Associates**
Engineers, Geologists & Geophysicists

**Site Plan**
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE **1**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| LZ | 09382,040.02 | DFL | 6/89 | | |

12479




## LEGEND

- BALL VALVE
- GATE VALVE
- SOLENOID VALVE
- CHECK VALVE
- FLOAT VALVE
- PUMP

## ABBREVIATIONS

| | |
|---|---|
| LSH | HIGH LEVEL SWITCH |
| LSL | LOW LEVEL SWITCH |
| FQI | FLOW INDICATOR |
| FQT | FLOW TRANSMITTER |

109463

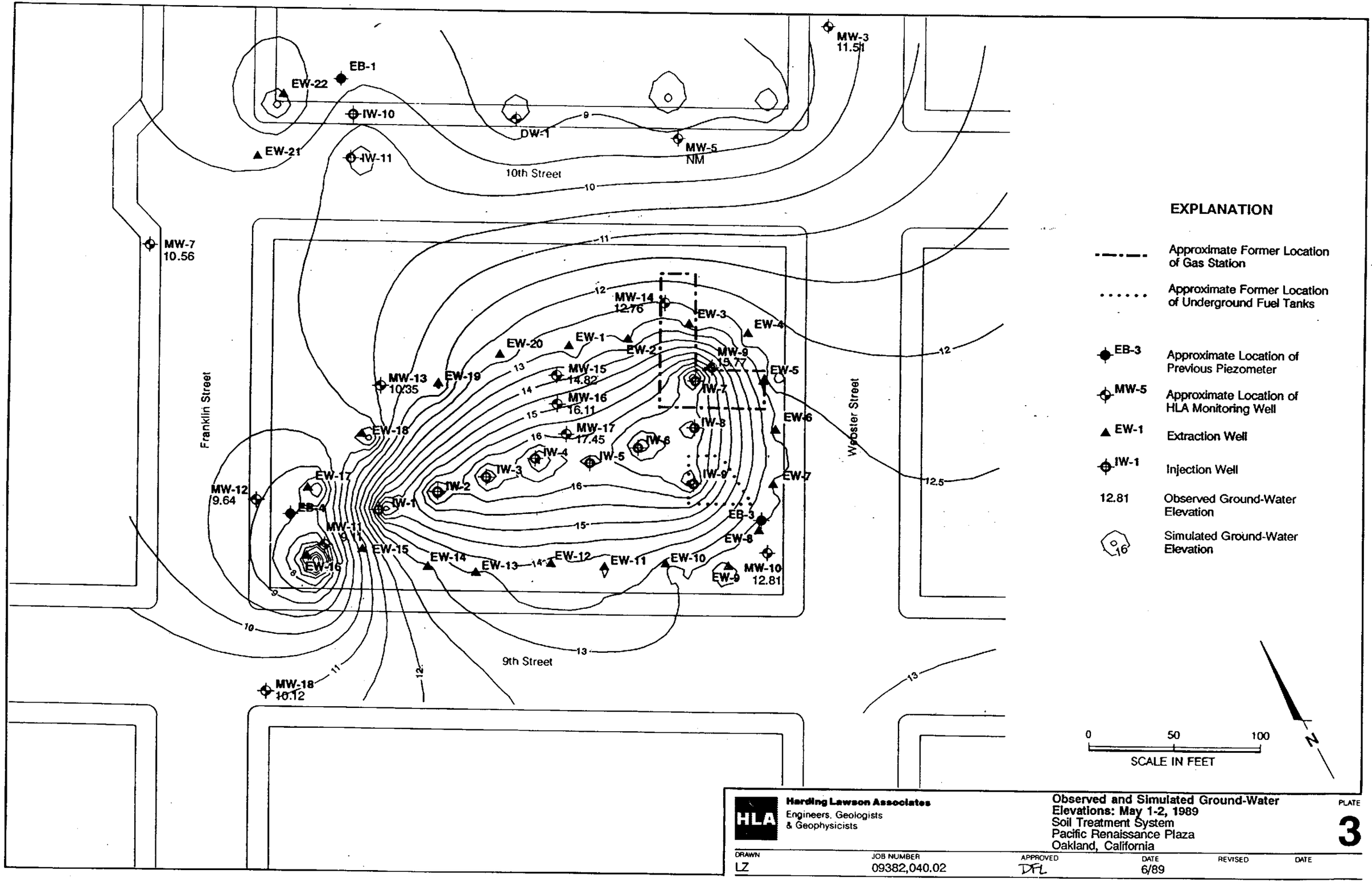
Harding Lawson Associates
Engineers and Geoscientists

**Schematic Diagram**
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE 2

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| AK | 09382,040.02 | | 6/89 | | |

12977




## EXPLANATION

- Approximate Former Location of Gas Station
- Approximate Former Location of Underground Fuel Tanks
- EB-3 — Approximate Location of Previous Piezometer
- MW-5 — Approximate Location of HLA Monitoring Well
- EW-1 — Extraction Well
- IW-1 — Injection Well
- 12.81 — Observed Ground-Water Elevation
- 16 — Simulated Ground-Water Elevation

0 50 100
SCALE IN FEET

N

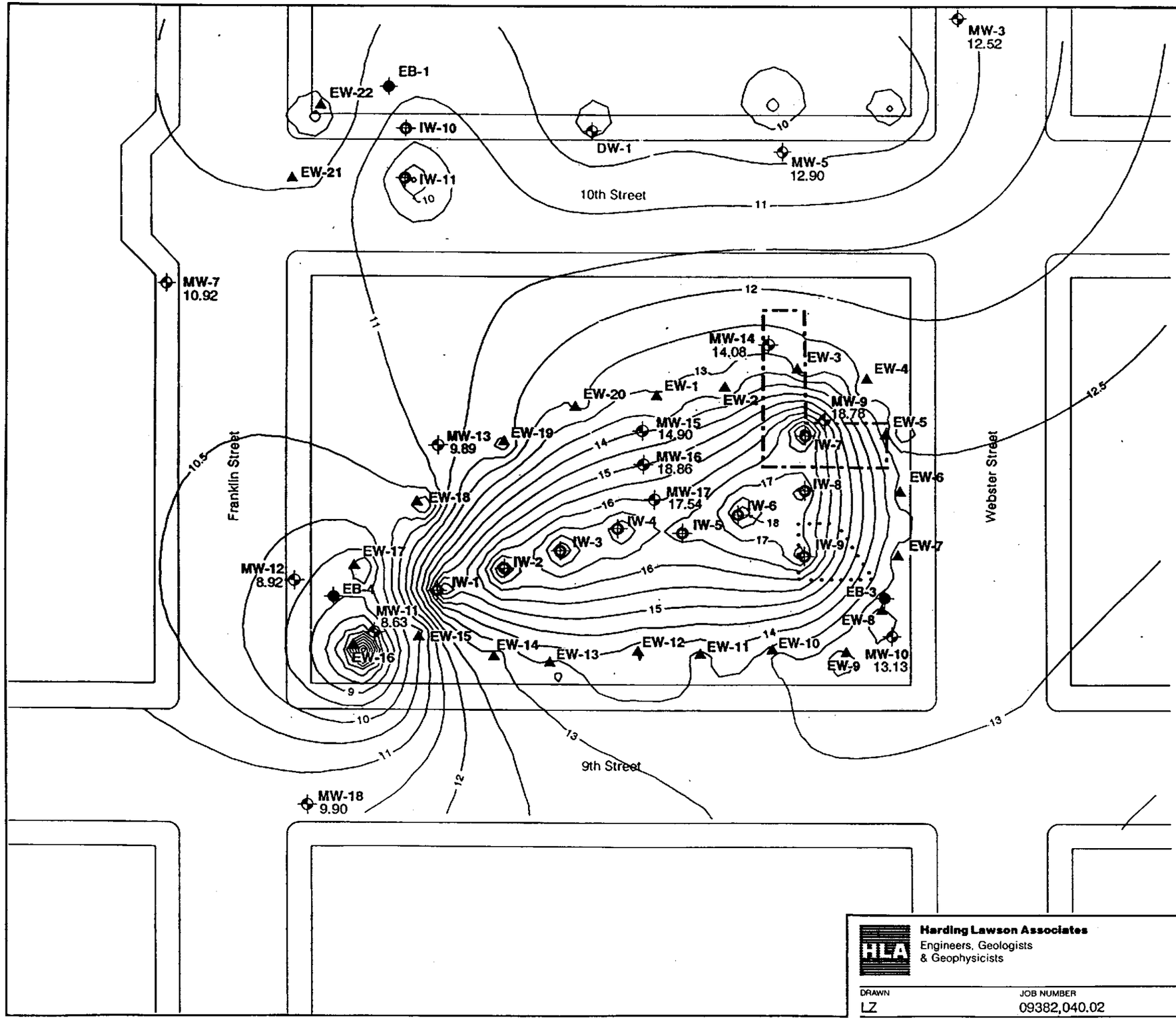
HLA **Harding Lawson Associates**
Engineers, Geologists & Geophysicists

**Observed and Simulated Ground-Water Elevations: May 1-2, 1989**
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE **3**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| LZ | 09382,040.02 | DFL | 6/89 | | |

12978




## EXPLANATION

- Approximate Former Location of Gas Station
- Approximate Former Location of Underground Fuel Tanks
- EB-3 — Approximate Location of Previous Piezometer
- MW-5 — Approximate Location of HLA Monitoring Well
- EW-1 — Extraction Well
- IW-1 — Injection Well
- 18.78 — Observed Ground-Water Elevation
- Simulated Ground-Water Elevation

0 50 100
SCALE IN FEET

N

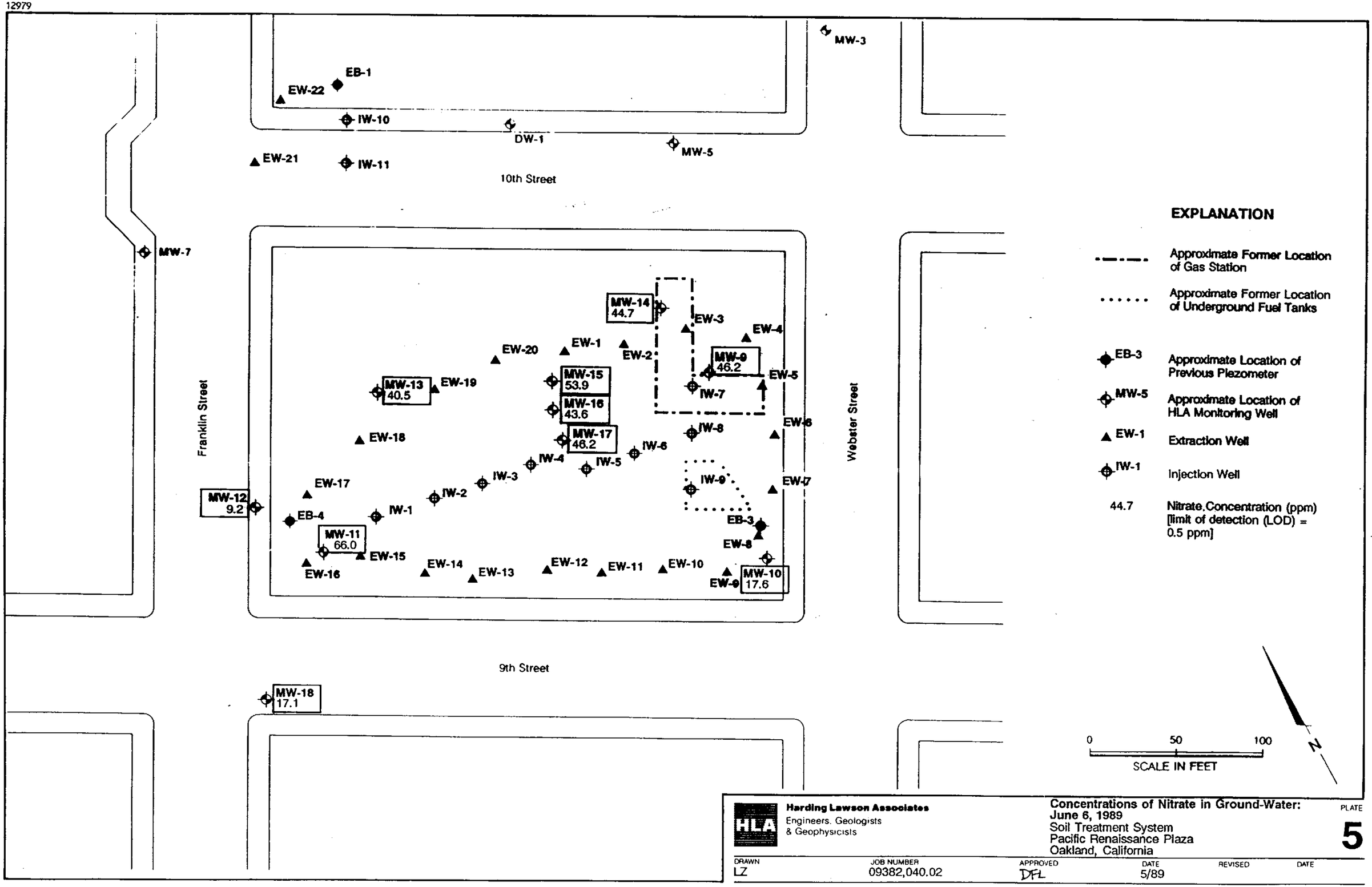
**Harding Lawson Associates**
Engineers, Geologists & Geophysicists

**Observed and Simulated Ground-Water Elevations: June 6, 1989**
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE **4**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| LZ | 09382,040.02 | DFL | 6/89 | | |

12979



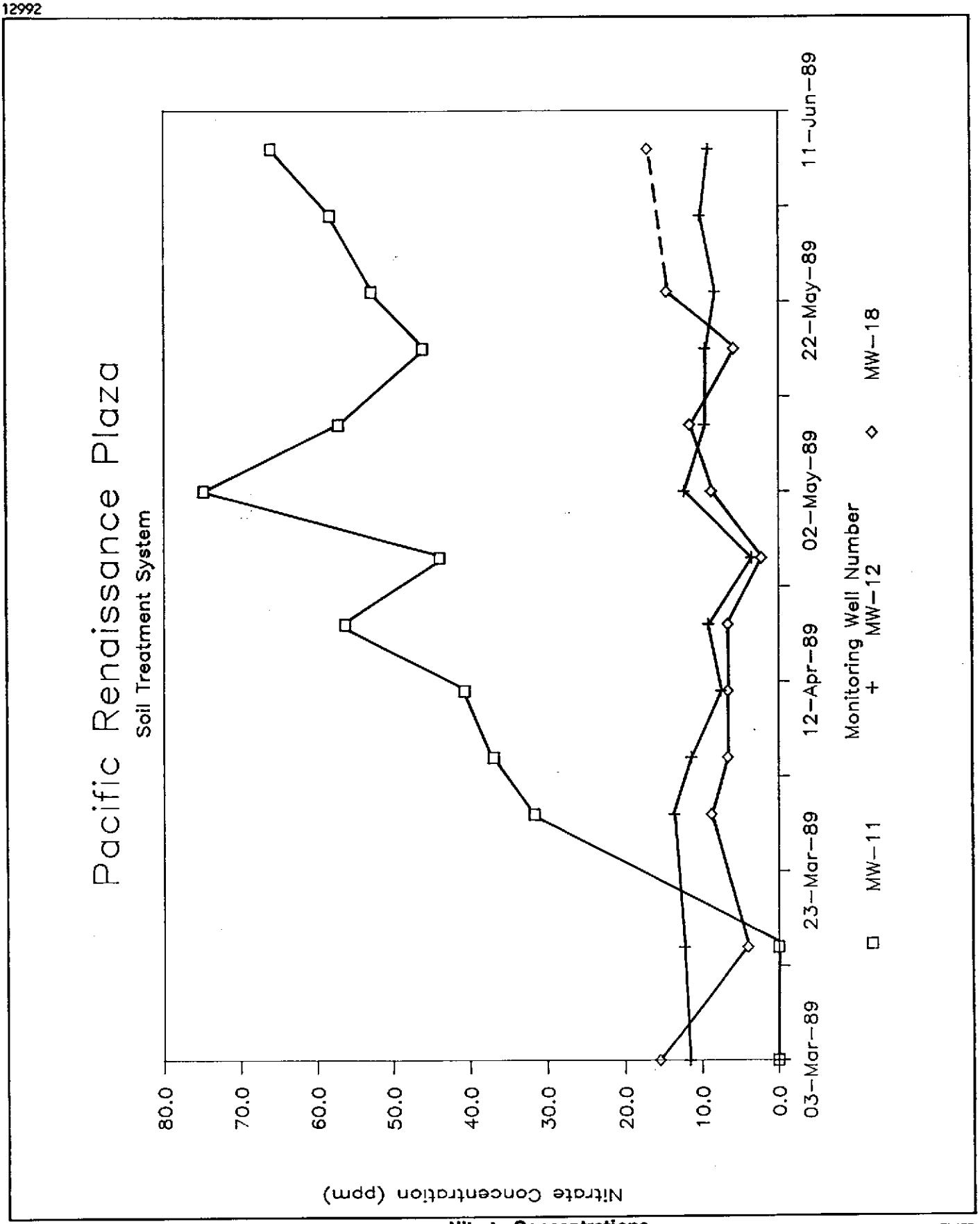

**Harding Lawson Associates**
Engineers, Geologists & Geophysicists

**Concentrations of Nitrate in Ground-Water: June 6, 1989**
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE **5**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| LZ | 09382,040.02 | DFL | 5/89 | | |

12992



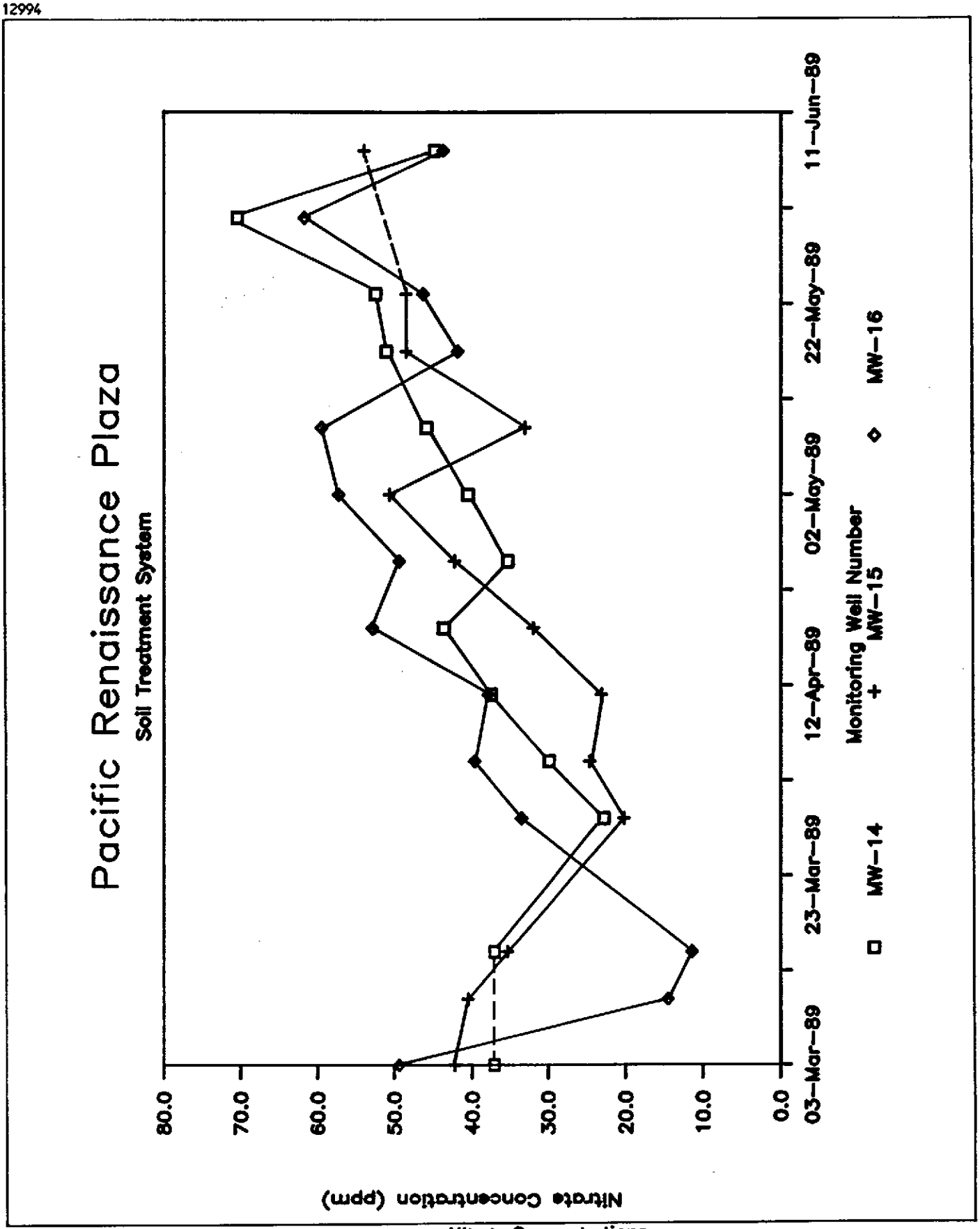

**Harding Lawson Associates**
Engineers and Geoscientists

**Nitrate Concentrations**
**Wells MW-11, MW-12, MW-18**
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE
**6**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| | 9382,040.02 | | 6/89 | | |

12994



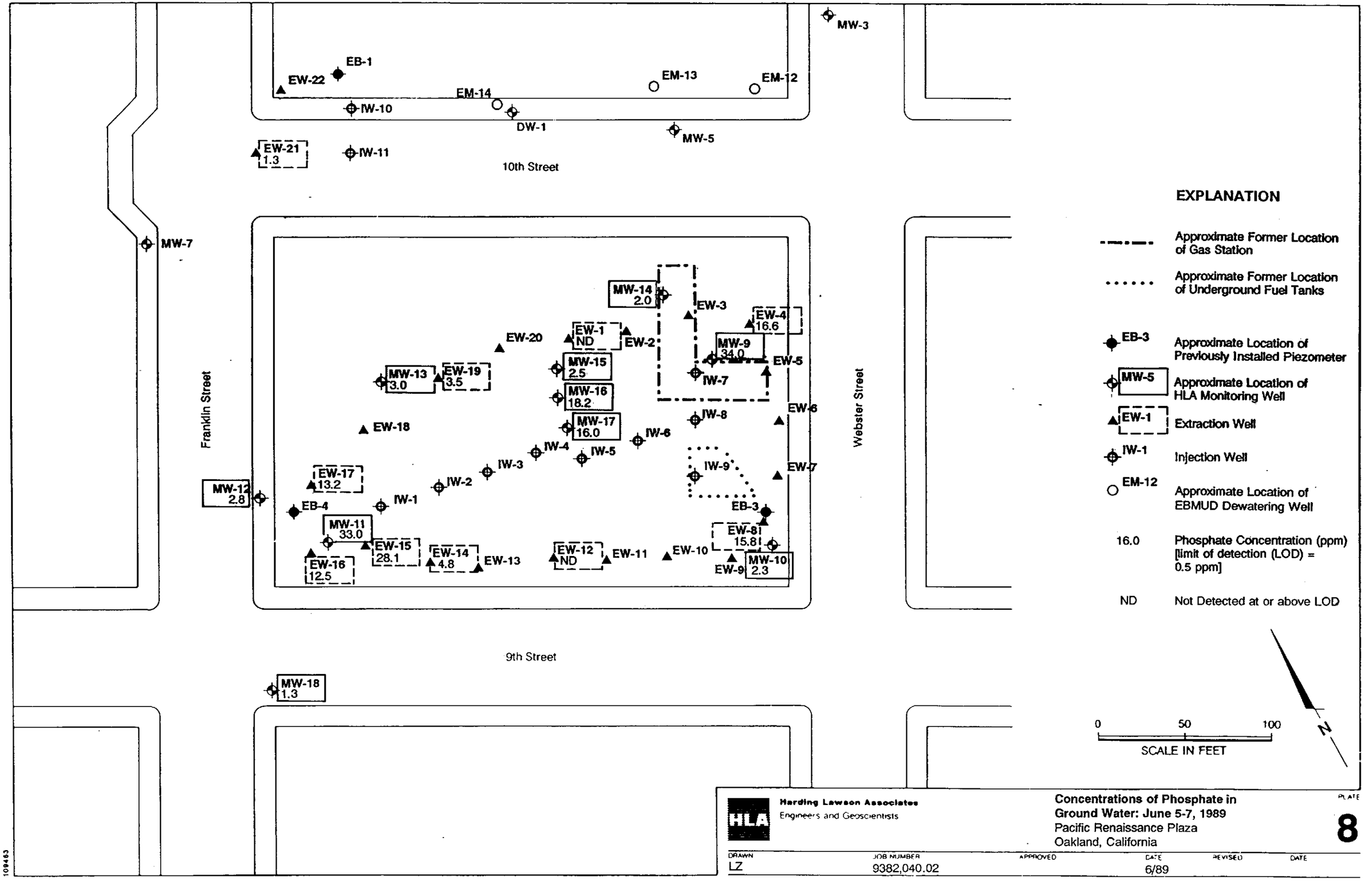

**Harding Lawson Associates**
Engineers and Geoscientists

**Nitrate Concentrations**
**Wells MW-14, MW-15, MW-16**
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE **7**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| DC | 9382,040.02 | | 6/89 | | |

12999




109463

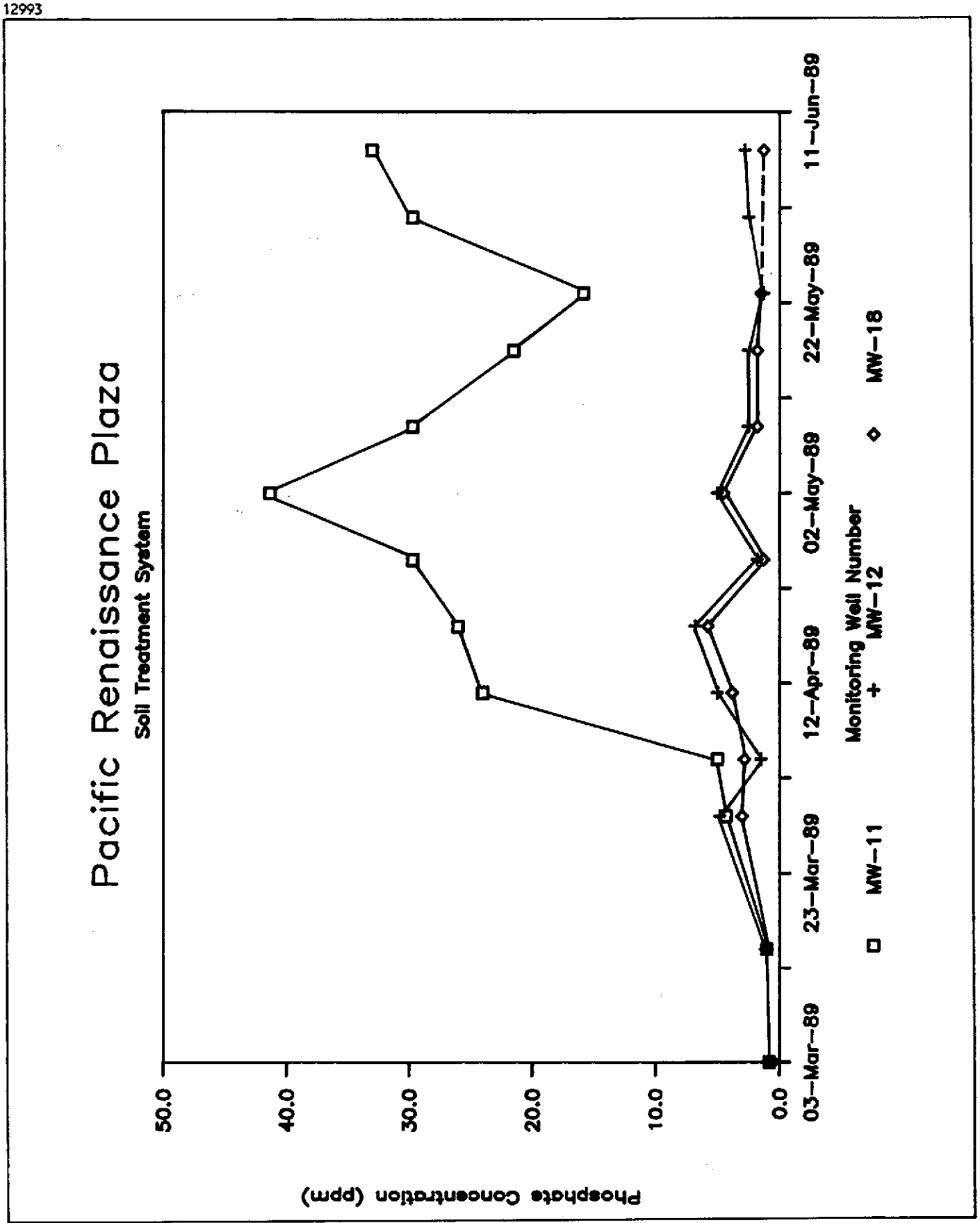
HLA Harding Lawson Associates
Engineers and Geoscientists

**Concentrations of Phosphate in Ground Water: June 5-7, 1989**
Pacific Renaissance Plaza
Oakland, California

PLATE **8**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| LZ | 9382,040.02 | | 6/89 | | |

12993



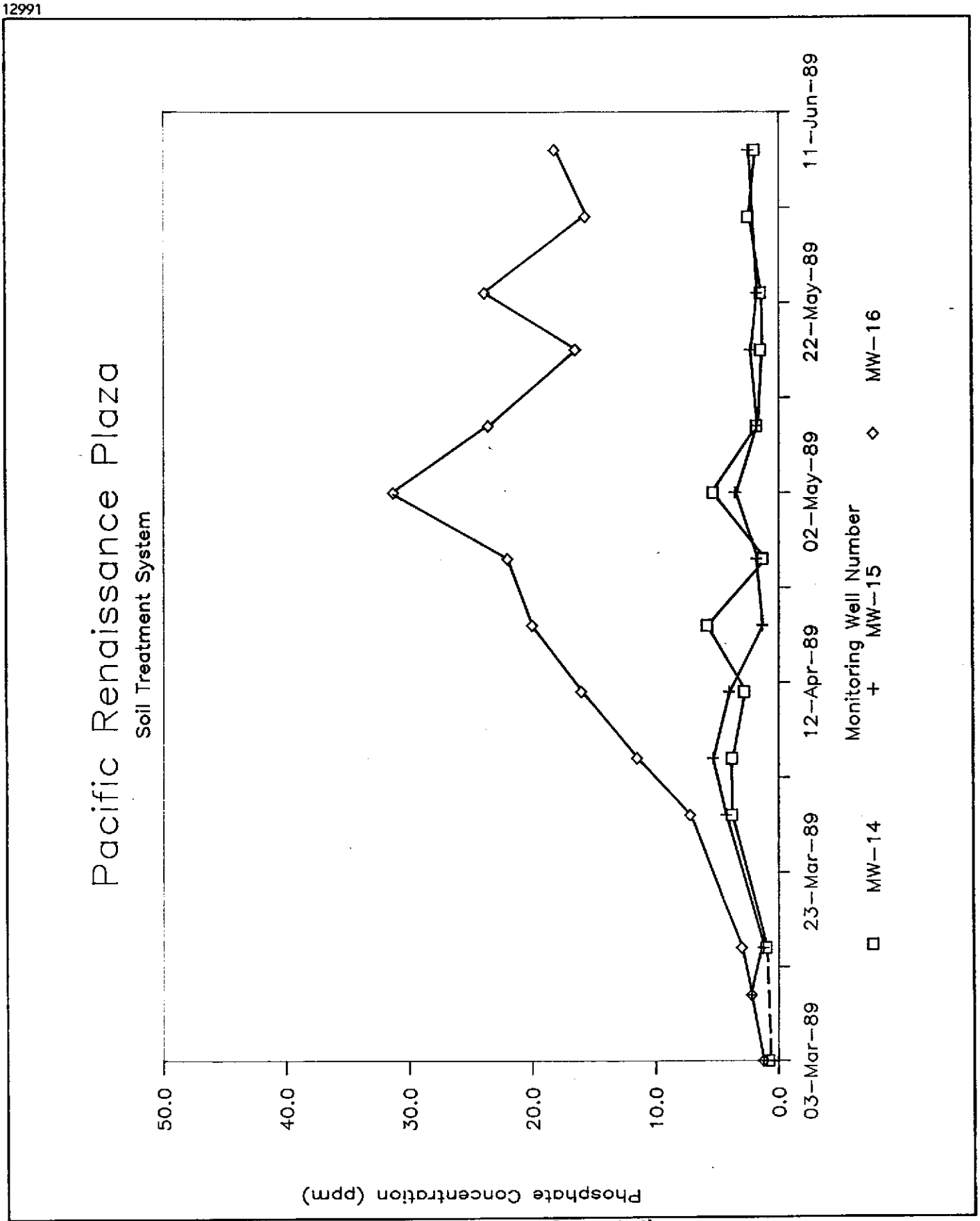

**Harding Lawson Associates**
Engineers and Geoscientists

**Phosphate Concentrations**
**Wells MW-11, MW-12, MW-18**
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE
**9**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| DC | 9382,040.02 | | 6/89 | | |

12991



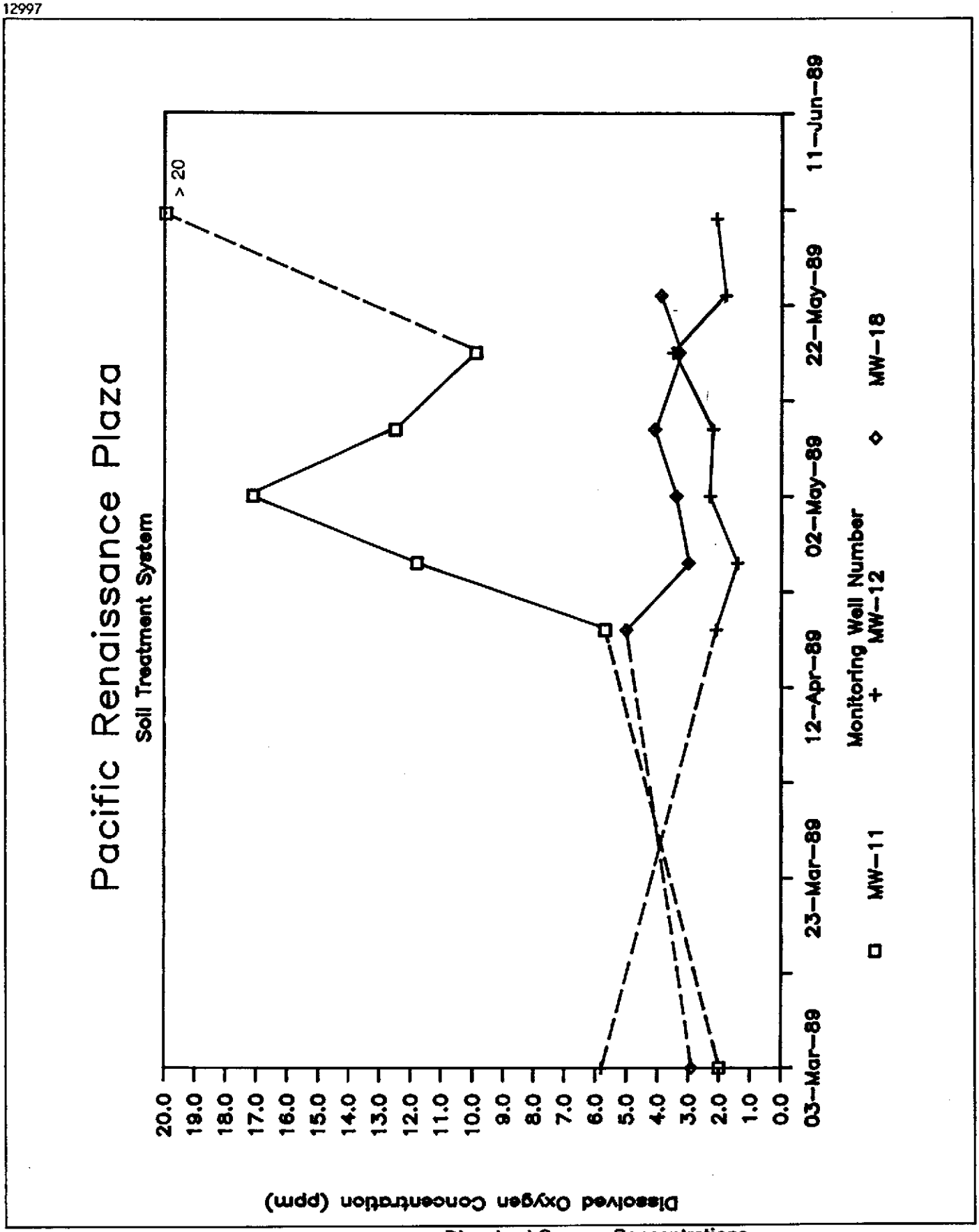

**Harding Lawson Associates**
Engineers and Geoscientists

**Phosphate Concentrations**
**Wells MW-14, MW-15, MW-16**
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE
**10**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| | 9382,040.02 | | 6/89 | | |

12997



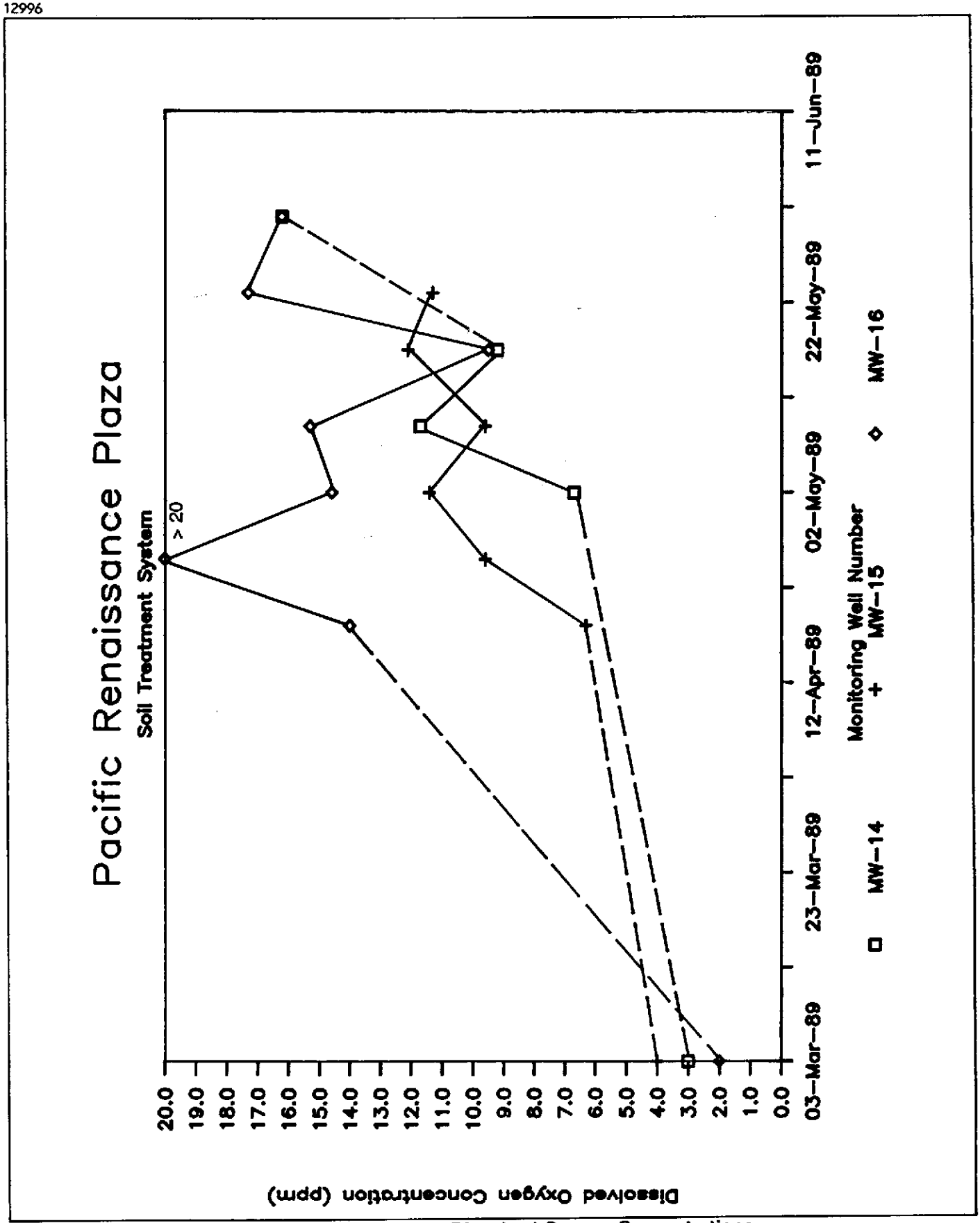

**Harding Lawson Associates**
Engineers and Geoscientists

**Dissolved Oxygen Concentrations**
**Wells MW-11, MW-12, MW-18**
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE **11**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| DC | 9382,040.02 | | 6/89 | | |

12996



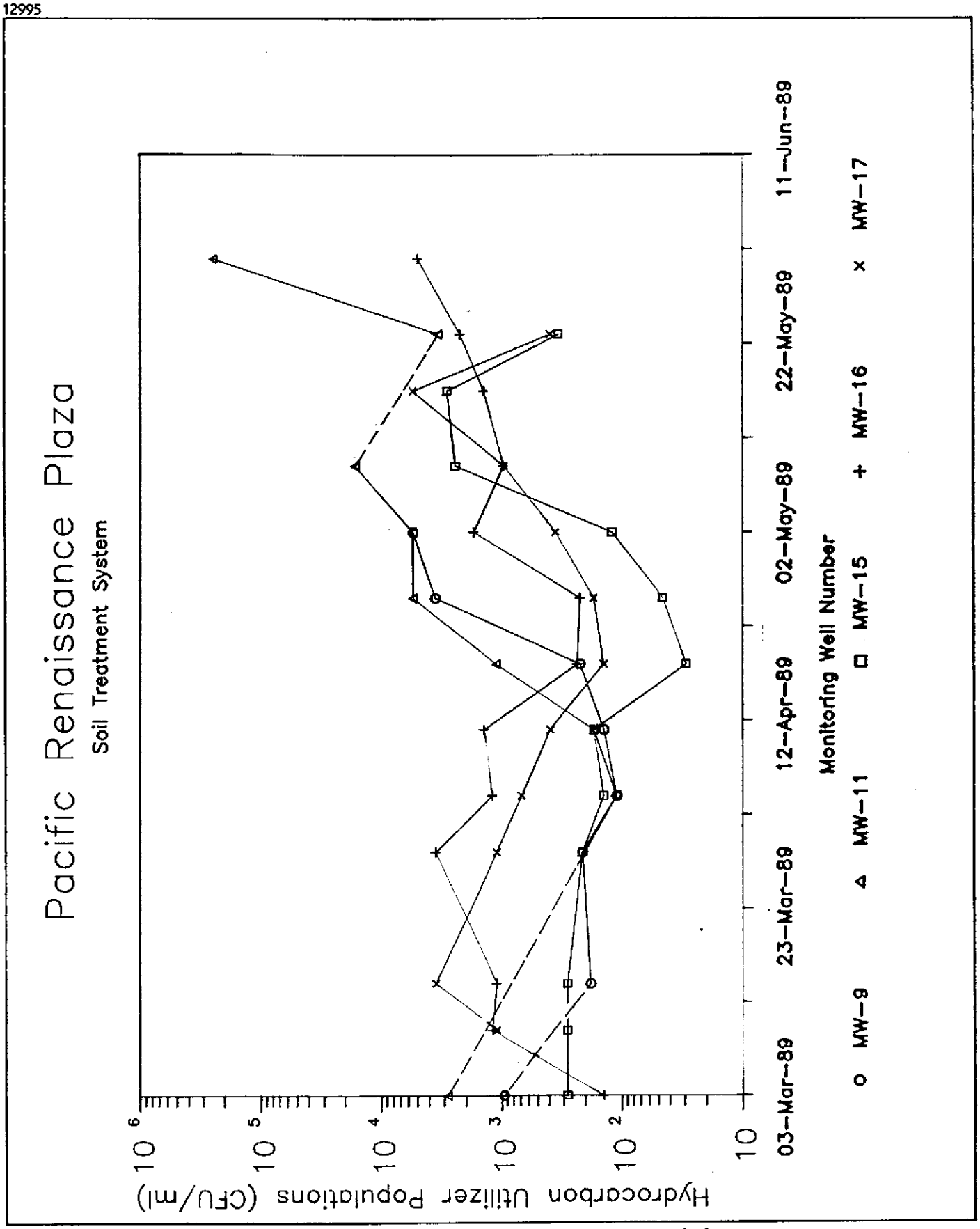

**Harding Lawson Associates**
Engineers and Geoscientists

**Dissolved Oxygen Concentrations**
**Wells MW-14, MW-15, MW-16**
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE **12**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| DC | 9382,040.02 | | 6/89 | | |

12995



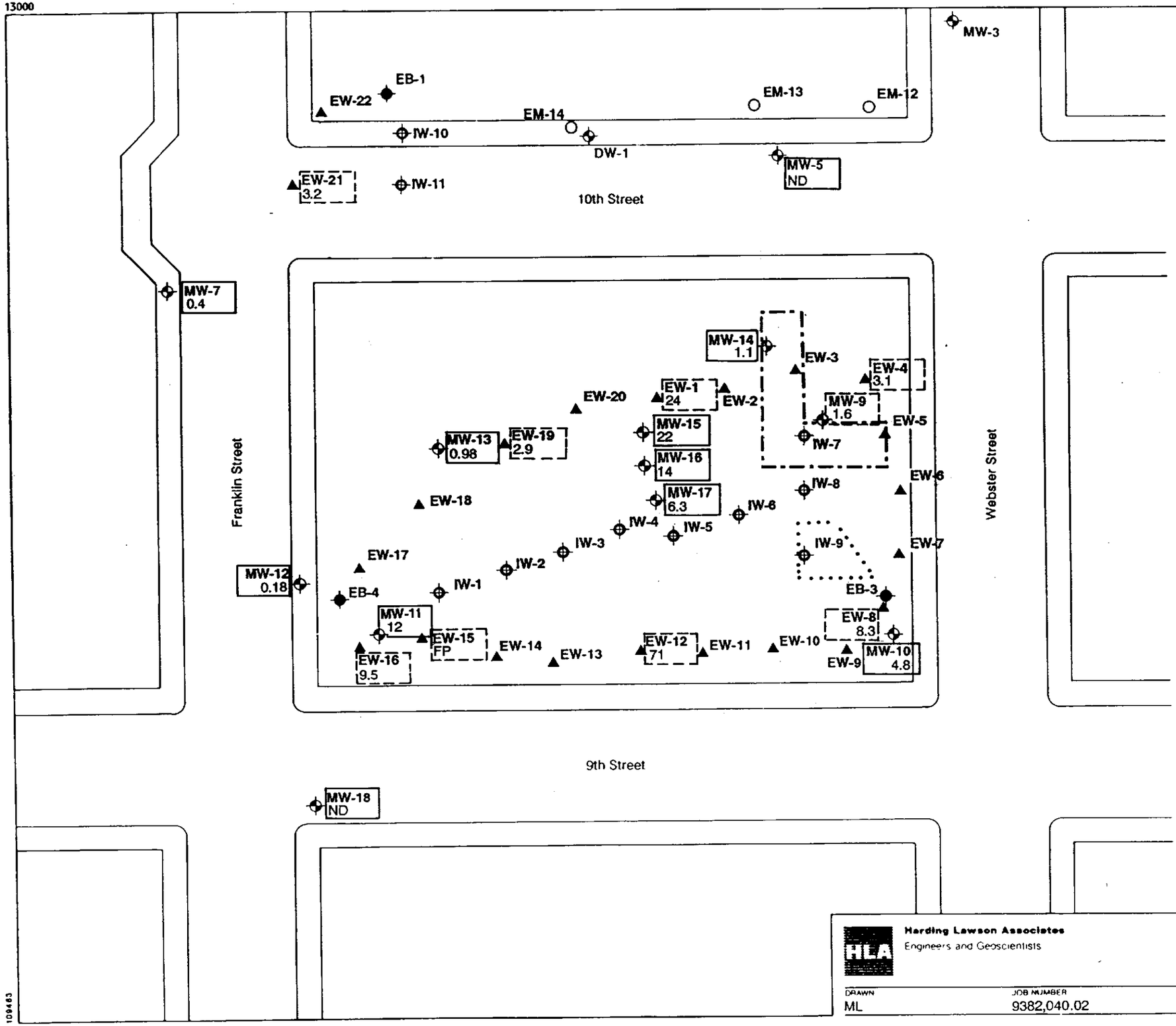

**Harding Lawson Associates**
Engineers and Geoscientists

**Hydrocarbon Utilizer Populations**
Soil Treatment System
Pacific Renaissance Plaza
Oakland, California

PLATE
**13**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| | 9382,040.02 | | 6/89 | | |

13000




## EXPLANATION

- Approximate Former Location of Gas Station
- Approximate Former Location of Underground Fuel Tanks
- EB-3 — Approximate Location of Previously Installed Piezometer
- MW-5 — Approximate Location of HLA Monitoring Well
- EW-1 — Extraction Well
- IW-1 — Injection Well
- EM-12 — Approximate Location of EBMUD Dewatering Well
- 5.9 — Petroleum Hydrocarbon Concentration (mg/l) as Gasoline [limit of detection (LOD) = 0.25 mg/l)]
- ND — Not Detected at or above LOD
- FP — Floating Product Observed in Well

0 50 100

SCALE IN FEET

N

109463

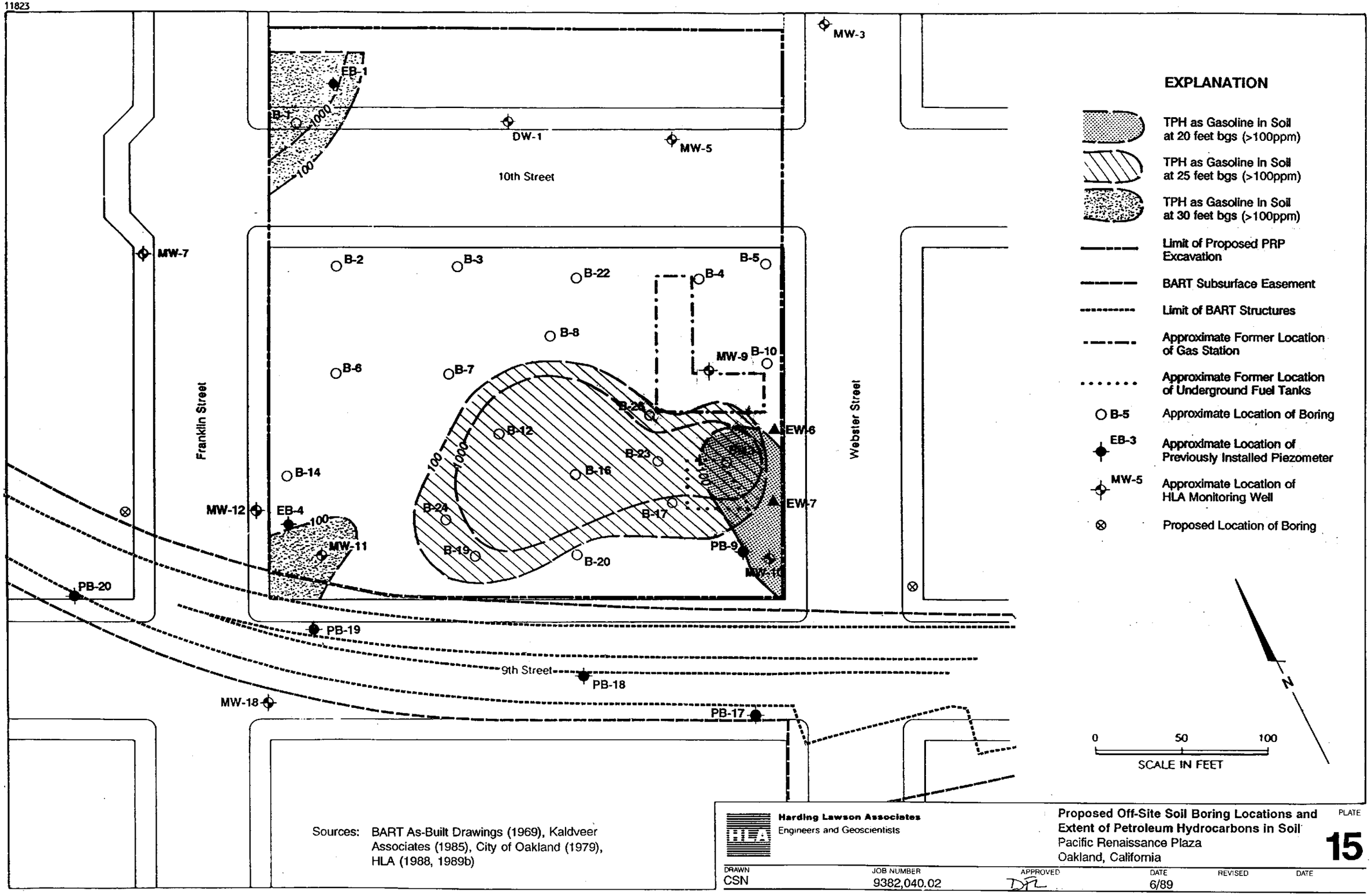
Harding Lawson Associates
Engineers and Geoscientists

**Concentrations of Petroleum Hydrocarbons in Ground-Water: June 5-7, 1989**
Pacific Renaissance Plaza
Oakland, California

PLATE **14**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| ML | 9382,040.02 | | 6/89 | | |

11823




Sources: BART As-Built Drawings (1969), Kaldveer Associates (1985), City of Oakland (1979), HLA (1988, 1989b)

Harding Lawson Associates
Engineers and Geoscientists

**Proposed Off-Site Soil Boring Locations and Extent of Petroleum Hydrocarbons in Soil**
Pacific Renaissance Plaza
Oakland, California

PLATE **15**

| DRAWN | JOB NUMBER | APPROVED | DATE | REVISED | DATE |
|---|---|---|---|---|---|
| CSN | 9382,040.02 | DFL | 6/89 | | |

# Appendix A

## LABORATORY ANALYTICAL RESULTS FOR WATER SAMPLES

pace laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas

June 28, 1989

Mr. David Leland
Harding Lawson Associates
200 Rush Landing Road
Novato, CA 94947

Dear Mr. Leland:

Enclosed is the report of laboratory analyses for samples received 06/05/89.

If you have any questions concerning this report, please feel free to contact us.

Sincerely,

Stephen Nackord

Stephen F. Nackord
Director, Sampling and Analytical Services

Enclosures

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas

Harding Lawson Associates
200 Rush Landing Road
Novato, CA 94947

June 28, 1989
PACE Project Number: 490605504

Attn: Mr. David Leland

Pacific R. Plaza

Date Sample(s) Collected: 06/05/89
Date Sample(s) Received: 06/05/89

| PACE Sample Number: | | | 734150 | 734160 | 734170 |
|---|---|---|---|---|---|
| Parameter | Units | MDL | 89230502 | 89230503 | 89230504 |
| | | | EW-1 | EW-4 | EW-8 |
| ORGANIC ANALYSIS | | | | | |
| INDIVIDUAL PARAMETERS | | | | | |
| Purgeable Fuels, as Gasoline (EPA 8015) | mg/L | 0.05 | 24 | 3.1 | 8.3 |
| AROMATIC VOLATILE COMPOUNDS EPA 8020 | | | | | |
| Benzene | ug/L | 0.2 | 7700 | 400 | 2500 |
| Toluene | ug/L | 0.2 | 5000 | 200 | 2000 |
| Chlorobenzene | ug/L | 0.2 | ND | ND | ND |
| Ethylbenzene | ug/L | 0.2 | 200 | ND | ND |
| Xylenes, Total | ug/L | 0.2 | 3500 | 600 | 1400 |
| 1,3-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| 1,4-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| 1,2-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| Fluorobenzene (Surrogate Recovery) | | | 102% | 84% | 109% |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas



June 28, 1989
PACE Project Number: 490605504

| PACE Sample Number: / Parameter | Units | MDL | 734180 89230505 EW-12 | 734190 89230508 EW-16 | 734200 89230510 EW-19 |
|---|---|---|---|---|---|
| ORGANIC ANALYSIS | | | | | |
| INDIVIDUAL PARAMETERS | | | | | |
| Purgeable Fuels, as Gasoline (EPA 8015) | mg/L | 0.05 | 71 | 9.5 | 2.9 |
| AROMATIC VOLATILE COMPOUNDS EPA 8020 | | | | | |
| Benzene | ug/L | 0.2 | 25000 | 2500 | 900 |
| Toluene | ug/L | 0.2 | 20000 | 2600 | 600 |
| Chlorobenzene | ug/L | 0.2 | LT 800 | ND | ND |
| Ethylbenzene | ug/L | 0.2 | 800 | ND | ND |
| Xylenes, Total | ug/L | 0.2 | 11000 | 1800 | 600 |
| 1,3-Dichlorobenzene | ug/L | 0.2 | 1200 | ND | ND |
| 1,4-Dichlorobenzene | ug/L | 0.2 | LT 800 | ND | ND |
| 1,2-Dichlorobenzene | ug/L | 0.2 | LT 800 | ND | ND |
| Fluorobenzene (Surrogate Recovery) | | | 112% | 111% | 99% |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas



June 28, 1989
PACE Project Number: 490605504

| PACE Sample Number: / Parameter | Units | MDL | 734210 89230511 EW-21 |
|---|---|---|---|
| **ORGANIC ANALYSIS** | | | |
| INDIVIDUAL PARAMETERS | | | |
| Purgeable Fuels, as Gasoline (EPA 8015) | mg/L | 0.05 | 3.2 |
| AROMATIC VOLATILE COMPOUNDS EPA 8020 | | | |
| Benzene | ug/L | 0.2 | ND |
| Toluene | ug/L | 0.2 | ND |
| Chlorobenzene | ug/L | 0.2 | ND |
| Ethylbenzene | ug/L | 0.2 | ND |
| Xylenes, Total | ug/L | 0.2 | 300 |
| 1,3-Dichlorobenzene | ug/L | 0.2 | ND |
| 1,4-Dichlorobenzene | ug/L | 0.2 | ND |
| 1,2-Dichlorobenzene | ug/L | 0.2 | ND |
| Fluorobenzene (Surrogate Recovery) | | | 85% |

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

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.

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

**Harding Lawson Associates**
200 Rush Landing Road
P.O. Box 6107
Novato, California 94948
415/892-0821
Telecopy: 415/892-1586

# CHAIN OF CUSTODY FORM

#90605.504

Lab: PACE

Samplers: Robert L. Nelson, Caleb Oamsey

Job Number: 9382,039.02

Name/Location: Pacific R. Plaza

Project Manager: David Leland

Recorder: Robert L. Nelson (Signature Required)

| SOURCE CODE | MATRIX: Water | Sediment | Soil | Oil | #CONTAINERS & PRESERV.: Unpres. | $H_2SO_4$ | $HNO_3$ | SAMPLE NUMBER OR LAB NUMBER: Yr | Wk | Seq | DATE: Yr | Mo | Dy | Time | STATION DESCRIPTION/ NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | X | | | | | X | | 89 | 23 | 050 | 2 | 90 | 605 | 1550 | 73415 (12) |
| 23 | X | | | | | X | | 89 | 23 | 050 | 3 | 90 | 605 | 1555 | 73416 |
| 23 | X | | | | | X | | 89 | 23 | 050 | 4 | 90 | 605 | 1600 | air bubbles in VOA 73417 |
| 23 | X | | | | | X | | 89 | 23 | 050 | 5 | 90 | 605 | 1320 | 73418 |
| 23 | X | | | | | X | | 89 | 23 | 050 | 8 | 90 | 605 | 1410 | 73419 |
| 23 | X | | | | | X | | 89 | 23 | 051 | 0 | 89 | 060 | 1435 | 73420 |
| 23 | X | | | | | X | | 89 | 23 | 051 | 1 | 89 | 060 | 1450 | 73421 |

ANALYSIS REQUESTED

| EPA 601/8010 | EPA 602/8020 | EPA 624/8240 | EPA 625/8270 | Priority Pltnt. Metals | Benzene/Toluene/Xylene | Total Petrol. Hydrocarb. | 8015 | 8020 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | X | X |
| | | | | | | | X | X |
| | | | | | | | X | X |
| | | | | | | | X | X |
| | | | | | | | X | X |
| | | | | | | | X | X |
| | | | | | | | X | X |
| | | | | | | | X | X |

780086 6/2

| LAB NUMBER: Yr | Wk | Seq | DEPTH IN FEET | COL MTD CD | QA CODE | MISCELLANEOUS |
|---|---|---|---|---|---|---|
| | | | | | | |

## CHAIN OF CUSTODY RECORD

| | | |
|---|---|---|
| RELINQUISHED BY: (Signature) Robert L. Nelson | RECEIVED BY: (Signature) | DATE/TIME |
| RELINQUISHED BY: (Signature) | RECEIVED BY: (Signature) | DATE/TIME |
| RELINQUISHED BY: (Signature) | RECEIVED BY: (Signature) | DATE/TIME |
| RELINQUISHED BY: (Signature) | RECEIVED BY: (Signature) | DATE/TIME |
| DISPATCHED BY: (Signature) DATE/TIME | RECEIVED FOR LAB BY: (Signature) C Sontag | DATE/TIME 4/5/84 5:15 pm |
| METHOD OF SHIPMENT | | |

Laboratory Copy Project Office Copy Field or Office Copy

6532

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas

June 27, 1989

Mr. David Leland
Harding Lawson Associates
200 Rush Landing Road
Novato, CA 94947

Dear Mr. Leland:

Enclosed is the report of laboratory analyses for samples received 06/06/89.

If you have any question concerning this report, please feel free to contact us.

| | | Date of Analysis | | |
|---|---|---|---|---|
| Lab No | HLA ID | EPA 8015 Gasoline | EPA 8010* Halocarbons | EPA 8020* Aromatics |
| 734470 | 89230613 | NR | 06/22/89 | 06/22/89 |
| 734480 | 89230614 | NR | 06/22/89 | 06/22/89 |
| 734490 | 89230615 | 06/12/89 | 06/22/89 | 06/22/89 |
| 734500 | 89230616 | NR | 06/22/89 | 06/22/89 |
| 734510 | 89230617 | 06/12/89 | 06/22/89 | 06/22/89 |
| 734520 | 89230618 | NR | 06/22/89 | 06/22/89 |
| 734530 | 89230619 | 06/12/89 | 06/22/89 | 06/22/89 |
| 734540 | 89230620 | 06/12/89 | 06/22/89 | 06/22/89 |
| 734550 | 89230621 | 06/12/89 | 06/22/89 | 06/22/89 |
| 734560 | 89230622 | 06/12/89 | 06/22/89 | 06/22/89 |

* All EPA 8010 and 8020 Analyses conducted past hold time of 06/20/89.
NR Not requested.

Sincerely,

Stephen Nackord

Stephen F. Nackord
Director, Sampling and Analytical Services

Enclosures
SFN/dlg 439

pace laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas

Harding Lawson Associates
200 Rush Landing Road
Novato, CA 94945

June 27, 1989
PACE Project Number: 490606505
PACE WP Number: WPPLAB #890
(Re)Issued: 07/11/89

Attn: Mr. David Leland

Pacific Ren. Plaza

Date Sample(s) Collected: 06/06/89
Date Sample(s) Received: 06/06/89

| PACE Sample Number: / Parameter | Units | MDL | 734470 89230613 mw-2 | 734480 89230614 mw-3 | 734490 89230615 mw-5 |
|---|---|---|---|---|---|
| **ORGANIC ANALYSIS** | | | | | |
| INDIVIDUAL PARAMETERS | | | | | |
| Purgeable Fuels, as Gasoline (EPA 8015) | mg/L | 0.05 | - | - | ND |
| VOLATILE HALOCARBONS AND AROMATICS | | | | | |
| VOLATILE HALOCARBONS BY EPA 8010 | | | - | - | - |
| Dichlorodifluoromethane | ug/L | 2.0 | ND | ND | ND |
| Chloromethane | ug/L | 2.0 | ND | ND | ND |
| Vinyl Chloride | ug/L | 2.0 | ND | ND | ND |
| Bromomethane | ug/L | 2.0 | ND | ND | ND |
| Chloroethane | ug/L | 2.0 | ND | ND | ND |
| Trichlorofluoromethane (Freon 11) | ug/L | 2.0 | ND | ND | ND |
| 1,1-Dichloroethene | ug/L | 0.5 | ND | 0.64 | 0.81 |
| Methylene Chloride | ug/L | 0.5 | ND | ND | ND |
| trans-1,2-Dichloroethene | ug/L | 0.5 | ND | ND | ND |
| 1,1-Dichloroethane | ug/L | 0.5 | ND | 0.84 | 1.6 |
| Chloroform | ug/L | 0.5 | ND | ND | 2.6 |
| 1,1,1-Trichloroethane (TCA) | ug/L | 0.5 | ND | ND | ND |
| Carbon Tetrachloride | ug/L | 0.5 | ND | ND | ND |
| 1,2-Dichloroethane (EDC) | ug/L | 0.5 | ND | ND | ND |
| Trichloroethene (TCE) | ug/L | 0.5 | 205 | ND | ND |
| 1,2-Dichloropropane | ug/L | 0.5 | ND | ND | ND |
| Bromodichloromethane | ug/L | 0.5 | ND | ND | ND |
| 2-Chloroethylvinyl ether | ug/L | 0.5 | ND | ND | ND |
| trans-1,3-Dichloropropene | ug/L | 0.5 | ND | ND | ND |
| cis-1,3-Dichloropropene | ug/L | 0.5 | ND | ND | ND |
| 1,1,2-Trichloroethane | ug/L | 0.5 | ND | ND | ND |
| Tetrachloroethene | ug/L | 0.5 | ND | ND | ND |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas

Mr. David Leland
Page 2

June 27, 1989
PACE Project Number: 490606505

| PACE Sample Number: / Parameter | Units | MDL | 734470 89230613 mw-2 | 734480 89230614 mw-3 | 734490 89230615 mw-5 |
|---|---|---|---|---|---|
| ORGANIC ANALYSIS | | | | | |
| VOLATILE HALOCARBONS AND AROMATICS | | | | | |
| Dibromochloromethane | ug/L | 0.5 | ND | ND | ND |
| Chlorobenzene | ug/L | 0.5 | ND | ND | ND |
| Bromoform | ug/L | 0.5 | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | ug/L | 0.5 | ND | ND | ND |
| 1,3-Dichlorobenzene | ug/L | 0.5 | ND | ND | ND |
| 1,4-Dichlorobenzene | ug/L | 0.5 | ND | ND | ND |
| 1,2-Dichlorobenzene | ug/L | 0.5 | ND | ND | ND |
| Bromochloromethane (Surrogate Recovery) | | | 105% | 99% | 101% |
| 1,4-Dichlorobutane (Surrogate Recovery) | | | 60% | 80% | 78% |
| VOLATILE AROMATICS BY EPA 8020 | | | - | - | - |
| Benzene | ug/L | 0.2 | 17 | ND | ND |
| Toluene | ug/L | 0.2 | 1.0 | ND | ND |
| Chlorobenzene | ug/L | 0.2 | ND | ND | ND |
| Ethylbenzene | ug/L | 0.2 | 4.1 | ND | ND |
| Xylenes, Total | ug/L | 0.2 | 19 | ND | ND |
| 1,3-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| 1,4-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| 1,2-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| Fluorobenzene (Surrogate Recovery) | | | 113% | 98% | 102% |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas



June 27, 1989
PACE Project Number: 490606505

| PACE Sample Number: / Parameter | Units | MDL | 734500 89230616 MW-6 | 734510 89230617 MW-7 | 734520 89230618 MW-8 |
|---|---|---|---|---|---|
| **ORGANIC ANALYSIS** | | | | | |
| INDIVIDUAL PARAMETERS | | | | | |
| Purgeable Fuels, as Gasoline (EPA 8015) | mg/L | 0.050 | - | 0.4 | - |
| VOLATILE HALOCARBONS AND AROMATICS | | | | | |
| VOLATILE HALOCARBONS BY EPA 8010 | | | - | - | - |
| Dichlorodifluoromethane | ug/L | 2.0 | ND | ND | ND |
| Chloromethane | ug/L | 2.0 | ND | ND | ND |
| Vinyl Chloride | ug/L | 2.0 | ND | ND | ND |
| Bromomethane | ug/L | 2.0 | ND | ND | ND |
| Chloroethane | ug/L | 2.0 | ND | ND | ND |
| Trichlorofluoromethane (Freon 11) | ug/L | 2.0 | ND | ND | ND |
| 1,1-Dichloroethene | ug/L | 0.5 | ND | ND | ND |
| Methylene Chloride | ug/L | 0.5 | ND | ND | ND |
| trans-1,2-Dichloroethene | ug/L | 0.5 | ND | ND | ND |
| 1,1-Dichloroethane | ug/L | 0.5 | ND | ND | ND |
| Chloroform | ug/L | 0.5 | 2.9 | ND | ND |
| 1,1,1-Trichloroethane (TCA) | ug/L | 0.5 | ND | ND | ND |
| Carbon Tetrachloride | ug/L | 0.5 | ND | ND | ND |
| 1,2-Dichloroethane (EDC) | ug/L | 0.5 | ND | ND | ND |
| Trichloroethene (TCE) | ug/L | 0.5 | 43 | ND | ND |
| 1,2-Dichloropropane | ug/L | 0.5 | ND | ND | ND |
| Bromodichloromethane | ug/L | 0.5 | ND | ND | ND |
| 2-Chloroethylvinyl ether | ug/L | 0.5 | ND | ND | ND |
| trans-1,3-Dichloropropene | ug/L | 0.5 | ND | ND | ND |
| cis-1,3-Dichloropropene | ug/L | 0.5 | ND | ND | ND |
| 1,1,2-Trichloroethane | ug/L | 0.5 | ND | ND | ND |
| Tetrachloroethene | ug/L | 0.5 | 0.9 | ND | ND |
| Dibromochloromethane | ug/L | 0.5 | ND | ND | ND |
| Chlorobenzene | ug/L | 0.5 | ND | ND | ND |
| Bromoform | ug/L | 0.5 | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | ug/L | 0.5 | ND | ND | ND |
| 1,3-Dichlorobenzene | ug/L | 0.5 | ND | ND | ND |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas



June 27, 1989
PACE Project Number: 490606505

| PACE Sample Number: / Parameter | Units | MDL | 734500 89230616 MW-6 | 734510 89230617 MW-7 | 734520 89230618 MW-8 |
|---|---|---|---|---|---|
| ORGANIC ANALYSIS | | | | | |
| VOLATILE HALOCARBONS AND AROMATICS | | | | | |
| 1,4-Dichlorobenzene | ug/L | 0.5 | ND | ND | ND |
| 1,2-Dichlorobenzene | ug/L | 0.5 | ND | ND | ND |
| Bromochloromethane (Surrogate Recovery) | | | 75% | 108% | 89% |
| 1,4-Dichlorobutane (Surrogate Recovery) | | | 67% | 90% | 92% |
| VOLATILE AROMATICS BY EPA 8020 | | | - | - | - |
| Benzene | ug/L | 0.2 | 840 | 1.0 | ND |
| Toluene | ug/L | 0.2 | 180 | 1.0 | ND |
| Chlorobenzene | ug/L | 0.2 | ND | ND | ND |
| Ethylbenzene | ug/L | 0.2 | 170 | 2.2 | ND |
| Xylenes, Total | ug/L | 0.2 | 480 | 1.1 | ND |
| 1,3-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| 1,4-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| 1,2-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| Fluorobenzene (Surrogate Recovery) | | | 148% MI | 100% | 94% |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas



June 27, 1989
PACE Project Number: 490606505.

| PACE Sample Number: / Parameter | Units | MDL | 734530 89230619 MW-9 | 734540 89230620 MW-10 | 734550 89230621 MW-10 Duplicate |
|---|---|---|---|---|---|
| **ORGANIC ANALYSIS** | | | | | |
| INDIVIDUAL PARAMETERS | | | | | |
| Purgeable Fuels, as Gasoline (EPA 8015) | mg/L | 0.05 | 1.6 | 4.8 | 4.3 |
| VOLATILE HALOCARBONS AND AROMATICS | | | | | |
| VOLATILE HALOCARBONS BY EPA 8010 | | | - | - | - |
| Dichlorodifluoromethane | ug/L | 2.0 | ND | ND | ND |
| Chloromethane | ug/L | 2.0 | ND | ND | ND |
| Vinyl Chloride | ug/L | 2.0 | ND | ND | ND |
| Bromomethane | ug/L | 2.0 | ND | ND | ND |
| Chloroethane | ug/L | 2.0 | ND | ND | ND |
| Trichlorofluoromethane (Freon 11) | ug/L | 2.0 | ND | ND | ND |
| 1,1-Dichloroethene | ug/L | 0.5 | ND | 1.7 | 2.7 |
| Methylene Chloride | ug/L | 0.5 | ND | ND | ND |
| trans-1,2-Dichloroethene | ug/L | 0.5 | ND | ND | ND |
| 1,1-Dichloroethane | ug/L | 0.5 | ND | 0.7 | 2.4 |
| Chloroform | ug/L | 0.5 | 3.2 | ND | ND |
| 1,1,1-Trichloroethane (TCA) | ug/L | 0.5 | ND | ND | ND |
| Carbon Tetrachloride | ug/L | 0.5 | ND | ND | ND |
| 1,2-Dichloroethane (EDC) | ug/L | 0.5 | ND | 0.7 | 0.54 |
| Trichloroethene (TCE) | ug/L | 0.5 | ND | 13 | 13 |
| 1,2-Dichloropropane | ug/L | 0.5 | ND | ND | ND |
| Bromodichloromethane | ug/L | 0.5 | ND | ND | ND |
| 2-Chloroethylvinyl ether | ug/L | 0.5 | ND | ND | ND |
| trans-1,3-Dichloropropene | ug/L | 0.5 | ND | ND | ND |
| cis-1,3-Dichloropropene | ug/L | 0.5 | ND | ND | ND |
| 1,1,2-Trichloroethane | ug/L | 0.5 | ND | ND | ND |
| Tetrachloroethene | ug/L | 0.5 | ND | ND | ND |
| Dibromochloromethane | ug/L | 0.5 | ND | ND | ND |
| Chlorobenzene | ug/L | 0.5 | ND | ND | ND |
| Bromoform | ug/L | 0.5 | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | ug/L | 0.5 | ND | ND | ND |
| 1,3-Dichlorobenzene | ug/L | 0.5 | ND | ND | ND |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas



June 27, 1989
PACE Project Number: 490606505

| PACE Sample Number: / Parameter | Units | MDL | 734530 89230619 MW-9 | 734540 89230620 MW-10 | 734550 89230621 MW-10 Duplicate |
|---|---|---|---|---|---|
| ORGANIC ANALYSIS | | | | | |
| VOLATILE HALOCARBONS AND AROMATICS | | | | | |
| 1,4-Dichlorobenzene | ug/L | 0.5 | ND | ND | ND |
| 1,2-Dichlorobenzene | ug/L | 0.5 | ND | ND | ND |
| Bromochloromethane (Surrogate Recovery) | | | 100% | 88% | 105% |
| 1,4-Dichlorobutane (Surrogate Recovery) | | | 93% | 89% | 95% |
| VOLATILE AROMATICS BY EPA 8020 | | | - | - | - |
| Benzene | ug/L | 0.2 | 360 | 660 | 640 |
| Toluene | ug/L | 0.2 | 106 | 140 | 140 |
| Chlorobenzene | ug/L | 0.2 | ND | ND | ND |
| Ethylbenzene | ug/L | 0.2 | 110 | 110 | 100 |
| Xylenes, Total | ug/L | 0.2 | 100 | 240 | 140 |
| 1,3-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| 1,4-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| 1,2-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| Fluorobenzene (Surrogate Recovery) | | | 101% | 150% MI | 147% MI |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas

Mr. David Leland
Page 7

June 27, 1989
PACE Project Number: 490606505

| PACE Sample Number: | | | 734560 |
|---|---|---|---|
| Parameter | Units | MDL | 89230622 |
| | | | Field Blank |
| **ORGANIC ANALYSIS** | | | |
| INDIVIDUAL PARAMETERS | | | |
| Purgeable Fuels, as Gasoline (EPA 8015) | mg/L | 0.05 | ND |
| VOLATILE HALOCARBONS AND AROMATICS | | | |
| VOLATILE HALOCARBONS BY 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 | ND |
| trans-1,2-Dichloroethene | ug/L | 0.5 | ND |
| 1,1-Dichloroethane | ug/L | 0.5 | ND |
| Chloroform | ug/L | 0.5 | ND |
| 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 | ND |
| Trichloroethene (TCE) | ug/L | 0.5 | ND |
| 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 |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas

Mr. David Leland
Page 8

June 27, 1989
PACE Project Number: 490606505

| PACE Sample Number: | | | 734560 |
|---|---|---|---|
| Parameter | Units | MDL | 89230622 |
| | | | Field Blank |
| ORGANIC ANALYSIS | | | |
| VOLATILE HALOCARBONS AND AROMATICS | | | |
| 1,4-Dichlorobenzene | ug/L | 0.5 | ND |
| 1,2-Dichlorobenzene | ug/L | 0.5 | ND |
| Bromochloromethane (Surrogate Recovery) | | | 97% |
| 1,4-Dichlorobutane (Surrogate Recovery) | | | 91% |
| VOLATILE AROMATICS BY EPA 8020 | | | - |
| Benzene | ug/L | 0.2 | ND |
| Toluene | ug/L | 0.2 | ND |
| Chlorobenzene | ug/L | 0.2 | ND |
| Ethylbenzene | ug/L | 0.2 | ND |
| Xylenes, Total | ug/L | 0.2 | ND |
| 1,3-Dichlorobenzene | ug/L | 0.2 | ND |
| 1,4-Dichlorobenzene | ug/L | 0.2 | ND |
| 1,2-Dichlorobenzene | ug/L | 0.2 | ND |
| Fluorobenzene (Surrogate Recovery) | | | 106% |

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

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.

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

**Harding Lawson Associates**
200 Rush Landing Road
P.O. Box 6107
Novato, California 94948
415/892-0821
Telecopy: 415/892-1586

# CHAIN OF CUSTODY FORM

4906606.505

Lab: PACE

Samplers: Robert L. Nelson, Caleb Dawson

Job Number: Pacific R. Plaza

Name/Location: 9382,039.02

Project Manager: David Leland

Recorder: Robert L. Nelson (Signature Required)

| SOURCE CODE | MATRIX: Water | Sediment | Soil | Oil | #CONTAINERS & PRESERV.: Unpres. | $H_2SO_4$ | $HNO_3$ | SAMPLE NUMBER OR LAB NUMBER: Yr | Wk | Seq | DATE: Yr | Mo | Dy | Time | STATION DESCRIPTION/ NOTES | ANALYSIS REQUESTED: EPA 601/8010 | EPA 602/8020 | EPA 624/8240 | EPA 625/8270 | Priority Pllnt. Metals | Benzene/Toluene/Xylene | Total Petrol. Hydrocarb. EPA 8015 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | X | | | | | 2 | | 89 | 23 | 06 13 | 89 | 06 | 06 | 10 15 | 73447 (2) | X | X | | | | | |
| 23 | X | | | | | 2 | | 89 | 23 | 06 14 | 89 | 06 | 06 | 11 30 | 73448 (2) | X | X | | | | | X |
| 23 | X | | | | | 3 | | 89 | 23 | 06 15 | 89 | 06 | 06 | 16 25 | 73449 (3) | X | X | | | | | X |
| 23 | X | | | | | 2 | | 89 | 23 | 06 16 | 89 | 06 | 06 | 10 55 | 73450 (2) | X | X | | | | | |
| 23 | X | | | | | 3 | | 89 | 23 | 06 17 | 89 | 06 | 06 | 13 10 | 73451 (3) | X | X | | | | | X |
| 23 | X | | | | | 2 | | 89 | 23 | 06 18 | 89 | 06 | 06 | 13 45 | 73452 (2) | X | X | | | | | |
| 23 | X | | | | | 3 | | 89 | 23 | 06 19 | 89 | 06 | 06 | 14 25 | 73453 (3) | X | X | | | | | X |
| 23 | X | | | | | 3 | | 89 | 23 | 06 20 | 89 | 06 | 06 | 15 30 | 73454 (3) | X | X | | | | | X |
| 23 | X | | | | | 3 | | 89 | 23 | 06 21 | 89 | 06 | 06 | 15 40 | 73455 (3) | X | X | | | | | X |
| 23 | X | | | | | 3 | | 89 | 23 | 06 22 | 89 | 06 | 06 | 16 10 | 73456 (3) | X | X | | | | | X |

| LAB NUMBER: Yr | Wk | Seq | DEPTH IN FEET | COL MTD CD | QA CODE | MISCELLANEOUS |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | 9/2 |
| | | | | | | |
| | | | | | | |

## CHAIN OF CUSTODY RECORD

| | | |
|---|---|---|
| RELINQUISHED BY: (Signature) Robert L. Nelson | RECEIVED BY: (Signature) T. Scott Johnson | DATE/TIME 6/6/89 1815 |
| RELINQUISHED BY: (Signature) | RECEIVED BY: (Signature) | DATE/TIME |
| RELINQUISHED BY: (Signature) | RECEIVED BY: (Signature) | DATE/TIME |
| RELINQUISHED BY: (Signature) | RECEIVED BY: (Signature) | DATE/TIME |
| DISPATCHED BY: (Signature) DATE/TIME | RECEIVED FOR LAB BY: (Signature) C. Santos | DATE/TIME 6/7/89 8 15 am |
| METHOD OF SHIPMENT | | |

Laboratory Copy White — Project Office Copy Yellow — Field or Office Copy Pink

6533

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas

June 28, 1989

Mr. David Leland
Harding Lawson Associates
200 Rush Landing Road
Novato, CA 94947

Dear Mr. Leland:

Enclosed is the report of laboratory analyses for samples received 06/08/89.

If you have any questions concerning this report, please feel free to contact us.

Sincerely,

Stephen F. Nackord
Director, Sampling and Analytical Services

Enclosures

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas

Harding Lawson Associates
200 Rush Landing Road
Novato, CA 94947

June 28, 1989
PACE Project Number: 490607501

Attn: Mr. David Leland

Pacific R. Plaza

Date Sample(s) Collected: 06/07/89
Date Sample(s) Received: 06/08/89

| PACE Sample Number: / Parameter | Units | MDL | 734590 89230723 MW-11 | 734600 89230724 MW-12 | 734610 89230725 MW-13 |
|---|---|---|---|---|---|
| **ORGANIC ANALYSIS** | | | | | |
| INDIVIDUAL PARAMETERS | | | | | |
| Purgeable Fuels, as Gasoline (EPA 8015) | mg/L | 0.05 | 12 | 0.18 | 0.98 |
| VOLATILE HALOCARBONS AND AROMATICS | | | | | |
| VOLATILE HALOCARBONS BY EPA 8010 | | | - | - | - |
| Dichlorodifluoromethane | ug/L | 2.0 | ND | ND | ND |
| Chloromethane | ug/L | 2.0 | ND | ND | ND |
| Vinyl Chloride | ug/L | 2.0 | ND | ND | ND |
| Bromomethane | ug/L | 2.0 | ND | ND | ND |
| Chloroethane | ug/L | 2.0 | ND | ND | ND |
| Trichlorofluoromethane (Freon 11) | ug/L | 2.0 | ND | ND | ND |
| 1,1-Dichloroethene | ug/L | 0.5 | ND | ND | ND |
| Methylene Chloride | ug/L | 0.5 | ND | ND | ND |
| trans-1,2-Dichloroethene | ug/L | 0.5 | ND | ND | ND |
| 1,1-Dichloroethane | ug/L | 0.5 | ND | ND | ND |
| Chloroform | ug/L | 0.5 | 7.4 | 7.1 | 16 |
| 1,1,1-Trichloroethane (TCA) | ug/L | 0.5 | ND | ND | ND |
| Carbon Tetrachloride | ug/L | 0.5 | ND | ND | ND |
| 1,2-Dichloroethane (EDC) | ug/L | 0.5 | 1.9 | ND | 2.0 |
| Trichloroethene (TCE) | ug/L | 0.5 | ND | ND | ND |
| 1,2-Dichloropropane | ug/L | 0.5 | ND | ND | ND |
| Bromodichloromethane | ug/L | 0.5 | ND | ND | 0.9 |
| 2-Chloroethylvinyl ether | ug/L | 0.5 | ND | ND | ND |
| trans-1,3-Dichloropropene | ug/L | 0.5 | ND | ND | ND |
| cis-1,3-Dichloropropene | ug/L | 0.5 | ND | ND | ND |
| 1,1,2-Trichloroethane | ug/L | 0.5 | ND | ND | ND |
| Tetrachloroethene | ug/L | 0.5 | ND | ND | ND |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas



June 28, 1989
PACE Project Number: 490607501

| PACE Sample Number: / Parameter | Units | MDL | 734590 89230723 MW-11 | 734600 89230724 MW-12 | 734610 89230725 MW-13 |
|---|---|---|---|---|---|
| ORGANIC ANALYSIS | | | | | |
| VOLATILE HALOCARBONS AND AROMATICS | | | | | |
| Dibromochloromethane | ug/L | 0.5 | 1.0 | ND | ND |
| Chlorobenzene | ug/L | 0.5 | ND | ND | ND |
| Bromoform | ug/L | 0.5 | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | ug/L | 0.5 | ND | ND | ND |
| 1,3-Dichlorobenzene | ug/L | 0.5 | ND | ND | ND |
| 1,4-Dichlorobenzene | ug/L | 0.5 | ND | ND | ND |
| 1,2-Dichlorobenzene | ug/L | 0.5 | ND | ND | ND |
| Bromochloromethane (Surrogate Recovery) | | | 135% | 127% | 138% |
| 1,4-Dichlorobutane (Surrogate Recovery) | | | 129% | 109% | 110% |
| VOLATILE AROMATICS BY EPA 8020 | | | - | - | - |
| Benzene | ug/L | 0.2 | 82 | 34 | 51 |
| Toluene | ug/L | 0.2 | 97 | 3.7 | 37 |
| Chlorobenzene | ug/L | 0.2 | ND | ND | ND |
| Ethylbenzene | ug/L | 0.2 | 45 | ND | 20 |
| Xylenes, Total | ug/L | 0.2 | 167 | 12 | 82 |
| 1,3-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| 1,4-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| 1,2-Dichlorobenzene | ug/L | 0.2 | ND | ND | ND |
| Fluorobenzene (Surrogate Recovery) | | | 131% | 108% | 110% |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas



June 28, 1989
PACE Project Number: 490607501

| PACE Sample Number: / Parameter | Units | MDL | 734620 89230726 MW-14 | 734630 89230727 MW-15 | 734640 89230728 MW-16 |
|---|---|---|---|---|---|
| **ORGANIC ANALYSIS** | | | | | |
| INDIVIDUAL PARAMETERS | | | | | |
| Purgeable Fuels, as Gasoline (EPA 8015) | mg/L | 0.05 | 1.1 | 22 | 14 |
| VOLATILE HALOCARBONS AND AROMATICS | | | | | |
| VOLATILE HALOCARBONS BY EPA 8010 | | | - | - | - |
| Dichlorodifluoromethane | ug/L | 2.0 | ND | - | LT 20 |
| Chloromethane | ug/L | 2.0 | ND | - | LT 20 |
| Vinyl Chloride | ug/L | 2.0 | ND | - | LT 20 |
| Bromomethane | ug/L | 2.0 | ND | - | LT 20 |
| Chloroethane | ug/L | 2.0 | ND | - | LT 20 |
| Trichlorofluoromethane (Freon 11) | ug/L | 2.0 | ND | - | LT 20 |
| 1,1-Dichloroethene | ug/L | 0.5 | ND | - | LT 5.0 |
| Methylene Chloride | ug/L | 0.5 | ND | - | LT 5.0 |
| trans-1,2-Dichloroethene | ug/L | 0.5 | ND | - | LT 5.0 |
| 1,1-Dichloroethane | ug/L | 0.5 | ND | - | LT 5.0 |
| Chloroform | ug/L | 0.5 | 9.1 | - | LT 5.0 |
| 1,1,1-Trichloroethane (TCA) | ug/L | 0.5 | ND | - | LT 5.0 |
| Carbon Tetrachloride | ug/L | 0.5 | ND | - | LT 5.0 |
| 1,2-Dichloroethane (EDC) | ug/L | 0.5 | 0.6 | - | 6.7 |
| Trichloroethene (TCE) | ug/L | 0.5 | ND | - | LT 5.0 |
| 1,2-Dichloropropane | ug/L | 0.5 | ND | - | LT 5.0 |
| Bromodichloromethane | ug/L | 0.5 | ND | - | LT 5.0 |
| 2-Chloroethylvinyl ether | ug/L | 0.5 | ND | - | LT 5.0 |
| trans-1,3-Dichloropropene | ug/L | 0.5 | ND | - | LT 5.0 |
| cis-1,3-Dichloropropene | ug/L | 0.5 | ND | - | LT 5.0 |
| 1,1,2-Trichloroethane | ug/L | 0.5 | ND | - | LT 5.0 |
| Tetrachloroethene | ug/L | 0.5 | ND | - | LT 5.0 |
| Dibromochloromethane | ug/L | 0.5 | ND | - | LT 5.0 |
| Chlorobenzene | ug/L | 0.5 | ND | - | LT 5.0 |
| Bromoform | ug/L | 0.5 | ND | - | LT 5.0 |
| 1,1,2,2-Tetrachloroethane | ug/L | 0.5 | ND | - | LT 5.0 |

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

pace laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas



June 28, 1989
PACE Project Number: 490607501

| PACE Sample Number: / Parameter | Units | MDL | 734620 89230726 MW-14 | 734630 89230727 MW-15 | 734640 89230728 MW-16 |
|---|---|---|---|---|---|
| **ORGANIC ANALYSIS** | | | | | |
| VOLATILE HALOCARBONS AND AROMATICS | | | | | |
| 1,3-Dichlorobenzene | ug/L | 0.5 | ND | - | LT 5.0 |
| 1,4-Dichlorobenzene | ug/L | 0.5 | ND | - | LT 5.0 |
| 1,2-Dichlorobenzene | ug/L | 0.5 | ND | - | LT 5.0 |
| Bromochloromethane (Surrogate Recovery) | | | 139% | - | 106% |
| 1,4-Dichlorobutane (Surrogate Recovery) | | | 103% | - | 132% |
| VOLATILE AROMATICS BY EPA 8020 | | | - | - | - |
| Benzene | ug/L | 0.2 | 57 | - | 370 |
| Toluene | ug/L | 0.2 | 2.2 | - | 560 |
| Chlorobenzene | ug/L | 0.2 | ND | - | LT 20 |
| Ethylbenzene | ug/L | 0.2 | 0.5 | - | 510 |
| Xylenes, Total | ug/L | 0.2 | 43 | - | 350 |
| 1,3-Dichlorobenzene | ug/L | 0.2 | ND | - | LT 20 |
| 1,4-Dichlorobenzene | ug/L | 0.2 | ND | - | LT 20 |
| 1,2-Dichlorobenzene | ug/L | 0.2 | ND | - | LT 20 |
| Fluorobenzene (Surrogate Recovery) | | | 109% | - | 115% |
| AROMATIC VOLATILE COMPOUNDS EPA 8020 | | | | | |
| Benzene | ug/L | 0.2 | - | 5.7 | - |
| Toluene | ug/L | 0.2 | - | 4.3 | - |
| Chlorobenzene | ug/L | 0.2 | - | ND | - |
| Ethylbenzene | ug/L | 0.2 | - | 0.3 | - |
| Xylenes, Total | ug/L | 0.2 | - | 2.4 | - |
| 1,3-Dichlorobenzene | ug/L | 0.2 | - | ND | - |
| 1,4-Dichlorobenzene | ug/L | 0.2 | - | ND | - |
| 1,2-Dichlorobenzene | ug/L | 0.2 | - | ND | - |
| Fluorobenzene (Surrogate Recovery) | | | - | 90% | - |

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

| PACE Sample Number: / Parameter | Units | MDL | 734650 89230729 MW-17 | 734660 89230730 MW-18 | 734670 89230731 MW-14 Duplicate |
|---|---|---|---|---|---|
| ORGANIC ANALYSIS | | | | | |
| INDIVIDUAL PARAMETERS | | | | | |
| Purgeable Fuels, as Gasoline (EPA 8015) | mg/L | 0.05 | 6.3 | ND | 0.64 |
| VOLATILE HALOCARBONS AND AROMATICS | | | | | |
| VOLATILE HALOCARBONS BY 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 | 1.2 |
| trans-1,2-Dichloroethene | ug/L | 0.5 | - | ND | ND |
| 1,1-Dichloroethane | ug/L | 0.5 | - | 2.7 | ND |
| Chloroform | ug/L | 0.5 | - | ND | 9.1 |
| 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 | 1.6 |
| Trichloroethene (TCE) | ug/L | 0.5 | - | 1.9 | 0.5 |
| 1,2-Dichloropropane | ug/L | 0.5 | - | ND | ND |
| Bromodichloromethane | ug/L | 0.5 | - | ND | 0.6 |
| 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 | - | 3.5 | ND |
| Dibromochloromethane | ug/L | 0.5 | - | ND | 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 |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas



June 28, 1989
PACE Project Number: 490607501

| PACE Sample Number: / Parameter | Units | MDL | 734650 89230729 MW-17 | 734660 89230730 MW-18 | 734670 89230731 MW-14 Duplicate |
|---|---|---|---|---|---|
| ORGANIC ANALYSIS | | | | | |
| VOLATILE HALOCARBONS AND AROMATICS | | | | | |
| 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) | | | - | 98% | 87% |
| 1,4-Dichlorobutane (Surrogate Recovery) | | | - | 93% | 73% |
| VOLATILE AROMATICS BY EPA 8020 | | | - | - | - |
| Benzene | ug/L | 0.2 | - | ND | ND |
| Toluene | ug/L | 0.2 | - | ND | ND |
| Chlorobenzene | ug/L | 0.2 | - | ND | ND |
| Ethylbenzene | ug/L | 0.2 | - | ND | ND |
| Xylenes, Total | ug/L | 0.2 | - | ND | ND |
| 1,3-Dichlorobenzene | ug/L | 0.2 | - | ND | ND |
| 1,4-Dichlorobenzene | ug/L | 0.2 | - | ND | ND |
| 1,2-Dichlorobenzene | ug/L | 0.2 | - | ND | ND |
| Fluorobenzene (Surrogate Recovery) | | | - | 96% | 90% |
| AROMATIC VOLATILE COMPOUNDS EPA 8020 | | | | | |
| Benzene | ug/L | 0.2 | 1.2 | - | - |
| Toluene | ug/L | 0.2 | 1.2 | - | - |
| Chlorobenzene | ug/L | 0.2 | ND | - | - |
| Ethylbenzene | ug/L | 0.2 | ND | - | - |
| Xylenes, Total | ug/L | 0.2 | 1.3 | - | - |
| 1,3-Dichlorobenzene | ug/L | 0.2 | ND | - | - |
| 1,4-Dichlorobenzene | ug/L | 0.2 | ND | - | - |
| 1,2-Dichlorobenzene | ug/L | 0.2 | ND | - | - |
| Fluorobenzene (Surrogate Recovery) | | | 104% | - | - |

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

pace. laboratories, inc.

# REPORT OF LABORATORY ANALYSIS

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas



June 28, 1989
PACE Project Number: 490607501

| PACE Sample Number: / Parameter | Units | MDL | 734680 89230732 Field Blank |
|---|---|---|---|
| **ORGANIC ANALYSIS** | | | |
| **INDIVIDUAL PARAMETERS** | | | |
| Purgeable Fuels, as Gasoline (EPA 8015) | mg/L | 0.05 | ND |
| **VOLATILE HALOCARBONS AND AROMATICS** | | | |
| VOLATILE HALOCARBONS BY 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 | ND |
| trans-1,2-Dichloroethene | ug/L | 0.5 | ND |
| 1,1-Dichloroethane | ug/L | 0.5 | ND |
| Chloroform | ug/L | 0.5 | ND |
| 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 | ND |
| Trichloroethene (TCE) | ug/L | 0.5 | ND |
| 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 |

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

pace laboratories, inc.

Offices:
Minneapolis, Minnesota
Tampa, Florida
Coralville, Iowa
Novato, California
Leawood, Kansas

# REPORT OF LABORATORY ANALYSIS

Mr. David Leland
Page 8

June 28, 1989
PACE Project Number: 490607501

| PACE Sample Number: | | | 734680 |
|---|---|---|---|
| Parameter | Units | MDL | 89230732 |
| | | | Field Blank |
| **ORGANIC ANALYSIS** | | | |
| VOLATILE HALOCARBONS AND AROMATICS | | | |
| 1,4-Dichlorobenzene | ug/L | 0.5 | ND |
| 1,2-Dichlorobenzene | ug/L | 0.5 | ND |
| Bromochloromethane (Surrogate Recovery) | | | 92% |
| 1,4-Dichlorobutane (Surrogate Recovery) | | | 89% |
| VOLATILE AROMATICS BY EPA 8020 | | | - |
| Benzene | ug/L | 0.2 | 56 |
| Toluene | ug/L | 0.2 | 2.3 |
| Chlorobenzene | ug/L | 0.2 | ND |
| Ethylbenzene | ug/L | 0.2 | 0.6 |
| Xylenes, Total | ug/L | 0.2 | 44 |
| 1,3-Dichlorobenzene | ug/L | 0.2 | ND |
| 1,4-Dichlorobenzene | ug/L | 0.2 | ND |
| 1,2-Dichlorobenzene | ug/L | 0.2 | ND |
| Fluorobenzene (Surrogate Recovery) | | | 91% |

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

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.

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

**Harding Lawson Associates**
7655 Redwood Blvd.
P.O. Box 578
Novato, CA 94948
(415) 892-0821

# CHAIN OF CUSTODY FORM

1980075O1 SHEET 1 OF 1
PACE (78C0X6)

Samplers: Robert Nelson, Caleb Conway

Job Number: 9382,039.02

Name/Location: Pacific R. Plaza

Project Manager: David Edard

Recorder: Robert L. Nelson (Signature Required)

| SOURCE CODE | MATRIX: Water | Sediment | Soil | Oil | #CONTAINERS & PRESERV.: Unpres. | $H_2SO_4$ | $HNO_3$ | SAMPLE NUMBER OR LAB NUMBER: Yr | Wk | Seq | DATE: Yr | Mo | Dy | Time | STATION DESCRIPTION/ NOTES | ANALYSIS REQUESTED: EPA 601/8010 | EPA 602/8020 | EPA 624/8240 | EPA 625/8270 | Priority Pllnt. Metals | Benzene/Toluene/Xylene | Total Petrol. Hydrocarb. EPA 8015 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | X | | | | 3 | | | 92 | 30 | 723 | 92 | 30 | 7 | 1210 | 73459 (3) | X | X | | | | | X |
| 23 | X | | | | 3 | | | | | 724 | | | | 0945 | 73460 (3) | X | X | | | | | X |
| 23 | X | | | | 3 | | | | | 725 | | | | 1140 | 73461 (3) | X | X | | | | | X |
| 23 | X | | | | 3 | | | | | 726 | | | | 1650 | 73462 (3) | X | X | | | | | X |
| 23 | X | | | | 3 | | | | | 727 | | | | 1450 | 73463 (2) | | X | | | | | X |
| 23 | X | | | | 3 | | | | | 728 | | | | 1525 | 73464 (3) | X | X | | | | | X |
| 23 | X | | | | 2 | | | | | 729 | | | | 1620 | 73465 (2) | | X | | | | | X |
| 23 | X | | | | 3 | | | | | 730 | | | | 0915 | 73466 (3) | X | X | | | | | X |
| 23 | X | | | | 3 | | | | | 731 | | | | 1700 | 73467 (3) | X | X | | | | | X |
| 23 | X | | | | 3 | | | | | 732 | | | | 1535 | 73468 (3) | X | X | | | | | X |

| LAB NUMBER: Yr | Wk | Seq | DEPTH IN FEET | COL MTD CD | QA CODE | MISCELLANEOUS |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | 9/2 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

## CHAIN OF CUSTODY RECORD

| RELINQUISHED BY: (Signature) | RECEIVED BY: (Signature) | DATE/TIME |
|---|---|---|
| Robert L Nelson | | |
| RELINQUISHED BY: (Signature) | RECEIVED BY: (Signature) | DATE/TIME |
| RELINQUISHED BY: (Signature) | RECEIVED BY: (Signature) | DATE/TIME |
| RELINQUISHED BY: (Signature) | RECEIVED BY: (Signature) | DATE/TIME |
| DISPATCHED BY: (Signature) DATE/TIME | RECEIVED FOR LAB BY: (Signature) | DATE/TIME: FF 1830 |
| METHOD OF SHIPMENT | | |

Laboratory Copy White — Project Office Copy Yellow — Field or Office Copy Pink

6533

## DISTRIBUTION

**REPORT OF SYSTEM MONITORING**
**MARCH THROUGH MAY 1989**
**SOIL TREATMENT SYSTEM**
**PACIFIC RENAISSANCE PLAZA**
**OAKLAND, CALIFORNIA**
**July 10, 1989**

**Copy No.** 4

| | | Copy No. |
|---|---|---|
| 1 copy: | California Regional Water Quality Control Board<br>San Francisco Bay Region<br>1111 Jackson Street, Room 6000<br>Oakland, California 94607<br><br>Attention: Mr. Vijay B. Patel | 1 |
| 2 copies: | City of Oakland Redevelopment Agency<br>One City Hall Plaza<br>Oakland, California 94612<br><br>Attention: Mr. Peter Chen | 2-3 |
| 1 copy: | Alameda County Department of Environmental Health<br>80 Swan Way, Room 200<br>Oakland, California 94621<br><br>Attention: Mr. Lowell Miller | 4 |

JDS/DFL/CRS/clm/A8701-H

QUALITY CONTROL REVIEWER

Tamara L. Williams

Tamara L. Williams
Geologist - 3954